## ETSI TS 138 533 V15.1.0 (2019-07)



5G;

NR;

User Equipment (UE) conformance specification; Radio Resource Management (RRM) (3GPP TS 38.533 version 15.1.0 Release 15)



# Reference RTS/TSGR-0538533vf10 Keywords 5G

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## Foreword

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

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

Version x.y.z

#### where:

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

## 1 Scope

The present document specifies the measurement procedures for the conformance test of the user equipment (UE) that contain requirements for support of RRM (Radio Resource Management) as part of the 5G New Radio (5G-NR). This document covers NR Range 1, NR Range 2 and Interworking.

The requirements are listed in different clauses only if the corresponding parameters deviate. More generally, tests are only applicable to those mobiles that are intended to support the appropriate functionality. To indicate the circumstances in which tests apply, this is noted in the "test applicability" part of the test.

For example, only Release 15 and later UE declared to support NR shall be tested for this functionality. In the event that for some tests different conditions apply for different releases, this is indicated within the text of the test itself.

## 2 References

[15]

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*.

Release as the present document.		
	[1]	3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
	[2]	3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".
	[3]	3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".
	[4]	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".
	[5]	3GPP TS 38.101-4: "NR; User Equipment (UE) radio transmission and reception; Part 4: Performance requirements".
	[6]	3GPP TS 38.133: "NR; Requirements for support of radio resource management".
	[7]	3GPP TS 38.211: "NR; Physical channels and modulation".
	[8]	3GPP TS 38.213: "NR; Physical layer procedures for control".
	[9]	3GPP TS 38.214: "NR; Physical layer procedures for data".
	[10]	3GPP TS 38.215: "NR; Physical layer measurements".
	[11]	3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities".
	[12]	3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".
	[13]	3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".
	[14]	3GPP TS 38.508-1: "5GS; User Equipment (UE) conformance specification; Part 1: Common test environment".

Implementation Conformance Statement (ICS) proforma".

3GPP TS 38.508-2: "5GS; User Equipment (UE) conformance specification; Part 2: Common

[16]	3GPP TS 38.509: "5GS; Special Conformance Testing Functions for UE".
[17]	3GPP TS 38.521-1: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 Standalone".
[18]	3GPP TS 38.521-2: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Range 2 Standalone".
[19]	3GPP TS 38.521-3: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".
[20]	3GPP TS 38.521-4: "NR; User Equipment (UE) conformance specification; Part 4: Performance".
[21]	3GPP TS 38.522: "NR; User Equipment (UE) conformance specification; Applicability of radio transmission, radio reception and radio resource management test cases".
[22]	3GPP TS 38.903: "NR; Derivation of test tolerances and measurement uncertainty for User Equipment (UE) conformance test cases".
[23]	3GPP TS 36.133: "E-UTRA requirements for support of radio resource management".
[24]	3GPP TS 36.211: "E-UTRA Physical Channels and Modulation".
[25]	3GPP TS 36.508: "Common test environments for User Equipment (UE)".
[26]	3GPP TS 36.521-3: "E-UTRA; UE conformance specification; Radio transmission and reception; Part 3: Radio Resource Management (RRM) conformance testing"
[27]	3GPP TS 36.101: "E-UTRA UE radio transmission and reception".
[28]	3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".
[29]	3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC) Protocol Specification".
[30]	3GPP TS 38.304: "NR; User Equipment (UE) procedures in idle mode".
[31]	3GPP TS 38.212 "NR; Multiplexing and channel coding".

## 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

example: text used to clarify abstract rules by applying them literally.

Editor's note: intended to capture definitions

## 3.2 Symbols

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

<symbol> <Explanation>

Editor's note: intended to capture symbols

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

BS Base Station BWP Bandwidth Part

EN-DC E-UTRA – NR Dual Connectivity

FR1 Frequency Range 1
FR2 Frequency Range 2
NR New Radio
NSA Non-Standalone

OCNG OFDMA Channel Noise Generator

PSCell Primary Secondary Cell

RMC Reference Measurement Channel

SA Standalone SS System Simulator

## 3A Requirements for the support of RRM

## 3A.1 General

Radio Resource Management (RRM) ensures the efficient use of the available radio resources and also provides mechanisms that enable NR to meet radio resource related requirements. The requirements are divided in four main clauses according to the network deployment and the frequency range:

- Clause 4 for EN-DC option 3 test cases where all NR cells are in FR1.
- Clause 5 for EN-DC option 3 test cases where at least one NR cell is in FR2.
- Clause 6 for SA option 2 test cases where all NR cells are in FR1.
- Clause 7 for SA option 2 test cases where at least one NR cell is in FR2.

The requirements that are tested include:

- Idle mode, the cell re-selection algorithms that are controlled by the setting of parameters (thresholds and hysteresis values) that define the best cell and/or determine when the UE should select a new cell

Inactive mode, the cell re-selection algorithms that are controlled by the setting of parameters (thresholds and hysteresis values) that define the best cell and/or determine when the UE should select a new cell

- The configuration of the UE measurement and reporting procedures that are transmitted via dedicated signalling in connected mode and the reporting accuracy of the required measurements.
- Connected mode, the mobility of radio connections that has to be supported
- Handover decisions that may be based on UE or gNB measurements
- Inter-RAT RRM, the management of radio resources in connection with inter-RAT mobility, e.g. Inter-RAT handover

Inter frequency and inter-RAT test cases are performed without frequency overlapping between cells required in the test.

- For bands with bandwidth not accommodating all the NR cells required in the test without frequency overlapping, inter band testing shall be done according to subclause 3A.5. If the UE does not support the combination given in subclause 3A.5, the relevant tests are applicable only to the bands with the necessary bandwidth.

- In case when frequency overlapping occurs due to the frequency channel selection defined for the test (i.e. Cell number as per Annex D), other frequency channels which avoid the frequency overlapping shall be selected. If no suitable selection is found the test is not applicable for the affected band.

## 3A.1.1 Test coverage across 5G NR architecture options

The test cases in this specification cover both Standalone (FR1, FR2) as well as Non-Standalone FR1 and FR2 (E-UTRA and 5G NR interworking) testing. Below shall be the understanding with respect to coverage across 5G NR architecture options:

- 1. Unless otherwise stated within the test case, it shall be understood that test requirements for NSA Option 3 and 7 are agnostic of the NSA architecture option configured within the test. The test coverage across the mentioned NSA options shall be considered fulfilled by execution of the NSA test case using one of them. Subsequently the test results can be leveraged to the other NSA option.
- 2. Only one SA or NSA architecture option type is identified and utilized in the definition of each test case. For example, most NSA test cases are configured using Connectivity EN-DC i.e. NSA Option 3 and Standalone (SA) test cases are configured using Connectivity NR i.e. SA Option 2.
- 3. If a UE does not support NSA Option 3, NSA Option 7 can be configured to execute the test. This is accomplished by appropriately picking the generic procedure paremeter from Table 3A.1.1-2. The leverage rule detailed in (1) would apply.

Table 3A.1.1-1: Generic procedure parameter summary for SA

Generic Procedure Parameter to use in Initial Conditions		Description	5G NR SA Architecture Option supported by UE
Connectivity	NR	NG-RAN NR Radio Access	SA Option 2
	E-UTRA	NG-RAN E-UTRA	SA Option 5
		Radio Access	

Editor's Note: Any additional test config details needed for SA Option 5 is FFS

Table 3A.1.1-2: Generic procedure parameter summary for NSA

Generic Procedure Parameter to use in Initial Conditions		Description	5G NR NSA Architecture Option supported by UE
Connectivity	NSA		
	EN-DC	E-UTRA-NR Dual	NSA Option 3
		Connectivity	
	NE-DC	NR-E-UTRA Dual	NSA Option 4
		Connectivity	
	NGEN-DC	NG-RAN E-UTRA-NR	NSA Option 7
		Dual Connectivity	

Editor's Note: Any additional test config details needed for NSA Options 4 and 7 are FFS

## 3A.2 Requirements Classification for Statistical Testing

The test requirements are expressed as absolute requirements with a single value stating the requirement or expressed as a success rate. The statistical nature depends on the type of test 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 Device Under Test (DUT) passing the test actually meets the test requirement and determines how many times a test have to be repeated and what the pass and fail criteria is. The statistical significance shall be set according to Annex G.

## 3A.3 Antenna Configuration

Unless otherwise specified, NR FDD or NR TDD cells in all RRM test cases in AWGN propagation condition are configured with antenna configuration 1x2.

## 3A.4 NR band groups

The intention of the band grouping defined in this clause is to increase the readability of the test specification.

The frequency bands grouping is derived based on UE REFSENS requirements specified in TS 38.101-1 [2], TS 38.101-2 [3] and TS 38.101-3 [4] 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.

## 3A.4.1 NR operating bands in FR1

NR frequency bands grouping for FR1 is specified in Table 3A.4.1-1.

Table 3A.4.1-1: NR frequency band groups for FR1

Group	N	NR FDD		NR TDD
	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
В	NR_FDD_FR1_B	n66, n74 <sup>3</sup>	NR_TDD_FR1_B	-
С	NR_FDD_FR1_C	-	NR_TDD_FR1_C	n77¹, n78, n79
D	NR_FDD_FR1_D	n28	NR_TDD_FR1_D	n77²
Е	NR_FDD_FR1_E	n2, n5, n7	NR_TDD_FR1_E	n41
F	NR_FDD_FR1_F	-	NR_TDD_FR1_F	-
G	NR_FDD_FR1_G	n3, n8, n12, n20, n71	NR_TDD_FR1_G	-
Н	NR_FDD_FR1_H	n25	NR_TDD_FR1_H	-

NOTE 1: Except 3.8 GHz to 4.2 GHz.

NOTE 2: Only 3.8 GHz to 4.2 GHz.

NOTE 3: Except 1475.9 MHz to 1510.9 MHz.

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

Table 3A.4.1-2: Power offsets for the test configuration between NR frequency band groups for FR1 with respect to NR\_FDD\_FR1\_A

Band group	Power Offset [dB],		
notation	$\Delta_{BG\_offset}$	Band group notation	Power Offset [dB], Δ <sub>BG_offset</sub>
NR_FDD_FR1_A	-	NR_TDD_FR1_A	0.0
NR_FDD_FR1_B	0.5	NR_TDD_FR1_B	0.5
NR_FDD_FR1_C	1.0	NR_TDD_FR1_C	1.0
NR_FDD_FR1_D	1.5	NR_TDD_FR1_D	1.5
NR_FDD_FR1_E	2.0	NR_TDD_FR1_E	2.0
NR_FDD_FR1_F	2.0	NR_TDD_FR1_F	2.0
NR_FDD_FR1_G	3.0	NR_TDD_FR1_G	3.0
NR_FDD_FR1_H	3.5	NR_TDD_FR1_H	3.5
7777	NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_F NR_FDD_FR1_F NR_FDD_FR1_G NR_FDD_FR1_H	NR_FDD_FR1_A - NR_FDD_FR1_B 0.5 NR_FDD_FR1_C 1.0 NR_FDD_FR1_D 1.5 NR_FDD_FR1_E 2.0 NR_FDD_FR1_F 2.0 NR_FDD_FR1_G 3.0 NR_FDD_FR1_H 3.5	NR_FDD_FR1_A         -         NR_TDD_FR1_A           NR_FDD_FR1_B         0.5         NR_TDD_FR1_B           NR_FDD_FR1_C         1.0         NR_TDD_FR1_C           NR_FDD_FR1_D         1.5         NR_TDD_FR1_D           NR_FDD_FR1_E         2.0         NR_TDD_FR1_E           NR_FDD_FR1_F         2.0         NR_TDD_FR1_F           NR_FDD_FR1_G         3.0         NR_TDD_FR1_G

NOTE 1: In the test parameters table, only the power configuration for NR\_FDD\_FR1\_A or NR\_TDD\_FR1\_A will be given.

## 3A.4.2 NR operating bands in FR2

NR frequency bands grouping for FR2 is specified in Table 3A.4.2-1.

Table 3A.4.2-1: 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	
E	NR_TDD_FR2_E	
F	NR_TDD_FR2_F	n260 <sup>4</sup>
G	NR_TDD_FR2_G	n257 <sup>2</sup> , n258 <sup>2</sup> , n260 <sup>1</sup> , n261 <sup>2</sup>
Н	NR_TDD_FR2_H	
I	NR_TDD_FR2_I	
J	NR_TDD_FR2_J	
K	NR_TDD_FR2_K	
L	NR_TDD_FR2_L	
M	NR_TDD_FR2_M	
N	NR_TDD_FR2_N	
0	NR_TDD_FR2_O	
Р	NR_TDD_FR2_P	
Q	NR_TDD_FR2_Q	
R	NR_TDD_FR2_R	
S	NR_TDD_FR2_S	
Т	NR_TDD_FR2_T	n257³, n258³, n261³
U	NR_TDD_FR2_U	
V	NR_TDD_FR2_V	
W	NR_TDD_FR2_W	
X	NR_TDD_FR2_X	
Υ	NR_TDD_FR2_Y	n260 <sup>3</sup>
	UE power class 1.	
	UE power class 2.	
	UE power class 3.	
NOTE 4:	UE power class 4.	

Table 3A.4.2-2: Power offsets for the test configuration between NR frequency band groups for FR2 with respect to NR\_TDD\_FR2\_A

Group	Band group notation	Power Offset [dB], Δ <sub>BG_offset</sub>		
Α	NR_TDD_FR2_A	-		
В	NR_TDD_FR2_B	TBD		
С	NR_TDD_FR2_C	TBD		
D	NR_TDD_FR2_D	TBD		
Е	NR_TDD_FR2_E	TBD		
F	NR_TDD_FR2_F	TBD		
G	NR_TDD_FR2_G	TBD		
Н	NR_TDD_FR2_H	TBD		
1	NR_TDD_FR2_I	TBD		
J	NR_TDD_FR2_J	TBD		
K	NR_TDD_FR2_K	TBD		
L	NR_TDD_FR2_L	TBD		
M	NR_TDD_FR2_M	TBD		
N	NR_TDD_FR2_N	TBD		
0	NR_TDD_FR2_O	TBD		
Р	NR_TDD_FR2_P	TBD		
Q	NR_TDD_FR2_Q	TBD		
R	NR_TDD_FR2_R	TBD		
S	NR_TDD_FR2_S	TBD		
Т	NR_TDD_FR2_T	TBD		
U	NR_TDD_FR2_U	TBD		
V	NR_TDD_FR2_V	TBD		
W	NR_TDD_FR2_W	TBD		
Χ	NR_TDD_FR2_X	TBD		
Υ	NR_TDD_FR2_Y	TBD		
NOTE 1:	NOTE 1: In the test parameters table, only the power configuration for			

NOTE 1: In the test parameters table, only the power configuration for NR\_TDD\_FR2\_A will be given.

## 3A.5 NR operating band configuration

Inter-band configuration is not affecting the Test purpose since the minimum requirements are valid regardless of band. Band combinations defined in table 3A.5-1 shall be used for testing.

Table 3A.5-1: Inter-band configuration

Band under test		Additional band	
TBD		TBD	
Note 1:	The band under te	est should contain the inter-	
	frequency (neighb	our) cell.	
Note 2:	The additional band should contain the serving		
	cell of the test. If more than one inter-frequency		
	cell is needed, that cell should be on the		
	additional band.		
Note 3:	The bands and cells referred in this table are NR		
		nly. For instructions on how to	
	configure the E-U	TRA operating band please	
	refer to TS 36.521	-3 [26].	

## 4 EN-DC with all NR cells in FR1

This section contains test scenarios for E-UTRA and NR dual connectivity with E-UTRA as PCell and NR and PSCell. This configuration is also known as NSA Option 3 and 3a. All NR cells are in Frequency Range 1.

- 4.1 Void
- 4.2 Void
- 4.3 RRC\_CONNECTED state mobility
- 4.3.1 Void
- 4.3.2 RRC connection mobility control
- 4.3.2.1 Void
- 4.3.2.2 Random access
- 4.3.2.2.1 Contention based random access test in FR1 for PSCell in EN-DC

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents
- Cell mapping
- Test procedure update to initiate SCell Random Access procedure by PDCCH order

## 4.3.2.2.1.1 Test purpose

The purpose of this test is to verify that the behaviour of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits.

#### 4.3.2.2.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 4.3.2.2.1.3 Minimum conformance requirement

The random access procedure is used when establishing the layer 1 communication between the UE and NG-RAN. The random access is as defined in TS 38.213 [8] clause 7.4 and the control of the RACH transmission is as defined in TS 38.321 [12] clause 5.1.

The UE shall have capability to calculate PRACH transmission power according to the PRACH power formula as defined in TS 38.213 [8] clause 7.4 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 defined in TS 38.101-1 [2] Table 6.3.4.2-1. The relative power applied to additional preambles shall have an accuracy as specified in TS 38.101-1 [2] Table 6.3.4.3-1.

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 TS 38.321 [12] clause 5.1.4.

With the UE selected SSB with SS-RSRP above *rsrp-ThresholdSSB*, UE shall have the capability to select a Random Access Preamble randomly with equal probability from the Random Access Preambles associated with the selected SSB if the association between Random Access Preambles and SS blocks is configured, as specified in clause 5.1.2 in TS 38.321 [12].

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 [12].

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 [12], 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.

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [12], 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 [12].

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

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 [12], 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.

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.

The normative reference for this requirement is TS 38.133 [6] clauses 6.2.2 and A.4.3.2.2.1.

4.3.2.2.1.4 Test description

4.3.2.2.1.4.1 Initial conditions

This test can be run in the configurations defined in Table 4.3.2.2.1.4.1-1.

Table 4.3.2.2.1.4.1-1: Contention based random access test in FR1 for PSCell in EN-DC supported test configurations

Test Case ID	Test Config Index	Description	
	maex		
4.3.2.2.1-1	1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD	
4.3.2.2.1-2	2	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD	
4.3.2.2.1-3	3	LTE FDD, NR 30 kHz SSB SCS, 40MHz bandwidth, TDD	
4.3.2.2.1-4 4 LTE TDD, NR 30 kHz SSB SCS, 40MHz bandwidth, TDD			
Note: The UE is only required to be tested in one of the supported test configurations			

Configure the test equipment and the DUT according to the parameters in Table 4.3.2.2.1.4.1-2.

Table 4.3.2.2.1.4.1-2: Initial conditions for Contention based random access test in FR1 for EN-DC

Parameter		Value	Comment	
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.	
Test frequencies	As specified	As specified in Annex E, Table E.1-1 and TS 38.508-1 [14] subclause 4.3.1.		
Channel	As specified	I by the test configuration selected fr	om Table 4.3.2.2.1.4.1-1.	
bandwidth				
Propagation	AWGN		As specified in Annex C.2.2.	
conditions				
Connection	TE Part A.3.1.7.1		As specified in TS 38.508-1 [14] Annex A.	
Diagram	DUT Part	A.3.2.3.4		
Exceptions to	N/A	•		
connection				
diagram				

- 1. Message contents are defined in clause 4.3.2.2.1.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The E-UTRAN PCell power levels and settings are specified in Table A.6.1.1-1. Cell 2 is the NR FR1 PSCell. The connection setup is done according to the settings in Annex C.1.3, with downlink signal levels as per Annex C.1.2. General Test parameters are defined in Table 4.3.2.2.1.5-1.
- 3. Downlink signals for NR cell are initially set up according to Annex C.2.1.

#### 4.3.2.2.1.4.2 Test procedure

For this test two cells are used, an E-UTRA serving cell (PCell) and an NR FR1 PSCell. For the NR PSCell, the System Simulator shall not explicitly assign a random access preamble via dedicated signalling in the downlink.

- 1. Ensure the UE is in state RRC\_IDLE with generic procedure parameters *Connectivity* EN-DC according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to Table 4.3.2.2.1.5-1.
- 3. After power-up and cell selection, the UE shall trigger a random access procedure to establish an RRC connection on the NR PSCell.
- 4. Test 1: Correct behaviour when transmitting Random Access Preamble
  - 4.1. The UE shall send a preamble to the System Simulator. The System Simulator shall check that the Random Access Preamble belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured rsrp-ThresholdSSB.
- 5. Test 2: Correct behaviour when receiving Random Access Response
  - 5.1. Repeat steps 1-3.
  - 5.2. The UE shall send preambles to the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response containing Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.
  - 5.3. As the received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble, the UE shall perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [12], and transmit with the calculated PRACH transmission power when the backoff time expires.
  - 5.4. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator.
  - 5.5. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE shall transmit the msg3.
  - 5.6. Measure the power and timing of the first preamble and it shall not exceed the values specified in 4.3.2.2.1.5. Measure the relative power and timing applied to additional preambles (last 4 preambles) and it shall not exceed the values specified in 4.3.2.2.1.5.
- 6. Test 3: Correct behaviour when not receiving Random Access Response
  - 6.1. Repeat steps 1-3.
  - 6.2. The UE shall send preambles to the System Simulator. The System Simulator shall not respond to the first 4 preambles.
  - 6.3. As no Random Access Response was received within the RA Response window, the UE shall perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [12], and transmit with the calculated PRACH transmission power when the backoff time expires.
  - 6.4. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator.

- 6.5. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE shall transmit the msg3.
- 6.6. Measure the power and timing of the first preamble and it shall not exceed the values specified in 4.3.2.2.1.5. Measure the relative power and timing applied to additional preambles (last 4 preambles) and it shall not exceed the values specified in 4.3.2.2.1.5.
- 7. Test 4: Correct behaviour when receiving a NACK on msg3
  - 7.1. Repeat steps 1-3.
  - 7.2. The UE shall send a preamble to the System Simulator. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble
  - 7.3. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE shall transmit the msg3.
  - 7.4. The System Simulator shall NACK all UE msg3s.
  - 7.5. The UE shall re-transmit the msg3 until the maximum number of HARQ re-transmissions is reached.
  - 7.6. The System Simulator shall count the UE msg3s, and check that transmission stops when the maximum number of HARQ re-transmissions is reached.
- 8. Test 5: Correct behaviour when receiving an unsuccessful UE Contention Resolution
  - 8.1. Repeat steps 1-3.
  - 8.2. The UE shall send a preamble to the System Simulator. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble.
  - 8.3. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE shall transmit the msg3.
  - 8.4. 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.
  - 8.5. As the UE Contention Resolution Identity included in the MAC control element did not match the CCCH SDU transmitted in the uplink message, the UE shall perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [12], and transmit with the calculated PRACH transmission power when the backoff time expires.
  - 8.6. Measure the power and timing of the first preamble and it shall not exceed the values specified in 4.3.2.2.1.5.
- 9. Test 6: Correct behaviour when receiving a successful UE Contention Resolution
  - 9.1. Repeat steps 1-3.
  - 9.2. The UE shall send a preamble to the System Simulator. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble.
  - 9.3. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE shall transmit the msg3.
  - 9.4. 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 msg3 uplink message.
  - 9.5. As the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU, the Contention Resolution is successful and the UE shall send ACK.

- 10. Test 7: Correct behaviour when contention Resolution timer expires
  - 10.1. Repeat steps 1-3.
  - 10.2. The UE shall send a preamble to the System Simulator. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble.
  - 10.3. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE shall transmit the msg3.
  - 10.4. The System Simulator shall not send a response.
  - 10.5. As there was no response, the UE shall perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [12], and transmit with the calculated PRACH transmission power when the Contention Resolution Timer expires and then after the backoff timer expires.
  - 10.6. Measure the power and timing of the first preamble and it shall not exceed the values specified in 4.3.2.2.1.5.

## 4.3.2.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause FFS with the following exceptions:

**FFS** 

## 4.3.2.2.1.5 Test requirement

Table 4.3.2.2.1.5-1 defines the primary level settings for contention based random access test in FR1 for PSCell in ENDC. Tables 4.3.2.2.1.5-2, 4.3.2.2.1.5-3 and 4.3.2.2.1.5-4 define the Absolute power limits, Relative power limits and uplink timing error limits respectively, and all include test tolerances.

Table 4.3.2.2.1.5-1: General test parameters for contention based random access test in FR1 for PSCell in EN-DC

SSB Configuration		Parame	eter	Unit	Test-1	Comments
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	SSB Configu	ration				except for number of SSBs per SS-burst and SS/PBCH block index as
SS/PBCH block index	Number of S	SBs per SS	S-burst		2	Different from the
Duplex Mode for Cell 2	SS/PBCH block index			0,1	Different from the	
TDD Configuration	Duplex Mode	for Cell 2	Config 1,2		FDD	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			Config 3,4			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						As defined in A.2.1.
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		meters	Config 1,2		SR1.1 FDD	As defined in A.1.1.
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Note 4		Config 3,4		SR.2.1 TDD	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					1	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				dB		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $					0	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					1000 1111	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		$\hat{E}_s/I_{ot}$			3	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		$N_{cc}$		dBm/15kHz	-98	configured rsrp-
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		00	Config 3,4			ThresholdSSB
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		$\hat{E}_s/N_{oc}$	,	dB	3	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		SS-RSR	P Note 3	dBm/ SCS	-95	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		$\hat{E}_s/I_{ot}$				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		$N_{ac}$	Config 1,2	dBm/15kHz	-98	
$\frac{E_s/N_{oc}}{\text{SS-RSRP}^{\text{Note 3}}} \qquad \text{dBm/SCS} \qquad \frac{-115}{\text{config 1,2}} \\ \text{lo }^{\text{Note 2}} \qquad \frac{\text{Config 1,2}}{\text{Config 3,4}} \qquad \frac{\text{dBm}}{\text{config 3,4}} \qquad \frac{-65.3/9.36\text{MHz}}{-62.2/38.16\text{MHz}} \qquad \frac{\text{For symbols without SSB index 1}}{\text{index 1}} \\ \text{ss-PBCH-BlockPower} \qquad \frac{\text{dBm/SCS}}{\text{SS-PBCH-BlockPower}} \qquad \frac{\text{dBm/SCS}}{\text{SS-PBCH-BlockPower}} \qquad \frac{-5}{\text{As defined in clause 6.3.2 in TS 38.331 [13].}}{\text{Configured UE transmitted power (}} \qquad \frac{\text{dBm}}{\text{CMAX, f,c}} \qquad \frac{23}{\text{As defined in clause 6.2.4 in TS 38.101-1 [2].}} \\ \text{PRACH Configuration} \qquad \qquad \text{PRACH.1 FR1} \qquad \text{As defined in A.7.1.}$		00	Config 3,4		-101	ThresholdSSB
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		SS-RSR	P Note 3			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	O Note 2		Config 1,2	dBm		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				-62.2/38.16MHz		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	ss-PBCH-Blo	ss-PBCH-BlockPower		dBm/ SCS	-5	
	, and the second			dBm	23	As defined in clause
Propagation Condition - AWGN	PRACH Con	PRACH Configuration			PRACH.1 FR1	As defined in A.7.1.
	Propagation	Condition		-	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: Es/lot, SS-RSRP and lo level 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.

#### Test 1: Correct behaviour when transmitting Random Access Preamble

- The Random Access Preamble shall be one of the Random Access Preambles associated with SSB index 0.

Test 2: Correct behaviour when receiving Random Access Response

- The power of the first preamble shall be -30 dBm within the accuracy specified in Table 4.3.2.2.1.5-2.
- The relative power for preamble ramping step shall be 2 dB within the accuracy specified in Table 4.3.2.2.1.5-3.
- The transmit timing of all PRACH transmissions shall be within the accuracy specified in Table 4.3.2.2.1.5-4.

Test 3: Correct behaviour when not receiving Random Access Response

- The power of the first preamble shall be -30 dBm within the accuracy specified in Table 4.3.2.2.1.5-2.
- The relative power for preamble ramping step shall be 2 dB within the accuracy specified in Table 4.3.2.2.1.5-3.
- The transmit timing of all PRACH transmissions shall be within the accuracy specified in Table 4.3.2.2.1.5-4.

Test 4: Correct behaviour when receiving a NACK on msg3

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

Test 5: Correct behaviour when receiving an incorrect message over Temporary C-RNTI

- The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the back off time expires.
- The power of the first preamble shall be -30 dBm within the accuracy specified in Table 4.3.2.2.1.5-2.
- The transmit timing of the PRACH transmission shall be within the accuracy specified in Table 4.3.2.2.1.5-4.

Test 6: Correct behaviour when receiving a correct message over Temporary C-RNTI

- The UE shall send ACK if the contention resolution is successful.

Test 7: Correct behaviour when contention resolution timer expires

- The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the back off time expires if the contention resolution timer expires.
- The power of the first preamble shall be -30 dBm within the accuracy specified in Table 4.3.2.2.1.5-2.
- The transmit timing of the PRACH transmission shall be within the accuracy specified in Table 4.3.2.2.1.5-4.

Table 4.3.2.2.1.5-2 Absolute power tolerance Test requirements

Conditions	Tolerance
Normal	± 11.1 dB

Table 4.3.2.2.1.5-3 Relative power tolerance Test requirements

Power step ∆P (Up or down) (dB)	PRACH (dB)	
2 ≤ ΔP < 3	± 3.2	

Table 4.3.2.2.1.5-4: T<sub>e</sub> Timing error Test requirements

Frequency Range	SCS of SSB signals (kHz)	SCS of uplink signals s(KHz)	Te	
4	15	15	880*T <sub>c</sub>	
1	30	30	624*T <sub>c</sub>	
Note 1: T <sub>c</sub> is the basic timing unit defined in TS 38.211 [7]				

#### 4.3.2.2.2 Non-contention based random access test in FR1 for PSCell in EN-DC

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents
- Cell mapping
- Test procedure update to initiate SCell Random Access procedure by PDCCH order

#### 4.3.2.2.2.1 Test purpose

The purpose of this test is to verify that the behaviour of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits.

#### 4.3.2.2.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 4.3.2.2.3 Minimum conformance requirement

The random access procedure is used when establishing the layer 1 communication between the UE and NG-RAN. The random access is as defined in TS 38.213 [8] clause 7.4 and the control of the RACH transmission is as defined in TS 38.321 [12] clause 5.1.

The UE shall have capability to calculate PRACH transmission power according to the PRACH power formula as defined in TS 38.213 [8] clause 7.4 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 defined in TS 38.101-1 [2] Table 6.3.4.2-1. The relative power applied to additional preambles shall have an accuracy as specified in TS 38.101-1 [2] Table 6.3.4.3-1.

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 TS 38.321 [12] clause 5.1.4.

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 [12].

If the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs is configured, with the UE selected CSI-RS with CSI-RSRP above *cfra-csirs-DedicatedRACH-Threshold* amongst the associated CSI-RSs, UE shall have the capability to select the Random Access Preamble corresponding to the selected CSI-RS, and to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions in *ra-OccasionList* corresponding to the selected CSI-RS, and PRACH occasion shall be randomly selected with equal probability amongst the selected CSI-RS associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [12].

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 shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [12] 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.

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [12] 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 [12].

The normative reference for this requirement is TS 38.133 [6] clauses 6.2.2 and A.4.3.2.2.2. Non-contention based random access procedure is not initialized for Other SI requested from UE or for beam failure recovery, so the requirements related to those features are omitted.

4.3.2.2.4 Test description

4.3.2.2.4.1 Initial conditions

This test can be run in the configurations defined in Table 4.3.2.2.2.4.1-1.

Table 4.3.2.2.4.1-1: Non-contention based random access test in FR1 for PSCell in EN-DC supported test configurations

Test Case ID	Test Config Index	Description	
4.3.2.2.2-1	1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD	
4.3.2.2.2-2	2	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD	
4.3.2.2.2-3	3	LTE FDD, NR 30 kHz SSB SCS, 40MHz bandwidth, TDD	
4.3.2.2.4	4	LTE TDD, NR 30 kHz SSB SCS, 40MHz bandwidth, TDD	
Note: The UE is only required to be tested in one of the supported test configurations			

Configure the test equipment and the DUT according to the parameters in Table 4.3.2.2.2.4.1-2.

Table 4.3.2.2.2.4.1-2: Initial conditions for Non-contention based random access test in FR1 for EN-DC

Parameter	Value		Comment	
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.	
Test frequencies	As specified in Annex E, Table E.1-1 and TS 38.508-1 [14] subclause 4.3.1.			
Channel bandwidth	As specified by the test configuration selected from Table 4.3.2.2.2.4.1-1.			
Propagation conditions	AWGN		As specified in Annex C.2.2.	
Connection Diagram	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.	
Diagram	DUT Part	A.3.2.3.4		
Exceptions to connection diagram	N/A			

- 1. Message contents are defined in clause 4.3.2.2.2.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The E-UTRAN PCell power levels and settings are specified in Table A.6.1.1-1. Cell 2 is the NR FR1 PSCell. The connection setup is done according to the settings in Annex C.1.3, with downlink signal levels as per Annex C.1.2. General Test parameters are defined in Table 4.3.2.2.2.5-1.
- 3. Downlink signals for NR cell are initially set up according to Annex C.2.1.

#### 4.3.2.2.4.2 Test procedure

For this test two cells are used, an E-UTRA serving cell (PCell) and an NR FR1 PSCell. For the NR PSCell, the System Simulator shall explicitly assign a random access preamble via dedicated signalling in the downlink. There are two subtests, to test both SSB-based non-contention based random access (subtest 1) and CSI-RS-based non-contention based random access (subtest 2).

- 1. Ensure the UE is in state RRC\_IDLE with generic procedure parameters *Connectivity* EN-DC according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to Table 4.3.2.2.2.5-1.
- 3. After power-up and cell selection, the UE shall trigger a random access procedure to establish an RRC connection on the NR PSCell.
- 4. Test 1: Correct behaviour when transmitting SSB-based Random Access Preamble
  - 4.1. The UE shall send a preamble to the System Simulator. The System Simulator shall check that the Random Access Preamble has the Preamble Index associated with the SSB with index 0, that it arrives on a PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and that the selected PRACH occasion belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.
- 5. Test 2: Correct behaviour when transmitting CSI-RS-based Random Access Preamble
  - 5.1. Set the parameters according to Table 4.3.2.2.5-1 Subtest 2.
  - 5.2. Repeat steps 1-3
  - 5.3. The UE shall send a preamble to the System Simulator. The System Simulator shall check that the Random Access Preamble has the Preamble Index associated with the CSI-RS configured, that it arrives on a PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and that the selected PRACH occasion belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.
- 6. Test 3: Correct behaviour when receiving Random Access Response
  - 6.1. Repeat steps 1-3
  - 6.2. The UE shall send preambles to the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response containing Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.
  - 6.3. As the received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble, the UE shall perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [12], and transmit with the calculated PRACH transmission power.
  - 6.4. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator.
  - 6.5. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE may stop monitoring for Random Access Response(s).
  - 6.6. Measure the power and timing of the first preamble and it shall not exceed the values specified in 4.3.2.2.2.5. Measure the relative power and timing applied to additional preambles (last 4 preambles) and it shall not exceed the values specified in 4.3.2.2.2.5.
- 7. Test 4: Correct behaviour when not receiving Random Access Response
  - 7.1. Repeat steps 1-3.
  - 7.2. The UE shall send preambles to the System Simulator. The System Simulator shall not respond to the first 4 preambles.

- 7.3. As no Random Access Response was received within the RA Response window configured in *RACH-ConfigCommon*, the UE shall perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [12], and transmit with the calculated PRACH transmission power.
- 7.4. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator.
- 7.5. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE may stop monitoring for Random Access Response(s).
- 7.6. Measure the power and timing of the first preamble and it shall not exceed the values specified in 4.3.2.2.2.5. Measure the relative power and timing applied to additional preambles (last 4 preambles) and it shall not exceed the values specified in 4.3.2.2.2.5.

### 4.3.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause FFS with the following exceptions:

**FFS** 

#### 4.3.2.2.5 Test requirement

Table 4.3.2.2.5-1 defines the primary level settings for non-contention based random access test in FR1 for PSCell in EN-DC. Tables 4.3.2.2.2.5-2, 4.3.2.2.5-3 and 4.3.2.2.5-4 define the Absolute power limits, Relative power limits and uplink timing error limits respectively, and all include test tolerances.

Table 4.3.2.2.5-1: General test parameters for non-contention based random access test in FR1 for PSCell in EN-DC

	Parame		Unit	Test-1	Test-2	Comments
SSB Configu	ration	Config 1,2		SSB.1 FR1	SSB.1 FR1	As defined in A.3.1,
_		Config 3,4		SSB.2 FR1	SSB.2 FR1	except for number
						of SSBs per SS-
						burst and SS/PBCH
						block index as
	00	<u> </u>				below
Number of S	SBs per SS	-burst		2	2	Different from the
SS/PBCH blo	ali in alasi			0.4	0.4	definition in A.3.1  Different from the
33/PBCH DIC	ock maex			0,1	0,1	definition in A.3.1
CSI-RS Conf	iguration	Config 1,2		N/A	CSI-RS.1.1 FDD	As defined in A.1.4
00111000111	igaration	Config 3,4	1	14/7 (	CSI-RS.2.1 TDD	7.0 doi:10d 117.111
Duplex Mode	for Cell 2	Config 1,2		FDD	FDD	
_ ap.oxoao		Config 3,4	= 	TDD	TDD	†
TDD Configu	ration	Config 3,4		TDDConf.1.2	TDDConf.1.2	
OCNG Patter	n Note 1	J - ,		OCNG pattern 1	OCNG pattern 1	As defined in A.2.1.
PDSCH para	meters	Config 1,2		SR1.1 FDD	SR1.1 FDD	As defined in A.1.1.
Note 4		Config 3,4	-	SR2.1 TDD	SR2.1 TDD	
NR RF Chan	nel Number	•		1	1	
EPRE ratio o			dB	·		
EPRE ratio o			dB			
		PBCH_DMRS	dB			
		DMRS to SSS	dB	0	0	
EPRE ratio o	f PDCCH to	PDCCH_DMRS	dB			
		OMRS to SSS	dB			
	f PDSCH to	PDSCH_DMRS	dB			
SSB with index 0	$\hat{E}_s/I_{ot}$		dB	3	3	Power of SSB with index 0 is set to be
IIIGGX U	$N_{oc}$	Config 1,2	dBm/15kHz	-98	-98	above configured
	00	Config 3,4	1	-101	-101	rsrp-ThresholdSSB
	$\hat{E}_s/N_{oc}$		dB	3	3	
	SS-RSRI	P Note 3	dBm/ SCS	-95	-95	-
SSB with	$\hat{E}_s/I_{ot}$		dB	-17	-17	Power of SSB with
index 1	$N_{oc}$	Config 1,2	dBm/15kHz	-98	-98	index 1 is set to be below configured
	1 voc	Config 3,4	1	-101	-101	rsrp-ThresholdSSB
	$\hat{E}_s/N_{oc}$		dB	-17	-17	
	SS-RSRI	D Note 3	dBm/ SCS	-115	-115	
	33-K3K		dBm/ SCS	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without
lo Note 2		Config 1,2	ubiii	-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1
		Config 3,4	-ID / 0.00			A = -1-6
ss-PBCH-BlockPower		dBm/ SCS	-5	-5	As defined in clause 6.3.2 in TS 38.331 [13].	
Configured UE transmitted power ( $P_{ m CMAX, \ f.c}$ )		dBm	23	23	As defined in clause 6.2.4 in TS 38.101- 1 [2].	
PRACH Configuration			PRACH.2 FR1	PRACH.3 FR1	As defined in A.7.1.	
Propagation	Condition		_	AWGN	AWGN	
			<del></del>	eated and a constant to		<del></del>

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: Es/lot, SS-RSRP 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.

Test 1: Correct behaviour when transmitting SSB-based Random Access Preamble

- The Random Access Preamble shall be one of the Random Access Preambles associated with SSB index 0.
- The Random Access Preamble shall arrive on a PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0.
- The selected PRACH occasion shall belong to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

Test 2: Correct behaviour when transmitting CSI-RS-based Random Access Preamble

- The Random Access Preamble shall have the Preamble Index associated with the CSI-RS configured.
- The Random Access Preamble shall arrive on a PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured.
- the selected PRACH occasion belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

Test 3: Correct behaviour when receiving Random Access Response

- The power of the first preamble shall be -30 dBm within the accuracy specified in Table 4.3.2.2.2.5-2.
- The relative power for preamble ramping step shall be 2 dB within the accuracy specified in Table 4.3.2.2.2.5-3.
- The transmit timing of all PRACH transmissions shall be within the accuracy specified in Table 4.3.2.2.2.5-4.

Test 4: Correct behaviour when not receiving Random Access Response

- The power of the first preamble shall be -30 dBm within the accuracy specified in Table 4.3.2.2.2.5-2.
- The relative power for preamble ramping step shall be 2 dB within the accuracy specified in Table 4.3.2.2.2.5-3.
- The transmit timing of all PRACH transmissions shall be within the accuracy specified in Table 4.3.2.2.2.5-4.

Table 4.3.2.2.5-2: Absolute power tolerance Test requirements

Conditions	Tolerance
Normal	± 11.1 dB

Table 4.3.2.2.5-3: Relative power tolerance Test requirements

Power step ΔP (Up or down) (dB)	PRACH (dB)	
2 ≤ ΔP < 3	± 3.2	

Table 4.3.2.2.2.5-4: Te Timing error Test requirements

Frequency Range	SCS of SSB signals (kHz)	SCS of uplink signals s(KHz)	Te	
1	15	15	880*T <sub>c</sub>	
I I	30	30	624*T <sub>c</sub>	
Note 1: T <sub>c</sub> is the basic timing unit defined in TS 38.211 [7]				

## 4.3.2.3 Void

## 4.4 Timing

## 4.4.1 UE transmit timing

## 4.4.1.0 Minimum conformance requirements

## 4.4.1.0.1 Minimum conformance requirements for UE transmit timing accuracy

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 4.4.1.0.1-1. 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.

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

Table 4.4.1.0.1-1: Te Timing Error Limit

Table 4.4.1.0.1-2: The Value of  $N_{\rm TA~offset}$ 

Frequency range and band of cell used for uplink	$N_{ m TA~offset}$ (Unit: Tc)		
transmission	TA offset C		
FR1 FDD band without LTE-NR coexistence case or	25600 (Note 1)		
FR1 TDD band without LTE-NR coexistence case			
FR1 FDD band with LTE-NR coexistence case 0 (Note 1)			
FR1 TDD band with LTE-NR coexistence case	39936 (Note 1)		
FR2 13792			
Note 1: The UE identifies $N_{\mathrm{TA~offset}}$ based on the information n-			
TimingAdvanceOffset according to [2]. If UE is not provided with the			

1: The UE identifies  $N_{\mathrm{TA~offset}}$  based on the information n-TimingAdvanceOffset according to [2]. If UE is not provided with the information n-TimingAdvanceOffset, the default value of  $N_{\mathrm{TA~offset}}$  is set as 25600 for FR1 band. In case of multiple UL carriers in the same TAG, UE expects that the same value of n-TimingAdvanceOffset is provided for all the UL carriers according to section 4.2 in [3] and the value 39936 of  $N_{\mathrm{TA~offset}}$  can also be provided for a FDD serving cell.Note 2: Void

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

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

- 1) The maximum amount of the magnitude of the timing change in one adjustment shall be Tq.
- 2) The minimum aggregate adjustment rate shall be  $T_p$  per second.
- 3) The maximum aggregate adjustment rate shall be  $T_{\text{q}}$  per [200]ms.

where the maximum autonomous time adjustment step  $T_q$  and the aggregate adjustment rate  $T_p$  are specified in Table 4.4.1.0.1-3.

Table 4.4.1.0.1-3: 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>	
	120	[2.5]*64*T <sub>c</sub>	[2.5]*64*T <sub>c</sub>	
NOTE 1: T <sub>c</sub> is the basic timing unit defined in TS 38.211 [6]				

The normative reference for this requirement is TS.38.133 [6] clause 7.1.2.

### 4.4.1.1 EN-DC FR1 UE transmit timing accuracy

## 4.4.1.1.1 Test purpose

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNB 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.

#### 4.4.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

#### 4.4.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.4.1.0.1.

The normative reference for this requirement is TS.38.133 [6] clause A.4.4.1.1

#### 4.4.1.1.4 Test Description

#### 4.4.1.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1 of 38.521-1 [17].

This test can be run in one of the configurations defined in Table 4.4.1.1.4.1-1.

Table 4.4.1.1.4.1-1: Supported test configurations for FR1 PSCell

Configuration	Description		
4.4.1.1-1	FDD, SSB SCS 15 KHz, data SCS 15KHz, BW 10MHz		
4.4.1.1-2	TDD, SSB SCS 15 KHz, data SCS 15KHz, BW 10MHz		
4.4.1.1-3	TDD, SSB SCS 30 KHz, data SCS 30KHz, BW 40MHz		
Note: The UE is only required to pass in one of the supported test			
confi	gurations in FR1		

Configure the test equipment and the DUT according to the parameters in Table 4.4.1.1.4.1-2

Table 4.4.1.1.4.1-2: Initial conditions for EN-DC FR1 transmit timing accuracy

Parameter	neter Value Comment		Comment
Test environment	ent NC As specified in TS 38.508-1 [14] claus		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified in Annex E.1.1, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1.		
Channel bandwidth	As specified by the test configuration selected from Table 4.4.1.1.4.1-1		
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		N/A	

- 1. Message contents are defined in clause 6 4.4.1.1.4.3.
- 2. 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.6.1.1-1. The power levels and settings for Cell 1 are set according to Annex A.6, Table A.6.1.1-1. Cell 2 is NR FR1 PSCell. The connection setup is done according to the settings in Annex C.1.3, and the downlink signal levels as per Annex C.1.2. The general test parameters are given in Table 4.4.1.4.5-4 below.
- 3. Downlink signals for NR cell are initially set up according to Annex C.1.

#### 4.4.1.1.4.2 Test procedure

The test consists of two cells, a single E-UTRA cell (Pcell), and a single NR cell (PSCell). The downlink timing of the PSCell is changed and the changes in UE transmit timing are observed. The transmit timing is verified by the UE transmitting SRS used as a measurement reference facilitating the SS timing estimation.

The test sequence shall be carried out in RRC\_CONNECTED for every test case.

Following will be the test sequence for this test

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.
- 2. Set up E-UTRA PCell according to parameters given in Table A.6.1.1-1 and setup NR PSCell according to parameters given in Table 4.4.1.1.4-1.
- 3. The SS shall transmit an RRCConnectionReconfiguration message configuring the UE with the message content defined in clause 4.4.1.1.4.3.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within ( $N_{TA} + N_{TA\_offset}$ )  $\pm$   $T_e$  of the first detected path of DL SSB.
  - a. The  $N_{TA}$  offset value (in  $T_c$  units) is 25600 for FR1
  - b. The T<sub>e</sub> values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1
- 6. The test system shall adjust the timing of the DL path by values given in Table 4.4.1.1.4.2-1

Table 4.4.1.1.4.2-1: Adjustment Value for DL Timing

SCS of SSB signals (KHz)	A	djustment Value
	Test1	Test2
15	+64*64Tc	+32*64Tc
30	+32*64Tc	+16*64Tc

- 7. The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in Table 4.4.1.1.5-5. This will only be done for Test1.
- 8. The test system shall verify that the UE transmit timing offset stays within  $(N_{TA} + N_{TA\_offset}) \pm T_e$  of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

#### 4.4.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1 with the following exceptions:

Table 4.4.1.1.4.3-1: SRS-Config: Additional test requirement for UE transmit timing accuracy for ENDC FR1 UE

Derivation Path: TS 38.331 [6], clause 6.3.2			
Information Element	Value/remark	Comment	Condition
SRS-Config ::= SEQUENCE {			
srs-ResourceSetToReleaseList	Not present		
srs-ResourceSetToAddModList SEQUENCE			
(SIZE(0maxNrofSRS-ResourceSets)) OF SEQUENCE {			
srs-ResourceSetId	0		
srs-ResourceIdList SEQUENCE		0 for Config 1 and	
(SIZE(1maxNrofSRS-ResourcesPerSet)) OF {		Config 2	
SRS-ResourceId[1]	0	Ĭ	
}			
resourceType CHOICE {			
periodic SEQUENCE {		14.6 0 6 4	
periodicityAndOffset-p		sl1 for Config 1	
1		sl640 for Config 2	
}			
usage	codebook		
alpha	Alpha		
p0	0		
pathlossReferenceRS CHOICE {			
ssb-Index	SSB-Index		
Brown Or other IA direct. (O)	Network		
srs-PowerControlAdjustmentStates	Not present		
srs-ResourceToReleaseList	Not present		
srs-ResourceToAddModList SEQUENCE	Not present		
(SIZE(1maxNrofSRS-Resources)) OF SEQUENCE {			
srs-ResourceId	0		
nrofSRS-Ports	Port1		
ptrs-PortIndex	Not present		
transmissionComb CHOICE {			
n2 SEQUENCE {			
combOffset-n2	0		
cyclicShift-n2	0		
}			
resourceMapping SEQUENCE {			
startPosition	0		
nrofSymbols	n1		
repetitionFactor	n1		
}			
freqDomainPosition	0		
freqDomainShift	0		
freqHopping SEQUENCE {     c-SRS	4		
b-SRS	0		
b-hop	0		
}			
groupOrSequenceHopping		NOT PRESENT	
}			
sequenceld	0		
spatialRelationInfo SEQUENCE {	SRS-SpatialRelationInfo		
servingCellId	Not present		
referenceSignal CHOICE {	CCD Index		
ssb-Index	SSB-Index		
1			
}			
tpc-Accumulation	Not present		
}			
		•	

Table 4.4.1.1.4.3-2: *DRX-Config* : Additional test requirement for UE transmit timing accuracy Test 2 for EN-DC FR1

Derivation Path: TS 38.331 [6], clause 6.3.2			
Information Element	Value/remark	Comment	Condition
DRX-Config ::= CHOICE {			
drx-onDurationTimer CHOICE {			
milliSeconds	ms6		
}			
drx-InactivityTimer	ms1		
drx-HARQ-RTT-TimerDL	56		
drx-HARQ-RTT-TimerUL	56		
drx-RetransmissionTimerDL		sl1	
drx-RetransmissionTimerUL		sl1	
drx-LongCycleStartOffset CHOICE {			
ms320	0		
}			
shortDRX		NOT PRESENT	
drx-SlotOffset	0		
}			

## 4.4.1.1.5 Test Requirements

Table 4.4.1.1.5-1: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2	Band Group
SSB ARFCN		1,2,3	Freq1	Freq1	_
Duplex Mode		2,3	F	DD DD	
		1`		plicable	
TDD configuration		3	TDDC TDDC		] - 
		1		3,c = 52	
BW <sub>channel</sub>	MHz	2		B,c = 52	
		3		,c = 106	
		1		10: NRB,c = 52	
BWP BW	MHz	2	10: N <sub>RB,c</sub> = 52		_
		3	40: N <sub>RB,c</sub> = 106		
DRx Cycle	ms	1,2,3	N/A	320 <sup>Note5</sup>	
PDSCH Reference		1		1 FDD	
measurement channel		2		1 TDD	
		3	SR.2.	SR.2.1 TDD	
CORESET Reference		1	CR.1.	1 FDD	
Channel		2	CR.1.	CR.1.1 TDD	
		3	CR.2.1 TDD		
OCNG Patterns		1,2,3	OCNG pattern 1		
SMTC configuration		1,2	FR1 pa	attern 1	
OWTO configuration		3	FR1 pa	attern 2	
PDSCH/PDCCH	kHz	1,2	1	5	
subcarrier spacing	INI IZ	3	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		15	4.00			
to PDCCH DMRS		dB	1,23	0	0	
EPRE ratio of PDSCH						
DMRS to SSS						
EPRE ratio of PDSCH						
to PDSCH						
EPRE ratio of OCNG						
DMRS to SSS(Note 1)						
EPRE ratio of OCNG						
to OCNG DMRS (Note						
1)						
$N_{oc}$ Note2		dBm/15 kHz	1,2,3	-98	-98	
$N_{oc}^{Note2}$		15 (0.00	1,2	-98	-98	
TV <sub>oc</sub>		dBm/SCS	3	-95	-95	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$			1,2,3	3	3	
			4.0.0			
$\hat{E}_s/N_{oc}$			1,2,3	3	3	
SS-RSRP <sup>Note3</sup>		dBm/SCS	1,2	-95	-95	
		abili/303	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		
SRS Config			1,2,3	Config1 <sup>Note6</sup>	Config2 <sup>Note6</sup>	
NI 4 A CONIC I III						

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{ac}$  to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: DRx related parameters are given in Table 4.4.1.1.5-3

Note 6: SRS configs are given in Table 4.4.1.1.5-2

Table 4.4.1.1.5-2: SRS Configuration for Timing Accuracy Test

	Field	Config1	Config 2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceldList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
	SRS-ResourceSetId	0	0	
SRS-Resource	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping	0	0	
	startPosition			
	resourceMapping	n1	n1	
	nrofSymbols			
	resourceMapping	n1	n1	
	repetitionFactor			
	freqDomainPosition	0	0	
	freqDomainShift	0	0	
	freqHopping	sl1	sl1	

c-SRS			
freqHopping b-SRS	0	0	
freqHopping b-hop	0	0	
groupOrSequenceHopping	Neither	Neither	
resourceType	Periodic	Periodic	
periodicityAndOffset-p	sl1	sl640	Offset to align with DRx periodicity
sequenceld	0	0	Any 10 bit number

Table 4.4.1.1.5-3: DRX-Configuration for UL Timing Tests

Field	Test 2	
1 Icia	Value	
drx-onDurationTimer	6 ms	
drx-InactivityTimer	1 ms	
drx-RetransmissionTimerDL	1 slot	
drx-RetransmissionTimerUL	1 slot	
longDRX-CycleStartOffset	320 ms	
shortDRX	disable	
TimeAlignmentTimer Infinity		
Note: The DRX cycle and time alignment timer parameters are specified in clause 6.3.2 in TS 38.331 [13]		

Table 4.4.1.1.5-4: Te Timing Error Limit

Frequenc Range	-	SCS of SSB signals (KHz)	SCS of uplink signals s(KHz)	Te		
			15	13.75*64*T <sub>c</sub>		
		15	30	11.75*64*T <sub>c</sub>		
4			60	11.75*64*T <sub>c</sub>		
1		30	15	9.75*64*T <sub>c</sub>		
			30	9.75*64*T <sub>c</sub>		
			60	8.75*64*T <sub>c</sub>		
Note 1:	T <sub>c</sub> is	is the basic timing unit defined in TS 38.211 [6]				

Table 4.4.1.1.5-5:  $T_q$  Maximum Autonomous Time Adjustment Step and  $T_p$  Minimum Aggregate Adjustment rate

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

## 4.4.2 UE timer accuracy

## 4.4.3 Timing advance

## 4.4.3.0 Minimum conformance requirements

The timing advance is initiated from PSCell in EN-DC operation mode with MAC message that implies and adjustment of the timing advance, as defined in clause 5.2 of TS 38.321 [12].

#### 4.4.3.0.1 Minimum conformance requirements for 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 4.4.3.0.1-1, to the signalled timing advance value compared to the timing of preceding uplink transmission. The timing advance command step is defined in TS38.213 [8].

Table 4.4.3.0.1-1: UE Timing Advance adjustment accuracy

Sub Carrier Spacing, SCS 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>

### 4.4.3.0.2 Minimum conformance requirements for timing advance adjustment delay

UE shall adjust the timing of its uplink transmission timing at time slot n+k for a timing advance command received in time slot n, and the value of k is defined in section 4.2 in TS 38.213 [8]. The same requirement applies also when the UE is not able to transmit a configured uplink transmission due to the channel assessment procedure.

The normative reference for this requirement is TS.38.133 [6] clause A.4.4.3.1.

#### 4.4.3.1 EN-DC FR1 timing advance adjustment accuracy

#### 4.4.3.1.1 Test purpose

The purpose of the test is to verify UE timing advance adjustment delay and accuracy requirement defined in clause 7.3 of TS 38.133 [6].

#### 4.4.3.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 4.4.3.1.3 Minimum conformance requirement

The minimum conformance requirements are specified in clause 4.4.3.0.1 and clause 4.4.3.0.2.

The normative reference for this requirement is TS.38.133 [6] clause A.4.4.3.1.

#### 4.4.3.1.4 Test description

#### 4.4.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1 and Table 5.3.6-1 of 38.521-1 [17].

This test shall be tested using any of the test configurations in Table 4.4.3.1.4.1-1.

Table 4.4.3.1.4.1-1: EN-DC FR1 timing advance adjustment accuracy supported test configurations

Test Case ID	Description
4.4.3.1.4.1-1	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD
4.4.3.1.4.1-2	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD
4.4.3.1.4.1-3	LTE FDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD
4.4.3.1.4.1-4	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD

4.4.3.1.4.1-5	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD			
4.4.3.1.4.1-6	LTE TDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD			
Note: The UE is only required to be tested in one of the supported test configurations				

Configure the test equipment and the DUT according to the parameters in Table 4.4.3.1.4.1-2

Table 4.4.3.1.4.1-2: Initial conditions for EN-DC FR1 timing advance adjustment accuracy

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E.1.1, E.1.2, and Table E	.2-1 and TS 38.508-1 [14] clause 4.3.1.
Channel bandwidth	As specified	by the test configuration selected f	rom Table 4.4.3.1.4.1-1
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

Table 4.4.3.1.4.1-3: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		Cell 1: 1	1 for E-UTRAN Pcell
		Cell 2: 2	2 for NR PSCell
DL BWP		DLBWP.1.1	As specified in Table A.8.1-2
UL BWP		ULBWP.1.1	As specified in Table A.8.2-2
Timing Advance Command (T <sub>A</sub> ) value during T1		31	NTA_new = NTA_old for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T <sub>A</sub> ) value during T2		39	$N_{TA\_new} = N_{TA\_old} + 8192 * T_c$ (based on equation in TS38.213 [8] section 4.2)
T1	S	5	
T2	S	5	

- 1. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 is NR FR1 PSCell. The connection setup is done according to the settings in Annex C.1.1.
- 2. Downlink signals for NR cell are initially set up according to Annex C.1.2, C.1.3.

#### 4.4.3.1.4.2 Test Procedure

The test consists of two cells, a single E-UTRA cell (PCell), and a single NR cell (PSCell). 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). The test consists of two successive time periods, with time durations 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 4.4.3.1.4.1-3 and Table 4.4.3.1.5-2, 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. The UE Time Alignment Timer (timeAlignmentTimer IE), described in Clause 5.2 in TS 38.321[12], shall be configured so that it does not expire in the duration of the test.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. Message content are defined in clause 4.4.3.1.4.3.

- 2. Set the parameters according to values in Tables 4.4.3.1.4.1-3 and Table 4.4.3.1.5-1 as appropriate. Propagation conditions are set according to Annex C.2.2.
- 3. SS shall transmit an RRCConnectionReconfiguration message.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. 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 [12]. The Timing Advance Command value shall be set to 31, which according to Clause 4.2 in TS 38.213 [8] 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.
- 6. 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 of 39 as specified in Table 4.4.3.1.4.1-3.
- 7. 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.
- 8. As specified in Clause 7.3.2.1 of TS 38.133 [6], 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.
- 9. The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [12], shall be configured so that it does not expire in the duration of the test.
- 10. The result from the SRS and adjustment of the timing advance in step 7) is used to measure that the UE adjusts the timing of its transmission with a relative accuracy better than or equal to value specified in Table 4.4.3.0.1-1 to the signalled timing advance value compared to the timing of preceding uplink transmission.
- 11. If the UE adjust the timing of its transmission within a relative accuracy greater than or equal to value specified in Table 4.4.3.0.1-1 to the signalled timing advance value compared to the timing of preceding uplink transmission then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.
- 12. The SS shall transmit RRCConnectionReconfiguration message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.
- 13. The SS then shall transmit RRCConnectionReconfiguration message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.
- 14. If any of the above Reconfiguration in Step 12 or 13 fails, switch off and on the UE and ensure the UE is in RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 15. Repeat steps 3-14 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

## 4.4.3.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1, with exceptions listed below in the Table 4.4.3.1.4.3-1

Table 4.4.3.1.4.3-1: srs-Config setup

Derivation Path: TS 38.508-1, Table 4.6.3-182			
Information Element	Value/remark	Comment	Condition
SRS-Config ::= SEQUENCE {			
srs-ResourceSetToAddModList SEQUENCE	[1 entry]		
(SIZE(0maxNrofSRS-ResourceSets)) OF			
SEQUENCE {			
srs-ResourceSetId	0		
srs-ResourceldList SEQUENCE	1 entry		
(SIZE(1maxNrofSRS-ResourcesPerSet)) OF {			
SRS-ResourceId[1]	0		
}			
resourceType CHOICE {			
periodic SEQUENCE {			
}			
}			
Usage	nonCodebook		
pathlossReferenceRS CHOICE {			
ssb-Index	SSB-Index		
\	COB macx		
srs-ResourceToAddModList SEQUENCE	1 entry		
(SIZE(1maxNrofSRS-Resources)) OF SEQUENCE {	1 entry		
srs-ResourceId	0		
nrofSRS-Ports	port1		
transmissionComb CHOICE {	porti		
n2 SEQUENCE {			
	0		
combOffset-n2 cyclicShift-n2	0		
CyclicShirt-H2	0		
} 			
resourceMapping SEQUENCE {			
startPosition	0		
nrofSymbols	n1		
repetitionFactor	n1		
}			
freqDomainPosition	0		
freqDomainShift	0		
freqHopping SEQUENCE {			
c-SRS	12	Config 1,2,4,5	
	24	Config 3,6	
b-SRS	0		
b-hop	0		
}			
groupOrSequenceHopping	neither		
resourceType CHOICE {			
periodic SEQUENCE {	periodic		
}			
periodicityAndOffset-p	sl5 : 0	Once every 5	
		Slots	
}			
}			
}			

## 4.4.3.1.5 Test Requirement

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. k slots after the reception of the timing advance command, where:

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

k = 7 for Config 3, 6

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

Table 4.4.3.1.5-1 and Table 4.4.3.1.5-2 define the primary level settings.

Table 4.4.3.1.5-1: Cell specific test parameters for timing advance

Parameter	Unit	Test1	
Faiailletei		T1	T2

Duplex	mode	Config 1,4		FDD
- 1		Config 2,3,5,6		TDD
TDD	,. ,.	Config 1,4		Not Applicable
TDD conf	figuration	Config 2,5		TDDConf.1.1
		Config 3,6		TDDConf.2.1
		Config 1,4		10: N <sub>RB,c</sub> = 52
BWc	hannel	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,c</sub> = 52
BWP	PBW	Config 2,5	MHz	10: N <sub>RB,c</sub> = 52
		Config 3,6		40: N <sub>RB,c</sub> = 106
	DRx Cy	cle	ms	Not Applicable
		Config 1,4		SR.1.1 FDD
PDSCH R measureme		Config 2,5		SR.1.1 TDD
		Config 3,6		SR2.1 TDD
		Config 1,4		CR.1.1 FDD
CORESET Cha		Config 2,5		CR.1.1 TDD
		Config 3,6		CR2.1 TDD
	OCNG Pa	tterns		OCNG pattern 1
TRS conf	figuration	Config 1,4		TRS.1.1 FDD
		Config 2,5		TRS.1.1 TDD
		Config 3,6		TRS.1.2 TDD
OMTO	<i>c</i> :	Config 1,2,4,5		SMTC.1 FR1
SMTC cor	ifiguration	Config 3,6		SMTC.2 FR1
PDSCH/	PDCCH	Config 1,2,4,5		15 kHz
subcarrie	ŀ	Config 3,6	kHz	30 kHz
PUCCH/	/PUSCH	Config 1,2,4,5		15 kHz
subcarrie		Config 3,6	kHz	30 kHz
EF	PRE ratio of P	SS to SSS		
EPRE ratio	atio of PBCH atio of PDCC io of PDCCH atio of PDSCI ratio of PDS of OCNG DN	to DMRS to SSS to PBCH DMRS H DMRS to SSS to PDCCH DMRS H DMRS to SSS CH to PDSCH MRS to SSS(Note 1) OCNG DMRS (Note	dB	0
	$N_{oc}$ No		dBm/15kH z	-98
$N_{oc}$ Note2		nfig 1,2,4,5 config 3,6	dBm/SCS	-98 -95
	$\hat{E}_{s}/I_{c}$		dBIII/3C3	3
$\hat{E}_s/N_{oc}$		dB	3	
Io <sup>Note3</sup>		nfig 1,2,4,5	dBm/ 9.36MHz	-67.57
		config 3,6	dBm/ 38.16MHz	-62.58
	Propagation of	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 4.4.3.1.5-2: Sounding Reference Symbol Configuration for timing advance

Field		Value	Comment
c-SRS	Config 1,2,4,5	12	
U-3K3	Config 3,6	24	Fraguerov hanning is disabled
b-S	RS	0	Frequency hopping is disabled
b-ł	пор	0	
freqDoma	inPosition	0	Frequency domain position of SRS
freqDon	nainShift	0	
groupOrSequ	enceHopping	neither	No group or sequence hopping
SRS-Periodi	cityAndOffset	sl5=0	Once every 5 slots
pathlossReferenceRS		ssb-Index=0	SSB #0 is used for SRS path loss estimation
Usage		nonCodebook	Non-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	ffset-n2	0	transmission Comb setting
cyclicS	Shift-n2	0	transmissionComb setting
nrofSRS-Ports		port1	Number of antenna ports used for SRS transmission
Note: For further inf	ormation see clause 6	6.3.2 in TS 38.331.	

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

# 4.5 Signaling characteristics

## 4.5.1 Radio link monitoring

The requirements in this section apply for radio link monitoring on PSCell in EN-DC operation mode.

The UE shall monitor the downlink link quality based on the reference signal in the configured RLM-RS resource(s) in order to detect the downlink radio link quality of the PCell and PSCell as specified in TS 38.213 [8]. 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.

### 4.5.1.0 Minimum conformance requirements

## 4.5.1.0.1 Minimum conformance requirements for out-of-sync SSB-based RLM

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last  $T_{\text{Evaluate\_out\_SSB}}$  [ms] period becomes worse than the threshold  $Q_{\text{out\_SSB}}$  within  $T_{\text{Evaluate\_out\_SSB}}$  [ms] evaluation period. The requirements in this section apply for each SSB based RLM-RS resource configured for PSCell, provided that the SSB configured for RLM is transmitted within UE active DL BWP during the entire evaluation period defined in Table 4.5.1.0.1-1.

T<sub>Evaluate out SSB</sub> is defined in Table 4.5.1.0.1-1 for FR1.

Table 4.5.1.0.1-1: Evaluation period T<sub>Evaluate\_out</sub> for FR1

Configuration		T <sub>Evaluate_out_SSB</sub> (ms)	
no DRX		max(200,ceil(10*P)*T <sub>SSB</sub> )	
DRX cycle≤320		max(200,ceil(15*P)*max(T <sub>DRX</sub> ,T <sub>SSB</sub> ))	
DRX cycle>320		ceil(10*P)*T <sub>DRX</sub>	
NOTE:	OTE: T <sub>SSB</sub> is the periodicity of SSB configured for RLM.		
T <sub>DRX</sub> is the DRX cycle length			

#### For FR1,

- P=1/(1 T<sub>SSB</sub>/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

If the high layer in TS 38.331 [13] signaling of *smtc2* is present, T<sub>SMTCperiod</sub> follows *smtc2*; otherwise T<sub>SMTCperiod</sub> follows *smtc1*.

The normative reference for this requirement is TS 38.133 [6] clause 8.1.2.

# 4.5.1.1 EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing

#### 4.5.1.1.1 Test purpose

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PSCell configured with SSB-based RLM RS in non-DRX mode. This test will partly verify the FR1 PSCell radio link monitoring requirements in TS 38.133 [6] section 8.1.2.

#### 4.5.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 4.5.1.1.3 Minimum conformance requirement

The minimum requirements are specified in clause 4.5.1.0.1. DRX configuration is not used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.1.1.

#### 4.5.1.1.4 Test description

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 as defined in 38.133 [6]. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure 4.5.1.1.4-1 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.

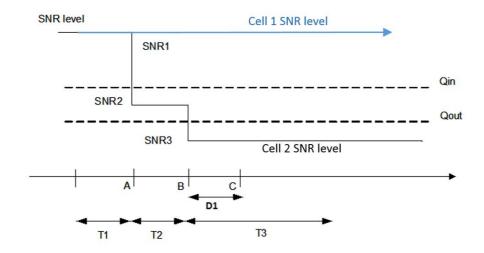


Figure 4.5.1.1.4-1: SNR variation for out-of-sync testing

#### 4.5.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1 and Table 5.3.6-1 of 38.521-1 [17].

This test shall be tested using any of the test configurations in Table 4.5.1.1.4.1-1.

Table 4.5.1.1.4.1-1: EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode supported test configurations

Test Case ID	Description		
4.5.1.1.4.1-1	LTE FDD, NR 15 KHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.5.1.1.4.1-2	LTE FDD, NR 15 KHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.5.1.1.4.1-3	LTE FDD, NR 30 KHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
4.5.1.1.4.1-4	LTE TDD, NR 15 KHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.5.1.1.4.1-5	LTE TDD, NR 15 KHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.5.1.1.4.1-6	LTE TDD, NR 30 KHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Configure the test equipment and the DUT according to the parameters in Table 4.5.1.1.4.1-2

Table 4.5.1.1.4.1-2: Initial conditions for EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

Parameter	Value		Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified in Annex E.1.1, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1.				
Channel bandwidth	As specified by the test configuration selected from Table 4.5.1.1.4.1-1				
Propagation conditions		AWGN	As specified in Annex C.2.2.		
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.2.3.4			
Exceptions to connection diagram		N/A			

PDCCH transmission parameters are given in Table 4.5.1.1.4.1-3

Table 4.5.1.1.4.1-3: PDCCH transmission parameters for out-of-sync

Attribute	Value for BLER Configuration #0
DCI format	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH RE energy to average SSS RE energy	4dB
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	4dB
Bandwidth (MHz)	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

- 1. Message contents are defined in clause 4.5.1.1.4.3.
- 2. The power levels and settings for Cell 1 are set according to Annex A.6, Table A.6.1.1-1. Cell 2 is NR FR1 PSCell. The connection setup is done according to the settings in Annex C.1.3, and the downlink signal levels as per Annex C.1.2
- 3. The test parameters are given in Table 4.5.1.1.4.1-4 below.
- 4. Downlink signals for NR cell are initially set up according to Annex C.1.2, C.1.3.

Table 4.5.1.1.4.1-4: General test parameters for FR1 out-of-sync testing in non-DRX mode

Parai	meter	Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number	r		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: $N_{RB,c} = 52$
	Config 2, 5		10: $N_{RB,c} = 52$
	Config 3, 6		40: $N_{RB,c} = 106$
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
configuration			
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
configuration			N. (A. II. I.I.
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
CORESET Reference	Config 1, 4		CR.1.1 FDD
Channel	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier	Config 1, 2, 4, 5		15 KHz
spacing	Config 3, 6		30 KHz

Config 3, 6	PRACH Configuration Config 1, 2, 4, 5				Table A.3.8.2.4-1
OCNG parameters         OP.1           CP length         Normal           Correlation Matrix and Antenna Configuration         2x2 Low           Out of sync transmission parameters         DCI format         1-0           Number of Control OFDM symbols         2           Aggregation level         CCE         8           Ratio of hypothetical PDCCH RE energy to average SSS RE energy         dB         4           Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy         REG bundle size         6           DRX         OFF           Gap pattern ID         gp0           Layer 3 filtering         Enabled           T310 timer         ms         0           T311 timer         ms         1000           N310         1         1           N311         1         1           CSI-RS configuration         Config 1, 4         [CSI-RS.1.3 FDD]           Config 2, 5         [CSI-RS.1.3 TDD]           Config 3, 6         [CSI-RS.2.3 TDD]					Table A.3.8.2.4-1
CP length	SSB index assigned as RLM RS				0
Correlation Matrix and Antenna Configuration   2x2 Low	OCNG parameters				OP.1
Out of sync transmission parameters         DCI format Number of Control OFDM symbols         1-0           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         4           DRX         OFF           Gap pattern ID Layer 3 filtering T310 timer         ms         0           T311 timer         ms         0           N310         1           N311         1           CSI-RS configuration         Config 1, 4 Config 2, 5 Config 3, 6         [CSI-RS.1.3 TDD] CSI-RS.2.3 TDD]           T1         s         1	CP length				Normal
Number of Control OFDM symbols   2   Aggregation level   CCE   8   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   6   CFF					2x2 Low
Parameters	Out of sync	DCI forma	it		1-0
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   6	transmission	Number of	f Control OFDM symbols		2
energy to average SSS RE energy   Ratio of hypothetical PDCCH DMRS   dB   4	parameters	Aggregation	on level	CCE	8
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy       dB       4         DMRS precoder granularity       REG bundle size       6         DRX       OFF         Gap pattern ID       gp0         Layer 3 filtering       Enabled         T310 timer       ms       0         T311 timer       ms       1000         N310       1         N311       1         CSI-RS configuration       Config 1, 4       [CSI-RS.1.3 FDD]         Config 2, 5       [CSI-RS.1.3 TDD]         Config 3, 6       [CSI-RS.2.3 TDD]         T1       s       1		Ratio of h	ypothetical PDCCH RE	dB	4
energy to average SSS RE energy           DMRS precoder granularity         REG bundle size           BRX         OFF           Gap pattern ID         gp0           Layer 3 filtering         Enabled           T310 timer         ms         0           T311 timer         ms         1000           N310         1         1           N311         1         1           CSI-RS configuration         Config 1, 4         [CSI-RS.1.3 FDD]           Config 2, 5         [CSI-RS.1.3 TDD]           Config 3, 6         [CSI-RS.2.3 TDD]           T1         s         1		energy to	average SSS RE energy		
DMRS precoder granularity         REG bundle size           BRX         6           Cope         0FF           Gap pattern ID         gp0           Layer 3 filtering         Enabled           T310 timer         ms         0           T311 timer         ms         1000           N310         1         1           N311         1         1           CSI-RS configuration         Config 1, 4         [CSI-RS.1.3 FDD]           Config 2, 5         [CSI-RS.1.3 TDD]           Config 3, 6         [CSI-RS.2.3 TDD]           T1         s         1		Ratio of h	ypothetical PDCCH DMRS	dB	4
REG bundle size   6		energy to	average SSS RE energy		
DRX         OFF           Gap pattern ID         gp0           Layer 3 filtering         Enabled           T310 timer         ms         0           T311 timer         ms         1000           N310         1         1           N311         1         1           CSI-RS configuration         Config 1, 4         [CSI-RS.1.3 FDD]           Config 2, 5         [CSI-RS.1.3 TDD]           Config 3, 6         [CSI-RS.2.3 TDD]           T1         s         1					REG bundle size
Sap pattern ID		REG bund	dle size		6
Layer 3 filtering         Enabled           T310 timer         ms         0           T311 timer         ms         1000           N310         1         1           N311         1         1           CSI-RS configuration         Config 1, 4         [CSI-RS.1.3 FDD]           Config 2, 5         [CSI-RS.1.3 TDD]           Config 3, 6         [CSI-RS.2.3 TDD]           T1         s         1	DRX				OFF
T310 timer         ms         0           T311 timer         ms         1000           N310         1           N311         1           CSI-RS configuration         Config 1, 4         [CSI-RS.1.3 FDD]           Config 2, 5         [CSI-RS.1.3 TDD]           Config 3, 6         [CSI-RS.2.3 TDD]           T1         s         1	Gap pattern ID				gp0
T311 timer         ms         1000           N310         1           N311         1           CSI-RS configuration         Config 1, 4         [CSI-RS.1.3 FDD]           Config 2, 5         [CSI-RS.1.3 TDD]           Config 3, 6         [CSI-RS.2.3 TDD]           T1         s         1	Layer 3 filtering				Enabled
N310         1           N311         1         1           CSI-RS configuration         Config 1, 4         [CSI-RS.1.3 FDD]           Config 2, 5         [CSI-RS.1.3 TDD]           Config 3, 6         [CSI-RS.2.3 TDD]           T1         s         1	T310 timer			ms	0
N311         1           CSI-RS configuration         Config 1, 4         [CSI-RS.1.3 FDD]           Config 2, 5         [CSI-RS.1.3 TDD]           Config 3, 6         [CSI-RS.2.3 TDD]           T1         s         1	T311 timer			ms	1000
CSI-RS configuration         Config 1, 4 [CSI-RS.1.3 FDD]           Config 2, 5 [CSI-RS.1.3 TDD]         [CSI-RS.2.3 TDD]           T1         s         1	N310				1
Config 2, 5 [CSI-RS.1.3 TDD] Config 3, 6 [CSI-RS.2.3 TDD] T1 s 1	N311				1
Config 3, 6 [CSI-RS.2.3 TDD]  T1 s 1	CSI-RS configuration		Config 1, 4		[CSI-RS.1.3 FDD]
T1 s 1	_		Config 2, 5		[CSI-RS.1.3 TDD]
	Config 3, 6				[CSI-RS.2.3 TDD]
T2 s 0.6	T1			S	1
12 0.0	T2			S	0.6
T3 s 0.6	T3			S	0.6
D1 s 0.44	D1			S	0.44
Note 1: All configurations are assigned to the UE prior to the start of time period T1.	Note 1: All co	nfigurations a	are assigned to the UE prior to	the start of time p	period T1.

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

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

#### 4.5.1.1.4.2 Test Procedure

The test consists of two cells, a single E-UTRA cell (Pcell), and a single NR cell (PSCell). Prior to the start of the time duration T1, the UE shall be fully synchronized to PSCell. The UE shall be configured for periodic CQI reporting in PUCCH [format 1] with a reporting periodicity as mentioned in the above table 4.5.1.1.4.1-4.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.
- 2. Set the parameters according to T1 in Table 4.5.1.1.5-1 for subtest 1 and 2. Propagation conditions are set according to Annex C.2.2. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 4.5.1.1.5-1 for subtests 1 and 2. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.1.5-1 for subtests 1 and 2. T3 starts.

#### 5. If the SS:

a) detects uplink power equal to or higher than [-50 dBm] in each subframe configured for CQI transmission (according to configured CQI periodicity on PUCCH [format 1]) during the period from time point A to time point B

and

b) does not detect any uplink power higher than [-50 dBm] from time point C (240 ms after the start of T3) until T3 expires,

the number of successful tests is increased by one.

- 6. Otherwise the number of failed tests is increased by one and proceed to Step 10.
- 7. When T3 expires the SS shall change the SNR value to T1 as specified in Table 4.5.1.1.5-1.
- 8. If the UE has not re-established the connection in at least 1s, the SS shall ensure PSCell is released.
- 9. The SS then shall transmit RRCConnectionReconfiguration message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.
- 10. If the Reconfiguration fails, switch off and on the UE and ensure the UE is in RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5].
- 11. Repeat steps 2-10 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 4.5.1.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1.

Table 4.5.1.1.4.3-1: PDCCH Search Space

Derivation Path: TS 38.508-1 [14], Table 4.6.3-162			
Information Element	Value/remark	Comment	Condition
SearchSpace ::= SEQUENCE {			
searchSpaceId	0	SearchSpaceId with condition CSS	CSS
controlResourceSetId	0	ControlResourceS etId	
monitoringSlotPeriodicityAndOffset CHOICE {			
si1	NULL		
}			
Duration	2		
monitoringSymbolsWithinSlot	11000000000000	Symbols 0 and 1	
nrofCandidates SEQUENCE {			
aggregationLevel1	n0		
aggregationLevel2	n0		
aggregationLevel4	n0		
aggregationLevel8	n1	AL8	
aggregationLevel16	n0		
}			
searchSpaceType CHOICE {			
common SEQUENCE {			CSS, SISS
ue-Specific SEQUENCE {			USS
dci-Formats	formats0-0-And-1-0	DCI Format 1_0	
}			
}			
}			

Table 4.5.1.1.4.3-2: UE-TimersAndConstants

Derivation Path: TS 38.508-1 [14], Table 4.6.3-200			
Information Element	Value/remark	Comment	Condition
UE-TimersAndConstants ::= SEQUENCE {			
t310	ms0		
n310	n1		
t311	ms1000		
n311	n1		
}			

Table 4.5.1.1.4.3-3: CSI-FrequencyOccupation

Derivation Path: TS 38.508-1 [14], Table 4.6.3-33					
Information Element	Value/remark	Comment	Condition		
CSI-FrequencyOccupation ::= SEQUENCE {					
startingRB	0				
nrofRBs	52	10 MHz (Test 1, 2,			
		4, 5)			
	106	40 MHz (Test 3,			
		6)			
}			•		

#### 4.5.1.1.5 Test Requirement

Table 4.5.1.1.5-1 defines the cell specific primary level settings.

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%.

Table 4.5.1.1.5-1: 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	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB			4		
EPRE rati	o of PDCCH to PDCCH DMRS	dB			0		
EPRE rati	o of PBCH DMRS to SSS	dB					
EPRE rati	o of PBCH to PBCH DMRS	dB					
EPRE rati	o of PSS to SSS	dB					
EPRE rat	o of PDSCH DMRS to SSS	dB			0		
EPRE rati	o of PDSCH to PDSCH DMRS	dB					
EPRE rati	o of OCNG DMRS to SSS	dB					
EPRE rati	o of OCNG to OCNG DMRS	dB					
SNR	Config 1, 4	dB	1	-7	-15	-4.5	1
	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
N Config 1, 4		dBm/15	-98				
$N_{oc}$	Config 2, 5	KHz			-98		
Config 3, 6					-98		
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 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 4.5.1.1.5-2: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field		Test 2	
		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).			

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%

# 4.5.1.2 EN-DC FR1 radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

Editor's Notes: This test case is incomplete. The following aspects are either missing or not yet determined

- Test Tolerances are TBD
- CSI-RS config and some PDCCH parameters for In-Sync are in square brackets pending RAN4 updates.- Test tolerance analysis is TBD

#### 4.5.1.2.1 Test purpose

The purpose of this test is to verify that the UE properly detects in sync, for the purpose of monitoring downlink radio link quality of the PSCell, when DRX is not used. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1.2.

#### 4.5.1.2.2 Test applicability

This test applies to all types of E-UTRA UEs Release 15 and forward supporting EN-DC

## 4.5.1.2.3 Minimum conformance requirements

The minimum requirements are specified in clause 4.5.1.0.2. DRX configuration is not used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.1.2.

#### 4.5.1.2.4 Test description

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. 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.

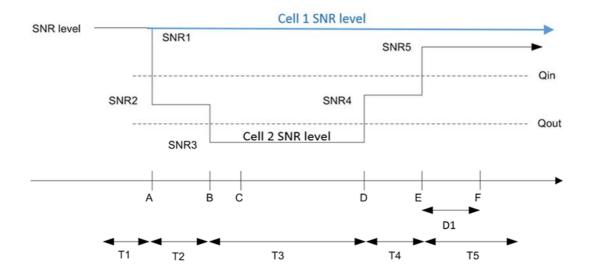


Figure 4.5.1.2.4-1: SNR variation for in-sync testing

#### 4.5.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table [5.3.5-1] and Table [5.3.6-1] of 38.521-1 [17].

This test shall be tested using any of the test configurations in Table 4.5.1.2.4.1-1.

Table 4.5.1.2.4.1-1: Supported test configurations for FR1 PSCell

Configuration	Description
1	LTE FDD, NR 15 KHz SSB SCS, 10MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 KHz SSB SCS, 10MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 KHz SSB SCS, 40MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 KHz SSB SCS, 10MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 KHz SSB SCS, 10MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 KHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note: The UE is only	required to pass in one of the supported test configurations in FR1

Configure the test equipment and the DUT according to the parameters in Table 4.5.1.2.4.1-2.

Table 4.5.1.2.4.1-2: Initial conditions for EN-DC FR1 radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

Parameter		Value	Comment
Test environment		NC	As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As	specified in Annex E.1.1, Table E.:	2-1 and TS 38.508-1 [14] clause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 4.5.1.2.5-1		
Propagation conditions		AWGN	As specified in Annex C.2.2.
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	

Exceptions to	N/A	
connection		
diagram		

PDCCH transmission parameters are given in Table 4.5.1.2.4.1-3.

Table 4.5.1.2.4.1-3: PDCCH transmission parameters for in-sync

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

- 1. Message contents are defined in clause 4.5.1.3.4.3.
- 2. The power levels and settings for Cell 1 are set according to Annex A.6, Table A.6.1.1-1. Cell 2 is NR FR1 PSCell. The connection setup is done according to the settings in Annex C.1.3, and the downlink signal levels as per Annex C.1.2
- 3. The general test parameters are given in Table 4.5.1.2.5-4 below.
- 4. Downlink signals for NR cell are initially set up according to Annex C.1.

Table 4.5.1.2.4.1-4: General test parameters for FR1 in-sync testing in non-DRX mode

Paran	neter	Unit	Value
			Test 1
Active E-U	TRA PCell		Cell 1
E-UTRA RF Ch	annel Number		1
Active F	PSCell		Cell 2
RF Channe	el 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		DEBWI .I.I
UL initial BWP	Config 1, 2, 3, 4, 5,		ULBWP.0.1
configuration	6		OLBWI .O. I
UL dedicated BWP	Config 1, 2, 3, 4, 5,		ULBWP.1.1
configuration	6		_
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
CORESET Reference	Config 1, 4		CR.1.1 FDD
Channel	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD

SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration			SMTC.1
OWN C Comigaran	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 KHz
subcarrier spacing			
	Cornig 3, 6		30 KHz
PRACH Configuration	on Config 1, 2, 4, 5		Table A.3.8.2.4-1
	Config 3, 6		Table A.3.8.2.4-1
SSB index as	ssigned as RLM RS		0
	parameters		OP.1
С	Plength		Normal
	and Antenna Configuration		2x2 Low
In ayna	DCI format		1.0
In sync			1-0
transmission	Number of Control		2
parameters	OFDM symbols	005	
	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	u.b	'
	to average SSS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		TLO Buildio 3126
	REG bundle size		6
	DRX		OFF
Gan	pattern ID		N.A.
	er 3 filtering		Enabled
	310 timer	ms	2000
T3	311 timer	ms	1000
	N310		1
	N311		1
CSI-RS	Config 1, 4		[CSI-RS.1.3 FDD]
configuration	Config 2, 5		[CSI-RS.1.3 TDD]
	Config 3, 6		[CSI-RS.2.3 TDD]
T1		S	0.5
	T2	S	0.4
	T3	S	1.46
	T4	S	0.4
	T5	S	1
	D1	S	0.42
	<u> </u>		U. 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.

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

#### 4.5.1.2.4.2 Test procedure

The test consists of two cells, a single E-UTRA cell (Pcell), and a single NR cell (PSCell). Prior to the start of the time duration T1, the UE shall be fully synchronized to PSCell. The UE shall be configured for periodic CQI reporting in PUCCH [format 1] with a reporting periodicity as mentioned in the above table 4.5.1.2.4.1-4.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.
- 2. Set the parameters according to T1 in Table 4.5.1.2.4-1 for subtest 1 and 2. Propagation conditions are set according to Annex TBD. T1 starts.
- 3. When T1 expires, the SS shall change the SNR value to T2 as specified in Table 4.5.1.2.5-1. T2 starts.
- 4. When T2 expires, the SS shall change the SNR value to T3 as specified in Table 4.5.1.2.5-1. T3 starts.
- 5. When T3 expires, the SS shall change the SNR value to T3 as specified in Table 4.5.1.2.5-1. T4 starts.
- 6. When T4 expires, the SS shall change the SNR value to T3 as specified in Table 4.5.1.2.5-1. T5 starts.
- 7. If the SS detects uplink power equal to or higher than -39 dBm in the On-duration part of every DRX cycle in the subframe according the configured CQI reporting mode (PUCCH 1-0) during the period from time point A to time point F (1120 ms after the start of time duration T5) the number of successful tests is increased by one.
  - Otherwise the number of failed tests is increased by one.
- 8. Repeat steps 2-7 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

## 4.5.1.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1 with the following exceptions.

Table 4.5.1.1.4.3-2: PDCCH Search Space

Derivation Path: TS 38.508-1 [14], Table 4.6.3-162			
Information Element	Value/remark	Comment	Condition
SearchSpace ::= SEQUENCE {			
searchSpaceId	0	SearchSpaceId with condition CSS	CSS
controlResourceSetId	0	ControlResourceS etId	
monitoringSlotPeriodicityAndOffset CHOICE {			
sl1	NULL		
}			
duration	2		
monitoringSymbolsWithinSlot	11000000000000	Symbols 0 and 1	
nrofCandidates SEQUENCE {			
aggregationLevel1	n0		
aggregationLevel2	n0		
aggregationLevel4	n0		
aggregationLevel8	n1	AL8	
aggregationLevel16	n0		
}			
searchSpaceType CHOICE {			
common SEQUENCE {			CSS, SISS
ue-Specific SEQUENCE {			USS
dci-Formats	formats0-0-And-1-0	DCI Format 1_0	
}			
}			
}			

#### Table 4.5.1.1.4.3-2: UE-TimersAndConstants

Derivation Path: TS 38.508-1 [14], Table 4.6.3-200				
Information Element	Value/remark	Comment	Condition	
UE-TimersAndConstants ::= SEQUENCE {				
t310	ms0			
n310	n1			
t311	ms1000			
n311	n1			
}				

### Table 4.5.1.1.4.3-3: CSI-FrequencyOccupation

Derivation Path: TS 38.508-1 [14], Table 4.6.3-33				
Information Element	Value/remark	Comment	Condition	
CSI-FrequencyOccupation ::= SEQUENCE {				
startingRB	0			
nrofRBs	52	10 MHz (Test 1, 2, 4, 5)		
	106	40 MHz (Test 3, 6)		
}				

### 4.5.1.2.5 Test Requirement

The requirements in this section apply for each SSB based RLM-RS resource configured for PCell or PSCell, provided that the SSB configured for RLM are actually transmitted within UE active DL BWP during the entire evaluation period specified in section 4.5.1.2.3.

Table 4.5.1.2.5-1 defines the cell specific primary level settings.

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% with a confidence interval of 95%.

Table A.4.5.1.2.5-1: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	T3	T4	T5
EPRE r	ratio of PDCCH DMRS to SSS	dB			4		
EPRE r	ratio of PDCCH to PDCCH DMRS	dB			0		
EPRE i	ratio of PBCH DMRS to SSS	dB					
EPRE i	ratio of PBCH to PBCH DMRS	dB					
EPRE r	ratio of PSS to SSS	dB					
EPRE r	ratio of PDSCH DMRS to SSS	dB			0		
EPRE r	ratio of PDSCH to PDSCH DMRS	dB					
EPRE r	ratio of OCNG DMRS to SSS	dB					
EPRE r	ratio of OCNG to OCNG DMRS	dB					
SNR	Config 1, 4	dB	1	-7	-15	-4.5	1
	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
N <sub>oc</sub> Config 1, 4 Config 2, 5		dBm/	-98				
Config 2, 5		15		-98			
	Config 3, 6	KHz	-98				
Propag	ation condition			TDL-C	300ns	100Hz	
Note 1:							
	and a constant total transmitted	power sp	ectral o	density	is ach	ieved fo	or all
	OFDM symbols.						_
Note 2:	Note 2: The signal contains PDCCH for UEs other than the device under test as				t 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:	Note 5: The SNR values are specified for testing a UE which supports 2RX on at				n at		
	least one band. For testing of a UE which supports 4RX on all bands, the						
	SNR during T3 and T4 is modified	ed as spe	cified i	n secti	on A.3.	6.	

# 4.5.1.3 EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing

-Some RAN4 Params are in square brackets

#### 4.5.1.3.1 Test purpose

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PSCell configured with SSB-based RLM RS when DRX is used. This test will partly verify the NR cell radio link monitoring requirements in TS 38.133 [6] section 8.1.

#### 4.5.1.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 4.5.1.3.3 Minimum conformance requirement

The minimum requirements are specified in clause 4.5.1.0.1. DRX configuration is used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.1.3.

#### 4.5.1.3.4 Test description

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 as defined in 38.133 [6]. The test consists of three successive time periods, with time

duration of T1, T2 and T3 respectively. Figure 4.5.1.3.4-1 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.

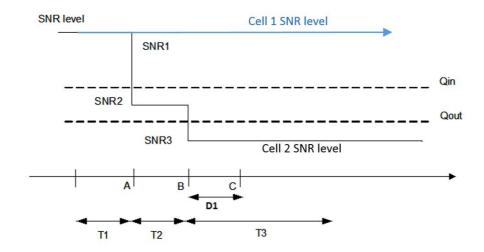


Figure 4.5.1.3.4-1: SNR variation for out-of-sync testing

#### 4.5.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1 and Table 5.3.6-1 of 38.521-1 [17].

This test shall be tested using any of the test configurations in Table 4.5.1.3.4.1-1.

Table 4.5.1.3.4.1-1: EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in DRX mode supported test configurations

Test Case ID	Description		
4.5.1.3.4.1-1	LTE FDD, NR 15 KHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.5.1.3.4.1-2	LTE FDD, NR 15 KHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.5.1.3.4.1-3	LTE FDD, NR 30 KHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
4.5.1.3.4.1-4	LTE TDD, NR 15 KHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.5.1.3.4.1-5	LTE TDD, NR 15 KHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.5.1.3.4.1-6	LTE TDD, NR 30 KHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
Note: The UE is	Note: The UE is only required to pass in one of the supported test configurations in FR1		

Configure the test equipment and the DUT according to the parameters in Table 4.5.1.3.4.1-2

Table 4.5.1.3.4.1-2: Initial conditions for EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in DRX mode

Parameter	Value		Comment
Test environment		NC	As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As	specified in Annex E.1.1, Table E.2	2-1 and TS 38.508-1 [14] clause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 4.5.1.3.4.1-1		
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		N/A	

PDCCH transmission parameters are given in Table 4.5.1.3.4.1-3

Table 4.5.1.3.4.1-3: PDCCH transmission parameters for out-of-sync

Attribute	Value for BLER Configuration #0
DCI format	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH RE energy to average SSS RE energy	4dB
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	4dB
Bandwidth (MHz)	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

- 1. Message contents are defined in clause 4.5.1.3.4.3.
- 2. The power levels and settings for Cell 1 are set according to Annex A.6, Table A.6.1.1-1. Cell 2 is NR FR1 PSCell. The connection setup is done according to the settings in Annex C.1.3, and the downlink signal levels as per Annex C.1.2
- 3. The test parameters are given in Table 4.5.1.3.4.1-4 below.
- 4. Downlink signals for NR cell are initially set up according to Annex C.1.2, C.1.3.

Table 4.5.1.3.4.1-4: General test parameters for FR1 out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCe	Active E-UTRA PCell		Cell 1
E-UTRA RF Channe	l Number		1
Active PSCell	Active PSCell		Cell 2
RF Channel Number	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, 6		DLBWP.0.1
configuration DL dedicated BWP	Config 1 2 2 1 F 6		-
	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
configuration UL initial BWP Config 1, 2, 3, 4, 5, 6			
configuration Config 1, 2, 3, 4, 5, 6			ULBWP.0.1
UL dedicated BWP	Config 1, 2, 3, 4, 5, 6		
configuration	301mg 1, 2, 0, 1, 0, 0		ULBWP.1.1
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
CORESET Reference	Config 1, 4		CR.1.1 FDD
Channel	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 KHz
subcarrier spacing	Config 3, 6		30 KHz
PRACH Configuration	Config 1, 2, 4, 5		Table A.3.8.2.4-1
1 10 to 11 configuration	Config 3, 6		Table A.3.8.2.4-1
SSB index assigned as	RLM RS		0
OCNG parameters			OP.1
CP length	A		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	dB	4
	PDCCH RE energy to		
	average SSS RE energy		
	Datic of hypothetical	dB	4
	Ratio of hypothetical PDCCH DMRS energy to	ub	4
	average SSS RE energy		
	avolago ooo ke olloigy		
	DMRS precoder		REG bundle size
	granularity		NEO bullate size
	REG bundle size		6
DRX Configuration			[DRX.4]
Gap pattern ID			N.A.
Layer 3 filtering			Enabled Enabled
T310 timer		me	0
T311 timer		ms ms	1000
N310		1113	1
N311			1
CSI-RS configuration	Config 1, 4		[CSI-RS.1.3 FDD]
2 3 C Cominguitation	Config 2, 5		[CSI-RS.1.3 TDD]
	Config 3, 6		[CSI-RS.2.3 TDD]
T1		s	4
T2		S	3
T3		S	3
D1		S	2.44
Note 1: All configura	tions are assigned to the LIE	prior to the	start of time period T1

All configurations are assigned to the UE prior to the start of time period T1. UE-specific PDCCH is not transmitted after T1 starts. E-UTRAN is in non-DRX mode under test. Note 1:

Note 2:

Note 3:

#### 4.5.1.3.4.2 Test Procedure

The test consists of two cells, a single E-UTRA cell (Pcell), and a single NR cell (PSCell). Prior to the start of the time duration T1, the UE shall be fully synchronized to PSCell. The UE shall be configured for periodic CQI reporting in PUCCH [format 1] with a reporting periodicity as mentioned in the above table 4.5.1.3.4.1-4.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.
- 2. Set the parameters according to T1 in Table 4.5.1.3.5-1 for subtest 1 and 2. Propagation conditions are set according to Annex C.2.2. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 4.5.1.3.5-1 for subtests 1 and 2. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.3.5-1 for subtests 1 and 2. T3 starts.
- 5. If the SS:
  - a) detects uplink power equal to or higher than [-50 dBm] in each subframe configured for CQI transmission (according to configured CQI periodicity on PUCCH [format 1]) during the period from time point A to time point B

#### and

b) does not detect any uplink power higher than [-50 dBm] from time point C (240 ms after the start of T3) until T3 expires,

the number of successful tests is increased by one.

- 6. Otherwise the number of failed tests is increased by one, and proceed to Step 10.
- 7. When T3 expires the SS shall change the SNR value to T1 as specified in Table 4.5.1.3.5-1.
- 8. If the UE has not re-established the connection in at least 1s, the SS shall ensure that PSCell is released..
- 9. The SS then shall transmit RRCConnectionReconfiguration message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.
- 10. If the Reconfiguration fails, switch off and on the UE and ensure the UE is in RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5].
- 11. Repeat steps 2-10 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 4.5.1.3.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1.

Table 4.5.1.1.4.3-1: PDCCH Search Space

Derivation Path: TS 38.508-1 [14], Table 4.6.3-162				
Information Element	Value/remark	Comment	Condition	
SearchSpace ::= SEQUENCE {				
searchSpaceId	0	SearchSpaceId with condition CSS	CSS	
controlResourceSetId	0	ControlResourceS etId		
monitoringSlotPeriodicityAndOffset CHOICE {				
sl1	NULL			
}				
duration	2			
monitoringSymbolsWithinSlot	1100000000000	Symbols 0 and 1		
nrofCandidates SEQUENCE {				
aggregationLevel1	n0			
aggregationLevel2	n0			
aggregationLevel4	n0			
aggregationLevel8	n1	AL8		
aggregationLevel16	n0			
}				
searchSpaceType CHOICE {				
common SEQUENCE {			CSS, SISS	
ue-Specific SEQUENCE {			USS	
dci-Formats	formats0-0-And-1-0	DCI Format 1_0		
}				
}				
}				

#### Table 4.5.1.1.4.3-2: UE-TimersAndConstants

Derivation Path: TS 38.508-1 [14], Table 4.6.3-200			
Information Element	Value/remark	Comment	Condition
UE-TimersAndConstants ::= SEQUENCE {			
t310	ms0		
n310	n1		
t311	ms1000		
n311	n1		
}			

## Table 4.5.1.1.4.3-3: CSI-FrequencyOccupation

Derivation Path: TS 38.508-1 [14], Table 4.6.3-33				
Information Element	Value/remark	Comment	Condition	
CSI-FrequencyOccupation ::= SEQUENCE {				
startingRB	0			
nrofRBs	52	10 MHz (Test 1, 2, 4, 5)		
	106	40 MHz (Test 3, 6)		
}				

### 4.5.1.3.5 Test Requirement

Table 4.5.1.3.5-1 defines the cell specific primary level settings.

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

The rate of correct events observed during repeated tests shall be at least 90%.

Table 4.5.1.3.5-1: 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		0	
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	Config 1, 4	dB	1	-7	-15
	Config 2, 5		1	-7	-15
	Config 3, 6		1	-7	-15
M	Config 1, 4	dBm/15		-98	
$N_{oc}$	Config 2, 5	KHz		-98	
	Config 3, 6			-98	
Propagation condition			7	DL-C 300ns 100l	Нz

OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total Note 1: transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

SNR levels correspond to the signal to noise ratio over the SSS REs. Note 3:

Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.4.5.1.3.1-1.

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

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%

#### 4.5.1.4 EN-DC FR1 radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in DRX mode

Editor's Notes: This test case is incomplete. The following aspects are either missing or not yet determined

- CSI-RS config and some PDCCH parameters for In-Sync are in square brackets pending RAN4 updates.
- Test tolerance analysis is TBD
- Exceptions to Message contents are TBD

#### 4.5.1.4.1 Test purpose

The purpose of this test is to verify that the UE properly detects 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.

#### 4.5.1.4.2 Test applicability

This test applies to all types of E-UTRA Ues Release 15 and forward supporting EN-DC

#### 4.5.1.4.3 Minimum conformance requirements

The minimum requirements are specified in clause 4.5.1.0.2. DRX configuration is used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.1.4.

#### 4.5.1.4.4 Test Description

There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.4.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

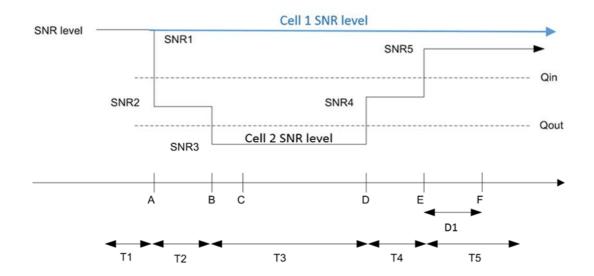


Table 4.5.1.4.4-1 - SNR variation for in-sync testing

#### 4.5.1.4.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table [5.3.5-1] and Table [5.3.6-1] of 38.521-1 [17].

This test shall be tested using any of the test configurations in Table 4.5.1.4.4.1-1.

Table 4.5.1.4.4.1-1: Supported test configurations for FR1 PSCell

Configuration	Description		
1	LTE FDD, NR 15 KHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 KHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 KHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 KHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 KHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 KHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
Note: The UE is onl	Note: The UE is only required to pass in one of the supported test configurations in FR1		

Configure the test equipment and the DUT according to the parameters in Table 4.5.1.4.4.1-2

Table 4.5.1.4.4.1-2: Initial conditions for EN-DC FR1 radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in DRX mode

Parameter	Value		Comment
Test environment		NC	As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As	specified in Annex E.1.1, Table E.2	2-1 and TS 38.508-1 [14] clause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 4.5.1.4.4.1-1		on selected from Table 4.5.1.4.4.1-1
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		N/A	

PDCCH transmission parameters are given in Table 4.5.1.4.4.1-3

Table 4.5.1.4.4.1-3: PDCCH transmission parameters for in-sync

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

- 1. Message contents are defined in clause 4.5.1.3.4.3.
- 2. The power levels and settings for Cell 1 are set according to Annex A.6, Table A.6.1.1-1. Cell 2 is NR FR1 PSCell. The connection setup is done according to the settings in Annex C.1.3, and the downlink signal levels as per Annex C.1.2
- 3. The general test parameters are given in Table 4.5.1.4.5-4 below.
- 4. Downlink signals for NR cell are initially set up according to Annex C.1.

Table 4.5.1.4.4.1-4: General test parameters for FR1 in-sync testing in DRX mode

Р	aramete	er	Unit	Value
		•	Test 1	
Active E-UTRA PCell				Cell 1
E-UTRA RF Channel Nu	ımber			1
	Active PSCell			Cell 2
RF Channel Number Duplex mode		Config 1, 4		2 FDD
Duplex mode		Config 1, 4  Config 2, 3, 5, 6		TDD
BW <sub>channel</sub>		Config 1, 4	MHz	10: N <sub>RB,c</sub> = 52
DVVchannel		Config 2, 5	1411 12	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
DL dedicated BWP		Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
configuration				
UL initial BWP configura	ition	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP		Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
configuration TDD Configuration		Config 1, 4		Not Applicable
1 DD Configuration		Config 2, 5		TDDConf.1.1
		Config 3, 6		TDDConf.2.1
CORESET Reference C	hannel	Config 1, 4		CR.1.1 FDD
		Config 2, 5		CR.1.1 TDD
		Config 3, 6		CR.2.1 TDD
SSB Configuration		Config 1, 4		SSB.1 FR1
		Config 2, 5		SSB.1 FR1
		Config 3, 6		SSB.2 FR1
SMTC Configuration		Config 1, 2, 4, 5		SMTC.1
		Config 3, 6		SMTC.1
PDSCH/PDCCH subcar	rier	Config 1, 2, 4, 5		15 KHz
spacing		Config 3, 6		30 KHz
PRACH Configuration		Config 1, 2, 4, 5		Table A.3.8.2.4-1
		Config 3, 6		Table A.3.8.2.4-1
SSB index assigned as	SSB index assigned as RLM RS			0
OCNG parameters				OP.1
CP length				Normal
Correlation Matrix and A	intenna (	Configuration		2x2 Low
In sync transmission	DCI fo	ormat		1-0
parameters		per of Control OFDM		2
	Symb		CCE	4
		Aggregation level Ratio of hypothetical PDCCH		0
		nergy to average SSS	dB	
	DMR:	of hypothetical PDCCH S energy to average RE energy	dB	0
	DMR	S precoder granularity		REG bundle size
	REG	bundle size		6
Out of sync		ormat		1-0
transmission parameters	Numb symb	per of Control OFDM		2
Aggre Ratio RE en		egation level	CCE	8
		of hypothetical PDCCH nergy to average SSS nergy	dB	4
	Ratio DMR: SSS	of hypothetical PDCCH S energy to average RE energy	dB	4
		S precoder granularity		REG bundle size
	REG	bundle size		6

DRX Configuration			Table A.3.3.3-1
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration	Config 1, 4		[CSI-RS.1.3 FDD]
_	Config 2, 5		[CSI-RS.1.3 TDD]
	Config 3, 6		[CSI-RS.2.3 TDD]
T1		S	4
T2		S	1.6
T3		S	1.36
T4		S	0.4
T5		S	1.4
D1		S	1
Nata 4. All application		and an tactle and at the	T4

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.

#### 4.5.1.4.4.2 Test Procedure

The test consists of two cells, a single E-UTRA cell (Pcell), and a single NR cell (PSCell). Prior to the start of the time duration T1, the UE shall be fully synchronized to PSCell. The UE shall be configured for periodic CQI reporting in PUCCH [format 1] with a reporting periodicity as mentioned in the above table 4.5.1.4.4.1-4.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.
- 2. Set the parameters according to T1 in Table 4.5.1.4.4-1 for subtest 1 and 2. Propagation conditions are set according to Annex TBD. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 4.5.1.4.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.4.5-1. T3 starts.
- 5. When T3 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.4.5-1. T4 starts.
- 6. When T4 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.4.5-1. T5 starts.
- 7. If the SS detects uplink power equal to or higher than -39 dBm in the On-duration part of every DRX cycle in the subframe according the configured CQI reporting mode (PUCCH 1-0) during the period from time point A to time point F (1120 ms after the start of time duration T5) the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

8. Repeat steps 2-7 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

## 4.5.1.4.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1 with the following exceptions.

## Table 4.5.1.4.4.3-1: Common Exception messages for EN-DC FR1 Radio Link Monitoring In-Sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

TBD

#### 4.5.1.4.5 Test Requirement

The requirements in this section apply for each SSB based RLM-RS resource configured for PCell or PSCell, provided that the SSB configured for RLM are actually transmitted within UE active DL BWP during the entire evaluation period specified in section 4.5.1.4.3.

Table 4.5.1.4.5-1 defines the cell specific primary level settings.

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% with a confidence interval of 95%.

Table A.4.5.1.4.5-1: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in DRX mode

Parameter	Unit			Test 1		
		T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMRS to SSS	dB			4		
EPRE ratio of PDCCH to PDCCH DMRS	dB			0		
EPRE ratio of PBCH DMRS to SSS	dB					
EPRE ratio of PBCH to PBCH DMRS	dB					
EPRE ratio of PSS to SSS	dB					
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 Config 1, 4	dB	1	-7	-15	-4.5	1
Config 2, 5		1	-7	-15	-4.5	1
Config 3, 6		1	-7	-15	-4.5	1
M Config 1, 4	dBm/15			-98		
$N_{oc}$ Config 1, 4 Config 2, 5	KHz			-98		
Config 3, 6				-98		
Propagation condition			TDL-	C 300ns 1	00Hz	
Note 1: OCNG shall be used such that the					a constant to	otal
transmitted power spectral density is achieved for all OFDM symbols.						
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OC				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,		T5 is denot	ted as SNR	1, SNR2, S	SNR3, SNR4	4 and
SNR5 respectively in Figure A.4.	5.1.4.1-1.					

- Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.6.

#### 4.5.1.5 EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with CSI-RS-based RLM RS in non-DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- TT analysis is missing.
- RAN4 dependency: There are brackets and TBDs in core requirements and test parameters.

#### 4.5.1.5.1 Test purpose

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 TS 38.133 clause 8.1.

#### 4.5.1.5.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC and CSI-RS based RLM.

## 4.5.1.5.3 Minimum conformance requirements

The minimum requirements are specified in clause 4.5.1.0.3. DRX configuration is not used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.1.5.

## 4.5.1.5.4 Test description

The test consists of two subtests with two cells configured, the E-UTRA PCell and NR PSCell; the difference between the two subtests is whether the measurement gap is configured on the PCell and PSCell or not. Each subtest consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure 4.5.1.5.4-1 shows the three different time durations and the corresponding variation of the downlink SNR in the active cell to emulate out-of-sync states.

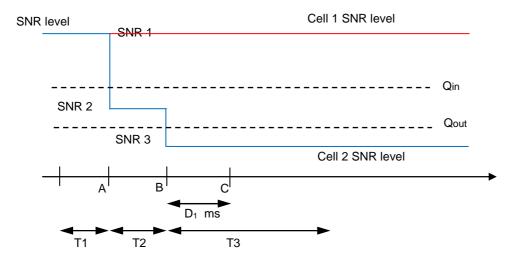


Figure 4.5.1.5.4-1: SNR variation for out-of-sync testing

## 4.5.1.5.4.1 Initial conditions

Test 4.5.1.5 can be run in one of the configurations defined in Table 4.5.1.5.4.1-1.

Table 4.5.1.5.4.1-1: Supported test configurations for FR1 PSCell

Configuration	Description	
4.5.1.5-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.1.5-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.1.5-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
4.5.1.5-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.1.5-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.1.5-6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
Note: The UE is only required to pass in one of the supported test configurations in FR1		

Configure the test equipment and the DUT according to the parameters in Table 4.5.1.5.4.1-2

Table 4.5.1.5.4.1-2: Initial conditions for CSI-RS In-sync radio link monitoring in non-DRX mode

Parameter	Value		Comment	
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.	
Test frequencies	As specified in Annex E, table E.2-1 and TS 38.508-1 [14] clause 4.3.1.			
Channel bandwidth	As specified	As specified by the test configuration selected from Table 4.5.1.6.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.	
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.	
Diagram	DUT Part	A.3.2.3.4		
Exceptions to connection diagram	N/A			

- 1. The test parameters are given in Table 4.5.1.5.4.1-2 below.
- 2. Message contents are defined in clause 4.5.1.5.4.3.
- 3. There are two cells in the test, where Cell 1 is the E-UTRAN PCell on the E-UTRA carrier, and Cell 2 is the NR PSCell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to TS 38.133 [6] Table A.6.1.1-1 for this test. Cell 2 is configured according to Annex C.1.1 and C.1.2.

Table 4.5.1.5.4.1-3: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
A .: 5 UTD 4 D	0 "		0.11.4
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
TDD	Config 1, 4		Not Applicable
Configuration	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.1.2
CORESET	Config 1, 4		CR. 1.1 FDD
Reference	Config 2, 5		CR. 1.1 TDD
Channel	Config 3, 6		CR. 2.1 TDD
SSB	Config 1, 4		SSB.1 FR1
Configuration	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC	Config 1, 2, 4, 5		SMTC.1
Configuration	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 KHz
subcarrier spacing	Config 3, 6		30 KHz
csi-RS-Index assi	gned as RLM RS		[0]
OCNG parameter	S		OCNG pattern 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-	dB	4
	RS RE energy		

	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			*[ <i>gp0</i> ]
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
NZP CSI-RS con	figuration		[Resourceld 1]
ZP CSI-RS config	guation		TBD
CSI-IM configura	tion		TBD
Periodic CSI repo	orting		PUCCH
CSI reporting	Config 1, 2, 4, 5	slot	[5]
periodicity	Config 3, 6		[10]
T1		S	1
T2		S	0.4
T3		S	[0.6]
D1		S	[0.24]
	ecific PDCCH is not transmitted af RAN is in non-DRX mode under tes		

Table 4.5.1.5.4.1-4: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

		Test 1
	Field	Value
	gapOffset	[0]
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned. (Ensure that RLM partially overlapped with m gap)	oundary RS is

Table 4.5.1.5.4.1-5: NZP-CSI-RS resource configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field	Resourceld 0	Resourceld 1	
i ieiu	Value	Value	
frequencyDomainA Ilocation <sup>Note 1</sup>	row1	row2	
startingRB	0	0	
nrofRBs	Note 2	Note 2	
Note 2: nrofRBs is	TS 38.211 [6] table 7.4.1.5.3-1 nrofRBs is derived based on the Configuration in Table A.4.5.1.5.1-1		

#### 4.5.1.5.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [5] or [10] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms).

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of Cell 2 according to T1 in Table 4.5.1.5.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 4.5.1.5.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.5.5-1. T3 starts.
- 5. If the SS:
  - a) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point B

and

b) does not detect any uplink power on NR carrier higher than OFF power defined in TS 38.521-1 [17] clause 6.3.2.5 from time point C (D1 after the start of T3) until T3 expires,

the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

- 6. When T3 expires the SS shall change the SNR value to T1 as specified in Table 4.5.1.5.5-1.
- 7. If the UE has not re-established the connection in at least 1s, the SS shall ensure PSCell is released.
- 8. The SS then shall transmit RRCConnectionReconfiguration message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.
- 9. If the Reconfiguration fails, switch off and on the UE and ensure the UE is in RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5].
- 10. Repeat steps 2-10 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

## 4.5.1.5.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause FFS with the following exceptions:

Table 4.5.1.5.4.3-1: Common Exception messages

Default Message Contents		
Common contents of system information		
blocks exceptions		
Default RRC messages and information FFS		
elements contents exceptions		

## 4.5.1.5.5 Test requirement

Tables 4.5.1.5.4.1-2 and 4.5.1.5.5-1 define the primary level settings including test tolerances for Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode.

Table 4.5.1.5.5-1: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Parameter		Unit	Test 1			
			T1	T2	T3	
PDCCH_beta		dB	4			
PDCCH_DMRS_beta		dB		4		
PBCH_beta		dB				
PSS_beta	a	dB				
SSS_beta	a	dB		0		
PDSCH_b	oeta	dB				
OCNG_be	eta	dB				
SNR	Config 1, 4	dB	TBD	TBD	TBD	
	Config 2, 5		TBD	TBD	TBD	
	Config 3, 6		TBD	TBD	TBD	
λI	Config 1, 4	dBm/15K	dBm/15K [-98]			
$N_{oc}$	Config 2, 5	Hz		[-98]		
Config 3, 6				[-98]		
Propagati	on condition		[TDL-C 300ns 100Hz]			
Note 1:	OCNG shall be used	d such that th	ne resources in Cell	2 are fully allocated	l and a constant	
	total transmitted pov					
Note 2:	The uplink resource	s for CSI rep	orting are assigned	to the UE prior to the	ne start of time	
	period T1.					
Note 3:	NZP CSI-RS resour		juration for CSI repo	orting are assigned t	o the UE prior to	
	the start of time peri					
Note 4:	Measurement gap o					
Note 5:	The timers and laye	r 3 filtering re	elated parameters a	re configurea prior t	o the start of time	
Note 6	period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.			nort of OCNC		
•					part of OCNG.	
					I SND3	
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.		IOININO				
Note 9:				n supports 2RX on a	it least one band	
Note 9: The SNR values are specified for testing a For testing of a UE which supports 4RX on						

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 slots configured for CQI transmission according the configured CQI reporting mode on PUCCH.

The UE shall stop transmitting uplink signal no later than time point C (D1 after the start of time duration T3).

The uplink signal is verified on the basis of the UE output power:

- UE output power equal to or higher than Transmit minimum power (as defined in TS 38.521-1 [17] clause 6.3.1.5) means uplink signal
- UE output power equal to or less than Transmit OFF power (as defined in TS 38.521-1 [17] clause 6.3.2.5) means no uplink signal.

The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

## 4.5.1.6 EN-DC FR1 radio link monitoring in-sync test for PSCell configured with CSI-RS-based RLM RS in non-DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- TT analysis is missing.
- RAN4 dependency: There are brackets and TBDs in core requirements and test parameters.

## 4.5.1.6.1 Test purpose

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 TS 38.133 clause 8.1.

## 4.5.1.6.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC and CSI-RS based RLM.

#### 4.5.1.6.3 Minimum conformance requirements

The minimum requirements are specified in clause 4.5.1.0.3. DRX configuration is not used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.1.6.

### 4.5.1.6.4 Test description

The test consists of two subtests with two cells configured, the E-UTRA PCell and NR PSCell; the difference between the two subtests is whether the measurement gap is configured on the PCell and PSCell or not. Each subtest consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 4.5.1.6.4-1 shows the five different time durations and the corresponding variation of the downlink SNR in the active cell to emulate in-sync states.

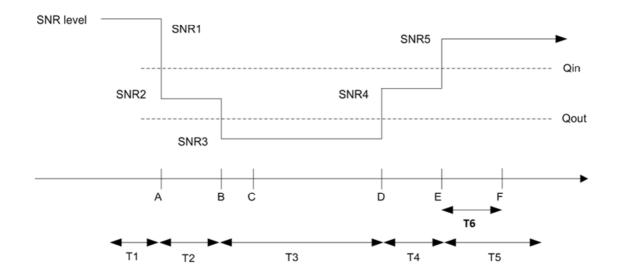


Figure 4.5.1.6.4-1: SNR variation for In-sync testing

## 4.5.1.6.4.1 Initial conditions

Test 4.5.1.6 can be run in one of the configurations defined in Table 4.5.1.6.4.1-1.

Table 4.5.1.6.4.1-1: Supported test configurations for FR1 PSCell

Configuration	Description	
4.5.1.6-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.1.6-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.1.6-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
4.5.1.6-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.1.6-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.1.6-6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
Note: The UE is only required to pass in one of the supported test configurations in FR1		

Configue the test equipment and the DUT according to the parameters in Table 4.5.1.6.4.1-2

Table 4.5.1.6.4.1-2: Initial conditions for CSI-RS In-sync radio link monitoring in non-DRX mode

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, table E.2-1 and TS 38.	508-1 [14] clause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 4.5.1.6.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

- 1. The test parameters are given in Table 4.5.1.6.4.1-2 below.
- 2. Message contents are defined in clause 4.5.1.6.4.3.
- 3. There are two cells in the test, where Cell 1 is the E-UTRAN PCell on the E-UTRA carrier, and Cell 2 is the NR PSCell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table A.6.1.1-1 for this test. Cell 2 is configured according to Annex C.1.1 and C.1.2.

Table 4.5.1.6.4.1-3: 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
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.1.2
CORESET	Config 1, 4		CR. 1.1 FDD
Reference Channel	Config 2, 5		CR. 1.1 TDD
	Config 3, 6		CR. 2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 KHz
subcarrier spacing	Config 3, 6		30 KHz

csi-RS-Index a	assigned as RLM RS		[0]
OCNG parameters			OCNG pattern 1
CP length			Normal
	Correlation Matrix and Antenna		[2x2 Low]
Configuration			
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to		
	average CSI-RS RE energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy to		
	average CSI-RS RE energy		
	DMDC		REG bundle size
	DMRS precoder granularity		
	REG bundle size		6
In sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to		
	average CSI-RS RE energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy to		
	average CSI-RS RE energy		
	DMRS precoder granularity		REG bundle size
DRX	REG bundle size		6 OFF
Gap pattern ID			[N.A.] Enabled
Layer 3 filtering	9		Eriabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
NZP CSI-RS c	onfiguration		[Resourceld 1]
ZP CSI-RS co	_		TBD
CSI-IM configu	uration		TBD
Periodic CSI reporting			PUCCH
CSI reporting	Config 1, 2, 4, 5	slot	[5]
periodicity	Config 1, 2, 4, 5  Config 3, 6	SIUL	[0] [10]
T1			<u>[10]</u> 1
T2		S S	0.4
T3			[0.6]
D1		S S	[0.24]
	specific PDCCH is not transmitte		
	TRAN is in non-DRX mode unde		

Table 4.5.1.6.4.1-4: Measurement gap configuration for FR1 CSI-RS In-sync radio link monitoring in non-DRX mode

		Test 4
	Field	Value
	gapOffset	IO1
		[0]
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned. (Ensure that RLM	oundary RS is
	partially overlapped with m	ieasurement

Table 4.5.1.6.4.1-5: NZP-CSI-RS resource configuration for FR1 CSI-RS In-sync radio link monitoring in non-DRX mode

Field		Resourceld 0	Resourceld 1
		Value	Value
frequencyDomainA Ilocation <sup>Note 1</sup>		row1	row2
startingR	В	0	0
nrofRBs		Note 2	Note 2
Note 1:	TS 38.211	[6] table 7.4.1.5.3-	1
Note 2: nrofRBs is		derived based on t	
Configurat		tion in Table A.4.5.1	.6.1-1

## 4.5.1.6.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [5] or [10] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements without gap.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of Cell 2 according to T1 in Table 4.5.1.6.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 4.5.1.6.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.6.5-1. T3 starts.
- 5. When T3 expires the SS shall change the SNR value to T4 as specified in Table 4.5.1.6.5-1. T4 starts.
- 6. When T4 expires the SS shall change the SNR value to T5 as specified in Table 4.5.1.6.5-1. T5 starts.
- 7. If the SS detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point F (T6 after the start of time duration T5) the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

8. After T5 expires, repeat steps 2-7 for both subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 4.5.1.6.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause FFS with the following exceptions:

Table 4.5.1.6.4.3-1: Common Exception messages

Default Message Contents		
Common contents of system information		
blocks exceptions		
Default RRC messages and information	FFS	
elements contents exceptions		

#### 4.5.1.6.5 Test requirement

Tables 4.5.1.6.4.1-2 and 4.5.1.6.5-1 define the primary level settings including test tolerances for Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode.

Table 4.5.1.6.5-1: 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		T3
PDCCH_	PDCCH_beta		4		
PDCCH_	DMRS_beta	dB		4	
PBCH_be	eta	dB			
PSS_beta	a	dB			
SSS_beta	a	dB		0	
PDSCH_	beta	dB			
OCNG_b	eta	dB			
SNR	Config 1, 4	dB	TBD	TBD	TBD
	Config 2, 5		TBD	TBD	TBD
	Config 3, 6		TBD	TBD	TBD
M	Config 1, 4	dBm/15KHz		[-98]	
$N_{oc}$	Config 2, 5			[-98]	
	Config 3, 6			[-98]	
Propagat	ion condition			[TDL-C 300ns 100Hz]	
Note 1:	OCNG shall be u	used such that th	ne resources in Cell	2 are fully allocated	l and a constant
			density is achieved t		
Note 2:		irces for CSI rep	orting are assigned	to the UE prior to the	ne start of time
	period T1.				
Note 3:			juration for CSI repo	orting are assigned t	o the UE prior to
	the start of time	ı			
Note 4:			is assigned to the U		
Note 5:		ayer 3 filtering re	related parameters are configured prior to the start of time		o the start of time
Note 6	period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCN		nort of OCNC		
Note 6: The signal contains PDCCH for UEs other that Note 7: SNR levels correspond to the signal to noise r				part of OCNG.	
Note 8:			and T3 is denoted a		I SNR3
THOLE U.	respectively in fig			is Givini, Givinz and	I OI VI CO
Note 9:			r testing a UE which	n supports 2RX on a	it least one band
			rts 4RX on all bands		

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 after the start of time duration T5) the UE shall transmit uplink signal at least in all slots configured for CQI transmission according to the configured CQI reporting mode on PUCCH.

The uplink signal is verified on the basis of the UE output power:

- UE output power equal to or higher than Transmit minimum power (as defined in TS 38.521-1 [17] clause 6.3.1.5) means uplink signal

The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

# 4.5.1.7 EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with CSI-RS-based RLM RS in DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- TT analysis is missing.
- RAN4 dependency: There are brackets and TBDs in core requirements and test parameters.

## 4.5.1.7.1 Test purpose

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 FR1 PSCell CSI-RS Out-of-sync radio link monitoring requirements in TS 38.133 clause 8.1.

## 4.5.1.7.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC, CSI-RS based RLM and long DRX cycle.

## 4.5.1.7.3 Minimum conformance requirements

The minimum requirements are specified in clause 4.5.1.0.3. DRX configuration is used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.1.7.

## 4.5.1.7.4 Test description

The test consists of two subtests with two cells configured, the E-UTRA PCell and NR PSCell; the difference between the two subtests is whether the measurement gap is configured on the PCell and PSCell or not. Each subtest consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure 4.5.1.7.4-1 shows the three different time durations and the corresponding variation of the downlink SNR in the active cell to emulate out-of-sync states.

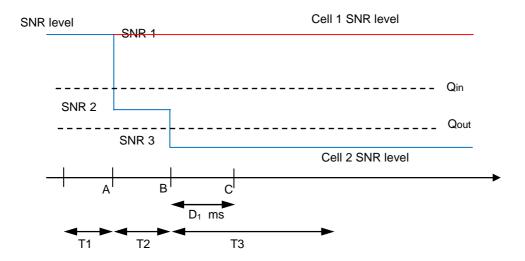


Figure 4.5.1.7.4-1: SNR variation for out-of-sync testing

#### 4.5.1.7.4.1 Initial conditions

Test 4.5.1.7 can be run in one of the configurations defined in Table 4.5.1.7.4.1-1.

Table 4.5.1.7.4.1-1: Supported test configurations for FR1 PSCell

Configuration	Description	
4.5.1.7-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.1.7-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.1.7-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
4.5.1.7-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.1.7-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.1.7-6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
Note: The UE is only required to pass in one of the supported test configurations in FR1		

Configue the test equipment and the DUT according to the parameters in Table 4.5.1.7.4.1-2

Table 4.5.1.7.4.1-2: Initial conditions for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	I in Annex E, table E.2-1 and TS 38.	508-1 [14] clause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 4.5.1.7.4.1-1.		rom Table 4.5.1.7.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	]
Exceptions to connection diagram	N/A		

- 1. The test parameters are given in Table 4.5.1.7.4.1-2 below.
- 2. Message contents are defined in clause 4.5.1.7.4.3.
- 3. There are two cells in the test, where Cell 1 is the E-UTRAN PCell on the E-UTRA carrier, and Cell 2 is the NR PSCell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table A.6.1.1-1 for this test. Cell 2 is configured according to Annex C.1.1 and C.1.2.

Table 4.5.1.7.4.1-3: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel	Number		1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.1.2
CORESET	Config 1, 4		CR. 1.1 FDD
Reference Channel	Config 2, 5		CR. 1.1 TDD
	Config 3, 6		CR. 2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
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
csi-RS-Index assigned	as RLM RS		[0]
OCNG parameters			OCNG pattern 1
CP length			Normal
Correlation Matrix and Configuration	l Antenna		[2x2 Low]
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		
	CSI-RS RE energy		

	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder	dB	4  REG bundle size
	granularity		NEO buridie 3ize
	REG bundle size		6
DRX			640
Gap pattern ID			[N.A.]
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
NZP CSI-RS co	nfiguration		[Resourceld 1]
ZP CSI-RS conf	figuation		TBD
CSI-IM configur	ation		TBD
Periodic CSI rep	porting		PUCCH
CSI reporting	Config 1, 2, 4, 5	slot	[5]
periodicity			[10]
T1		S	1
T2		S	0.4
T3	T3		[0.6]
D1		S	[0.24]
	pecific PDCCH is not transmi RAN is in non-DRX mode un		

Table 4.5.1.7.4.1-4: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in DRX mode

	Field	Test 6	
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)		

Table 4.5.1.7.4.1-5: NZP-CSI-RS resource configuration for FR1 CSI-RS out-of-sync radio link monitoring in DRX mode

eld	Resourceld 0	Resourceld 1
	Value	Value
DomainA ote 1	row1	row2
3	0	0
	Note 2	Note 2
: TS 38.211 [6] table 7.4.1.5.3-1 : nrofRBs is derived based on the		
,	DomainA  B  TS 38.211  nrofRBs is	Pld Value  DomainA row1  3 0  Note 2  TS 38.211 [6] table 7.4.1.5.3-

Table 4.5.1.7.4.1-6: DRX Configuration for FR1 CSI-RS out-of-sync radio link monitoring in DRX mode.

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

Table 4.5.1.7.4.1-7: TimeAlignmentTimer Configuration for FR1 CSI-RS out-of-sync radio link monitoring in DRX mode.

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

## 4.5.1.7.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [5] or [10] ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. The UE is configured to perform inter-frequency measurements without gap.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause FFS.
- 2. Set the parameters of Cell 2 according to T1 in Table 4.5.1.7.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 4.5.1.7.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.7.5-1. T3 starts.
- 5. If the SS:
  - a) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in the On-duration part of every DRX cycle in the slots configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point B

and

b) does not detect any uplink power on NR carrier higher than OFF power defined in TS 38.521-1 [17] clause 6.3.2.5 from time point C (D1 after the start of T3) until T3 expires,

the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

6. When T3 expires the SS shall change the SNR value to T1 as specified in Table 4.5.1.7.5-1.

- 7. If the UE has not re-established the connection in at least 1s, the UE is switched off and then on. Ensure the UE is in RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 8. Repeat steps 2-7 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

## 4.5.1.7.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause FFS with the following exceptions:

Table 4.5.1.7.4.3-1: Common Exception messages

Default Message Contents		
Common contents of system information		
blocks exceptions		
Default RRC messages and information	FFS	
elements contents exceptions		

#### 4.5.1.7.5 Test requirement

Tables 4.5.1.7.4.1-2 and 4.5.1.7.5-1 define the primary level settings including test tolerances for Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode.

Table 4.5.1.7.5-1: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter		Unit	Test 1		
			T1	T2	Т3
PDCCH_		dB	4		
PDCCH_	_DMRS_beta	dB		4	
PBCH_b	eta	dB			
PSS_bet	a	dB			
SSS_bet	a	dB		0	
PDSCH_	beta	dB			
OCNG_b	eta	dB			
SNR	Config 1, 4	dB	TBD	TBD	TBD
	Config 2, 5		TBD	TBD	TBD
	Config 3, 6		TBD	TBD	TBD
M	Config 1, 4	dBm/15KHz		[-98]	
$N_{oc}$	Config 2, 5		[-98]		
	Config 3, 6		[-98]		
Propagat	tion condition		[TDL-C 300ns 100Hz]		
Note 1:				and a constant	
	total transmitted pov	wer spectral densi	ty is achieved for	all OFDM symbo	ls.
Note 2:	The uplink resource	s for CSI reporting	g are assigned to	the UE prior to th	e start of time
	period T1.				
Note 3:	NZP CSI-RS resour		on for CSI reportir	ng are assigned to	o the UE prior
	to the start of time p				
Note 4:	Measurement gap o	configuration is ass	signed to the UE p	orior to the start o	f time period
N	T1.	0 (1)			
Note 5:	The timers and laye	r 3 filtering related	parameters are	configured prior to	o the start of
Note 6:	time period T1.				
Note 6.	Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.				
Note 7:				SNR3	
INOIG U.	respectively in figure A.4.5.1.7.1-1.			OIVINO	
Note 9:			ing a UF which su	innorts 2RX on a	t least one
	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].					

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 once every DRX cycle, in the On-duration part of the cycle in the slots configured for CQI transmission according the configured CQI reporting mode on PUCCH.

The UE shall stop transmitting uplink signal no later than time point C (D1 after the start of time duration T3).

The uplink signal is verified on the basis of the UE output power:

- UE output power equal to or higher than Transmit minimum power (as defined in TS 38.521-1 [17] clause 6.3.1.5) means uplink signal
- UE output power equal to or less than Transmit OFF power (as defined in TS 38.521-1 [17] clause 6.3.2.5) means no uplink signal.

The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

# 4.5.1.8 EN-DC FR1 radio link monitoring in-sync test for PSCell configured with CSI-RS-based RLM RS in DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- TT analysis is missing.
- RAN4 dependency: There are brackets and TBDs in core requirements and test parameters.

## 4.5.1.8.1 Test purpose

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 FR1 PSCell CSI-RS in-sync radio link monitoring requirements in TS 38.133 clause 8.1.

### 4.5.1.8.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC, CSI-RS based RLM and long DRX cycle.

## 4.5.1.8.3 Minimum conformance requirements

The minimum requirements are specified in clause 4.5.1.0.3. DRX configuration is used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.1.8.

## 4.5.1.8.4 Test description

The test consists of two subtests with two cells configured, the E-UTRA PCell and NR PSCell; the difference between the two subtests is whether the measurement gap is configured on the PCell and PSCell or not. Each subtest consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 4.5.1.8.4-1 shows the five different time durations and the corresponding variation of the downlink SNR in the active cell to emulate in-sync states.

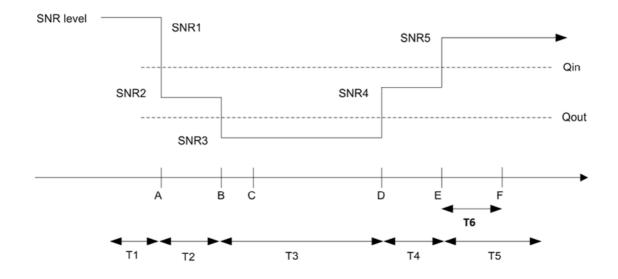


Figure 4.5.1.8.4-1: SNR variation for In-sync testing

## 4.5.1.8.4.1 Initial conditions

Test 4.5.1.8 can be run in one of the configurations defined in Table 4.5.1.8.4.1-1.

Table 4.5.1.8.4.1-1: Supported test configurations for FR1 PSCell

Configuration	Description	
4.5.1.8-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.1.8-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.1.8-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
4.5.1.8-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.1.8-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.1.8-6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
Note: The UE is only required to pass in one of the supported test configurations in FR1		

Configue the test equipment and the DUT according to the parameters in Table 4.5.1.8.4.1-2

Table 4.5.1.8.4.1-2: Initial conditions for CSI-RS In-sync radio link monitoring in DRX mode

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	I in Annex E, table E.2-1 and TS 38.	508-1 [14] clause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 4.5.1.8.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

- 1. The test parameters are given in Table 4.5.1.8.4.1-2 below.
- 2. Message contents are defined in clause 4.5.1.8.4.3.

3. There are two cells in the test, where Cell 1 is the E-UTRAN PCell on the E-UTRA carrier, and Cell 2 is the NR PSCell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table A.6.1.1-1 for this test. Cell 2 is configured according to Annex C.1.1 and C.1.2.

Table 4.5.1.8.4.1-3: General test parameters for FR1 PSCell for CSI-RS In-sync testing in DRX mode

P	arameter	Unit	Value
			Test 8
Active E-UTRA PCell			Cell 1
E-UTRA RF Char	nnel Number		1
Active PSCell			Cell 2
RF Channel Num			2
Duplex mode	Config 1, 4	4	FDD
TDD	Config 2, 3, 5, 6		TDD
TDD	Config 1, 4	_	Not Applicable
Configuration	Config 2, 5	-	TDDConf.1.1
CORESET	Config 3, 6 Config 1, 4		TDDConf.1.2 CR. 1.1 FDD
Reference	Config 1, 4	-	CR. 1.1 FDD
Channel	Config 3, 6		CR. 2.1 TDD
SSB	Config 1, 4		SSB.1 FR1
Configuration	Config 2, 5	-	SSB.1 FR1
Comigaration	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 csi-RS-Index assi			[0]
OCNG parameter			OCNG pattern 1
CP length	3		Normal
Correlation Matrix	and Antenna		[2x2 Low]
Configuration	and Amornia		[ZAZ ZOW]
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 CSI-RS RE		
	energy		
		dB	4
	Ratio of hypothetical PDCCH DMRS energy	uБ	4
	to average CSI-RS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		NEO Bariale 3/20
	REG bundle size		6
In sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		
	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to		
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy		
	to average CSI-RS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6

DRX			640
Gap pattern ID			*[ <i>gp0</i> ]
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
NZP CSI-RS co	nfiguration		[Resourceld 0]
ZP CSI-RS conf	figuation		TBD
CSI-IM configur	ation		TBD
Periodic CSI rep	oorting		PUCCH
CSI reporting	Config 1, 2, 4, 5	slot	[5]
periodicity	Config 3, 6		[10]
T1		S	1
T2		S	0.4
T3		S	[0.6]
D1		S	[0.44]
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			
Note 2: E-UT	RAN is in non-DRX mode	e under test.	

Table 4.5.1.8.4.1-4: Measurement gap configuration for FR1 CSI-RS In-sync radio link monitoring in DRX mode

Field		Test 8
	Field	
	gapOffset	[0]
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned. (Ensure that RLM partially overlapped with m gap)	oundary RS is

Table 4.5.1.8.4.1-5: NZP-CSI-RS resource configuration for FR1 CSI-RS In-sync radio link monitoring in DRX mode

Field		Resourceld 0	Resourceld 1
		Value	Value
frequency	yDomainA	row1	row2
Ilocation <sup>Note 1</sup>			
startingRB		0	0
nrofRBs	Note 2		Note 2
Note 1:	TS 38.211 [6] table 7.4.1.5.3-1		
Note 2:	nrofRBs is derived based on the		
Configuration in Table A.4.5.1.8.1-1			.8.1-1

Table 4.5.1.8.4.1-6: DRX Configuration for FR1 CSI-RS in-sync radio link monitoring in DRX mode.

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

Table 4.5.1.8.4.1-7: TimeAlignmentTimer Configuration for FR1 CSI-RS in-sync radio link monitoring in DRX mode.

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

#### 4.5.1.8.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [5] or [10] ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms).

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of Cell 2 according to T1 in Table 4.5.1.8.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 4.5.1.8.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.8.5-1. T3 starts.
- 5. When T3 expires the SS shall change the SNR value to T4 as specified in Table 4.5.1.8.5-1. T4 starts.
- 6. When T4 expires the SS shall change the SNR value to T5 as specified in Table 4.5.1.8.5-1. T5 starts.
- 7. If the SS detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in the On-duration part of every DRX cycle in the configured slots for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point F (T6 after the start of time duration T5) the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

8. After T5 expires, repeat steps 2-7 for both subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

## 4.5.1.8.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause FFS with the following exceptions:

Table 4.5.1.8.4.3-1: Common Exception messages

Default Message Contents			
Common contents of system information			
blocks exceptions			
Default RRC messages and information	FFS		
elements contents exceptions			

## 4.5.1.8.5 Test requirement

Tables 4.5.1.8.4.1-2 and 4.5.1.8.5-1 define the primary level settings including test tolerances for Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode.

Table 4.5.1.8.5-1: Cell specific test parameters for FR1 for CSI-RS In-sync radio link monitoring in DRX mode

PDCCH_beta	Parameter		Unit		Test 1	
PDCCH_DMRS_beta				T1	T2	T3
PBCH_beta	PDCCH_	beta	dB	4		
PSS_beta   dB   SSS_beta   dB   O	PDCCH_	DMRS_beta	dB		4	
SSS   beta   DBCH   D	PBCH_be	eta	dB			
PDSCH_beta   dB	PSS_beta	a	dB			
OCNG beta	SSS_beta	а	dB		0	
SNR Config 1, 4 dB TBD TBD TBD TBD  Config 3, 6 TBD TBD TBD TBD  Noc Config 1, 4 dBm/15KHz Config 2, 5 TBD TBD TBD  Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one	PDSCH_	beta	dB			
Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 1, 4 Config 2, 5 Config 3, 6 Config 4, 4 Config 4, 98 Config 4, 4 Confi	OCNG_b		dB			
Config 3, 6  Config 1, 4  Config 2, 5  Config 3, 6  Config 3, 6  Config 2, 5  Config 3, 6  Config 2, 5  Config 3, 6  Config 3, 6  Config 2, 5  Config 3, 6  Config 2, 5  Config 3, 6  Config 3, 6  Config 2, 5  Config 3, 6  Config 2, 5  Config 3, 6  Config 2, 5  Config 3, 6  Config 3, 6  Config 2, 5  Config 2, 5  Config 3, 6  Config 3, 6  Fe98  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.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one	SNR		dB	TBD	TBD	TBD
Noc Config 1, 4 Config 2, 5 [-98]  Config 3, 6 [-98]  Propagation condition [TDL-C 300ns 100Hz]  Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one		Config 2, 5		TBD	TBD	TBD
Noc Config 1, 4		Config 3, 6		TBD	TBD	TBD
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.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one	N		dBm/15KHz		[-98]	
Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one	<sup>1</sup> V <sub>oc</sub>	Config 2, 5			[-98]	
<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> <li>Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.</li> <li>Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one</li> </ul>		Config 3, 6			[-98]	
constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one	Propagat	ion condition		[T	DL-C 300ns 100h	lz]
<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> <li>Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.</li> <li>Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one</li> </ul>	Note 1:	OCNG shall be us	ed such that the r	esources in Cell 2	2 are fully allocate	ed and a
period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one		constant total tran	smitted power spe	ectral density is a	chieved for all OF	DM symbols.
<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> <li>Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.</li> <li>Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one</li> </ul>	Note 2:	The uplink resource	ces for CSI reporti	ng are assigned t	o the UE prior to	the start of time
to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one						
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T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one		to the start of time period T1.				
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one	Note 4:		configuration is a	ssigned to the UE	Eprior to the start	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 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one	N 5		0 (1)		<i>e</i> :	
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one	Note 5:		er 3 filtering relate	ed parameters are	e configurea prior	to the start of
OCNG.  Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one	Note C				no nort of	
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.  Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one	Note 6.				as part or	
Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.8.1-1.  Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one						
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				nd SNR3		
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one				IG OIVING		
[A.3.6].	9 10 10					

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 after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the ON-duration part of the cycle in the slots configured for CQI transmission according to the configured CQI reporting mode on PUCCH.

The uplink signal is verified on the basis of the UE output power:

- UE output power equal to or higher than Transmit minimum power (as defined in TS 38.521-1 [17] clause 6.3.1.5) means uplink signal

The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

## 4.5.2 Interruption

## 4.5.2.0 Minimum conformance requirements

4.5.2.0.1 Minimum conformance requirements for interruptions at transitions between active and non-active during DRX.

[TS 38.133, clause 8.2.1.2.1]

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

Each interruption shall not exceed X slot as defined in table 8.2.1.2.1-1.

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

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

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

The normative reference for this requirement is TS 38.133 [6] clause 8.2.1.2.1.

## 4.5.2.0.2 Minimum conformance requirements for interruptions during measurements on deactivated NR SCC

[TS 38.133, clause 8.2.1.2.5.1]

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

[TS 38.133, clause 8.2.2.2.3]

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

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

[TS 38.133, clause 8.2.2.2.2]

Table 8.2.2.2.1: Interruption duration for SCell activation/deactivation for inter-band CA

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

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

μ	NR Slot length (ms)	Interruption length			
0	1	1 + T <sub>SMTC_duration</sub>			
1	0.5	1 + T <sub>SMTC_duration</sub>			
2	0.25	2 + T <sub>SMTC_duration</sub>			
3	0.125	4 + T <sub>SMTC_duration</sub>			
- a k a -	C C C C C C C C C C C C C C C C C C C				

The normative reference for this requirement is TS 38.133 [6] clause 8.2.1.2.5.1.

## 4.5.2.0.3 Minimum conformance requirements for interruptions during measurements on deactivated E-UTRAN SCC

[TS 38.133 clause 8.2.1.2.5.2]

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

- an interruption on PSCell or any activated SCell with up to 0.5% probability of missed ACK/NACK when any of the configured *measCycleSCell* [2] for the deactivated E-UTRA SCells is 640 ms or longer.
- an interruption on PSCell or any activated SCell with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [2] for the deactivated E-UTRA SCells if indicated by the network using IE *allowInterruptions* [2].

Each interruption shall not exceed

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

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

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

The normative reference for this requirement is TS 38.133 [6] clause 8.2.1.2.5.1.

# 4.5.2.1 EN-DC FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

#### Editor's note:

- Message contents are not complete.
- Connection diagram is TBD.
- TT analysis is missing.
- RAN4 dependency: There are brackets and TBDs in core requirements and test parameters.

## 4.5.2.1.1 Test purpose

To verify E-UTRAN – NR Dual Connectivity UE's ability to complete PSCell interruption during LTE PCell DRX transitions within the missed ACK/NACK rate for NR PSCell in EN-DC requirements.

#### 4.5.2.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

#### 4.5.2.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.5.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.2.1.

## 4.5.2.1.4 Test description

### 4.5.2.1.4.1 Initial conditions

Test 4.5.2.1 can be run in one of the configurations defined in Table 4.5.2.1.4.1-1.

Table 4.5.2.1.4.1-1: Supported test configurations

Configuration	Description	
4.5.2.1-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.2.1-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.2.1-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
4.5.2.1-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.2.1-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.2.1-6	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		

Test Environment: Normal, as defined in TS 38.508-1 [14] clause 4.1.

Frequencies to be tested: According to Annex E Table E.2-1 and TS 38.508-1 [14] clause 4.4.2 and 4.3.1.

Channel Bandwidth to be tested: As specified by the test configuration selected from Table 4.5.2.1.4.1-1 and TS 38.508-1 [14] clause 4.3.1.

- 1. Connect the SS (node B emulator) and AWGN noise sources to the UE antenna connectors as shown in TS 38.508-1 [14] Annex A Figure TBD for UE part and Annex A Figure TBD for TE part.
- 2. The general test parameter settings are set up according to Table 4.5.2.1.4.1-2.
- 3. Propagation conditions are set according to Annex C.2.1.
- 4. Message contents are defined in clause 4.5.2.1.4.3.

5. There are one E-UTRAN carrier and one NR carrier and two cells in the test. Cell 1 is PCell on the E-UTRAN carrier, Cell 2 is PSCell on the NR carrier, Cell 1 is the cell used for connection setup with the power levels set according to Table A.6.1.1-1 for this test. Cell 2 is configured according to Annex C.1.1 and C.1.2.

Table 4.5.2.1.4.1-2: General test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to cell1 and cell 2
DRX		ON	DRX related parameters are defined in
			4.5.2.1.5-2
Measurement gap pattern		OFF	
Id		011	
T1	S	10	

## 4.5.2.1.4.2 Test procedure

The test consists of 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, 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.

- 1. Ensure the UE is in state FFS according to TS 38.508-1 [14] clause FFS.
- 2. Configure MCG according to TS 36.521-3 [26] Annex C.0, C.1 and SCG according to Annex C.1.1 and C.1.2 for all downlink physical channels.
- 3. The SS shall transmit an RRCConnectionReconfiguration message to configure PCell (Cell1) and PSCell (Cell2) on the MCG and SCG as per TS 36.508 [7] clause FFS with the message content exceptions defined in clause 4.5.2.1.4.3.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. The SS would ensure continuous transmission on PSCell, while not scheduling on PCell at least for 200 ms to ensure inactivity timer is expired on the UE for LTE PCell.
- 5. Set the parameters according to T1 in Table 4.5.2.1.5-1. Propagation conditions are set according to Annex C.2.1. T1 starts.
- SS schedules on PSCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor ACK/NACK/DTX on PSCell.
- 7. If more than 99% of uplink transmissions are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".
- 8. If no two consecutive DTX is observed by the SS, then count a success for the event "DTX". Otherwise count a fail for the event "DTX".
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS. (if the paging fails, switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS),

or

- switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS.

## 10. Repeat step 3-9 until a test verdict has been achieved

Each of the events "ACK/NACK" and "DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

## 4.5.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.6.1.5.4.3-1: Common Exception messages

Default Message Contents			
Common contents of system information			
blocks exceptions			
Default RRC messages and information	FFS		
elements contents exceptions			

## 4.5.2.1.5 Test requirement

Table 4.5.2.1.5.1-1 and 4.5.2.1.5-2 define the primary level settings including test tolerances for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC test.

Table 4.5.2.1.5-1: Cell specific test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter		Unit	Cell 2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
·	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5	1	TDDConf.1.1
	Config 3,6		TDDConf.2.1
BWchannel	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 BWP	Config 1,4		DLBWP.0.2 <sup>Note5</sup>
Configuration	Config 2,5		DLBWP.0.2 <sup>Note5</sup>
3	Config 3,6		DLBWP.0.2 <sup>Note5</sup>
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5	1	CR.1.1 TDD
paramotoro	Config 3,6	-	CR2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
paramotoro	Config 3,6		CCR.2.1 TDD
OCNG Patterns			OP.1
SMTC Configuration			SMTC.1
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
COD Comigaration	Config 3,6	1	SSB.2 FR1
Correlation Matrix and A			1x2 Low
Configuration			TAZ LOW
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS	S to SSS	1	
EPRE ratio of PBCH to PBC			
EPRE ratio of PDCCH DMF	RS to SSS		
EPRE ratio of PDCCH to P		dB	0
EPRE ratio of PDSCH DMF			
EPRE ratio of PDSCH to PI EPRE ratio of OCNG DMRS			
EPRE ratio of OCNG to OC		1	
N <sub>oc</sub> Note 2	NO DIVINO (Note 1)	dBm/15	
NOC		kHz	[-104]+TT
SS-RSRP Note 3		dBm/15	
		kHz	[-87] +TT
Ês/Iot		dB	17+TT
Ê <sub>s</sub> /N <sub>oc</sub>		dB	17+TT
Noc Note 2	Config 1,2,4,5	dBm/SCS	[-104] +TT
	Config 3,6	42,000	[-101] +TT
Io <sup>Note3</sup>		dBm/	[-59] +TT
	Config 1,2,4,5	9.36MHz	[ 00]
	0 " 6 5	dBm/	[-61.9] +TT
	Config 3,6	38.16MHz	[]
Time offset to cell1 Note 4		μς	33
Propagation Condition		F.0	AWGN
Note 1: OCNC shall h		th calla ara full	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

Note 5: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in TS 38.213 [3] section 12.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.

Note 3 SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.

Table 4.5.2.1.5-2: E-UTRAN PCell DRX-Configuration for E-UTRAN - NR FR1 interruption at transitions between active and non-active during DRX in synchronous DC

Field	Cell1	Comment
rieiu	Value	
onDurationTimer	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer <sup>Note 1</sup>	psf1	36.331
drx-RetransmissionTimer	psf1	
longDRX-CycleStartOffset	Sf160	
shortDRX	disable	
Note 1: UE is continuously scheduled in NR PSCell		

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 4.5.2.1.5-3.

Table 4.5.2.1.5-3: Interruption length X at transition between active and non-active during DRX

μ	NR Slot	Interruption length X
	length (ms)	Sync
0	1	1
1	0.5	1

The rate of correct events observed during repeated tests shall be at least 90%.

# 4.5.2.2 EN-DC FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Editor's note:

- Message contents are not complete.
- Connection diagram is TBD.
- TT analysis is missing.
- RAN4 dependency: There are brackets and TBDs in core requirements and test parameters.

## 4.5.2.2.1 Test purpose

To verify E-UTRAN – NR Dual Connectivity UE's ability to complete PSCell interruption during LTE PCell DRX transitions within the missed ACK/NACK rate for NR PSCell in asynchronous EN-DC requirements.

## 4.5.2.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

## 4.5.2.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.5.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.2.2.

## 4.5.2.2.4 Test description

#### 4.5.2.2.4.1 Initial conditions

Test 4.5.2.2 can be run in one of the configurations defined in Table 4.5.2.2.4.1-1.

Table 4.5.2.2.4.1-1: Supported test configurations

Configuration	Description	
4.5.2.2-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.2.2-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.2.2-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
4.5.2.2-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.2.2-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.2.2-6	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		

Test Environment: Normal, as defined in TS 38.508-1 [14] clause 4.1.

Frequencies to be tested: According to Annex E Table E.2-1 and TS 38.508-1 [14] clause 4.4.2 and 4.3.1.

Channel Bandwidth to be tested: As specified by the test configuration selected from Table 4.5.2.2.4.1-1 and TS 38.508-1 [14] clause 4.3.1.

- 1. Connect the SS (node B emulator) and AWGN noise sources to the UE antenna connectors as shown in TS 38.508-1 [14] Annex A Figure TBD for UE part and Annex A Figure TBD for TE part.
- 2. The general test parameter settings are set up according to Table 4.5.2.2.4.1-2.
- 3. Propagation conditions are set according to Annex C.2.1.
- 4. Message contents are defined in clause 4.5.2.2.4.3.
- 5. There are one E-UTRAN carrier and one NR carrier and two cells in the test. Cell 1 is PCell on the E-UTRAN carrier, Cell 2 is PSCell on the NR carrier. Cell 1 is the cell used for connection setup with the power levels set according to Table A.6.1.1-1 for this test. Cell 2 is configured according to Annex C.1.1 and C.1.2.

Table 4.5.2.2.4.1-2: General test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to cell1 and cell 2
DRX		ON	DRX related parameters are defined in 4.5.2.2.5-2
Measurement gap pattern Id		OFF	
T1	S	10	

## 4.5.2.2.4.2 Test procedure

The test consists of 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, 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.

- 1. Ensure the UE is in state FFS according to TS 38.508-1 [14] clause FFS.
- 2. Configure MCG according to TS 36.521-3 [26] Annex C.0, C.1 and SCG according to Annex C.1.1 and C.1.2 for all downlink physical channels.
- 3. The SS shall transmit an RRCConnectionReconfiguration message to configure PCell (Cell1) and PSCell (Cell2) on the MCG and SCG as per TS 36.508 [7] clause FFS with the message content exceptions defined in clause 4.5.2.2.4.3.

- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. The SS would ensure continuous transmission on PSCell, while not scheduling on PCell at least for 200 ms to ensure inactivity timer is expired on the UE for LTE PCell.
- 5. Set the parameters according to T1 in Table 4.5.2.2.5-1. Propagation conditions are set according to Annex C.2.1. T1 starts.
- SS schedules on PSCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor ACK/NACK/DTX on PSCell.
- 7. If more than 99% of uplink transmissions are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".
- 8. If no two consecutive DTX is observed by the SS, then count a success for the event "DTX". Otherwise count a fail for the event "DTX".
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS. (if the paging fails, switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS),

or

- switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS.
- 10. Repeat step 3-9 until a test verdict has been achieved

Each of the events "ACK/NACK" and "DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

## 4.5.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.6.1.5.4.3-1: Common Exception messages

Default Message Contents		
Common contents of system information		
blocks exceptions		
Default RRC messages and information	FFS	
elements contents exceptions		

## 4.5.2.2.5 Test requirement

Table 4.5.2.2.5.1-1 and 4.5.2.2.5-2 define the primary level settings including test tolerances for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC test.

Table 4.5.2.2.5-1: Cell specific test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter		Unit	Cell 2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
•	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
3	Config 2,5		TDDConf.1.1
	Config 3,6	1	TDDConf.2.1
BWchannel	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 BWP	Config 1,4		DLBWP.0.2 <sup>Note5</sup>
Configuration	Config 2,5	1	DLBWP.0.2 <sup>Note5</sup>
ooga.ao	Config 3,6	1	DLBWP.0.2 <sup>Note5</sup>
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5	-	SR.1.1 TDD
mododromont ondinior	Config 3,6	-	SR2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 1,4	1	CR.1.1 FDD CR.1.1 TDD
parameters	Config 3,6	-	CR2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
	Config 1,4	_	CCR.1.1 FDD
parameters		4	CCR.1.1 TDD
OCNC Detterns	Config 3,6		
OCNG Patterns			OP.1
SMTC Configuration	To " 1015		SMTC.1
SSB Configuration	Config 1,2,4,5	_	SSB.1 FR1
Config 3,6			SSB.2 FR1
Correlation Matrix and A	intenna		1x2 Low
Configuration			
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS	2 to 666	4	
EPRE ratio of PBCH to PBC			
EPRE ratio of PDCCH DMF		-	
EPRE ratio of PDCCH to P	DCCH DMRS	dB	0
EPRE ratio of PDSCH DMF		1 "-	
EPRE ratio of PDSCH to P			
EPRE ratio of OCNG DMR			
EPRE ratio of OCNG to OC	NG DMRS (Note 1)		
N <sub>oc</sub> Note 2		dBm/15 kHz	[-104]+TT
SS-RSRP Note 3		dBm/15 kHz	[-87] +TT
Ê <sub>s</sub> /I <sub>ot</sub>		dB	17+TT
Ê <sub>s</sub> /N <sub>oc</sub>		dB	17+TT
Noc Note 2	Config 1,2,4,5	dBm/SCS	[-104] +TT
<del></del>	Config 3,6	1	[-101] +TT
Io <sup>Note3</sup>	Config 1,2,4,5	dBm/ 9.36MHz	[-59] +TT
	Config 3,6	dBm/	[-61.9] +TT
		38.16MHz	
Time offset to cell1 Note 4		μs	500
Propagation Condition			AWGN
Note 1. OCNC shall b		th calla ara full	v allocated and a constant total transmitted = =:::==

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.

Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

Note 5: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in TS 38.213 [3] section 12.

Table 4.5.2.2.5-2: E-UTRAN PCell DRX-Configuration for E-UTRAN - NR FR1 interruption at transitions between active and non-active during DRX in asynchronous DC

Field	Cell1	Comment
rieiu	Value	
onDurationTimer	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer <sup>Note 1</sup>	psf1	36.331
drx-RetransmissionTimer	psf1	
longDRX-CycleStartOffset	Sf160	
shortDRX	disable	
Note 1: UE is continuously scheduled in NR PSCell		

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 4.5.2.2.5-3.

Table 4.5.2.2.5-3: Interruption length X at transition between active and non-active during DRX

μ	NR Slot	Interruption length X
	length (ms)	Async
0	1	2
1	0.5	2

The rate of correct events observed during repeated tests shall be at least 90%.

# 4.5.2.3 EN-DC FR1 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Editor's note:

- Message contents are not complete.
- Connection diagram is TBD.
- TT analysis is missing.
- RAN4 dependency: There are brackets and TBDs in core requirements and test parameters.

## 4.5.2.3.1 Test purpose

To verify E-UTRAN – NR Dual Connectivity UE's ability to complete PSCell interruptions during the measurement on the deactivated NR SCC within the missed ACK/NACK rate for NR PSCell in EN-DC requirements..

## 4.5.2.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

## 4.5.2.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.5.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.2.3.

## 4.5.2.3.4 Test description

#### 4.5.2.3.4.1 Initial conditions

Test 4.5.2.3 can be run in one of the configurations defined in Table 4.5.2.3.4.1-1.

Table 4.5.2.3.4.1-1: Supported test configurations

Configuration	Description	
4.5.2.3-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.2.3-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.2.3-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
4.5.2.3-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.2.3-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.2.3-6	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		

Test Environment: Normal, as defined in TS 38.508 [14] clause 4.1.

Frequencies to be tested: According to Annex E Table E.1-1 and TS 38.508 [14] clause 4.4.2 and 4.3.1.

Channel Bandwidth to be tested: As specified by the test configuration selected from Table 4.5.2.3.4.1-1 and TS 38.508-1 [14] clause 4.3.1.

- 1. Connect the SS (node B emulator) and AWGN noise sources to the UE antenna connectors as shown in TS 38.508 [14] Annex A, Figure TBD for UE part and Annex A, Figure TBD for TE part.
- 2. The general test parameter settings are set up according to Table 4.5.2.3.4.1-2.
- 3. Propagation conditions are set according to Annex [C.2.1]
- 4. Message contents are defined in clause 4.5.2.3.4.3.
- 5. There are one E-UTRAN carrier and two NR carriers and three cells specified in the test. Cell 1 is the PCell on E-UTRAN carrier, Cell 2 is the PSCell on one NR carrier and Cell 3 is the SCell on the other NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table A.6.1.1-1. Cell 2 and Cell 3 shall be configured according to Annex C.1.1 and C.1.2.

Table 4.5.2.3.4.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Active PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		OFF	
SCell measurement cycle	ms	640	
(measCycleSCell)	1113	040	
T1	S	10	

## 4.5.2.3.4.2 Test procedure

The test consists of three cells: Cell1, Cell2 and Cell3. Cell1 is E-UTRAN PCell, Cell2 is NR PSCell and Cell3 is deactivated NR SCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1, Cell2 and Cell3. Cell1 shall be configured as E-UTRAN PCell, Cell2 shall be configured as NR PSCell and Cell3 shall be configured as NR deactivated SCell. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1 the UE shall be continuously scheduled on E-UTRAN PCell and NR PSCell.

1. Ensure the UE is in state FFS according to TS 38.508-1 [14] clause TBD.

- 2. Configure MCG according to TS 36.521-3 [26] Annex C.0, C.1 and SCG according to Annex C.1.1 and C.1.2 for all downlink physical channels.
- 3. The SS shall transmit an RRCConnectionReconfiguration message including measCycleSCell or allowInterruptions for the deactivated NR SCell.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. Set the parameters according to T1 in Table 5.5.2.3.5-1. Propagation conditions are set according to Annex C.2.1. T1 starts.
- 6. SS schedules on PSCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor ACK/NACK/DTX on PSCell.
- 7. If more than 99.5% of uplink transmissions are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".
- 8. If no two consecutive DTX is observed by the SS, then count a success for the event "DTX". Otherwise count a fail for the event "DTX".
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS. (if the paging fails, switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS),

or

- switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS.
- 10. Repeat step 3-9 until a test verdict has been achieved.

Each of the events "ACK/NACK" and "DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

### 4.5.2.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.5.2.3.4.3-1: Common Exception messages

Default Message Contents				
Common contents of system information				
blocks exceptions				
Default RRC messages and information	FFS			
elements contents exceptions				

#### 4.5.2.3.5 Test requirement

Table 4.5.2.3.5-1 defines the primary level settings including test tolerances for E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in synchronous EN-DC test configurations.

Table 4.5.2.3.5-1: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parame	ter	Unit	Cell 2	Cell 3
Frequency Range			FR1	FR1
Duplex mode	Config 1,4		FDD	FDD
·	Config 2,3,5,6	1	TDD	TDD
TDD configuration	Config 1,4		Not Applicable	Not Applicable
· ·	Config 2,5	1	TDDConf.1.1	TDDConf.1.1
	Config 3,6	1	TDDConf.2.1	TDDConf.2.1
BW <sub>channel</sub>	Config 1,4		10: N <sub>RB,c</sub> = 52	10: N <sub>RB,c</sub> = 52
	Config 2,5	1	10: N <sub>RB,c</sub> = 52	10: N <sub>RB,c</sub> = 52
	Config 3,6	1	40: N <sub>RB,c</sub> = 106	40: N <sub>RB,c</sub> = 106
Initial BWP	Config 1,4		DLBWP.0.2 <sup>Note6</sup>	DLBWP.0.2 Note6
Configuration	Config 2,5	1	DLBWP.0.2 Note6	DLBWP.0.2 Note6
· ·	Config 3,6	1	DLBWP.0.2 Note6	DLBWP.0.2 Note6
PDSCH Reference	Config 1,4		SR.1.1 FDD	-
measurement channel	Config 2,5	1	SR.1.1 TDD	-
	Config 3,6	1	SR2.1 TDD	-
RMSI CORESET	Config 1,4		CR.1.1 FDD	CR.1.1 FDD
parameters	Config 2,5	1	CR.1.1 TDD	CR.1.1 TDD
•	Config 3,6	1	CR2.1 TDD	CR2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD	CCR.1.1 FDD
parameters	Config 2,5	1	CCR.1.1 TDD	CCR.1.1 TDD
•	Config 3,6	1	CCR.2.1 TDD	CCR.2.1 TDD
OCNG Patterns	, ,		OP.1	OP.1
SMTC Configuration			SMTC.1	SMTC.1
SSB Configuration	Config 1,2,4,5		SSB.1 FR1	SSB.1 FR1
S	Config 3,6	1	SSB.2 FR1	SSB.2 FR1
Correlation Matrix and Antenna			1x2 Low	1x2 Low
Configuration				
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS				
EPRE ratio of PBCH to PBC				
EPRE ratio of PDCCH DMF EPRE ratio of PDCCH to PI		dB	0	0
EPRE ratio of PDSCH DMF		ub	0	U
EPRE ratio of PDSCH to PI	DSCH	-		
EPRE ratio of OCNG DMRS				
EPRE ratio of OCNG to OC		1		
Noc <sup>Note 2</sup>		dBm/15	[-104]+TT	[-104] +TT
		kHz	[-104]+11	[-104] +11
SS-RSRP Note 3		dBm/15	[-87] +TT	[-87] +TT
		kHz		
Ê <sub>s</sub> /I <sub>ot</sub>		dB	17+TT	17+TT
Ês/Noc		dB	17+TT	17+TT
Noc <sup>Note 2</sup>	Config 1,2,4,5	dBm/SCS	[-104] +TT	[-104] +TT
	Config 3,6		[-101] +TT	[-101] +TT
Io <sup>Note3</sup>	Config 1,2,4,5	dBm/ 9.36MHz	[-59] +TT	[-59] +TT
	Config 3,6	dBm/ 38.16MHz	[-61.9] +TT	[-61.9] +TT
Time offset to cell1 Note 4		μs	33	33
Time offset to cell2 Note 5		μs	-	3
Propagation Condition			AWGN	AWGN
	e used such that ho	th cells are fully	allocated and a constant total	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.
- Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells
- Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
- Note 6: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in TS 38.213 [3] section 12.

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 4.5.2.3.5-2 if the NR PSCell is not in the same band as the deactivated SCell or Table 4.5.2.3.5-3 if the NR PSCell is in the same band as the deactivated SCell.

Table 4.5.2.3.5-2: 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 4.5.2.3.5-3: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

The rate of correct events observed during repeated tests shall be at least 90%.

# 4.5.2.4 EN-DC FR1 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Editor's note:

- Message contents are not complete.
- Connection diagram is TBD.
- TT analysis is missing.
- RAN4 dependency: There are brackets and TBDs in core requirements and test parameters.

#### 4.5.2.4.1 Test purpose

To verify E-UTRAN – NR Dual Connectivity UE's ability to complete PSCell interruptions during the measurement on the deactivated NR SCC within the missed ACK/NACK rate for NR PSCell in EN-DC requirements..

#### 4.5.2.4.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

#### 4.5.2.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.5.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.2.4.

## 4.5.2.4.4 Test description

## 4.5.2.4.4.1 Initial conditions

Test 4.5.2.4 can be run in one of the configurations defined in Table 4.5.2.4.4.1-1.

Table 4.5.2.4.4.1-1: Supported test configurations

Configuration	Description		
4.5.2.4-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.5.2.4-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.5.2.4-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
4.5.2.4-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.5.2.4-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.5.2.4-6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
Note: The UE is o	Note: The UE is only required to be tested in one of the supported test configurations		

Test Environment: Normal, as defined in TS 38.508 [14] clause 4.1.

Frequencies to be tested: According to Annex E Table E.1-1 and TS 38.508 [14] clause 4.4.2 and 4.3.1.

Channel Bandwidth to be tested: As specified by the test configuration selected from Table 4.5.2.4.4.1-1 and TS 38.508-1 [14] clause 4.3.1.

- 1. Connect the SS (node B emulator) and AWGN noise sources to the UE antenna connectors as shown in TS 38.508 [14] Annex A, Figure TBD for UE part and Annex A, Figure TBD for TE part.
- 2. The general test parameter settings are set up according to Table 4.5.2.4.4.1-2.
- 3. Propagation conditions are set according to Annex [C.2.1]
- 4. Message contents are defined in clause 4.5.2.4.4.3.
- 5. There are one E-UTRAN carrier and two NR carriers and three cells specified in the test. Cell 1 is the PCell on E-UTRAN carrier, Cell 2 is the PSCell on one NR carrier and Cell 3 is the SCell on the other NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table A.6.1.1-1. Cell 2 and Cell 3 shall be configured according to Annex C.1.1 and C.1.2.

Table 4.5.2.4.4.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Active PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		OFF	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

#### 4.5.2.4.4.2 Test procedure

The test consists of three cells: Cell1, Cell2 and Cell3. Cell1 is E-UTRAN PCell, Cell2 is NR PSCell and Cell3 is deactivated NR SCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1, Cell2 and Cell3. Cell1 shall be configured as E-UTRAN PCell, Cell2 shall be configured as NR PSCell and Cell3 shall be configured as NR deactivated SCell. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1 the UE shall be continuously scheduled on E-UTRAN PCell and NR PSCell.

1. Ensure the UE is in state FFS according to TS 38.508-1 [14] clause TBD.

- 2. Configure MCG according to TS 36.521-3 [26] Annex C.0, C.1 and SCG according to Annex C.1.1 and C.1.2 for all downlink physical channels.
- 3. The SS shall transmit an RRCConnectionReconfiguration message including measCycleSCell or allowInterruptions for the deactivated NR SCell.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. Set the parameters according to T1 in Table 5.5.2.3.5-1. Propagation conditions are set according to Annex C.2.1. T1 starts.
- 6. SS schedules on PSCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor ACK/NACK/DTX on PSCell.
- 7. If more than 99.5% of uplink transmissions are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".
- 8. If no two consecutive DTX is observed by the SS, then count a success for the event "DTX". Otherwise count a fail for the event "DTX".
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS. (if the paging fails, switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS),

or

- switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS.
- 10. Repeat step 3-9 until a test verdict has been achieved.

Each of the events "ACK/NACK" and "DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

### 4.5.2.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.5.2.4.4.3-1: Common Exception messages

Default Message Contents				
Common contents of system information				
blocks exceptions				
Default RRC messages and information	FFS			
elements contents exceptions				

#### 4.5.2.4.5 Test requirement

Table 4.5.2.4.5-1 defines the primary level settings including test tolerances for E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC test configurations.

Table 4.5.2.4.5-1: 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			FR1	FR1
Duplex mode	Config 1,4		FDD	FDD
	Config 2,3,5,6		TDD	TDD
TDD configuration	Config 1,4		Not Applicable	Not Applicable
_	Config 2,5		TDDConf.1.1	TDDConf.1.1
	Config 3,6		TDDConf.2.1	TDDConf.2.1
BW <sub>channel</sub>	Config 1,4		10: $N_{RB,c} = 52$	10: N <sub>RB,c</sub> = 52
	Config 2,5		10: N <sub>RB,c</sub> = 52	10: N <sub>RB,c</sub> = 52
	Config 3,6		40: N <sub>RB,c</sub> = 106	40: N <sub>RB,c</sub> = 106
Initial BWP	Config 1,4		DLBWP.0.2 <sup>Note6</sup>	DLBWP.0.2 Note6
Configuration	Config 2,5		DLBWP.0.2 Note6	DLBWP.0.2 Note6
_	Config 3,6		DLBWP.0.2 Note6	DLBWP.0.2 Note6
PDSCH Reference	Config 1,4		SR.1.1 FDD	-
measurement channel	Config 2,5	1	SR.1.1 TDD	-
	Config 3,6		SR2.1 TDD	-
RMSI CORESET	Config 1,4		CR.1.1 FDD	CR.1.1 FDD
parameters	Config 2,5	1	CR.1.1 TDD	CR.1.1 TDD
,	Config 3,6		CR2.1 TDD	CR2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD	CCR.1.1 FDD
parameters	Config 2,5	1	CCR.1.1 TDD	CCR.1.1 TDD
p on on the control of	Config 3,6		CCR.2.1 TDD	CCR.2.1 TDD
OCNG Patterns	Comig o,o		OP.1	OP.1
SMTC Configuration			SMTC.1	SMTC.1
SSB Configuration	Config 1,2,4,5		SSB.1 FR1	SSB.1 FR1
CCD Cornigaration	Config 3,6	1	SSB.2 FR1	SSB.2 FR1
Correlation Matrix and Antenna			1x2 Low	1x2 Low
Configuration				
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PB0				
EPRE ratio of PDCCH DMF			_	
EPRE ratio of PDCCH to P	DCCH DMRS	dB	0	0
EPRE ratio of PDSCH DMF EPRE ratio of PDSCH to P		-		
EPRE ratio of OCNG DMR		1		
EPRE ratio of OCNG to OC				
Noc <sup>Note 2</sup>		dBm/15		
1 100		kHz	[-104]+TT	[-104] +TT
SS-RSRP Note 3		dBm/15	[ 0.7] TT	1 071 TT
-		kHz	[-87] +TT	[-87] +TT
Ê <sub>s</sub> /I <sub>ot</sub>		dB	17+TT	17+TT
Ê <sub>s</sub> /N <sub>oc</sub>		dB	17+TT	17+TT
Noc <sup>Note 2</sup>	Config 1,2,4,5	dBm/S	[-104] +TT	[-104] +TT
	• • • • • • • • • • • • • • • • • • • •	1	[-101] +TT	[-101] +TT
	Config 3,6		r - 1 · · ·	
Io <sup>Note3</sup>	Config 1,2,4,5	dBm/ 9.36MHz	[-59] +TT	[-59] +TT
	Config 3,6	dBm/ 38.16MHz	[-61.9] +TT	[-61.9] +TT
Time offset to cell1 Note 4		μs	3	3
Time offset to cell <sup>2</sup> Note 5		· · · · · · · · · · · · · · · · · · ·		3
		μs	- A\A/CNI	
Propagation Condition			AWGN	AWGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for 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
- Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
- Note 6: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in TS 38.213 [3] section 12.

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 4.5.2.4.5-2 if the NR PSCell is not in the same band as the deactivated SCell or Table 4.5.2.4.5-3 if the NR PSCell is in the same band as the deactivated SCell.

Table 4.5.2.4.5-2: 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 4.5.2.4.5-3: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

The rate of correct events observed during repeated tests shall be at least 90%.

# 4.5.2.5 EN-DC FR1 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

#### Editor's note:

- Message contents are missing.
- Some parts of TC is TBD.
- Connection diagram is TBD.
- Test tolerance is missing.
- Cell mapping is missing

#### 4.5.2.5.1 Test purpose

To verify E-UTRAN – NR Dual Connectivity UE's ability to complete PSCell interruptions during the measurement on E-UTRAN SCC within the missed ACK/NACK rate for NR PSCell in EN-DC requirements..

## 4.5.2.5.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

#### 4.5.2.5.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.5.2.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.2.5.

## 4.5.2.5.4 Test description

#### 4.5.2.5.4.1 Initial conditions

Test 4.5.2.5 can be run in one of the configurations defined in Table 4.5.2.5.4.1-1.

Table 4.5.2.5.4.1-1: Supported test configurations

Configuration	Description		
4.5.2.5-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.5.2.5-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.5.2.5-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
4.5.2.5-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.5.2.5-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.5.2.5-6	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			

Test Environment: Normal, as defined in TS 38.508 [14] clause 4.1.

Frequencies to be tested: According to Annex E Table E.1-1 and TS 38.508 [14] clause 4.4.2 and 4.3.1.

Channel Bandwidth to be tested: As specified by the test configuration selected from Table Table 4.5.2.5.4.1-1 and TS 38.508-1 [14] clause 4.3.1.

- 1. Connect the SS (node B emulator) and AWGN noise sources to the UE antenna connectors as shown in TS 38.508 [14] Annex A, Figure TBD for UE part and Annex A, Figure TBD for TE part.
- 2. The general test parameter settings are set up according to Table 4.5.2.5.4.1-2.
- 3. Propagation conditions are set according to Annex [C.2.1]
- 4. Message contents are defined in clause 4.5.2.5.4.3.
- 5. There are two E-UTRAN carriers and one NR carrier and three cells specified in the test. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. Cell 1 is the cell used for connection setup with the power level set according to Table A.6.1.1-1. Cell 2 and Cell 3 shall be configured according to Annex C.1.1 and C.1.2.

Table 4.5.2.5.4.1-2: General test parameters for E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Active PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		OFF	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

#### 4.5.2.5.4.2 Test procedure

The test consists of three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1, Cell2 and Cell3. Cell1 shall be configured as E-UTRAN PCell, Cell2 shall be configured as NR PSCell and Cell3 shall be configured as NR deactivated SCell. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the E-UTRAN NR SCells is received by the UE, defines the start of time period T1. During T1 the UE shall be continuously scheduled on E-UTRAN PCell and NR PSCell.

1. Ensure the UE is in state FFS according to TS 38.508-1 [14] clause TBD.

- 2. Configure MCG according to TS 36.521-3 [26] Annex C.0, C.1 and SCG according to Annex C.1.1 and C.1.2 for all downlink physical channels.
- 3. The SS shall transmit an RRCConnectionReconfiguration message including measCycleSCell or allowInterruptions for the deactivated NR SCell to perform measurements on the deactivated SCC.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. Set the parameters according to T1 in Table 5.5.2.3.5-1. Propagation conditions are set according to Annex C.2.1. T1 starts.
- 6. SS schedules on PSCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor ACK/NACK/DTX on PSCell.
- 7. If more than 99.5% of uplink transmissions are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".
- 8. If no two consecutive DTX is observed by the SS, then count a success for the event "DTX". Otherwise count a fail for the event "DTX".
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS. (if the paging fails, switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS),

or

- switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS.
- 10. Repeat step 3-9 until a test verdict has been achieved.

Each of the events "ACK/NACK" and "DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

### 4.5.2.5.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 4.5.2.5.4.3-1: Common Exception messages

Default Message Contents				
Common contents of system information				
blocks exceptions				
Default RRC messages and information	FFS			
elements contents exceptions				

#### 4.5.2.5.5 Test requirement

Table 4.5.2.5.5-1 defines the primary level settings including test tolerances for E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC test configurations.

Table 4.5.2.5.5-1: NR cell specific test parameters for E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter		Unit	Cell 2
Frequency Range			FR1
Duplex mode			FDD
•	Config 2,3,5,6	1	TDD
TDD configuration	Config 1,4		Not Applicable
9	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BWchannel	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
Initial BWP	Config 1,4		DLBWP.0.2 <sup>Note5</sup>
Configuration	Config 2,5		DLBWP.0.2 <sup>Note5</sup>
3	Config 3,6		DLBWP.0.2 <sup>Note5</sup>
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
medearement ename.	Config 3,6	-	SR2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5	-	CR.1.1 TDD
parameters	Config 3,6	-	CR2.1 TDD
RMC CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 1,4	-	CCR.1.1 TDD
parameters	Config 2,5	-	CCR.2.1 TDD
OCNG Patterns	Coning 3,6		OP.1
SMTC Configuration	0		SMTC.1
SSB Configuration	Config 1,2,4,5	4	SSB.1 FR1
Config 3,6			SSB.2 FR1
Correlation Matrix and Antenna			1x2 Low
Configuration EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS	2 to 222	-	
EPRE ratio of PBCH to PBC		-	
EPRE ratio of PDCCH DMF			
EPRE ratio of PDCCH to PI		dB	0
EPRE ratio of PDSCH DMR			
EPRE ratio of PDSCH to PI	DSCH		
EPRE ratio of OCNG DMRS			
EPRE ratio of OCNG to OC	NG DMRS (Note 1)		
N <sub>oc</sub> Note 2		dBm/15 kHz	[-104] +TT
SS-RSRP Note 3		dBm/15 kHz	[-87] +TT
Ê <sub>s</sub> /I <sub>ot</sub>		dB	17+TT
Ê <sub>s</sub> /N <sub>oc</sub>		dB	17+TT
Noc <sup>Note 2</sup>	Config 1,2,4,5	dBm/SCS	[-104] +TT
	Config 3,6	]	[-101] +TT
Io <sup>Note3</sup>		dBm/	[-59] +TT
	Config 1,2,4,5	9.36MHz	f1
	0 " 00	dBm/	[-61.9] +TT
	Config 3,6	38.16MHz	r4 · · ·
Time offset to cell1 Note 4	L	μς	33
Propagation Condition		F-0	AWGN
	o used such that he	th colle are fully	/ allocated and a constant total transmitted nower

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.

Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

Note 5: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in TS 38.213 [3] section 12.

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed X defined in Table 4.5.2.5.5-2 if the NR PSCell is not in the same band as the E-UTRAN deactivated SCell or Y in Table Table 4.5.2.5.5-2 if the NR PSCell is in the same band as the E-UTRAN deactivated SCell.

Table 4.5.2.5.5-2: Interruption length X and Y at measurements on deactivated E-UTRA SCC

11.	NR Slot	Interruption length X slot	Interruption length Y slot
μ.	length (ms)	Sync	
0	1	1	1
1	0.5	1	1

The rate of correct events observed during repeated tests shall be at least 90%.

# 4.5.2.6 EN-DC FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

#### Editor's note:

- Message contents are missing.
- Some parts of TC is TBD.
- Connection diagram is TBD.
- Test tolerance is missing.
- Cell mapping is missing

## 4.5.2.6.1 Test purpose

The purpose of this test is to verify EN-DC UE's ability to complete PSCell interruptions during the measurement on E-UTRAN SCC within the missed ACK/NACK rate for NR PSCell in EN-DC requirements.

## 4.5.2.6.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

## 4.5.2.6.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.5.2.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.2.6.

## 4.5.2.6.4 Test description

#### 4.5.2.6.4.1 Initial conditions

This test shall be run in one of the configurations defined in Table 4.5.2.6.4.1-1.

Table 4.5.2.6.4.1-1: Supported test configurations for EN-DC FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Configuration	Description	
4.5.2.6-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.2.6-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.2.6-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
4.5.2.6-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.2.6-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.2.6-6	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		

Configure the test equipment and the DUT according to the parameters in Table 4.5.2.6.4.1-2.

Table 4.5.2.6.4.1-2: Initial conditions for EN-DC FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, table E.2-1 and TS 38.	508-1 [14] clause 4.3.1.
Channel bandwidth	As specified	by the test configuration selected fr	rom Table 4.5.2.6.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.1.
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.TBD	
Exceptions to connection diagram	N/A		

- 1. The general test parameter settings are set up according to Table 4.5.2.6.4.1-3.
- 2. Message contents are defined in clause 4.5.2.6.4.3.
- 3. There are two E-UTRAN carriers and one NR carrier and three cells specified in the test. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. Cell 1 is the cell used for connection setup with the power level set according to [TBD]. Cell 2 and Cell 3 shall be configured according to [TBD].

Table 4.5.2.6.4.1-3: General test parameters for EN-DC FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Active PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		011	
SCell measurement cycle	ms	640	
(measCycleSCell)	1113	040	
T1	S	10	

## 4.5.2.6.4.2 Test procedure

The test consists of three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1, Cell2 and Cell3. Cell1 shall be configured as E-UTRAN PCell, Cell2 shall be configured as NR PSCell and Cell3 shall be configured as NR deactivated SCell. The point in time

at which the RRC message including *measCycleSCell* or *allowInterruptions* for the E-UTRAN NR SCells is received by the UE, defines the start of time period T1. During T1 the UE shall be continuously scheduled on E-UTRAN PCell and NR PSCell.

- 1. Ensure the UE is in state FFS according to TS 38.508-1 [14] clause TBD.
- 2. Configure MCG according to TS 36.521-3 [26] Annex C.0, C.1 and SCG according to Annex C.1.1 and C.1.2 for all downlink physical channels.
- 3. The SS shall transmit an RRCConnectionReconfiguration message including measCycleSCell or allowInterruptions for the deactivated NR SCell to perform measurements on the deactivated SCC.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. Set the parameters according to T1 in Table 5.5.2.3.5-1. Propagation conditions are set according to Annex C.2.1. T1 starts.
- SS schedules on PSCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor ACK/NACK/DTX on PSCell.
- 7. If more than 99.5% of uplink transmissions are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".
- 8. If no two consecutive DTX is observed by the SS, then count a success for the event "DTX". Otherwise count a fail for the event "DTX".
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS. (if the paging fails, switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS),

or

- switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS.
- 10. Repeat step 3-9 until a test verdict has been achieved.

Each of the events "ACK/NACK" and "DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

#### 4.5.2.6.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 4.5.2.6.4.3-1: Common Exception messages

Default Message Contents				
Common contents of system information				
blocks exceptions				
Default RRC messages and information	FFS			
elements contents exceptions				

## 4.5.2.6.5 Test requirement

Table 4.5.2.6.5-1 defines the primary level settings including test tolerances for EN-DC FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC test configurations.

Table 4.5.2.6.5-1: NR cell specific test parameters for EN-DC FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parame	ter	Unit	Cell 2
Frequency Range			FR1
Duplex mode Config 1,4			FDD
•	Config 2,3,5,6	1	TDD
TDD configuration Config 1,4			Not Applicable
3	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BWchannel	Config 1,4	MHz	10: N <sub>RB,c</sub> = 52
	Config 2,5	1	10: N <sub>RB,c</sub> = 52
	Config 3,6		40: N <sub>RB,c</sub> = 106
Initial BWP	Config 1,4		DLBWP.0.2 <sup>Note5</sup>
Configuration	Config 2,5		DLBWP.0.2 <sup>Note5</sup>
<b>G</b>	Config 3,6		DLBWP.0.2 <sup>Note5</sup>
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5	1	CR.1.1 TDD
parameters.	Config 3,6		CR2.1 TDD
RMC CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
parametere	Config 3,6		CCR.2.1 TDD
OCNG Patterns	Coming 0,0		OP.1
SMTC Configuration			SMTC.1
SSB Configuration Config 1,2,4,5			SSB.1 FR1
CCB Comigaration	Config 3,6		SSB.2 FR1
Correlation Matrix and A			1x2 Low
Configuration			TAZ LOW
EPRE ratio of PSS to SS	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		u u u	Ů
EPRE ratio of PDSCH to		1	
EPRE ratio of OCNG DN			
EPRE ratio of OCNG to	OCNG DMRS Note 1		
Noc Note 2	OOI TO DIVINTO	dBm/15	
1400		kHz	[-104]+TT
SS-RSRP Note 3		dBm/15	
oo non		kHz	[-87] +TT
Ê <sub>s</sub> /I <sub>ot</sub>		dB	17+TT
Ê <sub>s</sub> /N <sub>oc</sub>		dB	17+TT
Noc Note 2	Config 1,2,4,5	dBm/SCS	[-104] +TT
00	Config 3,6	42,000	[-101] +TT
Io <sup>Note3</sup>	9	dBm/	[-59] +TT
	Config 1,2,4,5	9.36MHz	[ 55] 111
Config 3,6		dBm/	[-61.9] +TT
		38.16MHz	[ 00] * * * *
Time offset to cell1 Note 4		μς	500
Propagation Condition		μο	AWGN
Note 1: OCNC about h		 	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.

Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

Note 5: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in TS 38.213 [3] section 12.

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on E-UTRAN PCell and NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on E-UTRAN PCell and NR PSCell shall not exceed the value defined in Table 4.5.2.6.5-2 and Table 4.5.2.6.5-3.

Table 4.5.2.6.5-2: Interruption duration if the NR PSCell is not in the same band as the E-UTRAN deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table 4.5.2.6.5-3: Interruption duration if the NR PSCell is in the same band as the E-UTRAN deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1 + SMTC duration
1	0.5	2 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

## 4.5.3 SCell activation and deactivation delay

## 4.5.3.0 Minimum conformance requirements

#### 4.5.3.0.1 Minimum conformance requirements for SCell activation and deactivation delay

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:

T<sub>HARQ</sub> is the timing between DL data transmission and acknowledgement as specified in [12].

Tactivation\_time is the SCell activation delay.

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

- [T<sub>SMTC\_SCell</sub> + 5ms], if the SCell measurement cycle is equal to or smaller than [160ms].
- $[T_{SMTC\_MAX} + T_{SMTC\_SCell} + 5ms]$ , if the SCell measurement cycle is larger than [160ms].

If the SCell is unknown and belongs to FR1, T<sub>activation\_time</sub> is:

- [2\*T<sub>SMTC\_MAX</sub> + 2\*T<sub>SMTC\_SCell</sub> + 5ms] provided the SCell can be successfully detected on the first attempt.

If the SCell being activated belongs to FR2, and if there is at least one active serving cell on that FR2 band, provided that the SSBs in the serving cell(s) and the SSBs in the SCell fulfil the condition defined in section 3.6.3,  $T_{activation\_time}$  is  $[T_{SMTC\_SCell} + 5ms]$ .

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, Tactivation\_time is:
  - [TBD]

- If the target SCell is unknown to UE:
  - [TBD]

Note 1: The TBD shall be determined in RAN4#91 meeting.

#### 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<sub>SMTC</sub> <sub>SCell</sub>: SMTC periodicity of SCell being activated and the minimum value is 10ms.

T<sub>CSI\_reporting</sub> is the delay including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting and uncertainty in acquiring the first available CSI reporting resources as specified in [13].

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 TS 38.133 [6] section 9.2 and 9.3.
- the SSB measured during the period equal to max([5] measCycleSCell, [5] DRX cycles) also remains detectable during the SCell activation delay according to the cell identification conditions specified in TS 38.133 [6] section 9.2 and 9.3.

Otherwise SCell in FR1 is unknown.

For the first SCell activation in FR2 bands and for UE supporting power class 1, the SCell is known if it has been meeting the following conditions:

During the period equal to [X ms]:

the UE has sent a valid L3-RSRP measurement report with beam index for the cell and

the cell remains detectable according to the cell identification conditions

The SSB measured during the period equal to [Y ms] also remains detectable during the SCell activation delay according to the cell identification conditions specified in section 9.2 and 9.3.

the active TCI state is selected based on UE report in [Z ms]

Otherwise, the first SCell in FR2 band is unknown.

Note 2: FFS on X, Y and Z values, if X, Y and Z cannot be concluded in R15, then only unknown cell condition will apply for R15.

If the UE has been provided with higher layer in TS 38.331 [13] signaling of smtc2 prior to the activation command,  $T_{SMTC\_Scell}$  follows smtc1 or smtc2 according to the physical cell ID of the target cell being activated.  $T_{SMTC\_MAX}$  follows smtc1 or smtc2 according to the physical cell IDs of the target cells being activated and the active serving cells.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation command specified in [13] for an SCell at the first opportunities for the corresponding actions once the SCell is activated.

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

The interruption on PCell or any activated SCell in MCG for NE-DC specified in TS 38.133 [6] section 8.2 and the interruption on E-UTRA PSCell or any activated E-UTRA SCell in SCG or NE-DC specified in TS38.133 [6] section 7.36 of [23] shall not occur before slot  $n+1+[T_{HARQ}]$  and not occur after slot  $n+1+[T_{HARQ}+3ms+T_{SMTC\_MAX}+T_{SMTC\_duration}]$ .

The interruption on PCell, PSCell or any activated SCell in MCG or SCG for NR-DC specified in TS 38.133 [6] section 8.2 shall not occur before slot  $n+1+[T_{HARQ}]$  and not occur after slot  $n+1+[T_{HARQ}]$  and  $n+1+[T_{HARQ}]$  and not occur after slot  $n+1+[T_{HARQ}]$  and  $n+1+[T_{HARQ}]$  and n+1+[T

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

Starting from the slot specified in section 4.3 of [8] (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.

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

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

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

The interruption on PCell or any activated SCell in MCG for NE-DC specified in TS 38.133 [6] section 8.2 and the interruption on E-UTRA PSCell or any activated E-UTRA SCell in SCG for NE-DC specified in section 7.36 of [23] shall not occur before slot  $n+1+[T_{HARO}]$  and not occur after slot  $n+1+[T_{HARO}+3ms]$ .

The interruption on PCell, PSCell or any activated SCell in MCG or SCG for NR standalone mode specified in TS 38.133 [6] section 8.2 shall not occur before slot  $n+1+[T_{HARO}]$  and not occur after slot  $n+1+[T_{HARO}+3ms]$ .

The normative reference for this requirement is TS 38.133 [6] clause 8.3.

## 4.5.3.1 EN-DC FR1 SCell activation and deactivation of known SCell in non-DRX for 160ms SCell measurement cycle

Editor's notes: This test case is incomplete. The following aspects are either missing or TBD.

- The core requirements in TS 38.133 are between [.] or TBD;
- SSB ARFCN shall set to "freq2: for Cell 3, RAN4 correction is needed;
- Test tolerance analysis is missing;
- Test procedure and Message content are TBD;
- Test applicability Table in TS38.522 need to be updated.

#### 4.5.3.1.1 Test purpose

This test is to verify that the SCell activation and deactivation times are within the requirements, when the SCell in FR1 is known by the UE at the time of activation.

## 4.5.3.1.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

#### 4.5.3.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.5.3.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.3.1.

4.5.3.1.4 Test description

4.5.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.5.3.1.4.1-1.

Table 4.5.3.1.4.1-1: supported test configurations

Test Case ID	Description	
4.5.3.1-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.3.1-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.3.1-3	LTE FDD, NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
4.5.3.1-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
4.5.3.1-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
4.5.3.1-6	LTE TDD, NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
NOTE: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 4.5.3.1.4.1-2 and Table 4.5.3.1.4.1-3.

Table 4.5.3.1.4.1-2: Initial conditions for known FR1 SCell activation case

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	I in Annex E, Table E.1-1 and TS 38	3.508-1 [14] sclause 4.3.1.
Channel	As specified	by the test configuration selected f	rom Table 4.5.3.1.5-1
bandwidth			
Propagation	AWGN		As specified in Annex C.2.2.
conditions			
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.1	7
Exceptions to connection diagram	N/A		

Table 4.5.3.1.4.1-3: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
RF Channel Number		1,2,3	One E-UTRAN radio channel (1) and two NR radio channel (2,3) are used for this test
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in section A.3.7.2.1 of TS38.133 [6]
Active PSCell		Cell 2	Primary secondary cell on NR RF channel number 2.
Configured deactivated SCell		Cell 3	Configured deactivated secondary cell on NR RF channel number 3
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
CQI/PMI periodicity and offset configuration index		0	CQI reporting for SCell every second subframe
Cell-individual offset for cells on E-UTRA RF channel number	dB	0	Individual offset for cells on primary component carrier.
Cell-individual offset for cells on NR channel number	dB	0	Individual offset for cells on secondary component carrier.
SCell measurement cycle (measCycleSCell)	ms	160	
Cell3 timing offset to cell2	μs	0	
Time alignment error between cell3 and cell2	μs	≤ Time alignment error as specified in 3GPP TS 38.104 [28] clause 6.5.3.1. Editor's note: spec is not listed!	The value of time alignment error depends upon the type of carrier aggregation.
T1	S	[7]	During this time the PSCell shall be known and the SCell configured and detected.
T2	S	[1]	During this time the UE shall activate the SCell.
Т3	S	[1]	During this time the UE shall deactivate the SCell.
THARQ	ms	TBD	the timing between DL data transmission and acknowledgement as specified in 38.321 [12]
TCSI_Reporting	ms	[2]	the delay uncertainty in acquiring the first available CSI reporting resources as specified in 38.331 [13]
k	ms	$k_1 + 3 \cdot N_{\text{slot}}^{\text{subframe}, \mu} + 1$	As specified in section 4.3 of TS38.213 [8]

- 1. Message contents are defined in clause 4.5.3.1.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in the same frequency. Cell 2 is the PSCell and Cell 3 is the deactivated SCell.

#### 4.5.3.1.4.2 Test procedure

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.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted m, defines the start of time period T2. The UE shall be able to report valid CSI in PSCell for the activated SCell at latest in slot  $(m+T_{HARQ}+T_{activation\_time}+T_{CSI\_Reporting})$ . The UE shall start reporting CSI in PSCell in slot (m+k) and shall report CQI

index 0 (out-of-range) until the SCell activation has been completed. Any PCell or PSCell interruption due to activation of SCell shall occur in the slot  $(m+1+[T_{HARQ}])$  to  $(m+1+[T_{HARQ}+3ms+T_{SMTC\_MAX}+T_{SMTC\_duration}])$ .

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot  $(n+[T_{HARQ}+3ms])$ , and any PCell and PSCell interruption due to the deactivation shall occur in the slot  $(n+1+[T_{HARQ}])$  to  $(n+1+[T_{HARQ}+3ms])$ .

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508-1 [14] clause 4.5.
- 2. Configure MCG and SCG according to Annex C.1 for all downlink physical channels.
- 3. Set the parameters according to T1 in Table 4.6.1.1.4.1-2. Propagation conditions are set according to Annex C clauses C.2.2. T1 starts.
- 4. SS configure SCell according to section 4.5.3.1.4.3.
- 5. The SS shall configure transmission of PDSCH with time T<sub>HARO</sub> according to Table 4.5.3.1.4.1-3.
- 6. The SS activates SCC by sending the activation MAC-CE (Refer TS 38.321 [12], clauses 5.9, 6.1.3.10) in a slot # denoted m. If the SS receives ACK for MAC-CE sent by the UE, T2 starts in slot m, and the test proceeds to step 7, otherwise go to step 10.
- 7. The UE shall start sending CSI reports for SCell and the SS shall monitor CSI reports for SCell sent from the UE and ACK/NACK sent in PSCell during SCell activation.

#### 7a. For intra-band CA UE,

- If the first CSI report for SCell is received by the SS in a slot (m+k),
  - or slot (m+1+[T<sub>HARQ</sub>+3ms+ T<sub>SMTC\_MAX</sub> +T<sub>SMTC\_duration</sub>]+1) if the slot (m+k) was subject to interruption,
- and CSI report with non-zero CQI index is received by the SS earlier than or equal to slot  $(m+T_{HARQ}+T_{activation\_time}+T_{CSI\_Reporting})$ ,
  - or the next available uplink resource if there are no uplink resources for reporting the valid CSI in a slot (m+T<sub>HARQ</sub>+T<sub>activation\_time</sub>+T<sub>CSI\_Reporting</sub>)
- and DTX is not observed by the SS outside the slot (m+1+[ $T_{HARQ}$ ]) to (m+1+[ $T_{HARQ}$ +3ms+ $T_{SMTC\_MAX}$ + $T_{SMTC\_duration}$ ]+k) up to the end of T2
- Then the number of successes for the event "Activation" is increased by one. Otherwise, count a fail for the event "Activation" and go to step 10.

#### 7b. For inter-band CA UE,

- If the first CSI report for SCell is received by the SS in a slot (m+k),
  - or slot  $(m+1+[T_{HARQ}+3ms+T_{SMTC\_MAX}+T_{SMTC\_duration}]+1)$  if the slot (m+k) was subject to interruption,
- and CSI report with non-zero CQI index is received by the SS earlier than or equal to slot (m+T<sub>HARQ</sub>+T<sub>activation\_time</sub>+T<sub>CSI\_Reporting</sub>),
  - or the next available uplink resource if there are no uplink resources for reporting the valid CSI in a slot  $(m+T_{HARQ}+T_{activation\_time}+T_{CSI\_Reporting})$
- and  $\leq$  2 non-consecutive DTX slots are observed by the SS during the the slot (m+1+[T<sub>HARQ</sub>]) to (m+1+[T<sub>HARQ</sub>+3ms+T<sub>SMTC\_MAX</sub>+T<sub>SMTC\_duration</sub>]+k) up to the end of T2
- Then the number of successes for the event "Activation" is increased by one. Otherwise, count a fail for the event "Activation" and go to step 10.
- 8. When T2 expires, the SS deactivate SCC by sending the deactivation MAC-CE (Refer TS 38.321 [12], clauses 5.9, 6.1.3.10) in a slot # denoted n. If the SS receives ACK for MAC-CE sent by the UE, T3 starts in slot n, and the test proceeds to step 9, otherwise go to step 10.

9. The UE shall stop sending CSI reports for SCell and the SS shall monitor CSI reports for SCell sent from the UE and ACK/NACK sent in PSCell during SCell deactivation.

9a. For intra-band CA UE,

- If the last CSI report is received by the SS earlier than or equal to slot (n+[T<sub>HARO</sub>+3ms])
- and DTX is not observed by the SS outside the slot  $(n+1+[T_{HARQ}])$  to  $(n+1+[T_{HARQ}+3ms]+k)$  up to the end of T3,
- Then the number of successes for the event "Deactivation" is increased by one. Otherwise, count a fail for the event "Deactivation".

#### 9b. For intra-band CA UE,

- If the last CSI report is received by the SS earlier than or equal to slot  $(n+[T_{HARQ}+3ms])$
- and  $\leq 2$  non-consecutive DTX slots are observed by the SS during the slot (n+1+[T<sub>HARQ</sub>]) to (n+1+[T<sub>HARQ</sub>+3ms]+k) up to the end of T3,
- Then the number of successes for the event "Deactivation" is increased by one. Otherwise, count a fail for the event "Deactivation".
- 10. When T3 expires, or Activation in step 6 was not acknowledged, or a fail was counted for the event "Activation" in step 7, or Deactivation in step 8 was not acknowledged, the SS shall transmit a RRCRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 11. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 12. After the RRC connection release, the SS:
  - transmits in Cell 2 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508-1 [14] clause 4.5), or
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508-1 [14] clause 4.5.
- 13. Repeat steps 2-12 until a test verdict has been achieved.

Each of the events "Activation" and "Deactivation" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

## 4.5.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

#### 4.5.3.1.5 Test requirement

Table 4.5.3.1.5-1 defines the primary level settings including test tolerances for all tests.

Table 4.5.3.1.5-1: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter		Unit	Cell 2	Cell 3	
SSB ARFCN		-	T1 T2 T3	T1 T2 T3	
	Config 1,4		freq1 FDD	freq1	
Duplex mode	Config 2,3,5,6		TDD		
	Config 1,4		Not Applicable		
TDD configuration	Config 2,5		TDDConf.1.1		
. 22 coga.ao	Config 3,6		TDDConf.2.1		
	Config 1,4		10: N <sub>RB,c</sub> = 52		
DW					
BWchannel	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,c</sub> = 52		
BWP BW	Config 2,5		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	
measurement channel	Config 2,5		SR.1.1 TDD	SR.1.1 TDD	
measurement channel	Config 3,6		SR2.1 TDD	SR2.1 TDD	
RMSI CORESET	Config 1,4		CR.1.1 FDD	CR.1.1 FDD	
Reference Channel	Config 2,5		CR.1.1 TDD	CR.1.1 TDD	
Treference Grianner	Config 3,6		CR2.1 TDD	CR2.1 TDD	
RMC CORESET	Config 1,4		CCR.1.1 FDD	CCR.1.1 FDD	
Reference Channel	Config 2,5		CCR.1.1 TDD	CCR.1.1 TDD	
	Config 3,6		CCR.2.1 TDD	CCR.2.1 TDD	
OCNG Patterns			OCNG pattern 1		
SMTC configuration			SMTC.1		
SSB configuration	Config 1,2,4,5		SSB.1 FR1		
PDSCH/PDCCH	Config 3,6 Config 1,2,4,5		SSB.2 FR1 15 kHz		
subcarrier spacing	Config 1,2,4,5	kHz	30kHz		
EPRE ratio of PSS to S			JUKIIZ		
EPRE ratio of PBCH DN		$\dashv$			
EPRE ratio of PBCH to		+			
EPRE ratio of PDCCH D		+			
EPRE ratio of PDCCH to		dB	0		
EPRE ratio of PDSCH D					
EPRE ratio of PDSCH to		7			
EPRE ratio of OCNG DI		7			
EPRE ratio of OCNG to OCNG DMRS (note 1)		7			
$N_{oc  {\sf note}  2}$		dBm/15kHz	[-104]		
	Config 1,2,4,5		[-104]		
$N_{oc \; note \; 2}$	Config 3,6	dBm/SCS	[-101]		
$\hat{ extbf{E}}_{ ext{s}}/ extbf{I}_{ ext{ot}}$		dB	[17]		
$\hat{E}_s/N_{oc}$		dB	[17]		
SS-RSRP note 3	Config 1,2,4,5	dBm/SCS	[-87]		
	Config 3,6	dBm/SCS	[-84]		
	SCH_RP note 3		[-87]		
Propagation condition		-	AWGN		

NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over

subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled. NOTE 3: SS-RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

NOTE 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.]

During T2 the UE shall send the first CSI report for SCell in a slot (m+k), or in a slot (m+1+[ $T_{HARQ}$ +3ms+  $T_{SMTC\_MAX}$ + $T_{SMTC\_duration}$ ]+1) as defined in TS 38.133 [6] section 8.3 if the slot (m+k) was subject to interruption. Whether CSI report in slot (m+k) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in slot (m+k).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot  $(m+T_{HARQ}+T_{activation\_time}+T_{CSI\_Reporting})$ ,  $T_{activation\_time}=[T_{SMTC\_SCell}+5ms]$ , as defined in TS 38.133 [6] section 8.3.

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot ( $n+[T_{HARQ}+3ms]$ ), as defined in TS 38.133 [6] section 8.3.Figures 4.5.3.1.5-1 shows the deriviation of the Test procedure requreiment for DTX during T2, based on the core requirements for interruption.

NOTE: The differences between activation and deactivation are as follows:

- Activation → Deactivation
- First CSI → Last CSI
- Latest valid CSI report → Not exist (no need to check since CSI report was already stopped)

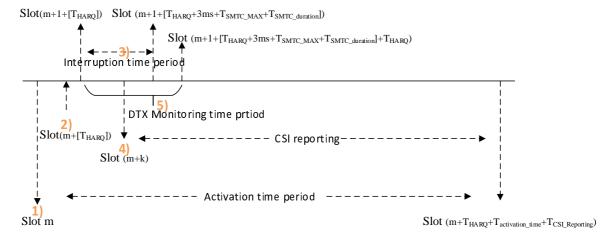


Figure 4.5.3.1.5-1: Procedure derivation for Activation

- 1) Activation command for SCell
- 2) ACK for MAC-CE for SCell1 activation
- 3) Possible interruption period by SCell1 activation
- 4) First CSI report timing (could be invalid CQI)
- 5) Possible DTX reception period on SS due to interruption by SCell1 activation

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot  $(m+1+[T_{HARQ}])$  to  $(m+1+[T_{HARQ}+3ms+T_{SMTC\_MAX}+T_{SMTC\_duration}])$ , as defined in TS 38.133 [6] section 8.3.

During T3 interruption of PCell / PSCell during SCell deactivation shall not happen outside the slot  $(n+1+[T_{HARQ}])$  to  $(n+1+[T_{HARQ}+3ms])$ , as defined in TS 38.133 [6] section 8.3.

The interruption of PSCell shall not be more than the values specified for EN-DC in TS 38.133 [6] section 8.2.1.2.4.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot (m+T<sub>HARQ</sub>+T<sub>activation\_time</sub>+T<sub>CSI\_Reporting</sub>) as defined in TS 38.133 [6] section 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# 4.5.3.2 EN-DC FR1 SCell activation and deactivation of known SCell in non-DRX for 320ms SCell measurement cycle

Editor's notes: This test cases is incomplete. The following aspects are either missing or TBD.

- test cases depends on completion from TC4.5.3.1
- SSB ARFCN shall set to "freq2: for Cell 3, RAN4 correction is needed;
- Test procedure; Message content; Test requirement;
- Test applicability Table in TS38.522 need to be updated.

#### 4.5.3.2.1 Test purpose

This test is to verify that the SCell activation and deactivation times are within the requirements, when the SCell in FR1 is known by the UE at the time of activation.

#### 4.5.3.2.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

#### 4.5.3.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.5.3.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.3.2.

#### 4.5.3.2.4 Test description

#### 4.5.3.2.4.1 Initial conditions

Same initial conditions as described in section 4.5.3.1.4.1 with following exception:

- The supported test configurations is replaced by Table 4.5.3.2.4.1-1.
- The listed parameter values in Tables 4.5.3.2.4.1-2 will replace the values of corresponding parameters in Tables 4.5.3.1.4.1-3.

Table 4.5.3.2.4.1-1: supported test configurations

Test Case ID	Description
4.5.3.2-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
4.5.3.2-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
4.5.3.2-3	LTE FDD, NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
4.5.3.2-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
4.5.3.2-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
4.5.3.2-6	LTE TDD, NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
NOTE: The U	JE is only required to be tested in one of the supported test configurations

Table 4.5.3.2.4.1-2: General test parameters for known FR1 SCell activation case, 320ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	320	

#### 4.5.3.2.4.2 Test procedure

Same test procedure as described in section 4.5.3.1.4.2 with following exception:

- TBD

## 4.5.3.2.4.3 Message contents

Same message contents as described in section 4.5.3.1.4.3 with following exception:

- TBD

## 4.5.3.2.5 Test requirement

Table 4.5.3.2.5-1 defines the primary level settings including test tolerances for all tests.

Table 4.5.3.2.5-1: Cell specific test parameters for known FR1 SCell activation case, 320ms SCell measurement cycle

Para	meter	Unit	Cell 2 T1 T2 T3	Cell 3 T1 T2 T3
SSB ARFCN			freq1	freq2
Duplex mode Config 1,4 Config 2,3,5,6				FDD
			TDD	
	Config 1,4		Not A	Applicable
TDD configuration	Config 2,5		TDDConf.1.1	
J	Config 3,6		TDD	)Conf.2.1
	Config 1,4			N <sub>RB,c</sub> = 52
BW <sub>channel</sub>		— MHz		VRB,c = 52
DVV channel	Config 2,5	IVITZ		
	Config 3,6			I <sub>RB,c</sub> = 106
	Config 1,4		10: N	N <sub>RB,c</sub> = 52
BWP BW	Config 2,5		10: N	$N_{RB,c} = 52$
	Config 3,6		40: N	I <sub>RB,c</sub> = 106
DRx Cycle		ms	Not A	Applicable
<del>-</del>	Config 1,4		SR.1.1 FDD	SR.1.1 FDD
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	SR.1.1 TDD
neasurement channel	Config 3,6		SR2.1 TDD	SR2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD	CR.1.1 FDD
Reference Channel	Config 2,5		CR.1.1 TDD	CR.1.1 TDD
Vererence orianner	Config 3,6		CR2.1 TDD	CR2.1 TDD
RMC CORESET	Config 1,4		CCR.1.1 FDD	CCR.1.1 FDD
Reference Channel	Config 2,5		CCR.1.1 TDD	CCR.1.1 TDD
Config 3,6			CCR.2.1 TDD	CCR.2.1 TDD
OCNG Patterns			OCNG pattern 1 SMTC.1	
SMTC configuration	Config 1,2,4,5			B.1 FR1
SSB configuration	Config 3,6	<del>-</del>		B.2 FR1
PDSCH/PDCCH	Config 1,2,4,5		15 kHz	
subcarrier spacing	Config 3,6	- kHz	30kHz	
EPRE ratio of PSS to SS	SS			
EPRE ratio of PBCH DM	IRS to SSS			
EPRE ratio of PBCH to I				
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 DNE  EPRE ratio of OCNG to				
$N_{oc}$ note 2	CONTROL (NOTE 1)	dDm/45kUz	[	-104]
	Config 1,2,4,5	dBm/15kHz	[-104]	
$N_{oc}^{}$ note 2		dBm/SCS		
Config 3,6				-101]
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		dB		[17]
$\hat{E}_s/N_{oc}$		dB		[17]
SS-RSRP note 3 Config 1,2,4,5		dBm/SCS	[-87]	
SCH RP note 3	Config 3,6	dBm/15 kHz		[-84] [-87]
Propagation condition		GDITI/ TO KITZ		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 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.]

During T2 the UE shall send the first CSI report for SCell in a slot (m+k), or in a slot (m+1+[ $T_{HARQ}$ +3ms+  $T_{SMTC\_MAX}$ + $T_{SMTC\_duration}$ ]+1) as defined in TS 38.133 [6] section 8.3 if the slot (m+k) was subject to interruption. Whether CSI report in slot (m+k) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in slot (m+k).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot  $(m+T_{HARQ}+T_{activation\_time}+T_{CSI\_Reporting})$ ,  $T_{activation\_time}=[T_{SMTC\_MAX}+T_{SMTC\_SCell}+5ms]$ , as defined in TS 38.133 [6] section 8.3

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot ( $n+[T_{HARQ}+3ms]$ ), as defined in TS 38.133 [6] section 8.3.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot  $(m+1+[T_{HARQ}])$  to  $(m+1+[T_{HARQ}+3ms+T_{SMTC\_MAX}+T_{SMTC\_duration}])$ , as defined in TS 38.133 [6] section 8.3.

During T3 interruption of PCell / PSCell during SCell deactivation shall not happen outside the slot  $(n+1+[T_{HARQ}])$  to  $(n+1+[T_{HARQ}+3ms])$ , as defined in TS 38.133 [6] section 8.3.

The interruption of PSCell shall not be more than the values specified for EN-DC in TS 38.133 [6] section 8.2.1.2.4.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot (m+T<sub>HARQ</sub>+T<sub>activation\_time</sub>+T<sub>CSI\_Reporting</sub>) as defined in TS 38.133 [6] section 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

#### 4.5.3.3 EN-DC FR1 SCell activation and deactivation of unknown SCell in non-DRX

Editor's notes: This test case is incomplete. The following aspects are either missing or TBD.

- test cases depends on completion from TC4.5.3.1;
- The core requirements in TS 38.133 are between [.] or TBD;
- SSB ARFCN shall set to "freq2: for Cell 3, RAN4 correction is needed;
- Test procedure and Message content are TBD;
- Test applicability Table in TS38.522 need to be updated.

#### 4.5.3.3.1 Test purpose

This test is to verify that the SCell activation and deactivation times are within the requirements, when the SCell in FR1 is unknown by the UE at the time of activation.

#### 4.5.3.3.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

#### 4.5.3.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.5.3.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.3.3.

#### 4.5.3.3.4 Test description

#### 4.5.3.3.4.1 Initial conditions

Same initial conditions as described in section 4.5.3.1.4.1 with following exception:

- The supported test configurations is replaced by Table 4.5.3.3.4.1-1.

- The listed parameter values in Tables 4.5.3.3.4.1-2 will replace the values of corresponding parameters in Tables 4.5.3.1.4.1-3.

Table 4.5.3.3.4.1-1: supported test configurations

Test Case ID	Description
4.5.3.3-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
4.5.3.3-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
4.5.3.3-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
4.5.3.3-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
4.5.3.3-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
4.5.3.3-6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
NOTE: The L	JE is only required to be tested in one of the supported test configurations

Table 4.5.3.3.4.1-2: 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.

#### 4.5.3.3.4.2 Test procedure

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.

During T2 the Test procedure requires the UE to send the first CSI report for SCell1 in a subframe (m+[k]), but also allows a subframe not happen outside the slot (m+1+[ $T_{HARQ}$ ]) to (m+1+[ $T_{HARQ}$ +3ms+  $T_{SMTC\_MAX}$ + $T_{SMTC\_duration}$ ]) if the subframe (m+[k]) was subject to interruption. The SS determines whether the CSI report in subframe (m+[k]) was interrupted or not by monitoring ACK/NACK sent in PSCell in subframe (m+[k]).

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508-1 [14] clause 4.5.
- 2. TBD.

## 4.5.3.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

#### 4.5.3.3.5 Test requirement

Table 4.5.3.3.5-1 defines the primary level settings including test tolerances for all tests.

Table 4.5.3.3.5-1: Cell specific test parameters for unknown FR1 SCell activation case

Para	ameter	Unit	Cell 2	Cell 3	
SSB ARFCN			T1 T2 T3 freq1	<b>T1 T2 T3</b> freq2	
Config 1.4				DD	
Duplex mode	Config 2,3,5,6			DD .	
	Config 1,4		Not Applicable		
TDD configuration	Config 2,5		TDDC	onf.1.1	
G	Config 3,6		TDDC	onf.2.1	
	Config 1,4		10: NR	B.c = 52	
BWchannel	Config 2,5	MHz		B,c = 52	
	Config 3,6		40: N <sub>RB,c</sub> = 106		
	Config 1,4			B,c = 52	
BWP BW	Config 2,5			в,c = 52	
DVVF DVV					
	Config 3,6			s,c = 106	
DRx Cycle	T = 0	ms	•	plicable	
PDSCH Reference	Config 1,4		SR.1.1 FDD	SR.1.1 FDD	
measurement channel	Config 2,5	<b>⊣</b> ⊦	SR.1.1 TDD	SR.1.1 TDD	
	Config 3,6		SR2.1 TDD	SR2.1 TDD	
RMSI CORESET	Config 1,4		CR.1.1 FDD	CR.1.1 FDD	
Reference Channel	Config 2,5		CR.1.1 TDD	CR.1.1 TDD	
	Config 3,6		CR2.1 TDD	CR2.1 TDD	
RMC CORESET	Config 1,4		CCR.1.1 FDD	CCR.1.1 FDD	
Reference Channel	Config 2,5		CCR.1.1 TDD	CCR.1.1 TDD	
Config 3,6			CCR.2.1 TDD	CCR.2.1 TDD	
OCNG Patterns			OCNG p	TC.1	
SMTC configuration	Config 1,2,4,5				
SSB configuration	Config 3,6	<b>-</b>	SSB.1 FR1 SSB.2 FR1		
PDSCH/PDCCH	Config 1,2,4,5			kHz	
subcarrier spacing	Config 3,6	kHz		KHZ	
EPRE ratio of PSS to S			301	VI 12	
EPRE ratio of PBCH DN					
EPRE ratio of PBCH to					
EPRE ratio of PDCCH I		<del>- </del>			
EPRE ratio of PDCCH t		dB	(	)	
EPRE ratio of PDSCH [					
EPRE ratio of PDSCH t					
EPRE ratio of OCNG D					
EPRE ratio of OCNG to					
$N_{oc}$ note 2		dBm/15kHz	[-1	04]	
M note 2	Config 1,2,4,5		[-104]		
$N_{oc}$ note 2	Config 3,6	dBm/SCS	[-101]		
$\hat{ extbf{E}}_{ ext{s}}/ extbf{I}_{ ext{ot}}$		dB	[1	7]	
$\hat{E}_s/N_{oc}$		dB	[1	7]	
SS-RSRP note 3		dBm/SCS		37] 34]	
SCH_RP note 3	Corning 3,0	dBm/15 kHz	•	34] 37]	
		- TO KI IZ			
Propagation condition		-		'GN	

NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

NOTE 3: SS-RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

NOTE 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.]

During T2 the UE shall send the first CSI report for SCell in a slot (m+k), or in a slot (m+1+ $[T_{HARQ}+3ms+T_{SMTC\_MAX}+T_{SMTC\_duration}]+1$ ) as defined in TS 38.133 [6] section 8.3 if the slot (m+k) was subject to interruption. Whether CSI report in slot (m+k) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in slot (m+k).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot  $(m+T_{HARQ}+T_{activation\_time}+T_{CSI\_Reporting})$ ,  $T_{activation\_time}=[2*T_{SMTC\_MAX}+2*T_{SMTC\_SCell}+5ms]$ , as defined in TS 38.133 [6] section 8.3.

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot ( $n+[T_{HARQ}+3ms]$ ), as defined in TS 38.133 [6] section 8.3.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot  $(m+1+[T_{HARQ}])$  to  $(m+1+[T_{HARQ}+3ms+T_{SMTC\_MAX}+T_{SMTC\_duration}])$ , as defined in TS 38.133 [6] section 8.3.

During T3 interruption of PCell / PSCell during SCell deactivation shall not happen outside the slot  $(n+1+[T_{HARQ}])$  to  $(n+1+[T_{HARQ}+3ms])$ , as defined in TS 38.133 [6] section 8.3.

The interruption of PSCell shall not be more than the values specified for EN-DC in TS 38.133 [6] section 8.2.1.2.4.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot (m+T<sub>HARQ</sub>+T<sub>activation\_time</sub>+T<sub>CSI\_Reporting</sub>) as defined in TS 38.133 [6] section 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## 4.5.4 UE UL carrier RRC reconfiguration delay

## 4.5.5 Link recovery procedures

4.5.5.1 to 4.5.5.3

## 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- RAN4 dependency: There are brackets and TBDs in core requirements and test parameters.
- TT analysis is missing

## 4.5.5.4.1 Test purpose

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  $q_1$ .

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.

To partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in TS 38.133 [6] clause 8.5.

#### 4.5.5.4.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

#### 4.5.5.4.3 Minimum conformance requirements

[TS 38.133 [6], clause 8.5.3.2]

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

The value of T<sub>Evaluate\_BFD\_CSI-RS</sub> is defined in Table 4.5.5.4.3-1 for FR1.

#### For FR1,

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

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

The values of M<sub>BFD</sub> used in Table 4.5.5.4.3-1 are defined as

-  $M_{BFD} = 10$ , if the CSI-RS resource configured for BFD is transmitted with Density = 3.

Table 4.5.5.4.3-1: Evaluation period T<sub>Evaluate\_BFD\_CSI-RS</sub> for FR1

Configuration		T <sub>Evaluate_BFD_CSI-RS</sub> (ms)	
n	no DRX max([50], [M <sub>BFD</sub> *P] * T <sub>CSI-RS</sub> )		
DRX cy	cycle $\leq$ 320ms max([50], [1.5×M <sub>BFD</sub> *P]*max(T <sub>DRX</sub> , T <sub>CSI-RS</sub> ))		
DRX cycle > 320ms [M <sub>BFD</sub> *P] * T <sub>DRX</sub>		[M <sub>BFD</sub> *P] * T <sub>DRX</sub>	
Note:	T <sub>CSI-RS</sub> is the   DRX cycle ler	e periodicity of CSI-RS resource in the set $\overline{q}_0$ . $T_{DRX}$ is the	

[TS 38.133 [6], clause 8.5.4]

When the radio link quality on all the configured RS resources in set  $\overline{q}_0$  is worse than  $Q_{\text{out\_LR}}$ , Layer 1 of the UE shall send a beam failure instance indication to the higher layers. A Layer 3 filter may be applied to the beam failure instance indications as specified in TS 38.331 [13].

The beam failure instance evaluation for the configured RS resources in set  $\bar{q}_0$  shall be performed as specified in section 6 in TS 38.213 [8]. Two successive indications from Layer 1 shall be separated by at least  $T_{Indication\_interval\_BFD}$ .

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

When DRX is used,  $T_{Indication\_interval\_BFD}$  is max(1.5\*DRX\_cycle\_length, 1.5\* $T_{BFD-RS,M}$ ) if DRX cycle\_length is less than or equal to 320ms, and  $T_{Indication\_interval}$  is DRX\_cycle\_length if DRX cycle\_length is greater than 320ms.

[TS 38.133 [6], clause 8.5.6.2]

UE shall be able to evaluate whether the L1-RSRP measured on the configured CSI-RS resource in set  $\overline{q}_1$  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.

The value of T<sub>Evaluate CBD CSI-RS</sub> is defined in Table 4.5.5.4.3-2.

For FR1,

- P=1/(1 T<sub>CSI-RS</sub>/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

The values of  $M_{CBD}$  used in Table 4.5.5.4.3-2 is defined as

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

Table 4.5.5.4.3-2: Evaluation period T<sub>Evaluate\_CBD\_CSI-RS</sub> for FR1

Configuration		T <sub>Evaluate_CBD_CSI-RS</sub> (ms)	
non-DRX		max(TBD, ceil(Mcbd *P) * Tcsi-rs)	
DRX cycle ≤ 320ms ceil(M <sub>CBD</sub> *P*N) * max(T <sub>DRX</sub> , T <sub>CSI-RS</sub> )		ceil(Mcbd *P*N) * max(Tdrx, Tcsi-rs)	
DRX cycle > 320ms		ceil(Mcbd *P) *Tdrx	
Note:	$T_{CSI-RS}$ is the periodicity of CSI-RS resource in the set $\overline{q}_{l}$ . $T_{DRX}$ is the		
DRX cycle length.			

The normative reference for this requirement is TS 38.133 [6] clauses 8.5.3.2, 8.5.4, 8.5.6.2 and A.4.5.5.4.

## 4.5.5.4.4 Test description

The test consists of two subtests with two cells configured, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell in FR1. The difference between the two subtests is whether the measurement gap is configured on the PSCell or not. Each subtest consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 4.5.5.4.4-1 shows the five different time durations and the corresponding variation of the downlink SNR in the active PSCell to emulate CSI-RS based beam failure.



Figure 4.5.5.4.4-1: SNR variation CSI-RS for EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX

## 4.5.5.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.5.5.4.4.1-1.

Table 4.5.5.4.4.1-1: Supported test configurations for EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX

Configuration	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
Note: The UE is onl	lote: The UE is only required to pass in one of the supported test configurations in FR1		

Configure the test equipment and the DUT according to the parameters in Table 4.5.5.4.4.1-2.

Table 4.5.5.4.4.1-2: Initial conditions for EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, table E.4-1 and TS 38.	508-1 [14] clause 4.3.1 and 4.4.2.
Channel bandwidth	As specified	by the test configuration selected fr	om Table 4.5.5.4.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

- 1. The general test parameter settings are set up according to Table 4.5.5.4.4.1-3. The measurement gap configuration for sub-test 2 is according to Table 4.5.5.4.4.1-4. The NZP-CSI-RS configuration for sub-test 1 and 2 is according to Table 4.5.5.4.4.1-5. The DRX configuration for subtest 1 and 2 is according to Table 4.5.5.4.4.1-6. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.
- 2. Message contents are defined in clause 4.5.5.4.4.3.
- 3. There are two cells in the test, where Cell 1 is the E-UTRAN PCell on the E-UTRA carrier, and Cell 2 is the NR PSCell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table A.6.1.1-1 for this test. Cell 2 is configured according to Annex C.1.1 and C.1.2.

Table 4.5.5.4.4.1-3: General test parameters for EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX

Parameter		Uni	Val	Comment	
		t	Test 1	Test 2	
Active P			Cell 1	Cell 1	
Duplex	nnel Number Config 1,		1 FDD	1 FDD	
mode	Config 1,  4  Config 2,	- -	TDD	TDD	
TDD	3, 5, 6				
TDD Configu			Not Applicable	Not Applicable	
ation	Config 2, 5		[TDDConf.1.1]	[TDDConf.1.1]	
	Config 3,		[TDDConf.1.2]	[TDDConf.1.2]	
CORES	Config 1,		[CR. 1.1 FDD]	[CR. 1.1 FDD]	A.3.1.2
Referen e	Config 2,	-	[CR. 1.1 TDD]	[CR. 1.1 TDD]	
Channe		-	[CR. 2.1 TDD]	[CR. 2.1 TDD]	
SSB Configu	Config 1,		SSB.1 FR1	SSB.1 FR1	A.3.10
ation	Config 2,	-	SSB.1 FR1	SSB.1 FR1	
	Config 3,	-	SSB.2 FR1	SSB.2 FR1	
SMTC Configu	Config 1,		FR1 patterm 1	FR1 patterm 1	A.3.11
ation	Config 3,		FR1 patterm 2	FR1 patterm 2	
PDSCH PDCCH	/ Config 1,		15 KHz	15 KHz	
subcarri r spacin	e Config 3,	-	30 KHz	30 KHz	
csi-RS-I	ndex d as beam		[0]	[0]	
	parameters		TBD	TBD	A.3.2.1
CP leng			Normal	Normal	
Correlat Antenna Configu	-		[2x2 Low]	[2x2 Low]	
Beam	DCI format		1-0	1-0	
failure detect ion trans	Number of Control OFDM symbols		2	2	
missio n	Aggregation level	CC E	8	8	
param eters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE	dB	0	0	
	energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	
	DMRS precoder granularity		REG bundle size	REG bundle size	

RE siz	EG bundle		6	6			
DRX			640	640			
Gap pattern	n ID		[N.A.]	*[ <i>gp0</i> ]			
	csi-RS-Index		2	2	Number of SSB indexes used for beam failure detection		
rlmInSyncO Threshold	cOutOfSync d		absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).		
rsrp-Thresh			TBD	TBD	Threshold used for Qout_LR_SSB		
powerContr S	powerControlOffsetS S		ontrolOffsetS db0		db0	db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailure MaxCount	beamFailureInstance MaxCount		[n2]	[n2]	see TS 38.321 [7], section 5.17		
beamFailure Timer	beamFailureDetection Timer		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17		
NZP CSI-Raconfiguration	NZP CSI-RS		[Resourceld 1]	[Resourceld 0]			
ZP CSI-RS configuation	ZP CSI-RS		TBD	TBD			
CSI-IM conf	figuration		TBD	TBD			
Periodic CS	Periodic CSI reporting		PUCCH	PUCCH			
CSI reporting	Config 1, 2, 4, 5	slot	[5]	[5]			
periodicit y	Config 3, 6		[10]	[10]			
T1		S	1	1	During this time the the UE shall be fully synchronized to cell		
T2		s	0.4	0.4			
T3			[TBD]	[TBD]			
D1		S S	[0.24]	[0.44]			
Note 1: U	JE-specific F	PDCCH	is not transmitted after	T1 starts.			

Table 4.5.5.4.4.1-4: Measurement gap configuration for EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX

Field	Test 2
rieid	Value
gapOffset	[0]

Table 4.5.5.4.4.1-5: NZP-CSI-RS resource configuration for EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX

Field	Resourceld 0	Resourceld 1		
	Value	Value		
frequencyD omainAlloca tion <sup>Note 1</sup>	row1	row2		
startingRB	0	0		
nrofRBs	Note 2	Note 2		
Note 1: TS 38.211 [7] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in TS 38.133 [6] Table A 4 5 1 7 1-1				

Table A.4.5.5.4.1-6: DRX-Configuration for EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX

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

#### 4.5.5.4.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in subtest 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of FR1 PSCell according to T1 in Table 4.5.5.4.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 4.5.5.4.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 4.5.5.4.5-1. T3 starts.
- 5. When T3 expires the SS shall change the SNR value to T4 as specified in Table 4.5.5.4.5-1. T4 starts.
- 6. When T4 expires the SS shall change the SNR value to T5 as specified in Table 4.5.5.4.5-1. T5 starts.
- 7. If the SS:
  - a) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1
     [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point B

and

b) does not detect any uplink power on NR carrier higher than OFF power defined in TS 38.521-1 [17] clause 6.3.2.5 from time point C until T3 expires

and

c) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point F (D1 after the start of T5) until T5 expires,

the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

- 8. When T5 expires the SS shall change the SNR value to T1 as specified in Table 4.5.5.4.5-1.
- 9. Wait [1s] for the UE to re-establish the connection or continue directly to step 10. If the UE re-establishes the connection within [1s] continue to step 11. Otherwise continue to step 10.
- 10. Switch the UE on and off. Ensure the UE is in RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, Connected without release On according to TS 38.508-1 [14] clause 4.5.

11. Repeat steps 2-10 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

## 4.5.5.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.5.5.4.4.3-1: Common Exception messages for EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX

Default Message Contents			
Common contents of system information blocks exceptions			
Default RRC messages and information elements contents exceptions	FFS		

## 4.5.5.4.5 Test requirement

Tables 4.5.5.4.4.1-3 and 4.5.5.4.5-1 define the primary level settings including test tolerances for EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX.

Test 1 and Test 2

Unit

Parameter

Note 2:

Table 4.5.5.4.5-1: Cell specific test parameters for EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX

Test 1 and Test 2

Parameter		Unit	Test 1 and Test 2					lest 1 and lest 2				
					I-RS of s					-RS of s		
EDDE			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
to SSS	tio of PSS	dB										
EPRE ra DMRS to	tio of PBCH SSS	dB										
EPRE ra to PBCH	tio of PBCH DMRS	dB										
EPRE ra PDCCH SSS	tio of	dB										
EPRE ra PDCCH : DMRS	tio of to PDCCH	dB			0					0		
EPRE ratio of PDSCH DMRS to SSS		dB										
EPRE ra PDSCH t DMRS	tio of to PDSCH	dB										
	tio of OCNG SSS <sup>(Note 1)</sup>	dB										
	tio of OCNG 5 DMRS (Note	dB										
SNR_C	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SI-RS	Config 2	[	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
$N_{oc}$	Config 1	dBm/			[-98]					[-98]		-
¹ oc	Config 2	15K			[-98]					[-98]		
	Config 3	Hz			[-98]					[-98]		
SS- RSRP <sup>N</sup> ote 3		dBm /SC S										
Ê <sub>s</sub> /I <sub>ot</sub>												
Ês/Noc												
lo	config 1, 2	dBm/ 9.36 MHz										
	Config 3, 4	dBm/ 38.1 MHz										
Propagat condition					TDLC30			[TDLC300]				

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

settable parameters themselves.

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.

SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set  $q_1$ .

No later than time point F occurring no later than D1 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set  $q_1$ .

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

## 4.5.6 Active BWP switch delay

## 4.5.6.1 DCI-based and time-based active BWP switch

## 4.5.6.1.0 Minimum conformance requirements

**FFS** 

4.5.6.1.1 EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD
- Test procedure is TBD
- Test applicability needs to be added to TS 38.522

4.5.6.1.1.1 Test purpose

**FFS** 

4.5.6.1.1.2 Test applicability

**FFS** 

4.5.6.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.5.6.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.6.1.1.

4.5.6.1.1.4 Test description

4.5.6.1.1.4.1 Initial conditions

**FFS** 

4.5.6.1.1.4.2 Test procedure

**FFS** 

4.5.6.1.1.4.3 Message contents

**FFS** 

4.5.6.1.1.5 Test requirements

**FFS** 

# 4.5.6.1.2 EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD
- Test procedure is TBD
- Test applicability needs to be added to TS 38.522

4.5.6.1.2.1 Test purpose

**FFS** 

4.5.6.1.2.2 Test applicability

**FFS** 

4.5.6.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.5.6.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.6.1.2.

4.5.6.1.2.4 Test description

4.5.6.1.2.4.1 Initial conditions

**FFS** 

4.5.6.1.2.4.2 Test procedure

FFS

4.5.6.1.2.4.3 Message contents

**FFS** 

4.5.6.1.2.5 Test requirements

**FFS** 

4.5.6.2 RRC-based active BWP switch

4.5.6.2.0 Minimum conformance requirements

FFS

4.5.6.2.1 EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD

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- Cell mapping is TBD

- Test procedure is TBD

- Test applicability needs to be added to TS 38.522

4.5.6.2.1.1 Test purpose

**FFS** 

4.5.6.2.1.2 Test applicability

**FFS** 

4.5.6.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.5.6.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.4.5.6.2.1.

4.5.6.2.1.4 Test description

4.5.6.2.1.4.1 Initial conditions

**FFS** 

4.5.6.2.1.4.2 Test procedure

**FFS** 

4.5.6.2.1.4.3 Message contents

**FFS** 

4.5.6.2.1.5 Test requirements

**FFS** 

# 4.6 Measurement procedures

## 4.6.1 Intra-frequency measurements

### 4.6.1.0 Minimum conformance requirements

## 4.6.1.0.1 Minimum conformance requirements for event-triggered reporting without gap

The UE shall be able to identify a new detectable intra frequency cell within  $T_{identify\_intra\_without\_index}$  if UE is not indicated to report SSB based RRM measurement result with the associated SSB index(reportQuantityRsIndexes or maxNrofRSIndexesToReport is not configured), or the UE is indicated that the neighbour cell is synchronous with the serving cell (deriveSSB-IndexFromCell is enabled). Otherwise UE shall be able to identify a new detectable intra frequency cell within  $T_{identify\_intra\_with\_index}$ . The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within  $T_{identify\_intra\_with\_out\_index}$ . It is assumed that deriveSSB-IndexFromCell is always enabled for FR1 TDD and FR2.

 $T_{identify\_intra\_without\_index} = (T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}) ms$ 

 $T_{identify\_intra\_with\_index} = (T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra} + T_{SSB\_time\_index\_intra}) \ ms$ 

Where:

 $T_{PSS/SSS\_sync\_intra}$ : it is the time period used in PSS/SSS detection given in table 4.6.1.0.1-1, 4.6.1.0.1-2, 4.6.1.0.1-4 (deactivated SCell) or 4.6.1.0.1-5 (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 4.6.1.0.1-3 or 4.6.1.0.1-6 (deactivated SCell)

 $T_{SSB\_measurement\_period\_intra}$ : equal to a measurement period of SSB based measurement given in table 4.6.1.0.1-7, table 4.6.1.0.1-8 table 4.6.1.0.1-9 (deactivated Scell) or 4.6.1.0.1-10(deactivated SCell)

CSSF<sub>intra</sub>: it is a carrier specific scaling factor and is determined

- according to CSSF<sub>outside\_gap,i</sub> in TS 38.133 [6] section 9.1.5.1 for measurement conducted outside
  measurement gaps, i.e. when intrafrequency SMTC is fully non overlapping or partially overlapping with
  measurement gaps, or according to CSSF<sub>within\_gap,i</sub> in TS 38.133 [6] section 9.1.5.2 for measurement
  conducted within measurement gaps, i.e. when intrafrequency SMTC is fully overlapping with measurement
  gaps.
  - if the high layer in TS 38.331 [13] signaling of *smtc2* is configured, the assumed periodicity of intrafrequency SMTC occasions corresponds to the value of higher layer parameter *smtc2*; Otherwise the assumed periodicity of intrafrequency SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

 $M_{pss/sss\_sync\_w/o\_gaps}$ : For a UE supporting FR2 power class 1,  $M_{pss/sss\_sync}$ =40. For a UE supporting power class 2,  $M_{pss/sss\_sync\_w/o\_gaps}$  =24. For a UE supporting FR2 power class 3,  $M_{pss/sss\_sync\_w/o\_gaps}$  =24. For a UE supporting FR2 power class 4,  $M_{pss/sss\_sync\_w/o\_gaps}$  = 24

 $M_{meas\_period\_w/o\_gaps}$ : For a UE supporting power class 1,  $M_{meas\_period\_w/o\_gaps}$  =40. For a UE supporting FR2 power class 2,  $M_{meas\_period\_w/o\_gaps}$  =24. For a UE supporting power class 3,  $M_{meas\_period\_w/o\_gaps}$  =24. For a UE supporting power class 4,  $M_{meas\_period\_w/o\_gaps}$  =24.

When intrafrequency SMTC is fully non overlapping with measurement gaps or intrafrequency SMTC is fully overlapping with MGs, Kp=1

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

If the higher layer signaling in TS38.331 [13] signaling of smtc2 is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for  $T_{identify\ intra\ with\ index}$  or  $T_{identify\ intra\ with\ index}$ 

For FR2 when any of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap is fully overlapping with intra-frequency SMTC,  $K_{layer1\_measurement} = 1.5$ , otherwise  $K_{layer1\_measurement} = 1.5$ 

If SCG DRX is in use, intrafrequency cell identification requirements specified in Table 4.6.1.0.1-1, Table 4.6.1.0.1-2, Table 4.6.1.0.1-3, Table 4.6.1.0.1-4, Table 4.6.1.0.1-5 and Table 4.6.1.0.1-6 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 4.6.1.0.1-1: Time period for PSS/SSS detection, (Frequency range FR1)

DRX cycle	T <sub>PSS/SSS_sync_intra</sub>	
No DRX	max[ 600ms, ceil( 5 x K <sub>p</sub> ) x SMTC period ] note 1 x	
	CSSFintra	
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 requiremen		
the one used by the cell being identified.		

Table 4.6.1.0.1-2: Time period for PSS/SSS detection, (Frequency range FR2)

DRX cycle	TPSS/SSS_sync_intra	
No DRX	max(600ms, ceil(Mpss/sss_sync_w/o_gaps x Kp x K layer1_measurement) x SMTC period) note 1 x CSSFintra	
DRX cycle≤ 320ms	max( 600ms, ceil(1.5 x M <sub>pss/sss_sync_w/o_gaps</sub> x K <sub>p</sub> x K layer1_measurement) x max(SMTC period,DRX cycle)) x CSSF <sub>intra</sub>	
DRX cycle>320ms	ceil(Mpss/sss_sync_w/o_gaps x Kp x K layer1_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 4.6.1.0.1-3: Time period for time index detection (Frequency range FR1)

DRX cycle	Tssb_time_index_intra		
No DRX	max(120ms, ceil( 3 x K <sub>p</sub> ) x SMTC period) Note 1 x		
	CSSF <sub>intra</sub>		
DRX cycle≤ 320ms	Max(120ms, ceil (1.5 x 3 x K <sub>p</sub> ) x max(SMTC		
	period,DRX cycle)) x CSSFintra		
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 4.6.1.0.1-4: Time period for PSS/SSS detection, deactivated SCell (Frequency range FR1)

DRX cycle	T <sub>PSS/SSS_sync_intra</sub>
No DRX	5 x measCycleSCell x CSSF <sub>intra</sub>
DRX cycle≤ 320ms	5 x max(measCycleSCell, 1.5xDRX cycle) x CSSF <sub>intra</sub>
DRX cycle> 320ms	5 x max(measCycleSCell, DRX cycle) x CSSF <sub>intra</sub>

Table 4.6.1.0.1-5: Time period for PSS/SSS detection, deactivated SCell (Frequency range FR2)

DRX cycle	T <sub>PSS</sub> /SSS_sync_intra
No DRX	Mpss/sss_sync_w/o_gaps x measCycleSCell x CSSFintra
DRX cycle≤ 320ms	M <sub>pss/sss_sync_w/o_gaps</sub> x max(measCycleSCell, 1.5xDRX cycle) x CSSF <sub>intra</sub>
DRX cycle> 320ms	M <sub>pss/sss_sync_w/o_gaps</sub> x max(measCycleSCell, DRX cycle) x CSSF <sub>intra</sub>

Table 4.6.1.0.1-6: Time period for time index detection, deactivated SCell (Frequency range FR1)

DRX cycle	Tssb_time_index_intra
No DRX	3 x measCycleSCell x CSSF <sub>intra</sub>
DRX cycle≤ 320ms	3 x max(measCycleSCell, 1.5xDRX cycle) x CSSF <sub>intra</sub>
DRX cycle> 320ms	3 x max(measCycleSCell, DRX cycle) x CSSF <sub>intra</sub>

The measurement period for intrafrequency measurements without gaps is as shown in table 4.6.1.0.1-7, 4.6.1.0.1-8, 4.6.1.0.1-9 (deactivated SCell) or 4.6.1.0.1-10 (deactivated SCell). If the higher layer signaling in TS38.331 [13] signaling of *smtc2* is present and smtc1 is fully overlapping with measurement and smtc2 is partially overlapping with measurement gaps, requirements are not specified for **Tssb\_measurement\_period\_intra**.

If SCG DRX is in use, intrafrequency measurement period requirements specified in Table 4.6.1.0.1-7, Table 4.6.1.0.1-8, Table 4.6.1.0.1-9 and Table 4.6.1.0.1-10 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 4.6.1.0.1-7: Measurement period for intrafrequency measurements without gaps(Frequency FR1)

DRX cycle	T <sub>SSB_measurement_period_intra</sub>
No DRX	max( 200ms, ceil( 5 x K <sub>p</sub> ) x SMTC period ) Note 1 x
	CSSFintra
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 identifie	d.

Table 4.6.1.0.1-8: Measurement period for intrafrequency measurements without gaps(Frequency FR2)

DRX cycle	Tssb_measurement_period_intra
No DRX	max( 400ms, ceil(Mmeas_period_w/o_gaps x Kp x K
	layer1_measurement) x SMTC period) Note 1 x CSSFintra
DRX cycle≤ 320ms	max( 400ms, ceil(1.5x M <sub>meas_period_w/o_gaps</sub> x K <sub>p</sub> x K
	layer1_measurement) x max(SMTC period,DRX cycle)) x
	CSSF <sub>intra</sub>
DRX cycle>320ms	ceil(Mmeas_period_w/o_gaps xKp x K layer1_measurement ) 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 4.6.1.0.1-9: Measurement period for intrafrequency measurements without gaps (deactivated SCell) (Frequency range FR1)

DRX cycle	Tssb_measurement_period_intra
No DRX	5 x measCycleSCell x CSSF <sub>intra</sub>
DRX cycle≤ 320ms	5 x max(measCycleSCell, 1.5xDRX cycle) x CSSF <sub>intra</sub>
DRX cycle> 320ms	5 x max(measCycleSCell, DRX cycle) x CSSF <sub>intra</sub>

Table 4.6.1.0.1-10: Measurement period for intrafrequency measurements without gaps (deactivated SCell) (Frequency range FR2)

DRX cycle	TssB_measurement_period_intra
No DRX	M <sub>meas_period with_gaps</sub> x measCycleSCell x CSSF <sub>intra</sub>
DRX cycle≤ 320ms	M <sub>meas_period with_gaps</sub> x max(measCycleSCell, 1.5xDRX
	cycle) x CSSF <sub>intra</sub>
DRX cycle> 320ms	M <sub>meas_period with_gaps</sub> x max(measCycleSCell, DRX cycle)
	x CSSF <sub>intra</sub>

The normative reference for this requirement is TS 38.133 [6] clause 9.2.5.1 and 9.2.5.2.

## 4.6.1.0.2 Minimum conformance requirements for event-triggered measurements with gap

TS 38.133, clause 9.2.2]

The requirements in TS 38.133 [6] Section 9.2 apply, provided:

- The cell being identified or measured is detectable.

An intra-frequency cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in TS 38.133 [6] Sections 10.1.2 and 10.1.3 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in TS 38.133 [6] Sections 10.1.7 and 10.1.8 for FR1 and FR2, respectively, for a corresponding Band,

- SS-SINR related side conditions given in TS 38.133 [6] Sections 10.1.12 and 10.1.13 for FR1 and FR2, respectively, for a corresponding Band,
- SSB\_RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding Band.

[TS 38.133, clause 9.2.6.2]

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 4.6.1.0.2 or 4.6.1.0.2.

 $T_{SSB\_time\_index\_intra}$ : it is the time period used to acquire the index of the SSB being measured given in table 4.6.1.0.2.

T <sub>SSB\_measurement\_period\_intra</sub>: equal to a measurement period of SSB based measurement given in table 4.6.1.0.2 or 4.6.1.0.2.

 $CSSF_{intra}$ : it is a carrier specific scaling factor and is determined according to  $CSSF_{within\_gap,i}$  in TS 38.133 [6] section 9.1.5.2 for measurement conducted within measurement gaps.

 $M_{pss/sss\_sync\_with\_gaps}$ : For a UE supporting FR2 power class 1,  $M_{pss/sss\_sync\_with\_gaps}$ =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 [13] signaling of smtc2 is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for  $T_{identify\_intra\_with\_index}$  or  $T_{identify\_intra\_with\_index}$ .

If SCG DRX is in use, intrafrequency cell identification requirements specified in TS 38.133 [6] Table 9.2.6.1-1, Table 9.2.6.1-2, and Table 9.2.5.1-3 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 4.6.1.0.2: Time period for PSS/SSS detection (Frequency range 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 4.6.1.0.2-2: Time period for PSS/SSS detection (Frequency range FR2)

DRX cycle	T <sub>PSS</sub> /SSS_sync_intra
No DRX	max(600ms, Mpss/sss_sync_with_gaps 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	Mpss/sss_sync_with_gaps x max(MGRP, DRX cycle) x
	CSSF <sub>intra</sub>

Table 4.6.1.0.2: Time period for time index detection (Frequency range 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>

[TS 38.133, clause 9.2.6.3]

The measurement period for FR1 intrafrequency measurements with gaps is as shown in Table 4.6.1.0.2-4.

The measurement period for FR2 intrafrequency measurements with gaps is as shown in Table 4.6.1.0.2-5.

If SCG DRX is in use, intrafrequency measurement period requirements specified in Table 4.6.1.0.2-4 and Table 4.6.1.0.2-5, shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 4.6.1.0.2-4: Measurement period for intrafrequency measurements with gaps (Frequency Range FR1)

DRX cycle	T ssb_measurement_period_intra
No DRX	Max(200ms, 5 x max(MGRP, SMTC period)) x
	CSSF <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 4.6.1.0.2-5: Measurement period for intrafrequency measurements with gaps (Frequency Range 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 CSSF <sub>intra</sub>

[TS 38.133, clause 9.2.4.3]

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in TS 38.133 [6] sections 10.1.2.1, 10.1.3.1, 10.1.7.1, 10.1.8.1, 10.1.12.1 and 10.1.13.1, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty

is:  $2 \times TTI_{DCCH}$ . This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

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 TS 38.133 [6] clause 9.2.5.1 or clause 9.2.6.2. When L3 filtering is used an additional delay can be expected.

If a cell which has been detectable at least for the time period  $T_{identify\ intra\ without\ index}$  or  $T_{identify\ intra\ with\ index}$  defined in TS 38.133 [6] clause 9.2.5.1 or clause 9.2.6.2 becomes undetectable for a period and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than  $T_{Measurement\_Period,\ Intra}$  provided the timing to that cell has not changed more than  $\pm$  3200 Tc while the measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used, an additional delay can be expected.

The normative reference for this requirement is TS 38.133 [6] clause 9.2.2, 9.2.6.2, 9.2.6.3 and 9.2.4.3.

## 4.6.1.1 EN-DC FR1 event-triggered reporting without gap in non-DRX

#### 4.6.1.1.1 Test purpose

This test is to verify the UE makes correct reporting of an event without gap within the intra-frequency cell search requirements.

## 4.6.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 4.6.1.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.6.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.4.6.1.1.

### 4.6.1.1.4 Test description

#### 4.6.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.6.1.1.4.1-1.

Table 4.6.1.1.4.1-1: supported test configurations

Test Case ID	Description
4.6.1.1-1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
4.6.1.1-2	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
4.6.1.1-3	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to be tested in one of the supported test configurations.	

Configure the test equipment and the DUT according to the parameters in Table 4.6.1.1.4.1-2 and Table 4.6.1.1.4.1-3.

Table 4.6.1.1.4.1-2: Initial conditions for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified in Annex E, Table E.1-1 and TS 38.508-1 [14] sclause 4.3.1.		
Channel bandwidth	As specified by the test configuration selected from Table 4.7.1.1.2-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A	•	

Table 4.6.1.1.4.1-3: General test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1, 2, 3	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 2: Cell 2 and Cell 3	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3	N/A	OFF
Time offset between PCell and PSCell		1, 2, 3	3 µs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	5	

- 1. Message contents are defined in clause 4.6.1.1.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in the same frequency. Cell 2 is the PSCell and Cell 3 is the neighbour NR Cell.

## 4.6.1.1.4.2 Test procedure

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.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508-1 [14] clause 4.5.

- 2. Configure MCG and SCG according to Annex C.1 for all downlink physical channels.
- 3. The SS shall configure the PCell (Cell 1) and PSCell (Cell 2) on the MCG and SCG as per TS 38.508-1 [14] clause 4.5 with the message content exceptions defined in clause 4.6.1.1.4.3.
- 4. Set the parameters according to T1 in Table 4.6.1.1.4.1-2. Propagation conditions are set according to Annex C clauses C.2.2. T1 starts.
- 5. The SS shall transmit an RRCConnectionReconfiguration message with event A3 configured.
- 6. The UE shall transmit an RRCConnectionReconfigurationComplete message.
- 7. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 4.6.1.1.4.1-2.
- 8. UE shall transmit a MeasurementReport message triggered by Event A3 for Cell 3 on PCell (Cell 1). If the measurement reporting delay from the beginning of time period T2 is less than 802 the number of successful tests is increased by one. If the UE fails to report the event within the measurement reporting delay requirement then the number of failure tests is increased by one.
- 9. The SS waits until the MeasurementReport message is received or when T2 expires.
- 10. The SS shall transmit RRCConnectionRelease message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message.
- 11. Set Cell 3 physical cell identity = [((current cell 3 physical cell identity + 1) mod 14 + 2)] for next iteration of the test procedure loop.
- 12. The SS then shall transmit *RRCConnectionReconfiguration* message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit *RRCConnectionReconfigurationComplete* message.
- 13. If any the reconfiguration fails, switch off and on the UE and ensure the UE is in RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [14] clause 4.5].
- 14. Repeat steps 3-13 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 4.6.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.6.1.1.4.3-1: Common Exception messages for Additional EN-DC FR1 event-triggered reporting without gap in non-DRX test requirement

	Default Message Contents
Common contents of system information	
blocks exceptions	
Default RRC messages and information	Table H.3.1-1
elements contents exceptions	Table H.3.1-2
	Table H.3.1-3 with Condition SSB.1 FR1, SMTC pattern 2 and
	Asynchronous cells for configuration 4.6.1.1-1
	Table H.3.1-3 with Condition SSB.1 FR1, SMTC pattern 1 and
	synchronous cells for configuration 4.6.1.1-2
	Table H.3.1-3 with Condition SSB.2 FR1, SMTC pattern 1 and
	synchronous cells for configuration 4.6.1.1-3
	Table H.3.1-4 with A3-offset = -6dB
	Table H.3.1-5
	Table H.3.1-7
	Table H.3.2-1
	Table H.3.2-2

#### 4.6.1.1.5 Test requirement

Table 4.6.1.1.5-1 defines the primary level settings including test tolerances for all tests.

Table 4.6.1.1.5-1: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1

Parameter	Unit	Test	Cell 2		Cell 3		
		configuration	T1	T2	T1	T2	
TDD configuration		1	N	/A	N,	/A	
		2	TDDConf.1.1			TDDConf.1.1	
		3		onf.2.1	TDDC		
PDSCH RMC		1	SR.1.	1 FDD	N.	/A	
configuration		2	SR.1.	1 TDD			
		3	SR.2.	1 TDD			
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD	
configuration		3	CR.2.	1 TDD	CR.2.	1 TDD	
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC		2	CCR.1	.1 TDD	CCR.1	.1 TDD	
configuration		3	CCR.2	.1 TDD	CCR.2	.1 TDD	
OCNG Patterns				P.1	OF		
Initial BWP		1, 2, 3 1, 2, 3		/P.0.1	DLBW		
configuration		, , -	ULBV		ULBW		
Active DL BWP		1, 2, 3		/P.1.1	DLBWP.1.1		
configuration							
Active UL BWP		1, 2, 3	ULBV	/P.1.1	ULBW	/P.1.1	
configuration							
RLM-RS		1, 2, 3	SS	SB		SB	
$N_{oc}$ note 2	dBm/SCS	1			-98		
OC .		2			-98		
		3			-95		
$N_{oc}$ note 2	dBm/15 KHz	1			-98		
oc		2					
		3		1			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
S / OL		2					
	in.	3	4	4	1.6.7	4	
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4	
57 00		2					
SS-RSRP note 3	dBm/SCS KHz	3	0.4	0.4	Infinity	0.4	
33-K3KP	UDIII/SUS KMZ	2	-94 -94	-94 -94	-Infinity -Infinity	-94 -94	
		3	-9 <del>4</del> -91	-94 -91	-Infinity	-94 -91	
lo	dBm/9.36 MHz	1	-64.60	-62.25	-Infinity	-62.25	
	dBm/9.36 MHz	2	-64.60	-62.25	-Infinity	-62.25	
	dBm/38.16 MHz	3	-58.50	-56.16	-Infinity	-56.16	
Propagation Condition	3211/00110 WH 12	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.

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 overall delays measured test requirement is expressed as:

 $T_{identify\_intra\_without\_index} = (T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}) \ ms$ 

 $T_{PSS/SSS\_sync\_intra} = max[600ms, ceil(5~x~K_p)~x~SMTC~period]~x~CSSF_{intra} = 600ms$ 

 $T_{SSB\_measurement\_period\_intra} = max[200ms, ceil(5 x K_p) x SMTC period] x CSSF_{intra} = 200 ms$ 

Which:

 $K_p = 1;$ 

SMTC period as defined in Table 4.6.1.1.4.1-3;

 $CSSF_{intra} = 1$ 

TTI insertion uncertainty =  $TTI_{DCCH} = 1$  ms;  $2xTTI_{DCCH} = 2$  ms

The overall delays measured shall be less than a total of 802 ms in this test case (note: this gives a total of 800 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

The rate of correct events observed during repeated tests shall be at least 90% with confidence level of 95%.

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.

## 4.6.1.2 EN-DC FR1 event-triggered reporting without gap in DRX

## 4.6.1.2.1 Test purpose

This test is to verify the UE makes correct reporting of an event without gap in DRX within the intra-frequency cell search requirements.

## 4.6.1.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 4.6.1.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.6.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.4.6.1.2.

4.6.1.2.4 Test description

## 4.6.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.6.1.2.4.1-1.

Table 4.6.1.2.4.1-1: supported test configurations

Test Case ID	Description
4.6.1.2-1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
4.6.1.2-2	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
4.6.1.2-3	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
NOTE: The L	JE is only required to be tested in one of the supported test configurations.

Configure the test equipment and the DUT according to the parameters in Table 4.6.1.2.4.1-2 and Table 4.6.1.2.4.1-3.

Table 4.6.1.2.4.1-2: Initial conditions for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

Parameter		Value	Comment			
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	I in Annex E, Table E.1-1 and TS 38	.508-1 [14] sclause 4.3.1.			
Channel bandwidth	As specified	As specified by the test configuration selected from Table 4.7.1.1.2-1.				
Propagation conditions	AWGN		As specified in Annex C.2.2.			
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	A.3.2.3.4				
Exceptions to connection diagram	N/A					

Table 4.6.1.2.4.1-3: General test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

Parameter	Unit	Test configur	Value		Comment
		ation	Test 1	Test 2	
Active cell		1, 2, 3	E-UTRAN Ce Cell 2	II 1 and NR	
Neighbour cell		1, 2, 3	NR Cell 3		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 2: Cell 2 and	Cell 3	
SSB configuration		1 2 3	SSB.1 FR1 SSB.1 FR1 SSB.2 FR1		
SMTC configuration		1 2 3	SMTC.2 SMTC.1 SMTC.1		
A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	S	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.2	Annex A.5 Table A.5-1
Time offset between PCell and PSCell		1, 2, 3	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs	<u> </u>	Synchronous cells
		3	3 μs		Synchronous cells
T1	S	1, 2, 3	5		
T2	S	1, 2, 3	5	10	

- 1. Message contents are defined in clause 4.6.1.2.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in the same frequency. Cell 2 is the PSCell and Cell 3 is the neighbour NR Cell.

### 4.6.1.2.4.2 Test procedure

Same test procedure as in subclause 4.6.1.1.4.2 with Step 8 is replaced by following:

8. UE shall transmit a MeasurementReport message triggered by Event A3 for Cell 3 on PCell (Cell 1). If the overall delays measured from the beginning of time period T2 is less than 922 ms for Test 1 or less than 6402 ms for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.

## 4.6.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.6.1.2.4.3-1: Common Exception messages for Additional EN-DC FR1 event-triggered reporting without gap in DRX test requirement

	Default Message Contents
Common contents of system information blocks exceptions	
Default RRC messages and information elements contents exceptions	Table H.3.1-1 Table H.3.1-2 Table H.3.1-3 with Condition SSB.1 FR1, SMTC pattern 2 and Asynchronous cells for configuration 4.6.1.2-1 Table H.3.1-3 with Condition SSB.1 FR1, SMTC pattern 1 and synchronous cells for configuration 4.6.1.2-2 Table H.3.1-3 with Condition SSB.2 FR1, SMTC pattern 1 and synchronous cells for configuration 4.6.1.2-3 Table H.3.1-4 with A3-offset = -6dB
	Table H.3.1-5 Table H.3.1-7 Table H.3.7-1 with Condition DRX.1 for Test 1 Table H.3.7-1 with Condition DRX.2 for Test 2 Table H.3.2-1 Table H.3.2-2

## 4.6.1.2.5 Test requirement

Table 4.6.1.2.4.1-2 and Table 4.6.1.2.5-1 defines the primary level settings including test tolerances for all tests.

Table 4.6.1.2.5-1: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

Parameter	Unit	Test	Cell 2		Cell 3		
		configuration	T1	T2	T1	T2	
TDD configuration		1	N	/A	N,	/A	
		2	TDDConf.1.1			TDDConf.1.1	
		3		onf.2.1	TDDC		
PDSCH RMC		1	SR.1.	1 FDD	N/	/A	
configuration		2	SR.1.	1 TDD			
		3	SR.2.	1 TDD			
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD	
configuration		3	CR.2.	1 TDD	CR.2.	1 TDD	
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC		2	CCR.1	.1 TDD	CCR.1	.1 TDD	
configuration		3		.1 TDD	CCR.2		
OCNG Patterns				P.1	OF		
Initial BWP		1, 2, 3 1, 2, 3		/P. 0.1	DLBW		
configuration		, _, _		/P.0.1	ULBW		
Active DL BWP		1, 2, 3		/P.1.1	DLBW		
configuration							
Active UL BWP		1, 2, 3	ULBV	/P.1.1	ULBW	/P.1.1	
configuration							
RLM-RS		1, 2, 3	SS	SB	SSB		
$N_{oc}$ note 2	dBm/SCS	1			-98		
- v oc		2			-98		
		3			-95		
$N_{oc}$ note 2	dBm/15 KHz	1			-98		
1 oc		2					
		3					
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
$\mathbf{L}_{\mathrm{s}}/\mathbf{L}_{\mathrm{ot}}$		2					
		3					
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4	
-s / - · oc		2					
		3					
SS-RSRP note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94	
		2	-94	-94	-Infinity	-94	
le le	dDree/O OC MUI-	3	-91	-91	-Infinity	-91	
lo	dBm/9.36 MHz		-64.60	-62.25	-Infinity	-62.25	
	dBm/9.36 MHz	2	-64.60	-62.25	-Infinity	-62.25	
Duanamatian	dBm/38.16 MHz	3	-58.50	-56.16	-Infinity	-56.16	
Propagation Condition		1, 2, 3	AWGN				

NOTE 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

NOTE 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 922 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The overall delays measured test requirement is expressed in test 1 with DRX 40ms as:

 $T_{identify\_intra\_without\_index} = (T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}) \ ms$ 

 $T_{PSS/SSS\_sync\_intra} = max[600ms, ceil(1.5 \ x \ 5 \ x \ K_p) \ x \ max(SMTC \ period, DRX \ cycle)] \ x \ CSSF_{intra} = 600ms$ 

T<sub>SSB\_measurement\_period\_intra</sub> = max[200ms, ceil(1.5 x 5 x K<sub>p</sub>) x max(SMTC period, DRX cycle)] x CSSF<sub>intra</sub> = 320 ms

Which:

```
K_p=1; SMTC period as defined in Table 4.6.1.2.4.1-3; DRX\ cycle=40; CSSF_{intra}=1
```

TTI insertion uncertainty =  $TTI_{DCCH} = 1$  ms;  $2xTTI_{DCCH} = 2$  ms

The overall delays measured shall be less than a total of 922 ms in test 1 (note: this gives a total of 920 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6402 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The overall delays measured test requirement is expressed in test 2 with DRX 640ms as:

```
\begin{split} T_{identify\_intra\_without\_index} &= (T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}) \ ms \\ &= T_{PSS/SSS\_sync\_intra} = ceil(5 \ x \ K_p) \ x \ DRX \ cycle \ x \ CSSF_{intra} = 3200 \ ms \\ &= T_{SSB\_measurement\_period\_intra} = ceil(5 \ x \ K_p) \ x \ DRX \ cycle \ x \ CSSF_{intra} = 3200 \ ms \\ &= Which: \\ &= K_p = 1; \\ &= DRX \ cycle = 640; \\ &= CSSF_{intra} = 1 \end{split}
```

TTI insertion uncertainty =  $TTI_{DCCH} = 1$  ms;  $2xTTI_{DCCH} = 2$  ms

The overall delays measured shall be less than a total of 6402 ms in test 2 (note: this gives a total of 6400 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% with confidence level of 95%.

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.

## 4.6.1.3 EN-DC FR1 event-triggered reporting with gap in non-DRX

Editor's note:

- Message contents are not complete.
- Connection diagram is TBD.
- Cell mapping in Annex E is missing.
- RAN4 dependency:
- Brackets in core requirements

#### 4.6.1.3.1 Test purpose

To verify that the UE makes correct reporting of an event in non-DRX within EN-DC intra-frequency NR cell search requirements in TS 38.133 [6] clause 9.2. This test will partly verify the TDD intra-frequency cell search requirements.

## 4.6.1.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

#### 4.6.1.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.6.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.4.6.1.3.

## 4.6.1.3.4 Test description

### 4.6.1.3.4.1 Initial conditions

Test 4.6.1.3 can be run in one of the configurations defined in Table 4.6.1.3.4.1-1.

Table 4.6.1.3.4.1-1: Supported test configurations for NR FR1 Cell

Configuration	Description				
4.6.1.3-1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode				
4.6.1.3-2	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
4.6.1.3-3	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations.					

Configure the test equipment and the DUT according to the parameters in Table 4.6.1.5.4.1-2.

Table 4.6.1.3.4.1-2: Initial conditions for EN-DC event-triggered reporting in FR1

Parameter		Value	Comment			
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	specified in Annex E, Table E.2-1 and TS 38.508-1 [14] sclause 4.4.2 and 4.3.1.				
Channel bandwidth	As specified	by the test configuration selected fi	rom Table 4.6.1.3.4.1-1.			
Propagation conditions	AWGN		As specified in Annex C.2.1.			
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	A.3.TBD				
Exceptions to connection diagram	N/A					

- 1. Message contents are defined in clause 4.6.1.3.4.3.
- 2. The general test parameter settings are set up according to Table 4.6.1.3.4.1-3.
- 3. There is one E-UTRA FDD carrier and one E-UTRA PCell specified in the test. Cell 1 is the cell used for connection setup with the power level set according to Table A.6.1.1-1 for this test. There is one NR FDD carrier and 2 NR Cells specified in the test. Cell 2 is the PSCell and Cell 3 is the neighbour cell. Cell 2 is configured according to Annex C.1.1 and C.1.2. Cell 3 is powered OFF.

Table 4.6.1.3.4.1-3: General test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3	E-UTRAN Cell 1 and NR	
		-, -, -	Cell 2	
Neighbour cell		1, 2, 3	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 2: Cell 2 and Cell 3	
Measurement gap type		1, 2, 3	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2, 3	40	
Measurement gap length	ms	1, 2, 3	6	
Measurement gap offset	ms	1, 2, 3	39	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
CSI-RS parameters		1	CSI-RS.1.2 FDD	
		2	CSI-RS.1.2 TDD	
		3	CSI-RS.2.2 TDD	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3	N/A	OFF
Time offset between PCell and PSCell		1, 2, 3	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	5	

## 4.6.1.3.4.2 Test procedure

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 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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of NR cells according to T1 in Table 4.6.1.3.5-1. Propagation conditions are set according to Annex C.2.2. T1 starts.
- 3. SS shall transmit an RRCConnectionReconfiguration message with event A3 configured.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 4.6.1.3.5-1. T2 starts.
- 6. UE shall transmit a MeasurementReport message embedded in E-UTRA RRC message *ULInformationTransferMRDC* triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than [802] ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.

- 7. After the SS receive the MeasurementReport message in step 6) or when T2 expires, the SS shall transmit RRCConnectionRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5),

or

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 4.6.1.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.6.1.3.4.3-1: Common Exception messages

#### 4.6.1.3.5 Test requirement

Tables 4.6.1.3.4.1-3 and 4.6.1.3.5-1 define the primary level settings including test tolerances for EN-DC intrafrequency event triggered reporting with per-UE gaps for PSCell in FR1.

Table 4.6.1.3.5-1: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1

Parameter	Unit	Test	Cell 2		Ce	II 3
		configuration	T1	T2	T1	T2
TDD configuration		1	N	/A	N.	/A
		2	TDDConf.1.1		TDDConf.1.1	
		3		onf.2.1		onf.2.1
PDSCH RMC		1	SR.1.	1 FDD	N.	/A
configuration		2	SR.1.	1 TDD		
		3	SR.2.	1 TDD		
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD
configuration		3	CR.2.	1 TDD	CR.2.	1 TDD
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD
CORESET RMC		2	CCR.1	.1 TDD	CCR.1	.1 TDD
configuration		3	CCR.2	.1 TDD	CCR.2	.1 TDD
OCNG Patterns		1, 2, 3	OI	P.1	OF	P.1
Initial BWP		1, 2, 3	DLBV	VP.0.1	DLBV	/P.0.1
configuration			ULBV	VP.0.1	ULBV	/P.0.1
Active DL BWP		1, 2, 3	DLBV	VP.1.2	DLBV	/P.1.1
configuration						
Active UL BWP		1, 2, 3	ULBWP.1.2 ULBWP.1.1		/P.1.1	
configuration						
RLM-RS		1, 2, 3	CSI	-RS		SB
$N_{oc}^{}$ Note 2	dBm/SCS	1			-98	
- · oc		2			-98	
		3			-95	
$N_{oc}$ Note 2	dBm/15 KHz	1			-98	
1 voc		2				
		3				
${ m \hat{E}}_{ m s}/{ m I}_{ m ot}$	dB	1	4	-1.46	-Infinity	-1.46
$\mathbf{L}_{\mathrm{s}}/\mathbf{L}_{\mathrm{ot}}$		2				
		3				
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4
$=_s$ / $\sim$ oc		2	_			
N		3				
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
T <sub>=</sub>	-ID /0.00 MIL!	3	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1	-64.60	-62.25	-Infinity	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	-Infinity	-62.25
D	dBm/38.16 MHz	3	-58.50	-56.16	-Infinity	-56.16
Propagation		1, 2, 3		A۷	VGN	
Condition			I			

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.

The overall delays measured is defined as the time from the beginning of time period T2, to the moment the UE send one Event A3 triggered measurement report to Cell 1.

The overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

The overall delays measured test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

Measurement reporting delay =  $T_{identify\_intra\_with\_index}$ 

where,

Tidentify intra with index = (Tpss/sss sync intra + Tssb measurement period intra) ms

- $T_{PSS/SSS\_sync\_ntra} = max[600ms, [5] x max(MGRP, SMTC period)] x CSSF_{intra} = max[600ms, [5] x max(40ms, 20ms)] x 1 = 600ms$
- $T_{SSB\_measurement\_period\_intra} = max[200ms, 5 x max(MGRP, SMTC period)] x CSSF_intra = max[200ms, 5 x max(40ms, 20ms)] x 1 = 200ms$

TTI insertion uncertainty = 2 ms

The overall delays measured shall be less than a total of [802] ms in this test case (note: this gives a total of 800 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

## 4.6.1.4 EN-DC FR1 event-triggered reporting with gap in DRX

#### Editor's note:

- Message contents are not complete.
- Connection diagram is TBD.
- Cell mapping in Annex E is missing.
- RAN4 dependency:
- Brackets in core requirements

#### 4.6.1.4.1 Test purpose

To verify that the UE makes correct reporting of an event in DRX within EN-DC intra-frequency NR cell search requirements in TS 38.133 [6] clause 9.2. This test will partly verify the intra-frequency cell search requirements.

## 4.6.1.4.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

#### 4.6.1.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.6.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.4.6.1.4.

## 4.6.1.4.4 Test description

## 4.6.1.4.4.1 Initial conditions

Test 4.6.1.4 can be run in one of the configurations defined in Table 4.6.1.4.4.1-1.

Table 4.6.1.4.4.1-1: Supported test configurations for NR FR1 Cell

Configuration	Description

4.6.1.4-1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode			
4.6.1.4-2	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode			
4.6.1.4-3	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations.				

Configure the test equipment and the DUT according to the parameters in Table 4.6.1.4.4.1-2.

Table 4.6.1.5.4.1-2: Initial conditions for EN-DC event-triggered reporting in FR1

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, Table E.2-1 and TS 3	8.508-1 [14] sclause 4.4.2 and 4.3.1.
Channel bandwidth	As specified	by the test configuration selected	from Table 4.6.1.4.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.1.
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.TBD	
Exceptions to connection diagram	N/A	•	

- 1. Message contents are defined in clause 4.6.1.4.4.3.
- 2. The general test parameter settings are set up according to Table 4.6.1.4.4.1-3.
- 3. There is one E-UTRA carrier and one E-UTRA PCell specified in the test. Cell 1 is the cell used for connection setup with the power level set according to Table A.6.1.1-1 for this test. There is one NR carrier and 2 NR Cells specified in the test. Cell 2 is the PSCell and Cell 3 is the neighbour cell. Cell 2 is configured according to Annex C.1.1 and C.1.2. Cell 3 is powered OFF.

Table 4.6.1.4.4.1-3: 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	Value		Comment
		ation	Test 1	Test 2	
Active cell		1, 2, 3	E-UTRAN Ce Cell 2	II 1 and NR	
Neighbour cell		1, 2, 3	NR Cell 3		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 2: Cell 2 and	Cell 3	
Measurement gap type		1, 2, 3 1, 2, 3	Per-UE gaps		
Measurement gap repitition periodicity	ms	1, 2, 3	40		
Measurement gap length	ms	1, 2, 3	6		
Measurement gap offset	ms	1, 2, 3	39		
SSB configuration		1	SSB.1 FR1		
		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC.2		
		2	SMTC.1		
		3	SMTC.1		
CSI-RS parameters		1	CSI-RS.1.2 FDD		
		2	CSI-RS.1.2 T		
		3	CSI-RS.2.2 T	DD	
A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	S	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.2	
Time offset between PCell and PSCell		1, 2, 3	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs		Synchronous cells
		3	3 μs		Synchronous cells
T1	S	1, 2, 3	5		
T2	S	1, 2, 3	5	10	

## 4.6.1.4.4.2 Test procedure

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 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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of NR cells according to T1 in Table 4.6.1.4.5-1. Propagation conditions are set according to Annex C.2.2. T1 starts.
- 3. SS shall transmit an RRCConnectionReconfiguration message with event A3 configured.
- $4. \ The \ UE \ shall \ transmit \ RRCConnection Reconfiguration Complete \ message.$
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 4.6.1.4.5-1. T2 starts.
- 6. UE shall transmit a MeasurementReport message embedded in E-UTRA RRC message *ULInformationTransferMRDC* triggered by Event A3. If the overall delays measured from the beginning of time

period T2 is less than [922] ms for Test 1 or less than [6402] ms for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.

- 7. After the SS receive the MeasurementReport message in step 6) or when T2 expires, the SS shall transmit RRCConnectionRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5),

or

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

## 4.6.1.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Default Message Contents

Test configuration 1 Test configuration 2 Test configuration 3

Common contents of system information blocks exceptions

Default RRC messages and information elements contents

Table 4.6.1.4.4.3-1: Common Exception messages

### 4.6.1.4.5 Test requirement

exceptions

Tables 4.6.1.4.4.1-3 and 4.6.1.4.5-1 define the primary level settings including test tolerances for EN-DC intrafrequency event triggered reporting with per-UE gaps for PSCell in FR1.

Table 4.6.1.4.5-1: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1 with DRX

Parameter	Unit	Test	Cell 2		Cell 3		
		configuration	T1	T2	T1	T2	
TDD configuration		1	N/A		N/A		
		2				TDDConf.1.1	
		3		onf.2.1	TDDConf.2.1		
PDSCH RMC		1	SR.1.	1 FDD	N.	/A	
configuration		2	SR.1.	1 TDD			
		3	SR.2.	1 TDD			
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	CR.1.1 FDD	
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD	
configuration		3	CR.2.	1 TDD	CR.2.	1 TDD	
Dedicated		1		.1 FDD		.1 FDD	
CORESET RMC		2		.1 TDD		.1 TDD	
configuration		3		.1 TDD		.1 TDD	
OCNG Patterns		1, 2, 3		P.1	OF		
Initial BWP		1, 2, 3		VP.0.1			
configuration		1, 2, 0		VP.0.1	DLBWP.0.1 ULBWP.0.1		
Active DL BWP		1, 2, 3		VP.1.2	DLBWP.1.1		
configuration		., _, 0	DEDVVI .1.1				
Active UL BWP		1, 2, 3	ULBV	ULBWP.1.2		ULBWP.1.1	
configuration							
RLM-RS		1, 2, 3	CSI-RS		SS	SB	
Note 2	dBm/SCS	1	-98				
1 voc		2		-	-98		
		3		-	-95		
Note 2	dBm/15 KHz	1	-98				
1 voc		2					
		3					
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
$\mathbf{L}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		2	_				
		3					
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4	
$=_s$ / $\sim_{oc}$		2	_				
and a second second		3					
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94	
		2	-94	-94	-Infinity	-94	
1-	-ID /O OO MIL!	3	-91	-91	-Infinity	-91	
lo	dBm/9.36 MHz	1	-64.60	-62.25	-Infinity	-62.25	
	dBm/9.36 MHz	2	-64.60	-62.25	-Infinity	-62.25	
Duanagatian	dBm/38.16 MHz	3	-58.50	-56.16	-Infinity	-56.16	
Propagation		1, 2, 3		AV	VGN		
Condition							

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period

Note 2: Interference from other cells and noise sources not specified in the test is assumed 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.

The overall delays measured is defined as the time from the beginning of time period T2, to the moment the UE send one Event A3 triggered measurement report to Cell 1.

The overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

The overall delays measured test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

Measurement reporting delay =  $T_{identify\_intra\_with\_index}$ 

where,

#### For Test 1:

 $T_{identify\_intra\_with\_index} = (T_{PSS/SSS\_sync\_ntra} + T_{SSB\_measurement\_period\_intra}) ms$ 

- T<sub>PSS/SSS\_sync\_ntra</sub> = max[600ms, ceil(1.5 x [5]) x max(MGRP, SMTC period, DRX cycle)] x CSSF<sub>intra</sub> = max[600ms, ceil(1.5 x [5]) x max(40ms, 20ms, 40ms)] x 1 = 600ms
- $T_{SSB\_measurement\_period\_intra} = max[200ms, ceil(1.5 x 5) x max(MGRP, SMTC period, DRX cycle)] x CSSF_intra = max[200ms, ceil(1.5 x 3) x max(40ms, 20ms, 40ms)] x 1 = 320ms$

TTI insertion uncertainty = 2 ms

The overall delays measured shall be less than a total of [922] ms in this test case (note: this gives a total of 920 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

#### For Test 2:

 $T_{identify\_intra\_with\_index} = (T_{PSS/SSS\_sync\_ntra} + T_{SSB\_measurement\_period\_intra}) ms$ 

- $T_{PSS/SSS \text{ sync ntra}} = 5 \text{ x max(MGRP, DRX cycle)} = 5 \text{ x max(40ms, 640ms)}] \text{ x } 1 = 3200 \text{ms}$
- T<sub>SSB\_measurement\_period\_intra</sub> = 5 x max(MGRP, DRX cycle) x CSSF<sub>intra</sub> = 5 x max(40ms, 640ms) x 1 = 3200ms

TTI insertion uncertainty = 2 ms

The overall delays measured shall be less than a total of [6402] ms in this test case (note: this gives a total of 6400 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

# 4.6.1.5 EN-DC FR1 event-triggered reporting without gap in non-DRX with SSB time index detection

#### Editor's note:

- Message contents are not complete.
- Connection diagram is TBD.
- Cell mapping in Annex E is missing.
- RAN4 dependency:

Brackets in core requirements

## 4.6.1.5.1 Test purpose

To verify that the UE makes correct reporting of an event in non-DRX within EN-DC intra-frequency NR cell search requirements in TS 38.133 [6] clause 9.5. This test will partly verify the FDD intra-frequency cell search requirements. UE is required to report SSB time index.

## 4.6.1.5.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

### 4.6.1.5.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.6.1.0.x.

The normative reference for this requirement is TS 38.133 [6] clause A.4.6.1.5.

4.6.1.5.4 Test description

4.6.1.5.4.1 Initial conditions

Test 4.6.1.5 can be run in one of the configurations defined in Table 4.6.1.5.4.1-1.

Table 4.6.1.5.4.1-1: Supported test configurations for FR1 PSCell

Configuration Description			
4.6.1.5-1 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations.			

Configure the test equipment and the DUT according to the parameters in Table 4.6.1.5.4.1-2.

Table 4.6.1.5.4.1-2: Initial conditions for EN-DC event-triggered reporting in FR1

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies			.508-1 [14] sclause 4.4.2 and 4.3.1.
Channel	As specified	by the test configuration selected fr	om Table 4.6.1.5.4.1-1.
bandwidth			
Propagation	AWGN		As specified in Annex C.2.1.
conditions			
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.TBD	
Exceptions to	N/A		
connection			
diagram			

- 1. Message contents are defined in clause 4.6.1.5.4.3.
- 2. The general test parameter settings are set up according to Table 4.6.1.5.4.1-3.
- 3. There is one E-UTRA FDD carrier and one E-UTRA PCell specified in the test. Cell 1 is the cell used for connection setup with the power level set according to Table A.6.1.1-1 for this test. There is one NR FDD carrier and 2 NR Cells specified in the test. Cell 2 is the PSCell and Cell 3 is the neighbour cell. Cell 2 is configured according to Annex C.1.1 and C.1.2. Cell 3 is powered OFF.

Table 4.6.1.5.4.1-3: General test parameters for EN-DC intra-frequency event triggered reporting without gap for FDD PSCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1	NR Cell 3	Cell to be identified.
RF Channel Number		1	1: Cell 1 2: Cell 2 and Cell 3	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX		1	N/A	OFF
Time offset between PCell and PSCell		1	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
T1	S	1	5	
T2	S	1	5	

#### 4.6.1.5.4.2 Test procedure

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 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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of NR cells according to T1 in Table 4.6.1.5.5-1. Propagation conditions are set according to Annex C.2.2. T1 starts.
- 3. SS shall transmit an RRCConnectionReconfiguration message with event A3 configured.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 4.6.1.5.5-1. T2 starts.
- 6. UE shall transmit a MeasurementReport message embedded in E-UTRA RRC message *ULInformationTransferMRDC* triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than [922] ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receive the MeasurementReport message in step 6) or when T2 expires, the SS shall transmit RRCConnectionRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5),

or

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

## 4.6.1.5.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.6.1.5.4.3-1: Common Exception messages

Default Message Contents			
Common contents of system information			
blocks exceptions			
Default RRC messages and information	FFS		
elements contents exceptions			

### 4.6.1.5.5 Test requirement

Tables 4.6.1.5.4.1-3 and 4.6.1.5.5-1 define the primary level settings including test tolerances for EN-DC FR1 event-triggered reporting without gap in non-DRX with SSB time index detection.

Table 4.6.1.5.5-1: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for FDD PSCell in FR1 with SSB index reading

Parameter	Unit	Test	Cell 2		Cell 3		
		configuration	T1	T2	T1	T2	
TDD configuration		1	N/A		N/A		
PDSCH RMC		1	SR.1.	SR.1.1 FDD		N/A	
configuration							
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC							
configuration							
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC							
configuration							
OCNG Patterns		1	-	2.1		P.1	
Initial BWP		1	DLBV		DLBWP.0.1		
configuration			ULBV		ULBWP.0.1		
Active DL BWP		1	DLBV	/P.1.1	DLBW	/P.1.1	
configuration					=		
Active UL BWP		1	ULBV	/P.1.1	ULBW	/P.1.1	
configuration							
RLM-RS		1	SS	SB		SB	
$N_{oc}^{}$ Note 2	dBm/SCS	1		-	.98		
$N_{oc}$ Note 2	dBm/15 KHz	1	-98				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4 -1.46		-Infinity	-1.46	
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4	
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94	
lo	dBm/9.36 MHz	1	-64.60	-62.25	-Infinity	-62.25	
Propagation		1	AWGN				
Condition							

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{\rm ec}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

The overall delays measured is defined as the time from the beginning of time period T2, to the moment the UE send one Event A3 triggered measurement report to Cell 1.

The overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

The overall delays measured test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

Measurement reporting delay = T<sub>identify intra with index</sub>

where,

 $T_{identify\_intra\_with\_index} = (T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra} + T_{SSB\_time\_index\_intra}) \ ms$ 

- $T_{PSS/SSS\_sync\_intra} = max[600ms, ceil([5] x K_p) x SMTC period]^{Note 1} x CSSF_{intra} = max[600ms, Ceil(5 x 1) x 20ms] x 1 = 600ms$
- $T_{SSB\_measurement\_period\_intra} = max[200ms, ceil(5 x K_p) x SMTC period]^{Note 1} x CSSF_{intra} = max[200ms, ceil(5 x 1) x 20ms] x 1 = 200ms$
- $T_{SSB\_time\_index\_intra} = max[120ms, ceil(3 x K_p) x SMTC period]^{Note 1} x CSSF_{intra} = max[120ms, ceil(3 x 1) x 20ms] x 1 = 120ms$

TTI insertion uncertainty = 2 ms

The overall delays measured shall be less than a total of [922] ms in this test case (note: this gives a total of 920 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

# 4.6.1.6 EN-DC FR1 event-triggered reporting with gap in non-DRX with SSB time index detection

#### Editor's note:

- Message contents are not complete.
- Connection diagram is TBD.
- Cell mapping in Annex E is missing.
- RAN4 dependency:
- Brackets in core requirements

### 4.6.1.6.1 Test purpose

To verify that the UE makes correct reporting of an event in non-DRX within EN-DC intra-frequency NR cell search requirements in TS 38.133 [6] clause 9.2. This test will partly verify the FDD intra-frequency cell search requirements. UE is required to report SSB time index.

#### 4.6.1.6.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

#### 4.6.1.6.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 4.6.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.4.6.1.6.

#### 4.6.1.6.4 Test description

#### 4.6.1.6.4.1 Initial conditions

Test 4.6.1.6 can be run in one of the configurations defined in Table 4.6.1.6.4.1-1.

Table 4.6.1.6.4.1-1: Supported test configurations for NR FR1 Cell

Configuration	Description	
4.6.1.6-1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
Note: The UE is only required to be tested in one of the supported test configurations.		

Configure the test equipment and the DUT according to the parameters in Table 4.6.1.6.4.1-2.

Table 4.6.1.6.4.1-2: Initial conditions for EN-DC event-triggered reporting in FR1

Parameter	Value	Comment

Test environment	NC As specified in TS 38.508-1 [14] clause 4.1.					
Test frequencies	As specified	in Annex E, Table E.2-1 and TS 3	8.508-1 [14] clause 4.4.2 and 4.3.1.			
Channel bandwidth	As specified	As specified by the test configuration selected from Table 4.6.1.6.4.1-1.				
Propagation conditions	AWGN		As specified in Annex C.2.1.			
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	A.3.TBD				
Exceptions to connection diagram	N/A					

- 1. Message contents are defined in clause 4.6.1.6.4.3.
- 2. The general test parameter settings are set up according to Table 4.6.1.6.4.1-3.
- 3. There is one E-UTRA FDD carrier and one E-UTRA PCell specified in the test. Cell 1 is the cell used for connection setup with the power level set according to Table A.6.1.1-1 for this test. There is one NR FDD carrier and 2 NR Cells specified in the test. Cell 2 is the PSCell and Cell 3 is the neighbour cell. Cell 2 is configured according to Annex C.1.1 and C.1.2. Cell 3 is powered OFF.

Table 4.6.1.6.4.1-2: General test parameters for EN-DC intra-frequency event triggered reporting with gap for PSCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1	NR Cell 3	Cell to be identified.
RF Channel Number		1	1: Cell 1 2: Cell 2 and Cell 3	
Measurement gap type		1	Per-UE gaps	
Measurement gap repitition periodicity	ms	1	40	
Measurement gap length	ms	1	6	
Measurement gap offset	ms	1	39	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
CSI-RS parameters		1	CSI-RS.1.2 FDD	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX		1	N/A	OFF
Time offset between PCell and PSCell		1	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
T1	S	1	5	
T2	S	1	5	

#### 4.6.1.6.4.2 Test procedure

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 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.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

- 2. Set the parameters of NR cells according to T1 in Table 4.6.1.6.5-1. Propagation conditions are set according to Annex C.2.2. T1 starts.
- 3. SS shall transmit an RRCConnectionReconfiguration message with event A3 configured.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 4.6.1.6.5-1. T2 starts.
- 6. UE shall transmit a MeasurementReport message embedded in E-UTRA RRC message *ULInformationTransferMRDC* triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than [922] ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receive the MeasurementReport message in step 6) or when T2 expires, the SS shall transmit RRCConnectionRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 3 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [14] clause 4.5),

or

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 4.6.1.6.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.6.1.6.4.3-1: Common Exception messages

Default Message Contents			
Common contents of system information			
blocks exceptions			
Default RRC messages and information	FFS		
elements contents exceptions			

#### 4.6.1.6.5 Test requirement

Tables 4.6.1.6.4.1-3 and 4.6.1.6.5-1 define the primary level settings including test tolerances for EN-DC intrafrequency event triggered reporting with gap for PSCell in FR1 with SSB index reading.

Table 4.6.1.6.5-1: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with gap for PSCell in FR1 with SSB index reading

Parameter	Unit	Test	Ce	Cell 2		Cell 3		
		configuration	T1 T2		T1	T2		
TDD configuration		1	N/A		N/A			
PDSCH RMC		1	SR.1.	SR.1.1 FDD		N/A		
configuration								
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD		
RMC								
configuration								
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD		
CORESET RMC								
configuration								
OCNG Patterns		1		P.1	_	P.1		
Initial BWP		1		VP.0.1	DLBWP.0.1			
configuration				VP.0.1	ULBWP.0.1			
Active DL BWP		1	DLBV	DLBWP.1.2		DLBWP.1.1		
configuration								
Active UL BWP		1	ULBV	VP.1.1	ULBW	/P.1.1		
configuration			ļ					
RLM-RS		1	CSI	-RS		SB		
$N_{oc}^{}$ Note 2	dBm/SCS	1		-	-98			
$N_{oc}^{}$ Note 2	dBm/15 KHz	1	-98					
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46		
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4		
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94		
lo	dBm/9.36 MHz	1	-64.60	-62.25	-Infinity	-62.25		
Propagation		1	AWGN					
Condition								

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{\rm ec}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

The overall delays measured is defined as the time from the beginning of time period T2, to the moment the UE send one Event A3 triggered measurement report to Cell 1.

The overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

The overall delays measured test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

Measurement reporting delay = T<sub>identify intra with index</sub>

where,

 $T_{identify\_intra\_with\_index} = (T_{PSS/SSS\_sync\_ntra} + T_{SSB\_measurement\_period\_intra} + T_{SSB\_time\_index\_intra}) \ ms$ 

- $T_{PSS/SSS\_sync\_ntra} = max[600ms, [5] x max(MGRP, SMTC period)] x CSSF_{intra} = max[600ms, [5] x max(40ms, 20ms)] x 1 = 600ms$
- $T_{SSB\_measurement\_period\_intra} = max[200ms, 5 x max(MGRP, SMTC period)] x CSSF_intra = max[200ms, 5 x max(40ms, 20ms)] x 1 = 200ms$
- T<sub>SSB\_time\_index\_intra</sub> = max[120ms, 3 x max(MGRP, SMTC period)] x CSSF<sub>intra</sub> = max[120ms, 3 x max(40ms, 20ms)] x 1 = 120ms

TTI insertion uncertainty = 2 ms

The overall delays measured shall be less than a total of [922] ms in this test case (note: this gives a total of 920 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

# 4.6.2 Inter-frequency measurements

#### 4.6.2.0 Minimum conformance requirements for Inter-frequency measurements

[TS 38.133-f50, clause 9.3.2]

The requirements in Section 9.3 apply, provided:

- The cell being identified or measured is detectable.

An inter-frequency cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in Sections 10.1.4 and 10.1.5 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in Sections 10.1.9 and 10.1.10 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in Sections 10.1.14 and 10.1.15 for FR1 and FR2, respectively, for a corresponding Band,
- SSB\_RP and SSB Ês/Iot according to Annex B.2.3 for a corresponding Band.

[TS 38.133-f50, clause 9.3.4]

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<sub>identify\_inter\_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). Otherwise UE shall be able to identify a new detectable inter frequency cell within T<sub>identify\_inter\_with\_index</sub>. The UE shall be able to identify a new detectable inter frequency SS block of an already detected cell within T<sub>identify\_inter\_without\_index</sub>.

$$T_{identify\_inter\_without\_index} = (T_{PSS/SSS\_sync\_inter} + T_{SSB\_measurement\_period\_inter}) \ ms$$

$$T_{identify\_inter\_with\_index} = (T_{PSS/SSS\_sync\_inter} + T_{SSB\_measurement\_period\_inter} + T_{SSB\_time\_index\_inter})$$
 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,  $M_{pss/sss\_sync} = 40$  samples.

 $M_{SSB\_index\_inter}$ : For a UE supporting power class 1,  $M_{SSB\_index\_inter} = 40$  samples. For a vehicle mounted UE supporting power class 2,  $M_{pss/sss\_sync\_inter} = 24$  samples. For a UE supporting power class 3,  $M_{SSB\_index\_inter} = 24$  samples. For a UE supporting power class 4,  $M_{meas\_period\_inter} = 24$  samples.

 $M_{meas\_period\_inter}$ : For a UE supporting FR2 power class 1,  $M_{meas\_period\_inter}$  =64 samples. For a vehicle mounted UE supporting FR2 power class 2,  $M_{pss/sss\_sync\_inter}$ =40 samples. For a UE supporting FR2 power class 3,  $M_{meas\_period\_inter}$ =40 samples. For a UE supporting FR2 power class 4,  $M_{meas\_period\_inter}$ =40 samples.

 $CSSF_{inter}$ : it is a carrier specific scaling factor and is determined according to  $CSSF_{within\_gap,i}$  in section 9.1.5.2 for measurement conducted within measurement gaps.

Table 9.3.4-1: Time period for PSS/SSS detection, (Frequency range FR1)

Condition NOTE1,2	TPSS/SSS_sync_inter	
No DRX	max( 600ms, (8) x max(MGRP, SMTC period)) x	
	CSSFinter	
DRX cycle ≤ 320ms	max( 600ms, ceil(8x1.5) x max(MGRP, SMTC period,	
	DRX cycle)) x CSSF <sub>inter</sub>	
DRX cycle > 320ms	(8) x DRX cycle x CSSF <sub>inter</sub>	
NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1		
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 3.6.1 are		
for the secondary cell group. The DRX cycle is	s 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) x max(MGRP, SMTC period)) x		
	CSSF <sub>inter</sub>		
DRX cycle ≤ 320ms	max( 120ms, ceil(3 x 1.5) x max(MGRP, SMTC period,		
	DRX cycle)) x CSSF <sub>inter</sub>		
DRX cycle > 320ms	(3) x DRX cycle x CSSF <sub>inter</sub>		
NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1			
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 3.6.1 are			
for the secondary cell group. The DRX cycle is	s the DRX cycle of the secondary cell group.		

[TS 38.133-f50, clause 9.3.5]

When measurement gaps are provided for inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting SS-RSRP, SS-RSRQ and SS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses 10.1.4, 10.1.5, 10.1.9, 10.1.10, 10.1.14 and 10.1.15, respectively, as shown in table 9.3.5-1 and 9.3.5-2:

Table 9.3.5-1: Measurement period for inter-frequency measurements with gaps (Frequency FR1)

Condition NOTE1,2	T SSB_measurement_period_inter		
No DRX	max[ 200ms, [8] x max(MGRP, SMTC period)] x		
	CSSF <sub>inter</sub>		
DRX cycle ≤ 320ms	max[ 200ms, ceil(8 x 1.5) x max(MGRP, SMTC period,		
	DRX cycle)] x CSSF <sub>inter</sub>		
DRX cycle > 320ms	[8] x DRX cycle x CSSF <sub>inter</sub>		
NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1			
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 3.6.1 are			
for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.			

[TS 38.133, clause 9.3.6.3]

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is:  $2 \times TTI_{DCCH}$ . This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be within  $T_{identify\_inter\_without\_index}$  if UE is not indicated to report SSB based RRM measurement result with the associated SSB index. Otherwise UE shall

be able to identify a new detectable inter frequency cell within  $T_{identify\_inter\_with\_index}$ . Both  $T_{identify\_inter\_without\_index}$  and  $T_{identify\_inter\_with\_index}$  are defined in clause 9.3.4. When L3 filtering is used an additional delay can be expected.

If a cell which has been detectable at least for the time period  $T_{identify\_inter\_without\_index}$  or  $T_{identify\_inter\_with\_index}$  defined in clause 9.3.4 and then triggers the measurement report as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than  $T_{SSB\_measurement\_period\_inter}$  defined in clause 9.3.5 provided the timing to that cell has not changed more than  $\pm$  3200 Tc while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used an additional delay can be expected.

The normative reference for this requirement is TS 38.133 [6] clause 9.3.2, 9.3.4, 9.3.5, 9.3.6.3.

# 4.6.2.1 EN-DC FR1-FR1 event-triggered reporting in non-DRX

#### 4.6.2.1.1 Test purpose

To verify that the UE makes correct reporting of an event in non-DRX within EN-DC inter-frequency NR cell search requirements without SSB time index detection in TS 38.133 [6] clause 9.3.4.

#### 4.6.2.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 4.6.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.4.6.2.1.

#### 4.6.2.1.4 Test description

#### 4.6.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.6.2.1.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 4.6.2.1.4.1-2. Test environment parameters are given in Table 4.6.2.1.4.1-3.

Table 4.6.2.1.4.1-1: EN-DC FR1-FR1 event triggered reporting tests in non-DRX supported test configurations

Test Case ID	Description		
4.6.2.1-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.6.2.1-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.6.2.1-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
4.6.2.1-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.6.2.1-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.6.2.1-6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
Note 1: The UE is only required to be tested in one of the supported test configurations			
Note 2: The targ	Note 2: The target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2		

Table 4.6.2.1.4.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection in non-DRX

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel		Config	1		One E-UTRAN TDD carrier
Number		1,2,3,4,5,6			frequencies is used.
NR RF Channel		Config	1	, 2	Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6			used.
Active cell		Config	LTE Cell 1 (Po		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
N		0 "	ND II O		number 1.
Neighbour cell		Config	NR cell 3		NR cell 3 is on NR RF channel
Gap Pattern Id		1,2,3,4,5,6 Config	0	4	number 2. As specified in TS 38.133
Gap Pattern Id		1,2,3,4,5,6	0	4	clause 9.1.2-1.
Measurement gap		Config	39	19	
offset		1,2,3,4,5,6			
SMTC-SSB parameters		Config 1,4	SSB.1 FR1		As specified in clause A.3
		Config 2,5	SSB.1 FR1		As specified in clause A.3.
		Config 3,6	SSB.2 FR1		As specified in clause A.3
A3-Offset	dB	Config 1,2,3,4,5,6	-6		
Hysteresis	dB	Config 1,2,3,4,5,6	0		
CP length		Config 1,2,3,4,5,6	Normal		
TimeToTrigger	S	Config 1,2,3,4,5,6	0		
Filter coefficient		Config 1,2,3,4,5,6	0		L3 filtering is not used
DRX		Config 1,2,3,4,5,6	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	Зµѕ		Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5		
T2	S	Config 1,2,3,4,5,6	1	1	

Table 4.6.2.1.4.1-3: Test Environment test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection in non-DRX

Parameter	Value	Comment			
Test environment	NC	As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified in Annex E, Table E.2-1 and TS 38	in Annex E, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.			
Channel bandwidth	As specified by the test configuration selected fr	om Table 4.6.2.1.4.1-1.			

Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.
J	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	ion bands use A.3.2.5.2 for DUT Part. and		

- 1. Message contents are defined in clause 4.6.2.1.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in different frequencies. Cell 2 is the PSCell and Cell 3 is the target cell. The power levels and settings for Cell 2 and Cell 3 are set according to Annex C.1.2.

#### 4.6.2.1.4.2 Test procedure

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.

In test 1 measurement gap pattern configuration # 0 as defined in Table 4.6.2.1.4.1-2 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 4.6.2.1.4.1-2 is provided for UE that support per-FR gap. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 4.6.2.1.4.1-2. T1 starts.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 4.6.2.1.4.1-2. T1 starts.
- 6. UE shall transmit a MeasurementReport message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delay measured from the beginning of time period T2 is less than 920 ms for Test 1 and 760 ms for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the MeasurementReport message in step 6 or when T2 expires, the SS shall transmit RRCConnectionReconfiguration message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. The SS shall transmit RRCConnectionReconfiguration message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message. If either of the reconfiguration in step 7 or step 9 fails, SS switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 4.6.2.1.4.1-2 as appropriate.

# 4.6.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.6.2.1.4.3-1: Common Exception messages for Additional EN-DC FR1-FR1 event triggered reporting tests in non-DRX test requirement

Default Message Contents						
Common contents of system information blocks exceptions						
Default RRC messages and information elements contents exceptions	Table H.3.1-1 Table H.3.1-2 with Conditions GAP NEEDED and INTER-FREQ Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.2 and Asynchronous cells for configuration 4.6.2.1-1 and 4.6.2.1-4 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.1 and Synchronous cells for configuration 4.6.2.1-2 and 4.6.2.1-5 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.2 FR1, SMTC.1 and Synchronous cells for configuration 4.6.2.1-3 and 4.6.2.1-6 Table H.3.1-4 with A3-offset = -6dB Table H.3.1-5 with Condition INTER-FREQ Table H.3.1-6 with Condition Pattern #0 for Test 1 Table H.3.1-7 with Condition INTER-FREQ Table H.3.1-7 with Condition INTER-FREQ Table H.3.4-1 Table H.3.4-2					

#### 4.6.2.1.5 Test requirement

Table 4.6.2.1.5-1 defines the primary level settings including test tolerances for all tests.

Table 4.6.2.1.5-1: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection in non-DRX

Parameter	Unit	Test	Cell 2	Cell 3	
		configuratio n	T1 T2	T1 T2	
NR RF Channel Number		Config 1,2,3,4,5,6	1	2	
Duplex mode		Config 1,4	F	DD	
		Config 2,3,5,6	T	DD	
BWchannel	MHz	Config 1,4	10: N <sub>R</sub>	<sub>B,c</sub> = 52	
		Config 2,5		$_{B,c} = 52$	
BWP BW	MHz	Config 3,6 Config 1,4	40: Nri	B <sub>B,c</sub> = 106 B <sub>B,c</sub> = 52	
DVVP DVV	IVITZ	Config 1,4		$_{B,c} = 52$ $_{B,c} = 52$	
		Config 3,6		B,c = 106	
TDD configuration		Config 2,5	TDDConf.1.1	TDDConf.1.1	
L W. LDL DWD		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	ULBWP.0.1	NA	
		1,2,3,4,5,6	0		
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1	NA	
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1	NA	
OCNG Patterns defined in		Config	OP.1	OP.1	
A.3.2.1.1 (OP.1)		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	
PDSCH Reference		Config 1,4	SR.1.1 FDD	-	
measurement channel		Config 2,5	SR.1.1 TDD		
		Config 3,6	SR2.1 TDD		
CORESET Reference Channel		Config 1,4	CR.1.1 FDD	-	
Channel		Config 2,5 Config 3,6	CR.1.1 TDD CR2.1 TDD		
SMTC configuration defined in A.3.2.11.1 and A.3.2.11.2		Config 1,4	SMTC.2		
		Config 2,3,5,6	SM	TC.1	
PDSCH/PDCCH subcarrier	kHz	Config			
spacing		1,2,4,5	ĺ	15	
		Config 3,6	3	30	
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to		Config	0	0	
PDCCH DMRS  EPRE ratio of PDSCH DMRS		1,2,3,4,5,6			
EPRE ratio of PDSCH to					
PDSCH EPRE ratio of OCNG DMRS					
to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
$N_{oc}^{}$ Note2	dBm/15 kHz		-98	-98	
$N_{oc}^{}$ Note2	dBm/S CS	Config 1,2,4,5	-98	-98	
		Config 3,6	-95	-95	

SS-RSRP Note 3	dBm/S	Config	-94	-94	-Infinity	-91
	CS	1,2,4,5				
		Config 3,6	-91	-91	-Infinity	-88
$\hat{E}_{s}/I_{ot}$	dB	Config	4	4	-Infinity	7
L <sub>s</sub> /L <sub>ot</sub>		1,2,3,4,5,6				
$\hat{E}_s/N_{oc}$	dB	Config	4	4	-Infinity	7
$L_s/V_{oc}$		1,2,3,4,5,6				
Io <sup>Note3</sup>	dBm/9.3	Config	-64.59	-64.59	-70.05	-62.26
	6MHz	1,2,4,5				
	dBm/38.	Config 3,6	-58.49	-58.49	-63.94	-56.15
	16MHz					
Propagation Condition		Config	AW	/GN	A	WGN
		1,2,3,4,5,6				

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

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% with a confidence level of 95%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 760 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# 4.6.2.2 EN-DC FR1-FR1 event-triggered reporting in DRX

#### 4.6.2.2.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX within EN-DC interfrequency NR cell search requirements without SSB time index detection in TS 38.133 [6] clause 9.3.4.

#### 4.6.2.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 4.6.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.4.6.2.2.

4.6.2.2.4 Test description

4.6.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.6.2.2.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 4.6.2.2.4.1-2. Test environment parameters are given in Table 4.6.2.2.4.1-3.

Table 4.6.2.2.4.1-1: EN-DC FR1-FR1 event triggered reporting tests in DRX supported test configurations

Test Case ID	Description					
4.6.2.2-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode					
4.6.2.2-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode					
4.6.2.2-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode					
4.6.2.2-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode					
4.6.2.2-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode					
4.6.2.2-6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode					
Note 1: The UE	Note 1: The UE is only required to be tested in one of the supported test configurations					
Note 2: The targ	et NR cell3 has the same SCS, BW and duplex mode as NR serving cell2					

Table 4.6.2.2.4-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection in DRX

Parameter	Unit	Test	Value			Comment	
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config	1			One E-UTRAN TDD carrier	
Number		1,2,3,4,5,6					frequencies is used.
NR RF Channel		Config		1,	, 2		Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6					used.
A stirre a self		0	1.75.0	-II 4 /D/	<b>3</b> - IIV	LND	LTE Call 4 is an ELITDA DE
Active cell		Config 1,2,3,4,5,6	LIEU	ell 1 (Pt (PScell)	Cell) and	INK	LTE Cell 1 is on E-UTRA RF channel number 1.
		1,2,3,4,5,0	Cell 2 (	(F SCEII)			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		4		As specified in TS 38.133
·		1,2,3,4,5,6					clause 9.1.2-1.
Measurement gap		Config	39		19		
offset		1,2,3,4,5,6					
SMTC-SSB parameters		Config 1,4	SSB.1	FR1			As specified in clause A.3
		Config 2,5	SSB.1	ED4			As specified in clause A.3
		Coning 2,5	33D.1	FKI			As specified in clause A.3
		Config 3,6	SSB.2	FR1			As specified in clause A.3
		Coming 0,0	000.2				7.6 specified in diadee 7.1.6
A3-Offset	dB	Config	-6				
		1,2,3,4,5,6					
Hysteresis	dB	Config	0				
		1,2,3,4,5,6					
CP length		Config	Norma	al			
Time To Taile and a	_	1,2,3,4,5,6	0				
TimeToTrigger	S	Config 1,2,3,4,5,6	0				
Filter coefficient		Config	0				L3 filtering is not used
Tiller coefficient		1,2,3,4,5,6	0				L3 littering is not used
DRX	ms	Config	DRX	DRX	DRX	DRX	As specified in A.5
	•	1,2,3,4,5,6	.1	.2	.1	.2	7 to opposition 1117 to
Time offset between		Config	3 μs		•	•	Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6	,				
Time offset between		Config 1,4	3ms				Asynchronous cells.
serving and neighbour							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	<sup>3</sup>				
T2	S	Config	1.1	1.1	1.1	1.1	
		1,2,3,4,5,6					

Table 4.6.2.2.4-3: Test Environment parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection in DRX

Parameter	Value	Comment			
Test environment	NC	As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified in Annex E, Table E.2-1 and TS 38	ified in Annex E, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.			
Channel bandwidth	As specified by the test configuration selected fr	rom Table 4.6.2.1.4.1-1.			

Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.
	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	- For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.1 for DUT Part. and A.3.1.8.4 for TE Part		

- 1. Message contents are defined in clause 4.6.2.2.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in different frequencies. Cell 2 is the PSCell and Cell 3 is the target cell. The power levels and settings for Cell 2 and Cell 3 are set according to Annex C.1.2.

#### 4.6.2.2.4.2 Test procedure

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.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 4.6.2.2.4-2 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 4.6.2.2.4-2 is provided for UE that support per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 4.6.2.2.4-2. T1 starts.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 4.6.2.2.4-2. T1 starts.
- 6. UE shall transmit a MeasurementReport message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delays measured from the beginning of time period T2 is less than 1080 ms for Test 1, 10240 ms for Test 2, 1080 ms for Test 3 and 10240 ms for Test 4 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the MeasurementReport message in step 6 or when T2 expires, the SS shall transmit RRCConnectionReconfiguration message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. The SS shall transmit RRCConnectionReconfiguration message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message. If either of the reconfiguration in step 7 or step 9 fails, SS switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 4.6.2.2.4-2 as appropriate.

#### 4.6.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.6.2.2.4.3-1: Common Exception messages for Additional EN-DC FR1-FR1 event triggered reporting with SSB test requirement

Default Message Contents						
Common contents of system information blocks exceptions						
Default RRC messages and information elements contents exceptions	Table H.3.1-1 Table H.3.1-2 with Conditions GAP NEEDED and INTER-FREQ Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.2 and Asynchronous cells for configuration 6.6.2.1-1 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.1 and Synchronous cells for configuration 6.6.2.1-2 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.2 FR1, SMTC.1 and Synchronous cells for configuration 6.6.2.1-3 Table H.3.1-4 with A3-offset = -6dB Table H.3.1-5 with Condition INTER-FREQ Table H.3.1-6 with Condition Pattern #0 for Test 1 and Test 2 Table H.3.1-6 with Condition Pattern #2 for Test 3 and Test 4 Table H.3.1-1 with Condition DRX.1 for Test 1 and Test 3 Table H.3.7-1 with Condition DRX.2 for Test 2 and Test 4 Table H.3.4-1 Table H.3.4-2					

#### 4.6.2.2.5 Test requirement

Table 4.6.2.2.5-1 defines the primary level settings including test tolerances for all tests.

Table 4.6.2.2.5-1: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell 2 Cell 3			
		configuratio n	T1 T2	T1 T2		
NR RF Channel Number		Config	1	2		
Duplex mode		1,2,3,4,5,6 Config 1,4		<u> </u> FDD		
Duplex mode		Config 1,4		TDD		
		2,3,5,6	'			
BWchannel	MHz	Config 1,4	10: N	RB,c = 52		
		Config 2,5		RB,c = 52		
		Config 3,6		RB,c = 106		
BWP BW	MHz	Config 1,4		RB,c = 52		
		Config 2,5		RB,c = 52		
TDD configuration		Config 3,6	40: N <sub>F</sub> TDDConf.1.1	RB,c = 106 TDDConf.1.1		
Conliguration		Config 2,5	TDDConi.1.1	I DDConi. I. I		
		Config 3,6	TDDConf.2.1	TDDConf.2.1		
Initial DL BWP		Config	DLBWP.0.1	NA		
Initial UL BWP		1,2,3,4,5,6	ULBWP.0.1	NIA.		
Initial of BMA		Config 1,2,3,4,5,6	ULBWP.U.1	NA		
Dedicated DL BWP		Config	DLBWP.1.1	NA		
		1,2,3,4,5,6				
Dedicated UL BWP		Config	ULBWP.1.1	NA		
		1,2,3,4,5,6				
TRS configuration		Config 1,4	TRS.1.1 FDD	NA		
		Config 2,5	TRS.1.1 TDD	NA		
		Config 3,6	TRS.1.2 TDD	NA		
OCNG Patterns defined in		Config	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			
CORESET Reference Channel		Config 1,4	CR.1.1 FDD	-		
Channel		Config 2,5	CR.1.1 TDD CR2.1 TDD			
SMTC configuration defined		Config 3,6		ATO 0		
in A.3.11.1 and A.3.11.2		Config 1,4	SN	MTC.2		
		Config 2,3,5,6	SN	/ITC.1		
PDSCH/PDCCH subcarrier	kHz	Config		15		
spacing		1,2,4,5				
5555 # 1500 # 000		Config 3,6		30		
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS		1				
EPRE ratio of PDCCH to		Config				
PDCCH DMRS		1,2,3,4,5,6	0	0		
EPRE ratio of PDSCH DMRS to SSS		, , , , , , , , ,				
EPRE ratio of PDSCH to PDSCH		]				
EPRE ratio of OCNG DMRS		<del> </del>				
to SSS(Note 1)						
EPRE ratio of OCNG to		1				
OCNG DMRS (Note 1)						

$N_{oc}$ Note2	dBm/15 kHz		-98		-98	
$N_{oc}^{ m Note2}$	dBm/S CS	Config 1,2,4,5	-98		-98	
		Config 3,6	-6	95	-95	
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91
		Config 3,6	-91	-91	-Infinity	-88
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
Io <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		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.

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% with a confidence level of 95%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

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% with a confidence level of 95%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

- 4.6.2.3 Void
- 4.6.2.4 Void
- 4.6.2.5 EN-DC FR1-FR1 event-triggered reporting in non-DRX with SSB time index detection

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.
- Antenna diagram for TE Part for 4Rx capable UEs without any 2Rx RF bands is TBD
- Message content is TBD
- Minimum conformance requirements contain [ ] and TBDs (RAN4 pending)
- Test procedure contains TBDs (RAN4 pending)
- Test requirement contains TBDs (RAN4 pending)
- Initial conditions contains TBDs (RAN4 pending)
- T1 and T2 are TBD (RAN4 pending)
- Section number will change (RAN4 pending)

#### 4.6.2.5.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in non-DRX within EN-DC interfrequency NR cell search requirements with SSB time index detection in TS 38.133 [6] clause 9.3.4.

#### 4.6.2.5.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 4.6.2.5.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.4.6.2.3.

#### 4.6.2.5.4 Test description

#### 4.6.2.5.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.6.2.5.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 4.6.2.5.4.1-2. Test environment parameters are given in Table 4.6.2.5.4.1-3.

Table 4.6.2.5.1-1: EN-DC FR1-FR1 event triggered reporting tests in non-DRX with SSB time index detection supported test configurations

Test Case ID	Description		
4.6.2.5 -1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.6.2.5 -2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.6.2.5 -3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
4.6.2.5 -4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.6.2.5 -5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.6.2.5 -6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
Note 1: The UE is only required to be tested in one of the supported test configurations			
Note 2: The targ	et NR cell3 has the same SCS, BW and duplex mode as NR serving cell2		

Table 4.6.2.5-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in non-DRX

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel		Config	1		One E-UTRAN TDD carrier
Number		1,2,3,4,5,6			frequencies is used.
NR RF Channel		Config	1	, 2	Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6			used.
Active cell		Config	LTE Cell 1 (Po		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
N		0 "	ND II O		number 1.
Neighbour cell		Config	NR cell 3		NR cell 3 is on NR RF channel
Gap Pattern Id		1,2,3,4,5,6 Config	0	4	number 2. As specified in TS 38.133
Gap Pattern Id		1,2,3,4,5,6	0	4	clause 9.1.2-1.
Measurement gap		Config	39	19	0.0000 0.1.12 1.
offset		1,2,3,4,5,6			
SMTC-SSB parameters		Config 1,4	SSB.1 FR1		As specified in clause A.3
		Config 2,5	SSB.1 FR1		As specified in clause A.3
		Config 3,6	SSB.2 FR1		As specified in clause A.3
A3-Offset	dB	Config	-6		
710 Olioci	ab	1,2,3,4,5,6			
Hysteresis	dB	Config	0		
		1,2,3,4,5,6			
CP length		Config 1,2,3,4,5,6	Normal		
TimeToTrigger	S	Config	0		
Time rorngger	5	1,2,3,4,5,6	l o		
Filter coefficient		Config	0		L3 filtering is not used
		1,2,3,4,5,6			
DRX		Config	OFF		DRX is not used
		1,2,3,4,5,6			
Time offset between		Config	3 μs		Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6			
Time offset between		Config 1,4	3ms		Asynchronous cells.
serving and neighbour cells					The timing of Cell 3 is 3ms later than the timing of Cell 2.
Cells		Config	2		Synchronous cells.
		2,3,5,6	3μs		Synonionous cens.
T1		Config	<u> </u>		
	S	1,2,3,4,5,6	5		
T2	S	Config	1	1	
12		1,2,3,4,5,6	'	'	
	L	., 2, 0, 7, 0, 0	l	l	

Table 4.6.2.5.4-3: Test Environment parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in non-DRX

Parameter	Value	Comment		
Test environment	NC	As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified in Annex E, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.			
Channel bandwidth	As specified by the test configuration selected fr	om Table 4.6.2.1.4.1-1.		

Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.
J	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		pable UEs without any 2Rx RF .3.2.5.1 for DUT Part. and TE Part	

- 1. Message contents are defined in clause 4.6.2.5.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in different frequencies. Cell 2 is the PSCell and Cell 3 is the target cell. The power levels and settings for Cell 2 and Cell 3 are set according to Annex C.1.2.

#### 4.6.2.5.4.2 Test procedure

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCel in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2.

In test 1 measurement gap pattern configuration # 0 as defined in Table 4.6.2.5.4-2 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 4.6.2.5.4-2 is provided for UE that support per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 4.6.2.5.4-2. T1 starts.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 4.6.2.5.4-2. T2 starts.
- 6. UE shall transmit a MeasurementReport message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delays measured from the beginning of time period T2 is less than 1040 ms for Test 1 and 880 ms for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the MeasurementReport message in step 6 or when T2 expires, the SS shall transmit RRCConnectionReconfiguration message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
  - 9. The SS shall transmit RRCConnectionReconfiguration message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message. If either of the reconfiguration in step 7 or step 9 fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.)
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 4.6.2.5.4-2 as appropriate.

# 4.6.2.5.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.6.2.5.4.3-1: Common Exception messages for Additional EN-DC FR1-FR1 event triggered reporting tests in non-DRX with SSB test requirement

	Default Message Contents
Common contents of system information blocks exceptions	
Default RRC messages and information elements contents exceptions	Table H.3.1-1 Table H.3.1-2 with Conditions GAP NEEDED and INTER-FREQ Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.2 and Asynchronous cells for configuration 4.6.2.1-1 and 4.6.2.1-4 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.1 and Synchronous cells for configuration 4.6.2.1-2 and 4.6.2.1-5 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.2 FR1, SMTC.1 and Synchronous cells for configuration 4.6.2.1-3 and 4.6.2.1-6 Table H.3.1-4 with A3-offset = -6dB and with Condition SSB Index Table H.3.1-5 with Condition INTER-FREQ Table H.3.1-6 with Condition Pattern #0 for Test 1 Table H.3.1-6 with Condition Pattern #2 for Test 2 Table H.3.1-7 with Conditions INTER-FREQ and SSB Index Table H.3.4-1 Table H.3.4-2

#### 4.6.2.5.5 Test requirement

Table 4.6.2.5.5-1 defines the primary level settings including test tolerances for all tests.

Table 4.6.2.5.5-1: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2	Cell 3	
		configuratio n	T1 T2	T1 T2	
NR RF Channel Number		Config	1	2	
Duplex mode		1,2,3,4,5,6 Config 1,4		<u> </u> FDD	
Duplex mode		Config 1,4		TDD	
		2,3,5,6	'		
BWchannel	MHz	Config 1,4	10: N	RB,c = 52	
		Config 2,5	10: N	RB,c = 52	
		Config 3,6	40: N <sub>F</sub>	RB,c = 106	
BWP BW	MHz	Config 1,4		RB,c = 52	
		Config 2,5		RB,c = 52	
TDD configuration		Config 3,6	TDDConf.1.1	RB,c = 106 TDDConf.1.1	
TDD configuration		Config 2,5			
		Config 3,6	TDDConf.2.1	TDDConf.2.1	
Initial DL BWP		Config	DLBWP.0.1	NA	
Initial UL BWP		1,2,3,4,5,6	ULBWP.0.1	NA	
IIIIIIai OL BVVP		Config 1,2,3,4,5,6	OLBVVP.U.1	INA	
Dedicated DL BWP		Config	DLBWP.1.1	NA	
		1,2,3,4,5,6			
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1	NA	
TRS configuration		Config 1,4	TRS.1.1 FDD	NA	
<u> </u>		Config 2,5	TRS.1.1 TDD	NA	
		Config 3,6	TRS.1.2 TDD	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		
0005057.0./		Config 3,6	SR2.1 TDD		
CORESET Reference Channel		Config 1,4	CR.1.1 FDD	-	
Channel		Config 2,5	CR.1.1 TDD CR2.1 TDD		
SMTC configuration defined		Config 3,6			
in A.3.2.11.1 and A.3.2.11.2		Config 1,4	SN	MTC.2	
		Config 2,3,5,6	SMTC.1		
PDSCH/PDCCH subcarrier	kHz	Config		15	
spacing		1,2,4,5			
EPRE ratio of PSS to SSS		Config 3,6		30	
EPRE ratio of PBCH DMRS		_			
to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS	<del></del>				
EPRE ratio of PDCCH to		Config	0	0	
PDCCH DMRS EPRE ratio of PDSCH DMRS		1,2,3,4,5,6	U	U	
to SSS EPRE ratio of PDSCH to		-			
PDSCH					
EPRE ratio of OCNG DMRS					
to SSS(Note 1)		1			
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
COING DIVING (INDIG 1)		1		İ	

$N_{oc}^{ m Note2}$	dBm/15 kHz		-(	98	-98		
$N_{oc}^{ m Note2}$	dBm/S CS	Config 1,2,4,5	-(	-98		-98	
		Config 3,6	-(	95		-95	
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91	
		Config 3,6	-91	-91	-Infinity	-88	
$\hat{E}_{s}/I_{ot}$	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		Config 1,2,3,4,5,6	AW	/GN	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.

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% with a confidence level of 95%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 880 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

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.

# 4.6.2.6 EN-DC FR1-FR1 event-triggered reporting in DRX with SSB time index detection

#### 4.6.2.6.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX within EN-DC interfrequency NR cell search requirements with SSB time index detection in TS 38.133 [6] clause 9.3.4.

#### 4.6.2.6.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 4.6.2.6.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A. 4.6.2.6.

4.6.2.6.4 Test description

4.6.2.6.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.6.2.6.1-1. Configure the test equipment and the DUT according to the parameters in Table 4.6.2.6.4.1-2. Test environment parameters are given in Table 4.6.2.6.4.1-3.

Table 4.6.2.6.4.1-1: EN-DC FR1-FR1 event triggered reporting tests in DRX with SSB time index detection supported test configurations

Test Case ID	Description		
4.6.2.6-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.6.2.6-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.6.2.6-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
4.6.2.6-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
4.6.2.6-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
4.6.2.6-6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
Note 1: The UE is only required to be tested in one of the supported test configurations			
Note 2: The targ	et NR cell3 has the same SCS, BW and duplex mode as NR serving cell2		

Table 4.6.2.6.4-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in DRX

Parameter	Unit	Test	Value			Comment	
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config	1			One E-UTRAN TDD carrier	
Number		1,2,3,4,5,6				frequencies is used.	
NR RF Channel		Config	1, 2				Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6					used.
Active cell		Config	LTE C	ell 1 (Po	Cell) and	l NR	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6	cell 2	(PScell)			channel number 1.
							NR Cell 2 is on NR RF channel
							number 1.
Neighbour cell		Config	NR ce	II 3			NR cell 3 is on NR RF channel
		1,2,3,4,5,6					number 2.
Gap Pattern Id		Config	0		4		As specified in TS 38.133
		1,2,3,4,5,6					clause 9.1.2-1.
Measurement gap		Config	39		19		
offset		1,2,3,4,5,6					
SMTC-SSB parameters		Config 1,4	SSB.1	FR1			As specified in clause A.3
		Config 2,5	SSB.1	FR1			As specified in clause A.3
		J , , ,					
		Config 3,6	SSB.2	: FR1			As specified in clause A.3
A3-Offset	dB	Config	-6				
I biotomoria	-ID	1,2,3,4,5,6	0				
Hysteresis	dB	Config	0				
CP length		1,2,3,4,5,6 Config	Normal				
CP length			Normai				
TimeToTrigger	S	1,2,3,4,5,6 Config	0				
rimerorngger	S	1,2,3,4,5,6	U				
Filter coefficient		Config	0 L3 filtering is not used				
Filler Coemcient		1,2,3,4,5,6	U				L3 fillering is flot used
DRX	ms	Config	DRX	DRX	DRX	DRX	As specified in clause A.5
DIX	1113	1,2,3,4,5,6	.1	.2	.1	.2	As specified in clause A.5
Time offset between		Config	3 μs	٠.۷	1		Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6	ο μο				Synomonodo En Do
Time offset between		Config 1,4	3ms				Asynchronous cells.
serving and neighbour		239 ., /	55				The timing of Cell 3 is 3ms later
cells							than the timing of Cell 2.
		Config	3μs			Synchronous cells.	
		2,3,5,6					
T4		0	-				
T1	S	Config	5				
To	_	1,2,3,4,5,6	1.5	105	140	10.5	
T2	S	Config 1,2,3,4,5,6	1.5	13.5	1.3	13.5	
		1,2,3,4,5,6		1	l	l	

Table 4.6.2.6.4-3: Test Environment parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in DRX

Parameter	Value	Comment		
Test environment	NC	As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified in Annex E, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.			
Channel bandwidth	As specified by the test configuration selected fr	rom Table 4.6.2.1.4.1-1.		

Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.
	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		pable UEs without any 2Rx RF .3.2.5.1 for DUT Part. and TE Part	

- 1. Message contents are defined in clause 4.6.2.6.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in different frequencies. Cell 2 is the PSCell and Cell 3 is the target cell. The power levels and settings for Cell 2 and Cell 3 are set according to Annex C.1.2.

#### 4.6.2.6.4.2 Test procedure

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.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 4.6.2.6.4-2 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 4.6.2.6.4-2 is provided for UE that support per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

- 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.1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 4.6.2.6.4-2. T1 starts.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 4.6.2.6.4-2. T2 starts.
- 6. UE shall transmit a MeasurementReport message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delays measured from the beginning of time period T2 is less than 1280 ms for Test 1, 13440 ms for Test 2, 1280 ms for Test 3 and 13440 ms for Test 4 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the MeasurementReport message in step 6 or when T2 expires, the SS shall transmit RRCConnectionReconfiguration message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. The SS shall transmit RRCConnectionReconfiguration message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message. If either of the reconfiguration in step 7 or step 9 fails, SS switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure

parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.)

- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 4.6.2.6.4-2 as appropriate.

#### 4.6.2.6.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.6.2.6.4.3-1: Common Exception messages for Additional EN-DC FR1-FR1 event triggered reporting in DRX with SSB test requirement

Default Message Contents				
Common contents of system information blocks exceptions				
Default RRC messages and information elements contents exceptions	Table H.3.1-1 Table H.3.1-2 with Conditions GAP NEEDED and INTER-FREQ Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.2 and Asynchronous cells for configuration 6.6.2.1-1 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.1 and Synchronous cells for configuration 6.6.2.1-2 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.2 FR1, SMTC.1 and Synchronous cells for configuration 6.6.2.1-3 Table H.3.1-4 with A3-offset = -6dB and Condition SSB Index Table H.3.1-5 with Condition INTER-FREQ Table H.3.1-6 with Condition Pattern #0 for Test 1 and Test 2 Table H.3.1-6 with Condition Pattern #2 for Test 3 and Test 4 Table H.3.1-7 with Condition DRX.1 for Test 1 and Test 3 Table H.3.7-1 with Condition DRX.2 for Test 2 and Test 4 Table H.3.4-1 Table H.3.4-2			

#### 4.6.2.6.5 Test requirement

Table 4.6.2.5.5-1 defines the primary level settings including test tolerances for all tests.

Table 4.6.2.6.5-1: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2 Cell 3				
		configuratio n	T1 T2	T1 T2			
NR RF Channel Number		Config 1,2,3,4,5,6	1	2			
Duplex mode		Config 1,4	FDD				
·		Config 2,3,5,6	TDD				
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				
BWP BW	MHz	Config 3,6 Config 1,4	40: N <sub>RB,c</sub> = 106 10: N <sub>RB,c</sub> = 52				
		Config 2,5	10: N	RB,c = 52			
OONO Betteme defined in		Config 3,6	40: N <sub>RB,c</sub> = 106				
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	OP.1	OP.1			
PDSCH Reference		Config 1,4	SR.1.1 FDD	-			
measurement channel		Config 2,5	SR.1.1 TDD				
CORESET Reference		Config 3,6	SR2.1 TDD				
CORESET Reference Channel		Config 1,4 Config 2,5	CR.1.1 FDD CR.1.1 TDD	-			
		Config 3,6	CR2.1 TDD				
TDD configuration		Config 2,5	TDD	Conf.1.1			
		Config 3,6	TDD	Conf.2.1			
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1				
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1				
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1				
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1				
TRS configuration		Config 1,4	TRS.1.1 FDD				
		Config 2,5	TRS.1.1 TDD				
		Config 3,6	TRS.	1.2 TDD			
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1,4	SMTC.2				
		Config 2,3,5,6	SMTC.1				
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5	15				
EDDE retire -t DOO 1 000		Config 3,6		30			
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS		_					
to SSS		_					
EPRE ratio of PBCH to PBCH DMRS		_					
EPRE ratio of PDCCH DMRS to SSS		_					
EPRE ratio of PDCCH to PDCCH DMRS		Config	0	0			
EPRE ratio of PDSCH DMRS to SSS		1,2,3,4,5,6					
EPRE ratio of PDSCH to PDSCH		1					
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							

$N_{oc}^{ m Note2}$	dBm/15 kHz		-98		-98	
$N_{oc}^{ m Note2}$	dBm/S CS	Config 1,2,4,5	-98 -95		-98	
		Config 3,6			-95	
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91
		Config 3,6	-91	-91	-Infinity	-88
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
Io <sup>Note3</sup>	dBm/9.3 6MHz	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		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.

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% with a confidence level of 95%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%. with a confidence level of 95%

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

- 4.6.2.7 Void
- 4.6.2.8 Void

# 4.7 Measurement performance requirements

# 4.7.1 SS-RSRP

# 4.7.1.0 Minimum conformance requirements

# 4.7.1.0.1 Intra-frequency absolute SS-RSRP measurement accuracy requirements

The intra-frequency SS-RSRP absolute accuracy requirements are defined for the SS-RSRP measured from a cell on the same frequency as that of the PCell or PSCell in FR1.

The accuracy requirements in Table 4.7.1.0.1-1 are valid under the following conditions:

- Conditions defined in 38.101-1 [2] Clause 7.3 for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB,
- Other conditions are [TBD].

Table 4.7.1.0.1-1: SS-RSRP intra frequency absolute accuracy in FR1

Accuracy		Conditions						
Normal	Extreme	SSB	lo Note 1 range					
condition condition		Ês/lot	NR operating band groups Note 2	Minimum Io			Maximum lo	
dB dB		dB		dBm / SCS <sub>SSB</sub>				
	dB			SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>	
±4.5 ±9			NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	N/A	-70	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-70	
			NR_TDD_FR1_C	-120	-117	N/A	-70	
	≥-6	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	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_B, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H,	N/A	N/A	-70	-50	

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

NOTE 2: NR operating band groups in FR1 are as defined in Section 3A.4.1

The reporting range for SS-RSRP is defined from -156dBm to -31dBm with 1dB resolution. The mapping of the measured quantity to the reported value is defined by Table 4.7.1.0.1-2.

Table 4.7.1.0.1-2: SS-RSRP and CSI-RSRP measurement report mapping

Reported value	Measured quantity value(L3 SS-RSRP)	Measured quantity value(L1 SS-RSRP and CSI-RSRP)	Unit
RSRP_0	SS-RSRP<-156	Not valid	dBm
RSRP_1	-156≤ SS-RSRP<-155	Not valid	dBm
RSRP_2	-155≤ SS-RSRP<-154	Not valid	dBm
RSRP_3	-154≤ SS-RSRP<-153	Not valid	dBm
RSRP_4	-153≤ SS-RSRP<-152	Not valid	dBm
RSRP_5	-152≤ SS-RSRP<-151	Not valid	dBm
RSRP_6	-151≤ SS-RSRP<-150	Not valid	dBm
RSRP_7	-150≤ SS-RSRP<-149	Not valid	dBm
RSRP_8	-149≤ SS-RSRP<-148	Not valid	dBm
RSRP_9	-148≤ SS-RSRP<-147	Not valid	dBm
RSRP_10	-147≤ SS-RSRP<-146	Not valid	dBm
RSRP_11	-146≤ SS-RSRP<-145	Not valid	dBm
RSRP_12	-145≤ SS-RSRP<-144	Not valid	dBm
RSRP_13	-144≤ SS-RSRP<-143	Not valid	dBm
RSRP_14	-143≤ SS-RSRP<-142	Not valid	dBm
RSRP_15	-142≤ SS-RSRP<-141	Not valid	dBm
RSRP_16	-141≤ SS-RSRP<-140	RSRP<-140	dBm
RSRP_17	-140≤ SS-RSRP<-139	-140≤ RSRP<-139	dBm
RSRP_18	-139≤ SS-RSRP<-138	-139≤ RSRP<-138	dBm
RSRP_111	-46≤ SS-RSRP<-45	-46≤ RSRP<-45	dBm
RSRP_112	-45≤ SS-RSRP<-44	-45≤ RSRP<-44	dBm
RSRP_113	-44≤ SS-RSRP<-43	-44≤ RSRP	dBm
RSRP_114	-43≤ SS-RSRP<-42	Not valid	dBm
RSRP_115	-42≤ SS-RSRP<-41	Not valid	dBm
RSRP_116	-41≤ SS-RSRP<-40	Not valid	dBm
RSRP_117	-40≤ SS-RSRP<-39	Not valid	dBm
RSRP_118	-39≤ SS-RSRP<-38	Not valid	dBm
RSRP_119	-38≤ SS-RSRP<-37	Not valid	dBm
RSRP_120	-37≤ SS-RSRP<-36	Not valid	dBm
RSRP_121	-36≤ SS-RSRP<-35	Not valid	dBm
RSRP_122	-35≤ SS-RSRP<-34	Not valid	dBm

RSRP_123	-34≤ SS-RSRP<-33	Not valid	dBm
RSRP_124	-33≤ SS-RSRP<-32	Not valid	dBm
RSRP_125	-32≤ SS-RSRP<-31	Not valid	dBm
RSRP_126	-31≤ SS-RSRP	Not valid	dBm
RSRP_127 <sup>1</sup>	Infinity	Infinity	dBm

Note 1: The value of RSRP\_127 is applicable for RSRP threshold configured by the network as defined in TS 38.331 [13], but not for the purpose of measurement reporting.

The normative reference for this requirement is TS 38.133 [6] clauses 10.1.2.1.1 and 10.1.6.

## 4.7.1.0.2 Intra-frequency relative SS-RSRP measurement accuracy requirements

The intra-frequency 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 in FR1.

The accuracy requirements in Table 4.7.1.0.2-1 are valid under the following conditions:

- Conditions defined in 38.101-1 [2] Clause 7.3 for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB,
- Other conditions are [TBD].

Table 4.7.1.0.2-1: SS-RSRP Intra frequency relative accuracy in FR1

Accı	ıracy	Conditions						
Normal	Extreme	SSB	SB Io Note 1 range					
condition	condition	Ês/lot Note 2	NR operating band groups Note 4	Minimum Io Maxi		Maximum Io		
				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	-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	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	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 TS 38.133 [6] Section 3.5.2.

The reporting range for SS-RSRP is defined from -156dBm to -31dBm with 1dB resolution. The mapping of the measured quantity to the reported value is defined by Table 4.7.1.0.1-2.

The normative reference for this requirement is TS 38.133 [6] clauses 10.1.2.1.2 and 10.1.6.

## 4.7.1.0.3 Inter-frequency absolute SS-RSRP measurement accuracy requirements

The inter-frequency SS-RSRP absolute accuracy requirements in this clause are defined for the SS-RSRP measured from a cell on a different frequency as that of the PCell or PSCell in FR1.

The accuracy requirements in Table 4.7.1.0.3-1 are valid under the following conditions:

- Conditions defined in 38.101-1 [2] Clause 7.3 for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB,
- Other conditions are [TBD].

Table 4.7.1.0.3-1: SS-RSRP inter frequency absolute accuracy in FR1

Accı	ıracy		Conditions				
Normal	Extreme	SSB		lo <sup>Note 1</sup> range			
condition	condition	Ês/lot Note 2	NR operating band groups Note 3		Minimur	n lo	Maximum lo
				dBm/S	CS <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	-121	-118	N/A	-70
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-70
			NR_TDD_FR1_C	-120	-117	N/A	-70
±4.5	±6	≥[-46]	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	≥[-46]	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_B, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H,	N/A	N/A	-70	-50

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

NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.

NOTE 3: NR operating band groups in FR1 are as defined in Section 3A.4.1

The reporting range for SS-RSRP is defined from -156dBm to -31dBm with 1dB resolution. The mapping of the measured quantity to the reported value is defined by Table 4.7.1.0.1-2.

The normative reference for this requirement is TS 38.133 [6] clauses 10.1.4.1.1 and 10.1.6.

## 4.7.1.0.4 Inter-frequency relative SS-RSRP measurement accuracy requirements

The inter-frequency SS-RSRP relative accuracy requirements in this clause are defined for the SS-RSRP measured from a cell on a different frequency as that of the PCell or PSCell in FR1.

The accuracy requirements in Table 4.7.1.0.4-1 are valid under the following conditions:

- Conditions defined in 38.101-1 [2] Clause 7.3 for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB,

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

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

Table 4.7.1.0.4-1: SS-RSRP inter frequency relative accuracy in FR1

Accı	Accuracy Conditions						
Normal	Extreme	SSB		lo <sup>Note 1</sup> range			
condition	condition	Ês/lot Note 2	NR operating band groups Note 3		Minimum Io		Maximum Io
				dBm/S	CS <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	-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	≥[-46]	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50
			NR_FDD_FR1_G	-118	-115	N/A	-50
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50

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

NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.

NOTE 3: NR operating band groups in FR1 are as defined in Section 3A.4.1

The reporting range for SS-RSRP is defined from -156dBm to -31dBm with 1dB resolution. The mapping of the measured quantity to the reported value is defined by Table 4.7.1.0.1-2.

The normative reference for this requirement is TS 38.133 [6] clauses 10.1.4.1.2 and 10.1.6.

## 4.7.1.1 Intra-frequency measurements

## 4.7.1.1.1 EN-DC FR1 SS-RSRP absolute measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

## 4.7.1.1.1 Test purpose

The purpose of this test is to verify that the intra-frequency SS-RSRP absolute measurement accuracy is within the specified limits for all bands.

#### 4.7.1.1.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

## 4.7.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.7.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.4.7.1.1.

## 4.7.1.1.4 Test description

## 4.7.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.7.1.1.4.1-1.

Table 4.7.1.1.4.1-1: EN-DC FR1 SS-RSRP measurement accuracy supported test configurations

Test Case ID	Description					
4.7.1.1.1-1	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD					
4.7.1.1.1-2	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD					
4.7.1.1.1-3	LTE FDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD					
4.7.1.1.1-4	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD					
4.7.1.1.1-5	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD					
4.7.1.1.1-6	LTE TDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD					
Note	Note: The UE is only required to be tested in one of the supported test configurations					

Configure the test equipment and the DUT according to the parameters in Table 4.7.1.1.1.4.1-2.

Table 4.7.1.1.4.1-2: Initial conditions for SS-RSRP intra frequency absolute accuracy in FR1

Parameter		Value	Comment
Test environment	NC, TI	_/VL, TL/VH, TH/VL, TH/VH	As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	P	s specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth	Α	s specified by the test configuration	n selected from Table 4.7.1.1.1.4.1-1.
Propagation conditions		AWGN	As specified in Annex C.2.2.
Connection Diagram	TE Part	A.3.1.8.2 with n = 2 and $\phi_1$ = 5 Hz	As specified in TS 38.508-1 [14] Annex A.
	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		N/A	

- 1. Message contents are defined in clause 4.7.1.1.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in the same frequency. Cell 2 is the PSCell and Cell 3 is the target cell for SS-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1.

## 4.7.1.1.4.2 Test procedure

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On*, according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to Table 4.7.1.1.5-1 as appropriate.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit an RRCConnectionReconfigurationComplete message.
- 5. The UE shall transmit periodically MeasurementReport messages.
- 6. After 10s wait from Step 3, the SS shall check the SS-RSRP reported values in the periodic MeasurementReport. The SS-RSRP value of Cell 3 reported by the UE is compared to the expected SS-RSRP. If the value is outside the limits in Table 4.7.1.1.1.5-2 or the UE fails to report the measurement value for Cell 3, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.
- 7. The SS shall continue checking the MeasurementReport messages transmitted by the UE until the confidence level according to Table G.2.3-1 in Annex G is achieved.

8. Repeat steps 1-7 for each sub-test in Table 4.7.1.1.5-1 as appropriate.

## 4.7.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

## 4.7.1.1.5 Test requirement

Table 4.7.1.1.5-1 defines the primary level settings including test tolerances for all tests.

Each SS-RSRP measurement report for each of the tests in Table 4.7.1.1.1.5-1 shall meet the corresponding absolute accuracy requirements in Table 4.7.1.1.1.5-2.

Table 4.7.1.1.5-1: EN-DC FR1 SS-RSRP measurement accuracy test parameters

Parameter		Unit	Tes		Tes		Tes	
			Cell 2 Cell 3		Cell 2	Cell 3	Cell 2 Cell 3	
SSB ARFCN Config 1,4			freq1 freq1 FDD				freq1	
Duplex mode	Config 1,4 Config 2,3,5,6	1			TC			
	Config 1,4		Not Applicable					
TDD configuration	Config 2,5				TDDC	onf.1.1		
	Config 3,6		TDDConf.2.1					
	Config 1,4				10: N <sub>RE</sub>	s,c = 52		
BW <sub>channel</sub>	Config 2,5	MHz			10: N <sub>RE</sub>	s,c = 52		
	Config 3,6				40: N <sub>RB</sub>	,c = 106		
	Config 1,4				10: N <sub>RE</sub>	s,c = 52		
BWP BW	Config 2,5				10: N <sub>RE</sub>	s,c = 52		
	Config 3,6				40: N <sub>RB</sub>	$_{,c} = 106$		
Downlink initial BWP of	onfiguration				DLB\	VP.0		
Downlink dedicated B\	WP configuration				DLB\	VP.1		
Uplink dedicated BWP	configuration				ULB\	VP.1		
DRx Cycle		ms			Not App	olicable		
DDCCH Deference	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		CR2.1 TDD		CCR2. 1 TDD		CCR2.1 TDD	
	Config 1,4		SSB 1.FR1		SSB 1.FR1		SSB 1.FR1	
SSB configuration	Config 2,5		SSB 1.FR1	-	SSB 1.FR1	-	SSB 1.FR1	-
	Config 3,6		SSB 2.FR1		SSB 2.FR1		SSB 2.FR1	
SMTC configuration				SMT	C 1			
OCNG Patterns					OF	P.1		
PDSCH/PDCCH Config 1,2,4,5 Subcarrier spacing Config 3,6		- kHz			15 l 30k	kHz :Hz		
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS		-						
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH		dB	0	0	0	0	0	0
EPRE ratio of OCNG DM EPRE ratio of OCNG to C		_						

M Note2	Config 1,2,4,5	Depending on band group	dBm/15Kh	-106±TT		-88±TT		-116 ±TT + Δ <sub>BG_offset</sub>		
$N_{oc}^{$	Config 3,6	Depending on band group	Z	-113±TT		-94±TT		116 ±TT + Δ <sub>BG_offset</sub>		
$N_{oc}^{$	Config 1,2	4,5	dBm/SCS	-106	-106±TT		-88±TT		Same as Noc/15kHz	
IV oc	Config 3,6	Depending on band group	ubili/SCS	-110	±TT	-91	±TT	_	ETT + _offset	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$			dB	2.5±TT	-6±TT	2.5±T T	-6±TT	0.46± TT	- 5.76± TT	
$\hat{E}_s/N_{oc}$			dB	6±TT	1±TT	6±TT	1±TT	3±TT	-1±TT	
SS-	Config 1,2,4,5	Depending on band group	dDay (OOO	- 100±T T	- 105±T T	- 82±TT	- 87±TT	- 113±T T + Δ <sub>BG_off</sub> set	$\begin{array}{c} \text{-} \\ \text{117} \pm \text{T} \\ \text{T +} \\ \Delta_{\text{BG\_offs}} \\ \text{et} \end{array}$	
RSRP <sup>Not</sup> e3	Config 3,6	Depending on band group	dBm/SCS	- 106±T T	- 109±T T	- 85±TT	- 90±TT	- 110±T T + Δ <sub>BG_off</sub> set	- 114±T T+ Δ <sub>BG_offs</sub> et	
IoNote3	Config 1,2,4,5	Depending on band group	dBm/ 9.36MHz	-70.09	9±TT	-52.09±TT			±TT + _offset	
	Config Depending on band 3,6 group		dBm/ 38.16MHz	-70.99±TT		-51.99±TT			5±TT + _offset	
	Propagation condition			AWGN						
	Antenna configuration			1x2						

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.
- Note 3: SS-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:  $\Delta_{BG\_offset}$  is defined in clause 3A.4, Table 3A.4.1-2.

Table 4.7.1.1.1.5-2: SS-RSRP Intra frequency absolute accuracy requirements for the reported values

Normal Conditions	Test 1	Test 2	Test 3	
	All bands	All bands	Dondo EDD. A	TDD
l l			Bands FDD_B1_FDD_B3	TBD TBD
Į į			Bands FDD_B1, FDD_B2 Bands FDD_C	TBD
Lowest reported value (Cell 3)	TBD	TBD	Bands FDD_C	TBD
Lowest reported value (Cell 3)	טסו	ופטו	Bands FDD_D Bands FDD E, FDD F	TBD
Į į			Bands FDD_E, FDD_F	TBD
Į į			Bands FDD_H	TBD
	TBD	TBD	Bands FDD_H	TBD
Į į	100	100	Bands FDD_A Bands FDD B1, FDD B2	TBD
l l			Bands FDD_C	TBD
Highest reported value (Cell 3)			Bands FDD_D	TBD
ingricot reperted value (eeil e)			Bands FDD_E, FDD_F	TBD
Į į			Bands FDD G	TBD
Į į			Bands FDD_D	TBD
Extreme Conditions	Test 1	Test 2	Test 3	
Extreme Conditions	All bands	All bands		
l l	TBD	TBD	Bands FDD_A	TBD
l l			Bands FDD_B1, FDD_B2	TBD
<u> </u>				
·			Bands FDD_C	TBD
Lowest reported value (Cell 3)			Bands FDD_D	TBD
Lowest reported value (Cell 3)			Bands FDD_D Bands FDD_E, FDD_F	TBD TBD
Lowest reported value (Cell 3)			Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G	TBD TBD TBD
Lowest reported value (Cell 3)			Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H	TBD TBD TBD TBD
Lowest reported value (Cell 3)	TBD	TBD	Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H Bands FDD_A	TBD TBD TBD TBD TBD
Lowest reported value (Cell 3)	TBD	TBD	Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H Bands FDD_A Bands FDD_B1, FDD_B2	TBD TBD TBD TBD TBD TBD TBD
	TBD	TBD	Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H Bands FDD_A Bands FDD_B1, FDD_B2 Bands FDD_C	TBD TBD TBD TBD TBD TBD TBD TBD TBD
Lowest reported value (Cell 3)  Highest reported value (Cell 3)	TBD	TBD	Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H Bands FDD_A Bands FDD_B1, FDD_B2 Bands FDD_C Bands FDD_D	TBD
	TBD	TBD	Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H Bands FDD_A Bands FDD_B1, FDD_B2 Bands FDD_C Bands FDD_D Bands FDD_D Bands FDD_E, FDD_F	TBD
	TBD	TBD	Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H Bands FDD_A Bands FDD_B1, FDD_B2 Bands FDD_C Bands FDD_D	TBD

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

## 4.7.1.1.2 EN-DC FR1 SS-RSRP relative measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

## 4.7.1.1.2.1 Test purpose

The purpose of this test is to verify that the intra-frequency SS-RSRP relative measurement accuracy is within the specified limits for all bands.

## 4.7.1.1.2.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

## 4.7.1.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.7.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.4.7.1.1.

## 4.7.1.1.2.4 Test description

## 4.7.1.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.7.1.1.2.4.1-1.

Table 4.7.1.1.2.4.1-1: EN-DC FR1 SS-RSRP measurement accuracy supported test configurations

Test Case ID	Description					
4.7.1.1.2-1	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD					
4.7.1.1.2-2	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD					
4.7.1.1.2-3	LTE FDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD					
4.7.1.1.2-4	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD					
4.7.1.1.2-5	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD					
4.7.1.1.2-6	LTE TDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD					
Note	Note: The UE is only required to be tested in one of the supported test configurations					

Configure the test equipment and the DUT according to the parameters in Table 4.7.1.1.2.4.1-2.

Table 4.7.1.1.2.4.1-2: Initial conditions for SS-RSRP intra frequency relative accuracy in FR1

Parameter		Value	Comment
Test environment	NC, TI	_/VL, TL/VH, TH/VL, TH/VH	As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified in Annex E, Table E.1-1 and TS 38.508-1 [14] sclause 4.3.1.		
Channel bandwidth	Α	s specified by the test configuration	n selected from Table 4.7.1.1.2.4.1-1.
Propagation conditions		AWGN	As specified in Annex C.2.2.
Connection Diagram	TE Part	A.3.1.8.2 with n = 2 and $\phi_1$ = 5 Hz	As specified in TS 38.508-1 [14] Annex A.
	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		N/A	

- 1. Message contents are defined in clause 4.7.1.1.2.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in the same frequency. Cell 2 is the PSCell and Cell 3 is the target cell for SS-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1.

## 4.7.1.1.2.4.2 Test procedure

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to Table 4.7.1.1.2.5-1 as appropriate.
- 3. The SS shall transmit an RRCConnection Reconfiguration message on Cell 1.
- 4. The UE shall transmit an RRCConnectionReconfigurationComplete message.
- $5. \ The \ UE \ shall \ transmit \ periodically \ Measurement Report \ messages.$
- 6. After 10s wait from Step 3, the SS shall check the SS-RSRP reported values of Cell 2 and Cell 3 in the periodic MeasurementReport. The SS-RSRP value of Cell 3 reported by the UE is compared to the reported SS-RSRP of Cell 2. If the resulting value is outside the limits in Table 4.7.1.1.2.5-2 or the UE fails to report the measurement value for Cell 2 or Cell 3, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.
- 7. The SS shall continue checking the MeasurementReport messages transmitted by the UE until the confidence level according to Table G.2.3-1 in Annex G is achieved.

8. Repeat steps 1-7 for each sub-test in Table 4.7.1.1.2.5-1 as appropriate.

## 4.7.1.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

#### 4.7.1.1.2.5 Test requirement

Table 4.7.1.1.2.5-1 defines the primary level settings including test tolerances for all tests.

Each SS-RSRP measurement report for each of the tests in Table 4.7.1.1.2.5-1 shall meet the corresponding absolute accuracy requirements in Table 4.7.1.1.2.5-2.

Table 4.7.1.1.2.5-1: Same as Table 4.7.1.1.1.5-1

Table 4.7.1.1.2.5-2: SS-RSRP Intra frequency relative accuracy requirements for the reported values

	Test 1	Test 2	Test 3
	All bands	All bands	All bands
Normal Conditions			
Lowest reported value (Cell 3)	RSRP_x - TBD	RSRP_x - TBD	RSRP_x - TBD
Highest reported value (Cell 3)	RSRP_x + TBD	RSRP_x + TBD	RSRP_x + TBD
Extreme Conditions			
Lowest reported value (Cell 3)	RSRP_x - TBD	RSRP_x - TBD	RSRP_x - TBD
Highest reported value (Cell 3)	RSRP_x + TBD	RSRP_x + TBD	RSRP_x + TBD
RSRP_x is the reported value of Cell 2			

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

## 4.7.1.2 Inter-frequency measurements

## 4.7.1.2.1 EN-DC FR1-FR1 SS-RSRP absolute measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.
- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

## 4.7.1.2.1.1 Test purpose

The purpose of this test is to verify that the inter-frequency SS-RSRP absolute measurement accuracy is within the specified limits for all bands.

#### 4.7.1.2.1.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

## 4.7.1.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.7.1.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.4.7.1.2.

## 4.7.1.2.1.4 Test description

## 4.7.1.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.7.1.2.1.4.1-1.

Table 4.7.1.2.1.4.1-1: EN-DC FR1-FR1 SS-RSRP measurement accuracy supported test configurations

Test Case ID	Description		
4.7.1.2.1-1	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD		
4.7.1.2.1-2	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD		
4.7.1.2.1-3	LTE FDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD		
4.7.1.2.1-4	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD		
4.7.1.2.1-5	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD		
4.7.1.2.1-6	LTE TDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD		
Note	Note: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 4.7.1.2.1.4.1-2.

Table 4.7.1.1.4.1-2: Initial conditions for SS-RSRP inter frequency absolute accuracy in FR1

Parameter	Value		Comment
Test environment	NC, TL/VL, TL/VH, TH/VL, TH/VH		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	A	as specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 4.7.1.2.1.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part	A.3.1.8.2 with n = 2 and $\phi_1$ = 5	As specified in TS 38.508-1 [14] Annex A.
	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		N/A	

- 1. Message contents are defined in clause 4.7.1.2.1.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in two different FR1 frequencies. Cell 2 is the PSCell and Cell 3 is the target cell for SS-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1.

## 4.7.1.2.1.4.2 Test procedure

Same as in clause 4.7.1.1.1.4.2 but replacing Table 4.7.1.1.1.5-1 and 4.7.1.1.1.5-2 with 4.7.1.2.1.5-1 and 4.7.1.2.1.5-2, respectively.

#### 4.7.1.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

## 4.7.1.2.1.5 Test requirement

TBD

## 4.7.1.2.2 EN-DC FR1-FR1 SS-RSRP relative measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

## 4.7.1.2.2.1 Test purpose

The purpose of this test is to verify that the inter-frequency SS-RSRP absolute measurement accuracy is within the specified limits for all bands.

## 4.7.1.2.2.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

#### 4.7.1.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.7.1.0.4.

The normative reference for this requirement is TS 38.133 [6] clause A.4.7.1.2.

#### 4.7.1.2.2.4 Test description

#### 4.7.1.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.7.1.2.2.4.1-1.

Table 4.7.1.2.2.4.1-1: EN-DC FR1-FR1 SS-RSRP measurement accuracy supported test configurations

Test Case ID	Description
4.7.1.2.2-1	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD
4.7.1.2.2-2	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD
4.7.1.2.2-3	LTE FDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD
4.7.1.2.2-4	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD
4.7.1.2.2-5	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD
4.7.1.2.2-6	LTE TDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD
Note	: The UE is only required to be tested in one of the supported test configurations

Configure the test equipment and the DUT according to the parameters in Table 4.7.1.2.2.4.1-2.

Table 4.7.1.2.2.4.1-2: Initial conditions for SS-RSRP inter frequency relative accuracy in FR1

Parameter	Value		Comment
Test environment	NC, TL/VL, TL/VH, TH/VL, TH/VH		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	A	as specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 4.7.1.2.2.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part  DUT Part	A.3.1.8.2 with n = 2 and $\phi_1$ = 5 Hz A.3.2.3.4	As specified in TS 38.508-1 [14] Annex A.
Exceptions to connection diagram		N/A	

- 1. Message contents are defined in clause 4.7.1.2.2.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in two different FR1 frequencies. Cell 2 is the PSCell and Cell 3 is the target cell for SS-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1.

## 4.7.1.2.2.4.2 Test procedure

Same as in clause 4.7.1.1.2.4.2 but replacing Table 4.7.1.1.2.5-1 and 4.7.1.1.2.5-2 with 4.7.1.2.2.5-1 and 4.7.1.2.2.5-2, respectively.

## 4.7.1.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

4.7.1.2.2.5 Test requirement

**TBD** 

## 4.7.2 SS-RSRQ

## 4.7.2.0 Minimum conformance requirements

## 4.7.2.0.1 Intra-frequency SS-RSRQ measurement accuracy requirements

**TBD** 

4.7.2.0.2 Inter-frequency SS-RSRQ measurement accuracy requirements

**TBD** 

## 4.7.2.1 EN-DC FR1 SS-RSRQ measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.
- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

## 4.7.2.1.1 Test purpose

The purpose of this test is to verify that the intra-frequency SS-RSRQ measurement accuracy is within the specified limits for all bands.

## 4.7.2.1.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

## 4.7.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.7.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.4.7.2.1.

#### 4.7.2.1.4 Test description

#### 4.7.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.7.2.1.4.1-1.

Table 4.7.2.1.4.1-1: EN-DC FR1 SS-RSRQ measurement accuracy supported test configurations

Test Case ID	Description		
4.7.2.1-1	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD		
4.7.2.1-2	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD		
4.7.2.1-3	LTE FDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD		
4.7.2.1-4	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD		
4.7.2.1-5	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD		
4.7.2.1-6	LTE TDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD		
Note	Note: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 4.7.2.1.4.1-2.

Table 4.7.2.1.4.1-2: Initial conditions for SS-RSRQ intra frequency accuracy in FR1

Parameter	Value		Comment
Test environment	NC, TL/VL, TL/VH, TH/VL, TH/VH		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	A	s specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth		As specified by the test configuration	on selected from Table 4.7.2.1.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part  DUT Part	A.3.1.8.2 with n = 2 and $\phi_1$ = 5 Hz A.3.2.3.4	As specified in TS 38.508-1 [14] Annex A.
	DOTFAIL	1 0	
Exceptions to connection diagram		N/A	

- 1. Message contents are defined in clause 4.7.2.1.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in the same frequency. Cell 2 is the PSCell and Cell 3 is the target cell for SS-RSRQ measurements. The connection setup is done according to the settings in Annex C.1.1.

4.7.2.1.4.2 Test procedure

TBD.

4.7.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

4.7.2.1.5 Test requirement

TBD

## 4.7.2.2 EN-DC FR1-FR1 SS-RSRQ measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.
- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

## 4.7.2.2.1 Test purpose

The purpose of this test is to verify that the inter-frequency SS-RSRQ measurement accuracy is within the specified limits for all bands.

## 4.7.2.2.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

#### 4.7.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.7.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.4.7.2.2.

#### 4.7.2.2.4 Test description

#### 4.7.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.7.2.2.4.1-1.

Table 4.7.2.2.4.1-1: EN-DC FR1-FR1 SS-RSRQ measurement accuracy supported test configurations

Test Case ID	Description	
4.7.2.2-1	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD	
4.7.2.2-2	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD	
4.7.2.2-3	LTE FDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD	
4.7.2.2-4	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD	
4.7.2.2-5	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD	
4.7.2.2-6	LTE TDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD	
Note	Note: The UE is only required to be tested in one of the supported test configurations	

Configure the test equipment and the DUT according to the parameters in Table 4.7.2.2.4.1-2.

Table 4.7.2.2.4.1-2: Initial conditions for SS-RSRQ inter frequency accuracy in FR1

Parameter	Value		Comment
Test environment	NC, TL/VL, TL/VH, TH/VL, TH/VH		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	A	as specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth		As specified by the test configuration	on selected from Table 4.7.2.1.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part	A.3.1.8.2 with n = 2 and $\phi_1$ = 5	As specified in TS 38.508-1 [14] Annex A.
	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		N/A	

- 1. Message contents are defined in clause 4.7.2.2.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in two different FR1 frequencies. Cell 2 is the PSCell and Cell 3 is the target cell for SS-RSRQ measurements. The connection setup is done according to the settings in Annex C.1.1.

## 4.7.2.2.4.2 Test procedure

TBD

## 4.7.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

4.7.2.2.5 Test requirement

**TBD** 

## 4.7.3 SS-SINR

## 4.7.4 L1-RSRP

## 4.7.4.0 Minimum conformance requirements

4.7.4.0.1 SSB based absolute L1-RSRP measurement accuracy requirements

**TBD** 

4.7.4.0.2 SSB based relative L1-RSRP measurement accuracy requirements

**TBD** 

4.7.4.0.3 CSI-RS based absolute L1-RSRP measurement accuracy requirements

**TBD** 

4.7.4.0.4 CSI-RS based relative L1-RSRP measurement accuracy requirements

**TBD** 

## 4.7.4.1 SSB based L1-RSRP measurements

## 4.7.4.1.1 EN-DC FR1 SSB based L1-RSRP absolute measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.
- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

## 4.7.4.1.1.1 Test purpose

The purpose of this test is to verify that the SSB based L1-RSRP absolute measurement accuracy is within the specified limits for all bands.

## 4.7.4.1.1.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

## 4.7.4.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.7.4.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.4.7.4.1.

4.7.4.1.1.4 Test description

4.7.4.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.7.4.1.1.4.1-1.

Table 4.7.4.1.1.4.1-1: EN-DC FR1 SSB based L1-RSRP absolute measurement accuracy supported test configurations

Test Case ID	Description
4.7.4.1.1-1	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD
4.7.4.1.1-2	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD
4.7.4.1.1-3	LTE FDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD
4.7.4.1.1-4	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD
4.7.4.1.1-5	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD
4.7.4.1.1-6	LTE TDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD
Note	: The UE is only required to be tested in one of the supported test configurations

Configure the test equipment and the DUT according to the parameters in Table 4.7.4.1.1.4.1-2.

Table 4.7.4.1.1.4.1-2: Initial conditions for SSB based L1-RSRP absolute accuracy in FR1

Parameter	Value		Comment
Test environment	NC, TL/VL, TL/VH, TH/VL, TH/VH		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	A	as specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 4.7.4.1.1.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.8.2 with n = 1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		N/A	

- 1. Message contents are defined in clause 4.7.4.1.1.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 is the NR FR1 cell. Cell 2 is the PSCell and the target for SSB base L1-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1.

4.7.4.1.1.4.2 Test procedure

TBD

4.7.4.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

4.7.4.1.1.5 Test requirement

**TBD** 

4.7.4.1.2 EN-DC FR1 SSB based L1-RSRP relative measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.
- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

## 4.7.4.1.2.1 Test purpose

The purpose of this test is to verify that the SSB based L1-RSRP relative measurement accuracy is within the specified limits for all bands.

## 4.7.4.1.2.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

## 4.7.4.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.7.4.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.4.7.4.1.

## 4.7.4.1.2.4 Test description

#### 4.7.4.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.7.4.1.2.4.1-1.

Table 4.7.4.1.2.4.1-1: EN-DC FR1 SSB based L1-RSRP relative measurement accuracy supported test configurations

Test Case ID	Description	
4.7.4.1.2-1	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD	
4.7.4.1.2-2	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD	
4.7.4.1.2-3	LTE FDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD	
4.7.4.1.2-4	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD	
4.7.4.1.2-5	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD	
4.7.4.1.2-6	LTE TDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD	
Note	Note: The UE is only required to be tested in one of the supported test configurations	

Configure the test equipment and the DUT according to the parameters in Table 4.7.4.1.2.4.1-2.

Table 4.7.4.1.2.4.1-2: Initial conditions for SSB based L1-RSRP relative accuracy in FR1

Parameter	Value		Comment
Test environment	NC, TL/VL, TL/VH, TH/VL, TH/VH		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies			and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 4.7.4.1.2.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.8.2 with $n = 1$	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

1. Message contents are defined in clause 4.7.4.1.2.4.3.

2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 is the NR FR1 cell. Cell 2 is the PSCell and the target for SSB base L1-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1.

4.7.4.1.2.4.2 Test procedure

**TBD** 

4.7.4.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

4.7.4.1.2.5 Test requirement

**TBD** 

#### 4.7.4.2 CSI-RS based L1-RSRP measurements

## 4.7.4.2.1 EN-DC FR1 CSI-RS based L1-RSRP absolute measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.
- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

## 4.7.4.2.1.1 Test purpose

The purpose of this test is to verify that the CSI-RS based L1-RSRP absolute measurement accuracy is within the specified limits for all bands.

## 4.7.4.2.1.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

## 4.7.4.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.7.4.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.4.7.4.2.

## 4.7.4.2.1.4 Test description

#### 4.7.4.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.7.4.2.1.4.1-1.

Table 4.7.4.2.1.4.1-1: EN-DC FR1 CSI-RS based L1-RSRP absolute measurement accuracy supported test configurations

Test Case ID	Description	
4.7.4.2.1-1	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD	
4.7.4.2.1-2	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD	
4.7.4.2.1-3	LTE FDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD	
4.7.4.2.1-4	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD	
4.7.4.2.1-5	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD	
4.7.4.2.1-6	LTE TDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD	
Note: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 4.7.4.2.1.4.1-2.

Table 4.7.4.2.1.4.1-2: Initial conditions for CSI-RS based L1-RSRP absolute accuracy in FR1

Parameter	Value		Comment
Test environment	NC, TL/VL, TL/VH, TH/VL, TH/VH		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	Α	s specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel	Α	s specified by the test configuration	n selected from Table 4.7.4.2.1.4.1-1.
bandwidth			
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part A.3.1.8.2 with n = 1		As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

- 1. Message contents are defined in clause 4.7.4.2.1.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 is the NR FR1 cell. Cell 2 is the PSCell and the target for SSB base L1-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1.

4.7.4.2.1.4.2 Test procedure

TBD

4.7.4.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

4.7.4.2.1.5 Test requirement

**TBD** 

## 4.7.4.2.2 EN-DC FR1 CSI-RS based L1-RSRP relative measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.
- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

## 4.7.4.2.2.1 Test purpose

The purpose of this test is to verify that the CSI-RS based L1-RSRP relative measurement accuracy is within the specified limits for all bands.

## 4.7.4.2.2.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

#### 4.7.4.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 4.7.4.0.4.

The normative reference for this requirement is TS 38.133 [6] clause A.4.7.4.2.

#### 4.7.4.2.2.4 Test description

#### 4.7.4.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 4.7.4.2.2.4.1-1.

Table 4.7.4.2.2.4.1-1: EN-DC FR1 CSI-RS based L1-RSRP relative measurement accuracy supported test configurations

Test Case ID	Description		
4.7.4.2.2-1	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD		
4.7.4.2.2-2	LTE FDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD		
4.7.4.2.2-3	LTE FDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD		
4.7.4.2.2-4	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD		
4.7.4.2.2-5	LTE TDD, NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD		
4.7.4.2.2-6	LTE TDD, NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD		
Note	Note: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 4.7.4.2.2.4.1-2.

Table 4.7.4.2.2.4.1-2: Initial conditions for CSI-RS based L1-RSRP relative accuracy in FR1

Parameter	Value		Comment
Test environment	NC, TL/VL, TL/VH, TH/VL, TH/VH		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies			and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth	P	s specified by the test configuration	n selected from Table 4.7.4.2.2.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part A.3.1.8.2 with n = 1		As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		N/A	

- 1. Message contents are defined in clause 4.7.4.2.2.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 is the NR FR1 cell. Cell 2 is the PSCell and the target for SSB base L1-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1.

## 4.7.4.2.2.4.2 Test procedure

**TBD** 

4.7.4.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

4.7.4.2.2.5 Test requirement

**TBD** 

# 5 EN-DC with at least one NR cell in FR2

This section contains test scenarios for E-UTRA and NR dual connectivity with E-UTRA as PCell and NR as PSCell. This configuration is also known as NSA Option 3 and 3a. At least one NR cell is in Frequency Range 2.

For conformance testing involving FR2 test cases in this specification, the UE under test shall disable UL Tx diversity schemes.

- 5.1 Void
- 5.2 Void
- 5.3 RRC\_CONNECTED state mobility
- 5.3.1 Void
- 5.3.2 RRC connection mobility control
- 5.3.2.1 Void
- 5.3.2.2 Random access
- 5.3.2.3 Void
- 5.4 Timing
- 5.4.1 UE transmit timing
- 5.4.1.1 EN-DC FR2 UE transmit timing accuracy

Editor's Notes

Minimum conformance requirements need to be updated in Clause [5.4.1.0]

- Test procedure is TBD
- Message contents are TBD
- Test Requirements section is incomplete

## 5.4.1.1.1 Test purpose

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

## 5.4.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC FR2.

#### 5.4.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause TBD.

The normative reference for this requirement is TS.38.133 [6] clause A.5.4.1.1

#### 5.4.1.1.4 Test Description

#### 5.4.1.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1 of 38.521-1 [17].

This test can be run in one of the configurations defined in Table 5.4.1.1.4.1-1.

Table 5.4.1.1.4.1-1: Supported test configurations for FR2 PSCell

Configuration	Description	
1	TDD, SSB SCS 240 KHz, data SCS 120kHz, BW 100MHz	

Configure the test equipment and the DUT according to the parameters in Table 5.4.1.1.4.1-2

Table 5.4.1.1.4.1-2: Initial conditions for EN-DC FR2 transmit timing accuracy

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies			2-1 and TS 38.508-1 [14] clause 4.3.1.
Channel bandwidth		on selected from Table 5.5.1.3.4.1-1	
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part TBD		As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	TBD	
Exceptions to connection diagram	N/A		

- 1. Message contents are defined in clause 5 4.1.1.4.3.
- 2. 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 power levels and settings for Cell 1 are set according to Annex A.6, Table A.6.1.1-1. Cell 2 is NR FR1 PSCell. The connection setup is done according to the settings in Annex C.1.3, and the downlink signal levels as per Annex C.1.2. The general test parameters are given in Table 4.4.1.4.5-4 below.
- 4. Downlink signals for NR cell are initially set up according to Annex C.1 TBD.

5.4.1.1.4.2 Test procedure

**TBD** 

5.4.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1 with the following exceptions:

# Table 5.4.1.1.4.3-1: SRS-Config : Additional test requirement for UE transmit timing accuracy for ENDC FR2 UE

TBD

5.4.1.1.5 Test Requirements

## Table 5.4.1.1.5-1: Cell Specific Test Parameters for UL Transmit Timing test

TBD

Table 5.4.1.1.5-2: SRS Configuration for Timing Accuracy Test

	Field	Config1	Config 2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceldList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
	SRS-ResourceSetId	0	0	
SRS-Resource	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping	0	0	
	startPosition			
	resourceMapping	n1	n1	
	nrofSymbols			
	resourceMapping	n1	n1	
	repetitionFactor			
	freqDomainPosition	0	0	
	freqDomainShift	0	0	
	freqHopping	sl1	sl1	
	c-SRS			
	freqHopping	0	0	
	b-SRS			
	freqHopping	0	0	
	b-hop			
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset-p	sl1	sl640	Offset to align with DRx
				periodicity
	sequenceld	0	0	Any 10 bit number

## 5.4.2 UE timer accuracy

## 5.4.3 Timing advance

## 5.4.3.0 Minimum conformance requirements

## 5.4.3.0.1 Minimum conformance requirements for timing advance adjustment accuracy

The timing advance is initiated from gNB with MAC message that implies and adjustment of the timing advance, as defined in clause 5.2 of TS 38.321 [12].

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 5.4.3.0.3-1, to the signalled timing advance value compared to the timing of preceding uplink transmission. The timing advance command step is defined in TS38.213 [8].

Table 5.4.3.0.3-1: UE Timing Advance adjustment accuracy

Sub Carrier Spacing, SCS 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>

The normative reference for this requirement is TS.38.133 [6] clause A.5.4.3.

## 5.4.3.1 EN-DC FR2 timing advance adjustment accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD
- Connection diagram is TBD- Message Exceptions is FFS
- Test Procedure will need further modification and review

## 5.4.3.1.1 Test purpose

The purpose of the test is to verify UE timing advance adjustment delay and accuracy requirement defined in clause 7.3 of TS 38.133 [6].

#### 5.4.3.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

## 5.4.3.1.3 Minimum conformance requirement

The minimum conformance requirements are specified in clause 5.4.3.0.1.

The normative reference for this requirement is TS.38.133 [6] clause A.5.4.3.1.

#### 5.4.3.1.4 Test description

#### 5.4.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1 of 38.521-2 [17].

This test shall be tested using any of the test configurations in Table 5.4.3.1.4.1-1.

Table 5.4.3.1.4.1-1: EN-DC FR2 timing advance adjustment accuracy supported test configurations

Config	fig Description	
1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode	
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode	
Note: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 5.4.3.1.4.1-2

Table 5.4.3.1.4.1-2: Initial conditions for EN-DC FR2 timing advance adjustment accuracy

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E.1.1, E.1.2, and Table E.	.3-1 and TS 38.508-1 [14] clause 4.3.1.
Channel bandwidth	As specified	by the test configuration selected fr	om Table 5.4.3.1.4.1-1
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.
	DUT Part	TBD	
Exceptions to connection diagram	N/A		

Table 5.4.3.1.4.1-3: 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 of TS
			38.133 [6]
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1 of TS
			38.133 [6]
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1 of TS
			38.133 [6]
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1 of TS
			38.133 [6]
Timing Advance Command		31	$N_{TA\_new} = N_{TA\_old}$ for the purpose of
$(T_A)$ value during T1			establishing a reference value from
			which the timing advance adjustment
			accuracy can be measured during T2
Timing Advance Command		39	$N_{TA\_new} = N_{TA\_old} + 8192 *T_c$ (based on
(T <sub>A</sub> ) value during T2			equation in TS 38.213 [3] section 4.2)
T1	S	5	
T2	S	5	

<sup>1.</sup> Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 is NR FR2 PSCell. The connection setup is done according to the settings in Annex C.1.1.

<sup>2.</sup> Downlink signals for NR cell are initially set up according to Annex C.1.2, C.1.3.

#### 5.4.3.1.4.2 Test Procedure

The test consists of two cells, a single E-UTRA cell (PCell), and a single NR cell (PSCell). 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). The test consists of two successive time periods, with time durations 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 5.4.3.1.5-1, 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. The UE Time Alignment Timer (timeAlignmentTimer IE), described in Clause 5.2 in TS 38.321, shall be configured so that it does not expire in the duration of the test.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. Message content are defined in clause 5.4.3.1.2.3.
- 2. Set the parameters according to values in Tables 5.4.3.1.4.1-3 and Table 5.4.3.1.5-1 as appropriate. Propagation conditions are set according to Annex C.2.2.
- 3. SS shall transmit an RRCConnectionReconfiguration message.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. 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. The Timing Advance Command value shall be set to 31, which according to Clause 4.2 in TS 38.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.
- 6. 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 of 39 as specified in table 5.4.3.1.4.1-3.
- 7. 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.
- 8. As specified in Clause 7.3.2.1 of TS 38.133 [6], 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.
- 9. 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.
- 10. The result from the SRS and adjustment of the timing advance in step 7) is used to measure that the UE adjusts the timing of its transmission with a relative accuracy better than or equal to value specified in Table 5.4.3.1.3-1 to the signalled timing advance value compared to the timing of preceding uplink transmission.
- 11. If the UE adjust the timing of its transmission within a relative accuracy greater than or equal to value specified in Table 5.4.3.1.3-1 to the signalled timing advance value compared to the timing of preceding uplink transmission then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.
- 12. The SS shall transmit RRCConnectionReconfiguration message with condition EN-DC\_PSCell\_Rel according to TS 36.508 [25] Table 4.6.1-8 to release NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.
- 13. The SS then shall transmit RRCConnectionReconfiguration message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.
- 14. If any of the above Reconfiguration in Step 12 or 13 fails, switch off and on the UE and ensure the UE is in RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 15. Repeat step 3-14 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

## 5.4.3.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1, with exceptions listed below in the Table 5.4.3.1.4.3-1

Table 5.4.3.1.4.3-1: srs-Config setup

Derivation Path: TS 38.508-1, Table 4.6.3-182			
Information Element	Value/remark	Comment	Condition
SRS-Config ::= SEQUENCE {			
srs-ResourceSetToAddModList SEQUENCE	[1 entry]		
(SIZE(0maxNrofSRS-ResourceSets)) OF	-		
SEQUENCE {			
srs-ResourceSetId	0		
srs-ResourceIdList SEQUENCE	1 entry		
(SIZE(1maxNrofSRS-ResourcesPerSet)) OF {			
SRS-Resourceld[1]	0		
}			
resourceType CHOICE {			
periodic SEQUENCE {			
}			
}			
Usage	nonCodebook		
pathlossReferenceRS CHOICE {			
ssb-Index	SSB-Index		
}			
srs-ResourceToAddModList SEQUENCE	1 entry		
(SIZE(1maxNrofSRS-Resources)) OF SEQUENCE {			
srs-Resourceld	0		
nrofSRS-Ports	port1		
transmissionComb CHOICE {			
n2 SEQUENCE {			
combOffset-n2	0		
cyclicShift-n2	0		
}			
}			
resourceMapping SEQUENCE {			
startPosition	0		
nrofSymbols	n1		
repetitionFactor	n1		
}			
freqDomainPosition	0		
freqDomainShift	0		
freqHopping SEQUENCE {			
c-SRS	16		
b-SRS	0		
b-hop	0		
}			
groupOrSequenceHopping	Neither		
resourceType CHOICE {			
periodic SEQUENCE {	Periodic		
}			
periodicityAndOffset-p	sl5 : 0	Once every 5	
		Slots	
}			
}			
}			

## 5.4.3.1.5 Test Requirement

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. k slots after the reception of the timing advance command, where k = 24.

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90% with a confidence level of 95%.

Table 5.4.3.1.5-1 and Table 5.4.3.1.5-2 define the primary level settings.

Table 5.4.3.1.5-1: Cell specific test parameters for timing advance

T1 T2  TDD  TDDConf.3.1  100: N <sub>RB,c</sub> = 66  100: N <sub>RB,c</sub> = 66  Not Applicable  SR.3.1 TDD  CR.3.1 TDD  TRS.2.1 TDD  CSI-RS.Config.0  OCNG pattern 1	
$TDDConf.3.1$ $100: N_{RB,c} = 66$ $100: N_{RB,c} = 66$ $Not Applicable$ $SR.3.1 TDD$ $CR.3.1 TDD$ $TRS.2.1 TDD$ $CSI-RS.Config.0$ $OCNG pattern 1$	
$100: N_{RB,c} = 66$ $100: N_{RB,c} = 66$ $Not Applicable$ $SR.3.1 TDD$ $CR.3.1 TDD$ $TRS.2.1 TDD$ $TRS.2.1 TDD$ $CSI-RS.Config.0$ $OCNG pattern 1$	
100: N <sub>RB,c</sub> = 66  Not Applicable  SR.3.1 TDD  CR.3.1 TDD  TRS.2.1 TDD  CSI-RS.Config.0  OCNG pattern 1	
Not Applicable SR.3.1 TDD CR.3.1 TDD TRS.2.1 TDD CSI-RS.Config.0 OCNG pattern 1	
SR.3.1 TDD CR.3.1 TDD TRS.2.1 TDD CSI-RS.Config.0 OCNG pattern 1	
CR.3.1 TDD TRS.2.1 TDD CSI-RS.Config.0 OCNG pattern 1	
TRS.2.1 TDD CSI-RS.Config.0 OCNG pattern 1	
CSI-RS.Config.0 OCNG pattern 1	
OCNG pattern 1	
SMTC.1 FR2	
120 kHz	
120 kHz	
0	
es TBD	
kH   -98	
00	
-89	
3	
3	
-57.96	
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.

Value Field Comment c-SRS 16 Frequency hopping is disabled 0 b-SRS b-hop 0 freqDomainPosition Frequency domain position of SRS 0 freqDomainShift 0 groupOrSequenceHopping neither No group or sequence hopping SRS-PeriodicityAndOffset Once every 5 slots sl5=0 SSB #0 is used for SRS path loss pathlossReferenceRS ssb-Index=0 estimation Non-codebook based UL transmission usage nonCodebook startPosition 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 nrofSRS-Ports port1 Number of antenna ports used for SRS transmission

Table 5.4.3.1.5-2: Sounding Reference Symbol Configuration for timing advance

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

For further information see clause 6.3.2 in TS 38.331 [2].

# 5.5 Signaling characteristics

# 5.5.1 Radio link monitoring

Note:

## 5.5.1 Radio link monitoring

The requirements in this section apply for radio link monitoring on PSCell in EN-DC operation mode. The UE shall monitor the downlink link quality based on the reference signal in the configured RLM-RS resource(s) in order to detect the downlink radio link quality of the PCell and PSCell as specified in TS 38.213 [8]. 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.

## 5.5.1.0 Minimum conformance requirements

## 5.5.1.0.1 Minimum conformance requirements for out-of-sync SSB-based RLM

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last  $T_{\text{Evaluate\_out\_SSB}}$  [ms] period becomes worse than the threshold  $Q_{\text{out\_SSB}}$  within  $T_{\text{Evaluate\_out\_SSB}}$  [ms] evaluation period. The requirements in this section apply for each SSB based RLM-RS resource configured for PSCell, provided that the SSB configured for RLM is transmitted within UE active DL BWP during the entire evaluation period defined in Table 5.5.1.0.1-1.

T<sub>Evaluate out SSB</sub> is defined in Table 5.5.1.0.1-1 for FR2.

Table 5.5.1.0.1-1: Evaluation period T<sub>Evaluate\_out</sub> for FR2

Configuration		T <sub>Evaluate_out_</sub> SSB (ms)	
no DRX		max(200,ceil(10*P*N)*T <sub>SSB</sub> )	
DRX cycle≤320 max(200,ceil(15*P*N)*max(T <sub>DRX</sub> ,T <sub>SSB</sub>		max(200,ceil(15*P*N)*max(T <sub>DRX</sub> ,T <sub>SSB</sub> ))	
DRX cycle>320		ceil(10*P*N)*T <sub>DRX</sub>	
NOTE: T <sub>SSB</sub> is the periodicity of SSB configured for RLM.			
T <sub>DRX</sub> is the DRX cycle length.			

## For FR2,

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

The normative reference for this requirement is TS 38.133 [6] clauses 8.1.2.

# 5.5.1.1 EN-DC FR2 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD
- Connection diagram is TBD
- -Initial Conditions has some TBD
- -Test Requirement has some TBD
- Message Exceptions is FFS
- Test Procedure will need further editing and review

#### 5.5.1.1.1 Test purpose

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PSCell configured with SSB-based RLM RS in non-DRX mode. This test will partly verify the NR cell radio link monitoring requirements in TS 38.133 [6] section 8.1.2.

## 5.5.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 5.5.1.1.3 Minimum conformance requirement

The minimum requirements are specified in clause 5.5.1.0.1. DRX configuration is not used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.5.5.1.1.

## 5.5.1.1.4 Test description

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 as defined in 38.133 [6]. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure 5.5.1.1.4-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [5] ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 2.

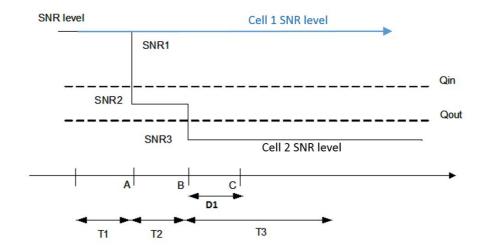


Figure 5.5.1.1.4-1: SNR variation for out-of-sync testing

#### 5.5.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1 of 38.521-2 [18].

This test shall be tested using any of the test configurations in Table 5.5.1.1.4.1-1.

Table 5.5.1.1.4.1-1: EN-DC FR2 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode supported test configurations

Configuration	Description		
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100MHz bandwidth, TDD duplex mode		
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR2			

Configure the test equipment and the DUT according to the parameters in Table 5.5.1.1.4.1-2

Table 5.5.1.1.4.1-2: Initial conditions for EN-DC FR2 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified in Annex E.1.1, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1.		
Channel bandwidth	As specified by the test configuration selected from Table 5.5.1.1.4.1-1		
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	TBD	
Exceptions to connection diagram		N/A	

PDCCH transmission parameters are given in Table 5.5.1.1.4.1-3

Table 5.5.1.1.4.1-3: PDCCH transmission parameters for out-of-sync

Attribute	Value for BLER Configuration #0	
DCI format	1-0	
Number of control OFDM symbols	2	
Aggregation level (CCE)	8	
Ratio of hypothetical PDCCH RE energy to average SSS RE energy	4dB	
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	4dB	
Bandwidth (MHz)	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	

- 1. Message contents are defined in clause 5.5.1.1.4.3.
- 2. The power levels and settings for Cell 1 are set according to Annex A.6, Table A.6.1.1-1. Cell 2 is NR FR2 PSCell. The connection setup is done according to the settings in Annex C.1.3, and the downlink signal levels as per Annex C.1.2
- 3. The test parameters are given in Table 5.5.1.1.4.1-4 below.
- 4. Downlink signals for NR cell are initially set up according to Annex [C.x].

Table 5.5.1.1.4.1-4: 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	E-UTRA RF Channel Number			1
Active PSCell				Cell 2
RF Channel Nu	mber			2
Duplex mode		Config 1, 2		TDD
BW <sub>channel</sub>		Config 1, 2		100: N <sub>RB,c</sub> = 66
DL initial BWP		Config 1, 2		DLBWP.0.1
DL dedicated B	WP	Config 1, 2		DLBWP.1.1
configuration	<b>- (</b> : t:	0		LII DWD o 4
UL initial BWP of UL dedicated B		Config 1, 2		ULBWP.0.1 ULBWP.1.1
configuration	VVP	Config 1, 2		ULBWP.1.1
TDD Configurat	ion	Config 1, 2		TBD
CORESET Refe		Config 1, 2		CR.3.1 TDD
SSB Configurat		Config 1, 2		SSB.1 FR2
SMTC Configur		Config 1, 2		SMTC.1
PDSCH/PDCCH		Config 1, 2		120 KHz
spacing				
PRACH Configu	uration	Config 1, 2		Table A.3.8.3.4
SSB index assi		Config 1, 2		0,1
RS				·
TCI Configuration		Config 1, 2		TBD
OCNG paramet	ers			OP.1
CP length				Normal
Correlation Mat	rix and Antenna (	Configuration		2x2 Low
Out of sync	DCI format			1-0
transmission parameters	Number of Control OFDM symbols			2
	Aggregation lev		CCE	8
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy		dB	4
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy		dB	4
	DMRS precode	er granularity		REG bundle size
	REG bundle siz	G 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, 2			[CSI-RS.3.3 TDD]	
T1			S	[1]
T2			S	[10]
T3			S	[12]
D1 s [9.64]  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.				

#### 5.5.1.1.4.2 Test Procedure

The test consists of two cells, a single E-UTRA cell (Pcell), and a single NR cell (PSCell). Prior to the start of the time duration T1, the UE shall be fully synchronized to PSCell. The UE shall be configured for periodic CQI reporting in PUCCH [format 1] with a reporting periodicity as mentioned in the above table 5.5.1.1.4.1-4.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 5.5.
- 2. Set the parameters according to T1 in Table 5.5.1.1.4.4-1 for subtest 1 and 2. Propagation conditions are set according to Annex TBD. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 5.5.1.1.4.4-1 for subtests 1 and 2. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 5.5.1.1.4.4-1 for subtests 1 and 2. T3 starts.
- 5. If the SS:
  - a) detects uplink power equal to or higher than [-50 dBm] in each subframe configured for CQI transmission (according to configured CQI periodicity on PUCCH [format 1]) during the period from time point A to time point B

and

b) does not detect any uplink power higher than [-50 dBm] from time point C (240 ms after the start of T3) until T3 expires,

the number of successful tests is increased by one.

- 6. Otherwise the number of failed tests is increased by one and proceed to Step 10.
- 7. When T3 expires the SS shall change the SNR value to T1 as specified in Table 5.5.1.1.4.4-1.
- 8. If the UE has not re-established the connection in at least 1s, the SS shall ensure PSCell is released.
- 9. The SS then shall transmit RRCConnectionReconfiguration message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.
- 10. If the Reconfiguration fails, switch off and on the UE and ensure the UE is in RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5].
- 11. Repeat steps 2-10 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 5.5.1.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1 with the following exceptions:

Table 5.5.1.1.4.3-1: PDCCH Search Space

Derivation Path: TS 38.508-1 [14], Table 4.6.3-162			
Information Element	Value/remark	Comment	Condition
SearchSpace ::= SEQUENCE {			
searchSpaceId	0	SearchSpaceId with condition CSS	CSS
controlResourceSetId	0	ControlResourceS etId	
monitoringSlotPeriodicityAndOffset CHOICE {			
sl1	NULL		
}			
Duration	2		
monitoringSymbolsWithinSlot	1100000000000	Symbols 0 and 1	
nrofCandidates SEQUENCE {			
aggregationLevel1	n0		
aggregationLevel2	n0		
aggregationLevel4	n0		
aggregationLevel8	n1	AL8	
aggregationLevel16	n0		
}			
searchSpaceType CHOICE {			
common SEQUENCE {			CSS, SISS
ue-Specific SEQUENCE {			USS
dci-Formats	formats0-0-And-1-0	DCI Format 1_0	
}			
}			
}			

#### Table 5.5.1.1.4.3-2: UE-TimersAndConstants

Derivation Path: TS 38.508-1 [14], Table 4.6.3-200	)		
Information Element	Value/remark	Comment	Condition
UE-TimersAndConstants ::= SEQUENCE {			
t310	ms0		
n310	n1		
t311	ms1000		
n311	n1		
}			

#### Table 5.5.1.1.4.3-3: CSI-FrequencyOccupation

Derivation Path: TS 38.508-1 [14], Table 4.6.3-33			
Information Element	Value/remark	Comment	Condition
CSI-FrequencyOccupation ::= SEQUENCE {			
startingRB	0		
nrofRBs	66	100 MHz (120 KHz SCS)	
}			

### 5.5.1.1.5 Test Requirement

Table 5.5.1.1.5-1 defines the cell specific primary level settings.

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%.

Table 5.5.1.1.5-1: OTA related cell specific test parameters for FR2 (Cell 2) for out-of-sync radio link monitoring tests in non-DRX mode

Parameter		Unit		Test 1	
			T1 T2 T		
ssb-Index 0 AoA Configuration	Config 1, 2		TBD		
ssb-Index 1 AoA Configuration	Config 1, 2		TBD		
EPRE ratio of PDCCH	DMRS to SSS	dB		4	
EPRE ratio of PDCCH	to PDCCH DMRS	dB		0	
EPRE ratio of PBCH D	MRS to SSS	dB			
EPRE ratio of PBCH to	PBCH DMRS	dB			
EPRE ratio of PSS to SSS		dB			
EPRE ratio of PDSCH DMRS to SSS		dB		0	
EPRE ratio of PDSCH to PDSCH DMRS		dB			
EPRE ratio of OCNG DMRS to SSS		dB			
EPRE ratio of OCNG to	OCNG DMRS	dB			
ssb-Index 0 SNR	Config 1, 2	dB	1	-7	-15
ssb-Index 1 SNR	Config 1, 2		1	-15	-15
$N_{oc}$	Config 1, 2	dBm/1 5KHz	-98		
Propagation condition			TDL-A 30ns 75Hz		
Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and 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 par OCNG.				t as part c	

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

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

Table 5.5.1.1.5-2: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field		Test 1
	rieiu	Value
gapOffset		0
Note 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned. (Ensur		
	that RLM RS is	partially overlapped with measurement gap).

## 5.5.1.2

## 5.5.1.3 EN-DC FR2 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD
- Connection diagram is TBD
- -Initial Conditions has some TBD
- -Test Requirement has some TBD

- Message Exceptions is FFS
- Test Procedure needs to be finalized and reviewed.

#### 5.5.1.3.1 Test purpose

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PSCell configured with SSB-based RLM RS when DRX is used. This test will partly verify the NR cell radio link monitoring requirements in TS 38.133 [6] section 8.1.2.

#### 5.5.1.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 5.5.1.3.3 Minimum conformance requirement

The minimum requirements are specified in clause 5.5.1.0.1. DRX configuration is used for this test.

The normative reference for this requirement is TS 38.133 [6] clause A.5.5.1.3.

#### 5.5.1.3.4 Test description

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 as defined in 38.133 [6]. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure 5.5.1.3.4-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 2.

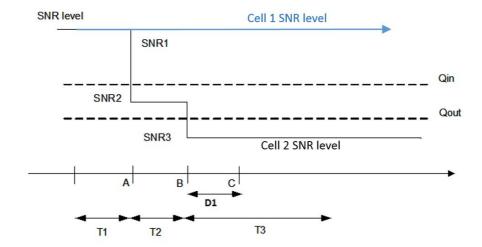


Figure 5.5.1.3.4-1: SNR variation for out-of-sync testing

### 5.5.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1 of 38.521-2 [18].

This test shall be tested using any of the test configurations in Table 5.5.1.3.4.1-1.

Table 5.5.1.3.4.1-1: EN-DC FR2 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode supported test configurations

Configuration	Description
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The U	JE is only required to pass in one of the supported test configurations in FR2

Configure the test equipment and the DUT according to the parameters in Table 5.5.1.3.4.1-2

Table 5.5.1.3.4.1-2: Initial conditions for EN-DC FR2 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As	specified in Annex E.1.1, Table E.:	2-1 and TS 38.508-1 [14] clause 4.3.1.
Channel bandwidth		As specified by the test configuration	on selected from Table 5.5.1.3.4.1-1
Propagation conditions		AWGN	As specified in Annex C.2.2.
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	TBD	
Exceptions to connection diagram		N/A	

PDCCH transmission parameters are given in Table 5.5.1.3.4.1-3

Table 5.5.1.3.4.1-3: PDCCH transmission parameters for out-of-sync

Attribute	Value for BLER Configuration #0
DCI format	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH RE energy to average SSS RE energy	4dB
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	4dB
Bandwidth (MHz)	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

- 1. Message contents are defined in clause 5.5.1.3.4.3.
- 2. The power levels and settings for Cell 1 are set according to Annex A.6, Table A.6.1.1-1. Cell 2 is NR FR2 PSCell. The connection setup is done according to the settings in Annex C.1.3, and the downlink signal levels as per Annex C.1.2
- 3. The test parameters are given in Table 5.5.1.3.4.1-4 below.
- 4. Downlink signals for NR cell are initially set up according to Annex [C.x].

Table 5.5.1.3.4.1-4: 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	anner Number			Cell 2
RF Channel Nu	mher			2
Duplex mode			+	TDD
BW <sub>channel</sub>		Config 1, 2 Config 1, 2		100: N <sub>RB,c</sub> = 66
DL initial BWP	configuration	Config 1, 2		DLBWP.0.1
DL illiliai BWP (		Config 1, 2	-	DLBWP.0.1 DLBWP.1.1
configuration	VVF	Corning 1, 2		DLBWF.1.1
UL initial BWP	configuration	Config 1, 2		ULBWP.0.1
UL dedicated B		Config 1, 2	+	ULBWP.1.1
configuration	VVF	Corning 1, 2		OLBWF.1.1
TDD Configurat	ion	Config 1, 2	+	TBD
CORESET Refe		Config 1, 2		CR.3.1 TDD
SSB Configurat		Config 1, 2		SSB.1 FR2
SMTC Configurat		<u> </u>		
		Config 1, 2		SMTC.1
PDSCH/PDCCH	- subcarrier	Config 1, 2		120 KHz
spacing		0 " 1 0	-	T 11 A 0 0 0 4
PRACH Configu		Config 1, 2		Table A.3.8.3.4
SSB index assig		Config 1, 2		0,1
TCI Configuration		Config 1, 2		TBD
OCNG paramet	ers			OP.1
CP length				Normal
Correlation Mat	rix and Antenna	Configuration		2x2 Low
Out of sync	DCI format			1-0
transmission parameters	Number of Control OFDM symbols			2
parameters	Aggregation lev	vel	CCE	8
		etical PDCCH RE age SSS RE energy	dB	4
	Ratio of hypoth DMRS energy energy	etical PDCCH to average SSS RE	dB	4
	DMRS precode	er granularity		REG bundle size
	REG bundle siz	ze		6
DRX Configurat				[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 configu	ration	Config 1, 2		[CSI-RS.3.3 TDD]
T1		, J ,	S	[4]
T2			S	[15]
T3			S	[15]
D1			s	[14.44]
DI			[]	

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.

#### 5.5.1.3.4.2 Test Procedure

The test consists of two cells, a single E-UTRA cell (Pcell), and a single NR cell (PSCell). Prior to the start of the time duration T1, the UE shall be fully synchronized to PSCell. The UE shall be configured for periodic CQI reporting in PUCCH [format 1] with a reporting periodicity as mentioned in the above table 5.5.1.3.4.1-4.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 5.5.
- 2. Set the parameters according to T1 in Table 5.5.1.3.5-1 for subtest 1 and 2. Propagation conditions are set according to Annex TBD. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 5.5.1.3.5-1 for subtests 1 and 2. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 5.5.1.3.5-1 for subtests 1 and 2. T3 starts.
- 5. If the SS:
  - a) detects uplink power equal to or higher than [-50 dBm] in each subframe configured for CQI transmission (according to configured CQI periodicity on PUCCH [format 1]) during the period from time point A to time point B

and

b) does not detect any uplink power higher than [-50 dBm] from time point C (240 ms after the start of T3) until T3 expires,

the number of successful tests is increased by one.

- 6. Otherwise the number of failed tests is increased by one and proceed to Step 10.
- 7. When T3 expires the SS shall change the SNR value to T1 as specified in Table 5.5.1.3.4.4-1.
- 8. If the UE has not re-established the connection in at least 1s, the SS shall ensure PSCell is released.
- 9. The SS then shall transmit RRCConnectionReconfiguration message with condition MCG\_and\_SCG according to TS 36.508 [25] Table 4.6.1-8 to add NR cell (PSCell). The UE shall transmit RRCConnectionReconfigurationComplete message.
- 10. If the Reconfiguration fails, switch off and on the UE and ensure the UE is in RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5].
- 11. Repeat steps 2-10 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 5.5.1.3.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1 with the following exceptions:

Table 5.5.1.3.4.3-1: PDCCH Search Space

Derivation Path: TS 38.508-1 [14], Table 4.6.3-162			
Information Element	Value/remark	Comment	Condition
SearchSpace ::= SEQUENCE {			
searchSpaceId	0	SearchSpaceId with condition CSS	CSS
controlResourceSetId	0	ControlResourceS etId	
monitoringSlotPeriodicityAndOffset CHOICE {			
sl1	NULL		
}			
Duration	2		
monitoringSymbolsWithinSlot	11000000000000	Symbols 0 and 1	
nrofCandidates SEQUENCE {			
aggregationLevel1	n0		
aggregationLevel2	n0		
aggregationLevel4	n0		
aggregationLevel8	n1	AL8	
aggregationLevel16	n0		
}			
searchSpaceType CHOICE {			
common SEQUENCE {			CSS, SISS
ue-Specific SEQUENCE {			USS
dci-Formats	formats0-0-And-1-0	DCI Format 1_0	
}			
}			
}			

#### Table 5.5.1.3.4.3-2: UE-TimersAndConstants

Derivation Path: TS 38.508-1 [14], Table 4.6.3-200			
Information Element	Value/remark	Comment	Condition
UE-TimersAndConstants ::= SEQUENCE {			
t310	ms0		
n310	n1		
t311	ms1000		
n311	n1		
}			

## Table 5.5.1.3.4.3-3: CSI-FrequencyOccupation

Derivation Path: TS 38.508-1 [14], Table 4.6.3-33	W.1		0 111
Information Element	Value/remark	Comment	Condition
CSI-FrequencyOccupation ::= SEQUENCE {			
startingRB	0		
nrofRBs	66	100 MHz (120 KHz SCS)	
}			

## 5.5.1.3.5 Test Requirement

Table 5.5.1.3.5-1 defines the cell specific primary level settings.

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%.

Table 5.5.1.3.5-1: OTA related cell specific test parameters for FR2 (Cell 2) for out-of-sync radio link monitoring tests in DRX mode

Parameter		Unit		Test 1		
				T1	T2	T3
ssb-Index Configura		Config 1, 2			TBD	
ssb-Index Configura		Config 1, 2		TBD		
		DMRS to SSS	dB		4	
EPRE rat	io of PDCCH	to PDCCH DMRS	dB		0	
EPRE rat	io of PBCH D	MRS to SSS	dB			
EPRE rat	io of PBCH to	PBCH DMRS	dB			
EPRE rat	io of PSS to	SSS	dB			
EPRE rat	io of PDSCH	DMRS to SSS	dB		0	
EPRE rat	io of PDSCH	to PDSCH DMRS	dB			
		DMRS to SSS	dB			
EPRE rat	io of OCNG t	o OCNG DMRS	dB			
ssb-Index	0 SNR	Config 1, 2	dB	1	-7	-15
ssb-Index	(1 SNR	Config 1, 2		1	-15	-15
$N_{oc}$		Config 1, 2	dBm/1 5KHz	-98		
Propagat	ion condition				L-A 30ns 75	
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: Note 4:	te 3: SNR levels correspond to the signal to noise ratio over the SSS REs.					

## 5.5.1.2 EN-DC FR2 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode

Editor's Notes: This test case is incomplete. The following aspects are either missing or not yet determined

- Test procedure is TBD
- Message Contents are TBD
- Test Requirements are TBD

## 5.5.1.2.1 Test Purpose

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 PSCell radio link monitoring requirements in clause 8.1.

#### 5.5.1.2.2 Test Applicability

This test applies to all types of E-UTRA UEs Release 15 and forwared supporting EN-DC

#### 5.5.1.2.3 Minimum Conformance 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%.

### 5.5.1.2.4 Test Description

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 5.5.1.2.4-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms.

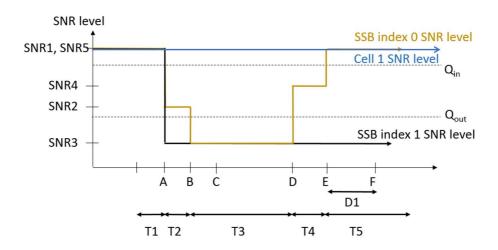


Figure 5.5.1.2.4-1: SNR variation for in-sync testing

### 5.5.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table [5.3.5-1] and Table 5.3.5-1 of 38.521-2 [18].

This test shall be tested using any of the test configurations in Table 5.5.1.2.4.1-1.

Table 5.5.1.2.4.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The U	JE is only required to pass in one of the supported test configurations in FR2

Configure the test equipment and the DUT according to the parameters in Table 5.5.1.2.4.1-2.

Table 5.5.1.2.4.1-2: Initial conditions for EN-DC FR2 radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

Parameter	Value		Comment
Test environment		NC	As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified in Annex E.1.1, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1.		
Channel bandwidth		As specified by the test configuration selected from Table 5.5.1.3.4.1-1	
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	TBD	
Exceptions to connection diagram		N/A	

PDCCH transmission parameters are given in Table 5.5.1.2.4.1-3.

Table 5.5.1.2.4.1-3: PDCCH transmission parameters for in-sync

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

- 1. Message contents are defined in clause 5.5.1.2.4.3.
- 2. The power levels and settings for Cell 1 are set according to Annex A.6, Table A.6.1.1-1. Cell 2 is NR FR2 PSCell. The connection setup is done according to the settings in Annex C.1.3, and the downlink signal levels as per Annex C.1.2
- 3. The general test parameters are given in Table 5.5.1.2.5-4 below.
- 4. Downlink signals for NR cell are initially set up according to Annex C.1.

Table 5.5.1.2.4.1-4: General test parameters for	Unit	Value
FR2 in-sync testing in non-DRX modeParameter		Test 1

E-UTRA RF Channel Number	Active E-UTRA PCell				Ce1l 1
RF Channel Number	E-UTRA RF Channel Number				-
Duplex mode				Cell 2	
BWchannes  Config 1		ımber			
D. Initial BWP configuration					
Description			Config 1		100: N <sub>RB,c</sub> = 66
Configuration			Config 1		DLBWP.0.1
UL initial BWP configuration	DL dedicated B	WP	Config 1		DLBWP.1.1
ULBWP.1.1   ULBWP.1.1					
configuration         Config 1         TBD           CORESET Reference Channel         Config 1         CR.3.1 TDD           SSB Configuration         Config 1         SSB.1 FR2           SMTC Configuration         Config 1         SMTC.3           PDSCH/PDCCH subcarrier spacing         Config 1         120 KHz           SPACH Configuration         Config 1         Table A.3.8.3.4           SSB index assigned as RLM RS         Config 1         Table A.3.8.3.4           SSB index assigned as RLM RS         Config 1         TBD           OCNG parameters         OP.1         OP.1           CP length         Normal         Normal           Correlation Matrix and Antenna Configuration         2x2 Low           In sync transmission parameters         DCI format         1-0           Aggregation level         CCE         4           Ratio of hypothetical PDCCH RE energy         dB         0           DMRS precoder granularity         REG bundle size           REG bundle size         6           DCI format         1-0           Number of Control OFDM symbols         2           Out of sync transmission parameters         Aggregation level         2           Aggregation level         REG bundle size					
TDD Configuration		WP	Config 1		ULBWP.1.1
CORESET Reference Channel					
SSB Configuration					
SMTC Configuration         Config 1         SMTC.3           PDSCH/PDCCH subcarrier spacing         Config 1         120 KHz           PRACH Configuration         Config 1         Table A.3.8.3.4           SSB index assigned as RLM RSB index as Index as Index as RLM RSB index as	CORESET Ref	erence Channel	Config 1		CR.3.1 TDD
PDSCH/PDCCH subcarrier spacing PRACH Configuration SSB index assigned as RLM Config 1 RS TCI Configuration CONG parameters CP length Correlation Matrix and Antenna Configuration Parameters  DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity REG bundle size Aggregation level REG bundle size DCI format REG bundle size Aggregation level REG bundle size DCI format Number of Control OFDM symbols Aggregation level REG bundle size DCI format Number of Control OFDM symbols Aggregation level REG bundle size DCI format Number of Control OFDM symbols Aggregation level REG bundle size DCI format Number of Control OFDM symbols Aggregation level REG bundle size BCI format Number of Control OFDM symbols Aggregation level REG bundle size Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy REG bundle size	SSB Configurat	tion	Config 1		SSB.1 FR2
Spacing	SMTC Configur	ration	Config 1		SMTC.3
PRACH Configuration	PDSCH/PDCCI	H subcarrier	Config 1		120 KHz
SSB index assigned as RLM   Config 1   0,1					
RS   TCl Configuration   Config 1   TBD			Config 1		Table A.3.8.3.4
TCI Configuration	SSB index assi	gned as RLM	Config 1		0,1
OCNG parameters CP length Correlation Matrix and Antenna Configuration  In sync transmission parameters  Bolt format  Control OFDM symbols  Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy  COut of sync transmission parameters  Out of sync transmission parameters  Aggregation level CCE 8  Ratio of hypothetical PDCCH RE energy to average SSS RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  CCE 8  REG bundle size  Aggregation level CCE 8  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  CCE 8  REG bundle size					
Normal   Correlation Matrix and Antenna Configuration   2x2 Low	TCI Configurati	on	Config 1		TBD
DCI format	OCNG parame	ters			OP.1
In sync transmission parameters  DCI format Number of Control 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 size DCI format Number of Control OFDM symbols  Aggregation level Aggregation level Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  Cut of sync transmission parameters  Out of sync transmission parameters  Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy  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	CP length				Normal
Number of Control 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 size  DCI format Number of Control OFDM symbols  2  Aggregation level REG bundle size  DCI format Number of Control OFDM symbols  2  Aggregation level Ratio of hypothetical PDCCH RE energy  Ratio of hypothetical PDCCH RE energy to average SSS RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity  REG bundle size  REG bundle size	Correlation Mat	rix and Antenna (	Configuration		2x2 Low
Number of Control 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 size  DCI format Number of Control OFDM symbols  2  Aggregation level REG bundle size  DCI format Number of Control OFDM symbols  2  Aggregation level Ratio of hypothetical PDCCH RE energy  Ratio of hypothetical PDCCH RE energy to average SSS RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity  REG bundle size  REG bundle size	In sync	DCI format			1-0
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  DCI format Number of Control OFDM symbols  Aggregation level  CCE  REG bundle size  DCI format Number of Control 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 hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity  REG bundle size  REG bundle size			tral OEDM 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 size  DCI format Number of Control OFDM symbols  Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy  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  REG bundle size  REG bundle size  REG bundle size		Number of Con	II OI DIVI SYIIIDOIS		2
energy to average SSS RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity  REG bundle size  DCI format  Number of Control 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 size  6  CCE  8  Ratio of hypothetical PDCCH RE energy dB  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity  REG bundle size	paramotoro	Aggregation lev	⁄el	CCE	4
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity  REG bundle size  DCI format Number of Control 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 size  6  CCE  8  Ratio of hypothetical PDCCH RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity  REG bundle size				dB	0
energy to average SSS RE energy  DMRS precoder granularity  REG bundle size  6  DCI format  Number of Control 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 size  REG bundle size  6  CCE  8  Ratio of hypothetical PDCCH RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  REG bundle size		energy to avera	ige SSS RE energy		
energy to average SSS RE energy  DMRS precoder granularity  REG bundle size  6  DCI format  Number of Control 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 size  REG bundle size  6  CCE  8  Ratio of hypothetical PDCCH RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  REG bundle size					
energy to average SSS RE energy  DMRS precoder granularity  REG bundle size  6  DCI format  Number of Control 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 size  REG bundle size  6  CCE  8  Ratio of hypothetical PDCCH RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  REG bundle size		5 11 11			
Out of sync transmission parameters  Out of hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity  REG bundle size  6  DCI format 1-0  Number of Control OFDM symbols  2  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	0
Out of sync transmission parameters  Out of hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity  REG bundle size  6  DCI format 1-0  Number of Control OFDM symbols  2  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		energy to avera	ige SSS RE energy		
Out of sync transmission parameters  Out of hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity  REG bundle size  6  DCI format 1-0  Number of Control OFDM symbols  2  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					
Out of sync transmission parameters  Out of hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity  REG bundle size  6  DCI format 1-0  Number of Control OFDM symbols  2  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					PEG hundlo sizo
Out of sync transmission parameters  DCI format  Number of Control 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  1-0  2  Aggregation level 8  Ratio of hypothetical PDCCH RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  REG bundle size		DMRS precode	r granularity		NEG bullule size
Out of sync transmission parameters  DCI format  Number of Control 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  1-0  2  Aggregation level 8  Ratio of hypothetical PDCCH RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  REG bundle size		REG bundle siz	œ.		6
Out of sync transmission parameters  Number of Control 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 size					
Out of sync transmission parameters  Aggregation level CCE 8 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			trol OFDM symbols		
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  Ratio of hypothetical PDCCH DMRS dB 4  Energy to average SSS RE energy  REG bundle size	Out of sync				
energy to average SSS RE energy  Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity  REG bundle size	transmission				
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy  DMRS precoder granularity  REG bundle size	parameters			dB	4
energy to average SSS RE energy  DMRS precoder granularity  REG bundle size		energy to avera	ige SSS RE energy		
energy to average SSS RE energy  DMRS precoder granularity  REG bundle size		Ratio of hypoth	etical PDCCH DMRS	dB	4
DMRS precoder granularity REG bundle size				45	· ·
Diving precoder granulantly		35.9, 10 4.010	.g. 200 onorgy		
REG bundle size 6		DMRS precode	r granularity		REG bundle size
		REG bundle siz	ze		6

DRX			OFF	
Gap pattern ID			N.A.	
Layer 3 filtering			Enabled	
T310 timer		ms	[6000]	
T311 timer		ms	1000	
N310			1	
N311			1	
CSI-RS configuration Config 1			[CSI-RS.3.3 TDD]	
T1		S	[0.5]	
T2		S	[2]	
T3		S	[1.86]	
T4		S	[0.02]	
T5		S	[7]	
D1		S	[6.5]	
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 afte	r T1 starts.		

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

#### 5.5.1.2.4.2 Test procedure

#### Editor's Note: Test procedure updates to ensure accurate FR2 test state is TBD

The test consists of two cells, a single E-UTRA cell (Pcell), and a single NR cell (PSCell). Prior to the start of the time duration T1, the UE shall be fully synchronized to PSCell. The UE shall be configured for periodic CQI reporting in PUCCH [format 1] with a reporting periodicity as mentioned in the above table 5.5.1.2.4.1-4.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.
- 2. Set the parameters according to T1 in Table 5.5.1.2.4-1 for subtest 1 and 2. Propagation conditions are set according to Annex TBD. T1 starts.
- 3. When T1 expires, the SS shall change the SNR value to T2 as specified in Table 5.5.1.2.5-1. T2 starts.
- 4. When T2 expires, the SS shall change the SNR value to T3 as specified in Table 5.5.1.2.5-1. T3 starts.
- 5. When T3 expires, the SS shall change the SNR value to T3 as specified in Table 5.5.1.2.5-1. T4 starts.
- 6. When T4 expires, the SS shall change the SNR value to T3 as specified in Table 5.5.1.2.5-1. T5 starts.
- 7. If the SS detects uplink power equal to or higher than [-50] dBm in the On-duration part of every DRX cycle in the subframe according the configured CQI reporting mode (PUCCH 1-0) during the period from time point A to time point F (1120 ms after the start of time duration T5) the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

8. Repeat steps 2-7 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 5.5.1.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1 with the following exceptions.

#### Table 5.5.1.2.4.3-1: Common Exception messages for EN-DC FR1 Radio Link Monitoring In-Sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

**TBD** 

#### 5.5.1.2.5 **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% with a 95% confidence interval.

5.5.1.2.5-1: OTA related cell specific test parameters for FR2 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode

Para	Unit			Test 1			
		T1	T2	T3	T4	T5	
ssb-Index 0 AoA Configuration	Config 1, 2		TBD				
ssb-Index 1 AoA Configuration	Config 1, 2		TBD				
EPRE ratio of PDCCH	DMRS to SSS	dB			4		
EPRE ratio of PDCCH	to PDCCH DMRS	dB			0		
EPRE ratio of PBCH D	MRS to SSS	dB					
EPRE ratio of PBCH to	PBCH DMRS	dB					
EPRE ratio of PSS to S	SSS	dB					
EPRE ratio of PDSCH	DMRS to SSS	dB			0		
EPRE ratio of PDSCH	to PDSCH DMRS	dB					
EPRE ratio of OCNG [	OMRS to SSS	dB					
EPRE ratio of OCNG t	o OCNG DMRS	dB					
ssb-Index 0 SNR	Config 1, 2	dB	1	-7	-15	-4.5	1
ssb-Index 1 SNR	Config 1, 2		1	-15	-15	-15	-15
$N_{oc}$	Config 1, 2	dBm/1 5KHz	-98				
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.

The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 2:

SNR levels correspond to the signal to noise ratio over the SSS REs. Note 3:

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.

#### 5.5.1.4 EN-DC FR2 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

Editor's Notes: This test case is incomplete. The following aspects are either missing or not yet determined

- Test procedure needs refinement
- Message Contents are TBD
- Test Requirements are TBD

#### 5.5.1.4.1 **Test Purpose**

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 with DRX configured. This test will partly verify the FR2 PSCell radio link monitoring requirements in clause 8.1.

#### 5.5.1.4.2 **Test Applicability**

This test applies to all types of E-UTRA UEs Release 15 and forwared supporting EN-DC

#### 5.5.1.4.3 Minimum Conformance 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%.

#### 5.5.1.4.4 Test Description

#### 5.5.1.4.4 Test Description

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.

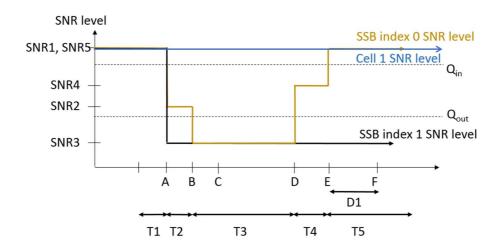


Figure 5.5.1.4.4-1: SNR variation for in-sync testing

#### 5.5.1.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table [5.3.5-1] and Table 5.3.5-1 of 38.521-2 [18].

This test shall be tested using any of the test configurations in Table 5.5.1.4.4.1-1.

Table 5.5.1.4.4.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The	UE is only required to pass in one of the supported test configurations in FR2

Configure the test equipment and the DUT according to the parameters in Table 5.5.1.4.4.1-2.

Table 5.5.1.4.4.1-2: Initial conditions for EN-DC FR2 radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

Parameter	Value		Comment
Test environment		NC	As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified in Annex E.1.1, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1.		
Channel bandwidth		As specified by the test configuration selected from Table 5.5.1.3.4.1-1	
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	TBD	
Exceptions to connection diagram		N/A	

PDCCH transmission parameters are given in Table 5.5.1.4.4.1-3.

Table 5.5.1.4.4.1-3: PDCCH transmission parameters for in-sync

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

- 1. Message contents are defined in clause 5.5.1.4.4.3.
- 2. The power levels and settings for Cell 1 are set according to Annex A.6, Table A.6.1.1-1. Cell 2 is NR FR2 PSCell. The connection setup is done according to the settings in Annex C.1.3, and the downlink signal levels as per Annex C.1.2
- 3. The general test parameters are given in Table 5.5.1.4.5-4 below.
- 4. Downlink signals for NR cell are initially set up according to Annex C.1.

Table 5.5.1.4.4.1-4: General test parameters for	Unit	Value
FR2 in-sync testing in DRX modeParameter		Test 1

Active E-UTRA	DCall			Cell 1
				1
E-UTRA RF Channel Number				Cell 2
Active PSCell			2 2	
RF Channel Number		Config 1 2		TDD
Duplex mode		Config 1, 2		
BW <sub>channel</sub>	<b>(</b> : (:	Config 1, 2		100: N <sub>RB,c</sub> = 66
DL initial BWP		Config 1, 2		DLBWP.0.1
DL dedicated B	WP	Config 1, 2		DLBWP.1.1
configuration	<i>c.</i>	0 " 1 0		LII DIA/D O 4
UL initial BWP		Config 1, 2		ULBWP.0.1
UL dedicated B	WP	Config 1, 2		ULBWP.1.1
configuration				
TDD Configurat		Config 1, 2		TBD
	erence Channel	Config 1, 2		CR.3.1 TDD
SSB Configurat		Config 1, 2		SSB.1 FR2
SMTC Configur	ation	Config 1, 2		SMTC.3
PDSCH/PDCCI	H subcarrier	Config 1, 2		120 KHz
spacing				
PRACH Configu	uration	Config 1, 2		Table A.3.8.3.4
SSB index assi		Config 1, 2		0,1
RS	•			·
TCI Configuration	on	Config 1, 2		TBD
OCNG paramet		,		OP.1
CP length				Normal
	rix and Antenna (	Configuration		2x2 Low
In sync	DCI format			1-0
transmission		trol OFDM symbols		2
parameters	·			_
	Aggregation lev		CCE	4
		etical PDCCH RE	dB	0
	energy to avera	ige SSS RE energy		
	Ratio of hypoth	etical PDCCH DMRS	dB	0
		ige SSS RE energy	u <sub>D</sub>	· ·
	onorgy to avoid	igo oco rez onorgy		
	DMRS precode	r granularity		REG bundle size
	REG bundle siz	'e		6
	DCI format	· <del>·</del>		1-0
		trol OFDM symbols		2
Out of sync	Aggregation los	vol	CCE	ρ
transmission	Aggregation lev		dB	8 4
parameters Ratio of hypothetic energy to average		ige SSS RE energy	αБ	4
	Datio of humath	etical PDCCH DMRS	٩D	4
	7.	etical PDCCH DMRS ige SSS RE energy	dB	4
	energy to avera	ige 333 RE ellergy		
	DMRS precode	r granularity		REG bundle size
	REG bundle siz	'e		6
		.~		7

DRX Configuration			[DRX.3]	
Gap pattern ID			N.A.	
Layer 3 filtering			Enabled	
T310 timer		ms	[6000]	
T311 timer		ms	1000	
N310			1	
N311			1	
CSI-RS configuration	Config 1, 2		[CSI-RS.3.3 TDD]	
T1		S	[4]	
T2		S	[6]	
T3		S	[5.54]	
T4		S	[0.02]	
T5		S	[7]	
D1		S	[6.5]	
Note 1: All configurations	s are assigned to the UE	orior to the star	t of time period T1.	
Note 2: UE-specific PDCCH is not transmitted after T1 starts.				
Note 3: F-UTRAN is in non-DRX mode under test.				

#### 5.5.1.4.4.2 Test procedure

#### Editor's Note: Test procedure updates to ensure accurate FR2 test state is TBD

The test consists of two cells, a single E-UTRA cell (Pcell), and a single NR cell (PSCell). Prior to the start of the time duration T1, the UE shall be fully synchronized to PSCell. The UE shall be configured for periodic CQI reporting in PUCCH [format 1] with a reporting periodicity as mentioned in the above table 5.5.1.4.4.1-4.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.
- 2. Set the parameters according to T1 in Table 5.5.1.4.4-1 for subtest 1 and 2. Propagation conditions are set according to Annex TBD. T1 starts.
- 3. When T1 expires, the SS shall change the SNR value to T2 as specified in Table 5.5.1.4.5-1. T2 starts.
- 4. When T2 expires, the SS shall change the SNR value to T3 as specified in Table 5.5.1.4.5-1. T3 starts.
- 5. When T3 expires, the SS shall change the SNR value to T3 as specified in Table 5.5.1.4.5-1. T4 starts.
- 6. When T4 expires, the SS shall change the SNR value to T3 as specified in Table 5.5.1.4.5-1. T5 starts.
- 7. If the SS detects uplink power equal to or higher than [-50] dBm in the On-duration part of every DRX cycle in the subframe according the configured CQI reporting mode (PUCCH 1-0) during the period from time point A to time point F (1120 ms after the start of time duration T5) the number of successful tests is increased by one.
  - Otherwise the number of failed tests is increased by one.
- 8. Repeat steps 2-7 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 5.5.1.4.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1 with the following exceptions.

## Table 5.5.1.4.4.3-1: Common Exception messages for EN-DC FR1 Radio Link Monitoring In-Sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

**TBD** 

#### 5.5.1.4.5 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% with a 95% confidence interval.

5.5.1.4.5-1: OTA related cell specific test parameters for FR2 (Cell 2) for in-sync radio link monitoring tests in DRX mode

Parameter					Test 1		
					T3	T4	T5
ssb-Index 0 AoA Config 1, 2 Configuration					TBD		
ssb-Index 1 AoA Config 1, 2 Configuration					TBD		
EPRE ratio of PDCCH	DMRS to SSS	dB			4		
EPRE ratio of PDCCH	to PDCCH DMRS	dB			0		
EPRE ratio of PBCH [	OMRS to SSS	dB					
EPRE ratio of PBCH t	o PBCH DMRS	dB					
EPRE ratio of PSS to	SSS	dB					
EPRE ratio of PDSCH	DMRS to SSS	dB			0		
EPRE ratio of PDSCH	to PDSCH DMRS	dB					
EPRE ratio of OCNG	DMRS to SSS	dB					
EPRE ratio of OCNG	to OCNG DMRS	dB					
ssb-Index 0 SNR	Config 1, 2	dB	1	-7	-15	-4.5	1
ssb-Index 1 SNR	Config 1, 2		1	-15	-15	-15	-15
$N_{oc}$ Config 1, 2		dBm/1 5KHz		•	-98		
Propagation condition	Propagation condition			TDL	-A 30ns	75Hz	
Note 1: OCNG sha	I be used such that the	resources in	Cell 2 a	re fully a	allocated	d and a	
constant total transmitted power spectral density is achieved for all OFDM symbols.							

- Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.3
- Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- The SNR values are specified for testing a UE which supports 2RX on at least one Note 4: band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

#### 5.5.2 Interruption

#### 5.5.2.0 Minimum conformance requirements

5.5.2.0.1 Minimum conformance requirements for interruptions at transitions between active and non-active during DRX

[TS 38.133, clause 8.2.1.2.1]

Interruption on PSCell and the activated SCell if configured due to E-UTRA PCell transitions between active and nonactive 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 5.5.2.0.1-1.

Each interruption shall not exceed X slot as defined in table 5.5.2.0.1-1.

Table 5.5.2.0.1-1: Interruption length X at transition between active and non-active during DRX

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

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

The normative reference for this requirement is TS 38.133 [6] clause 8.2.1.2.1.

## 5.5.2.0.2 Minimum conformance requirements for interruptions during measurements on deactivated NR SCC

[TS 38.133, clause 8.2.1.2.5.1]

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

[TS 38.133, clause 8.2.2.2.3]

Interruptions on PCell due to measurements when an SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption shall not exceed requirement in Table 5.5.2.0.2-1 if the PCell is not in the same band as the deactivated SCell. Each interruption shall not exceed requirement in Table 5.5.2.0.2-2 if the PCell is in the same band as the deactivated SCell.

Interruptions on active SCell due to measurements when an SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption shall not exceed requirement in Table 5.5.2.0.2-1 if the active SCell is not in the same band as the deactivated SCell. Each interruption shall not exceed requirement in Table 5.5.2.0.2-2 if the active SCell is in the same band as the deactivated SCell.

[TS 38.133, clause 8.2.2.2.2]

Table 5.5.2.0.2-1: Interruption duration for SCell activation/deactivation for inter-band CA

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

Table 5.5.2.0.2-2: Interruption duration for SCell activation/deactivation for intra-band CA

μ	NR Slot length (ms)	Interruption length			
0	1	1 + T <sub>SMTC_duration</sub>			
1	0.5	1 + T <sub>SMTC_duration</sub>			
2	0.25	2 + T <sub>SMTC_duration</sub>			
3	0.125	4 + T <sub>SMTC_duration</sub>			
- a k - a					

The normative reference for this requirement is TS 38.133 [6] clause 8.2.1.2.5.1.

## 5.5.2.0.3 Minimum conformance requirements for interruptions during measurements on deactivated E-UTRAN SCC

[TS 38.133 clause 8.2.1.2.5.2]

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

- an interruption on PSCell or any activated SCell with up to 0.5% probability of missed ACK/NACK when any of the configured *measCycleSCell* [2] for the deactivated E-UTRA SCells is 640 ms or longer.
- an interruption on PSCell or any activated SCell with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [2] for the deactivated E-UTRA SCells if indicated by the network using IE *allowInterruptions* [2].

Each interruption shall not exceed

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

Table 5.5.2.0.3-1: Interruption length X3 and Y3 at measurements on deactivated E-UTRA SCC

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

The normative reference for this requirement is TS 38.133 [6] clause 8.2.1.2.5.1.

# 5.5.2.1 EN-DC FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

#### Editor's note:

- Message contents are missing.
- Some parts of TC is TBD.

- Connection diagram is TBD.
- Test tolerance is missing.
- Cell mapping is missing

#### 5.5.2.1.1 Test purpose

The purpose of this test is to verify EN-DC UE's ability to complete PSCell interruption during LTE PCell DRX transitions within the missed ACK/NACK rate for NR PSCell in EN-DC requirements.

#### 5.5.2.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

#### 5.5.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.5.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.5.5.2.1.

#### 5.5.2.1.4 Test description

#### 5.5.2.1.4.1 Initial conditions

This test shall be run in one of the configurations defined in Table 5.5.2.1.4.1-1.

Table 5.5.2.1.4.1-1: Supported test configurations for EN-DC FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Configuration	Description
5.5.2.1-1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
5.5.2.1-2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

Configure the test equipment and the DUT according to the parameters in Table 5.5.2.1.4.1-2.

Table 5.5.2.1.4.1-2: Initial conditions for EN-DC FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, table E.3-1 and TS 38.	508-1 [14] clause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 5.5.2.1.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.1.
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.TBD	
Exceptions to connection diagram	N/A		

- 1. The general test parameter settings are set up according to Table 5.5.2.1.4.1-3.
- 2. Message contents are defined in clause 5.5.2.1.4.3.
- 3. There are one E-UTRAN carrier and one NR carrier and two cells in the test. Cell 1 is PCell on the E-UTRAN carrier, Cell 2 is PSCell on the NR carrier, Cell 1 is the cell used for connection setup with the power levels set according to Table A.6.1.1-1 for this test. Cell 2 is configured according to Annex C.1.1 and C.1.2.

Table 5.5.2.1.4.1-3: General test parameters for EN-DC 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		ON	DRX related parameters are defined in
		ON	Table A.5.5.2.1.1-3
Measurement gap pattern		OFF	
Id		OFF	
T1	S	10	

### 5.5.2.1.4.2 Test procedure

The test consists of 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, 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.

- 1. Ensure the UE is in state FFS according to TS 38.508-1 [14] clause FFS.
- 2. Configure MCG according to TS 36.521-3 [26] Annex C.0, C.1 and SCG according to Annex C.1.1 and C.1.2 for all downlink physical channels.
- 3. The SS shall transmit an RRCConnectionReconfiguration message to configure PCell (Cell1) and PSCell (Cell2) on the MCG and SCG as per TS 36.508 [7] clause FFS with the message content exceptions defined in clause 5.5.2.1.4.3.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. The SS would ensure continuous transmission on PSCell, while not scheduling on PCell at least for 200 ms to ensure inactivity timer is expired on the UE for LTE PCell.
- 5. Set the parameters according to T1 in Table 5.5.2.1.5-1. Propagation conditions are set according to Annex C.2.1. T1 starts.
- 6. SS schedules on PSCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor ACK/NACK/DTX on PSCell.
- 7. If more than 99% of uplink transmissions are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".
- 8. If no two consecutive DTX is observed by the SS, then count a success for the event "DTX". Otherwise count a fail for the event "DTX".
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS. (if the paging fails, switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS),

or

- switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS.
- 10. Repeat step 3-9 until a test verdict has been achieved

Each of the events "ACK/NACK" and "DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is

achieved. Different events may require different times for a verdict. If all events pass, the test passes. If one event fails, the test fails.

#### 5.5.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 5.5.2.1.4.3-1: Common Exception messages

Default Message Contents				
Common contents of system information				
blocks exceptions				
Default RRC messages and information	FFS			
elements contents exceptions				

### 5.5.2.1.5 Test requirement

Table 5.5.2.1.4.1-1 and 5.5.2.1.5-1 define the primary level settings including test tolerances for EN-DC FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC test.

Table 5.5.2.1.5-1: NR cell specific test parameters for EN-DC FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parame	Parameter		Cell 2	
Connection Type			Conducted	
Frequency Range			FR2	
Duplex mode	Config 1,2		TDD	
TDD configuration	Config 1,2		TBD	
BW <sub>channel</sub>	Config 1,2	MHz	100: N <sub>RB,c</sub> = 66	
Initial BWP Configuration	Config 1,2		TBD	
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD	
RMSI CORESET parameters	Config 1,2		CR.3.1 TDD	
PDCCH CORESET parameters	Config 1,2		TBD	
OCNG Patterns	1		OP.1	
SMTC Configuration	Config 1,2		SMTC.1 FR2	
EPRE ratio of PSS to SSS		dB		
EPRE ratio of PBCH DMRS				
EPRE ratio of PBCH to PBC				
EPRE ratio of PDCCH DMF			_	
EPRE ratio of PDCCH to PI			0	
EPRE ratio of PDSCH DMR EPRE ratio of PDSCH to PI		-		
		-		
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		1		
Ês/Noc		dB	TBD+TT	
Propagation Condition			AWGN	
Time offset to cell1 Note 2		μs	3	
Note 1. OCNC shall be used such that both calls are fully allocated and a constant total transmitted newer				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table 5.5.2.1.5-2: NR cell specific OTA related test parameters for EN-DC FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter	Unit	Cell 2
UE orientation around TBD axis and TBD axis		TBD
Relative difference in angle of arrival of cell 2 relative to cell 1	degrees	TBD
NR_TDD_FR2_A	dBm/15kHz <sup>Note4</sup>	TBD+TT
NR_TDD_FR2_B	ubili/ i3kHz <sup>-1868</sup>	100+11

	els have been derived from other pa		
	and shall be modeled as AWGN of	_	_
	er cells and noise sources not spec		
lo <sup>Note2</sup>	NR_TDD_FR2_A	dBm/95.04 MHz Note4	TBD+TT
$\hat{E}_{s}/I_{ot}$		dB	TBD+TT
	NR_TDD_FR2_G		
	NR_TDD_FR2_F		
	NR_TDD_FR2_E		
SS-RSRP <sup>Note2</sup>	NR_TDD_FR2_D	dBm/SCS Note4	TBD+TT
	NR_TDD_FR2_C		
	NR_TDD_FR2_B		
	NR_TDD_FR2_A		
	NR_TDD_FR2_G		
	NR_TDD_FR2_F		
	NR_TDD_FR2_E		
$N_{oc}^{ m Note1}$	NR_TDD_FR2_D	dBm/SCS <sup>Note3</sup>	TBD+TT
A.7. Noted	NR_TDD_FR2_C		
	NR_TDD_FR2_B		
	NR_TDD_FR2_A		
	NR_TDD_FR2_G		
	NR_TDD_FR2_F		
$N_{oc}^{ m Note1}$	NR_TDD_FR2_E		
37	NR_TDD_FR2_D		
	NR TDD FR2 C		

Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table 5.5.2.1.5-3: E-UTRAN PCell DRX-Configuration for EN-DC FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Field	Cell1	Comment
rieid	Value	
onDurationTimer	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer <sup>Note 1</sup>	psf1	36.331
drx-RetransmissionTimer	psf1	
longDRX-CycleStartOffset	Sf160	
shortDRX	disable	
Note 1: UE is continuously scheduled	in NR PSCel	II

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed 0.625ms (5 slots) as defined in section TS 38.133 8.2.1.

The rate of correct events observed during repeated tests shall be at least 90%.

# 5.5.2.2 EN-DC FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

#### Editor's note:

- Message contents are missing.
- Some parts of TC is TBD.
- Connection diagram is TBD.
- Test tolerance is missing.

Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0dBi gain at the center of the quiet zone

Note 5: As observed with 0dBi gain antenna at the center of the quiet zone

#### - Cell mapping is missing

#### 5.5.2.2.1 Test purpose

The purpose of this test is to verify EN-DC UE's ability to complete PSCell interruption during LTE PCell DRX transitions within the missed ACK/NACK rate for NR PSCell in EN-DC requirements.

#### 5.5.2.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

#### 5.5.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.5.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.5.5.2.2.

#### 5.5.2.2.4 Test description

#### 5.5.2.2.4.1 Initial conditions

This test shall be run in one of the configurations defined in Table 5.5.2.2.4.1-1.

Table 5.5.2.2.4.1-1: Supported test configurations for EN-DC FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Configuration	Description
5.5.2.2-1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
5.5.2.2-2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

Configure the test equipment and the DUT according to the parameters in Table 5.5.2.2.4.1-2.

Table 5.5.2.2.4.1-2: Initial conditions for EN-DC FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter	Value		Comment	
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.	
Test frequencies	As specified in Annex E, Table E.3-1 and TS 38.508-1 [14] clause 4.3.1.			
Channel bandwidth	As specified by the test configuration selected from Table 5.5.2.2.4.1-1.			
Propagation conditions	AWGN		As specified in Annex C.2.1.	
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.	
Diagram	DUT Part	A.3.TBD		
Exceptions to connection diagram	N/A			

- 1. The general test parameter settings are set up according to Table 5.5.2.2.4.1-3.
- 2. Message contents are defined in clause 5.5.2.2.4.3.
- 3. There are one E-UTRAN carrier and one NR carrier and two cells in the test. Cell 1 is PCell on the E-UTRAN carrier, Cell 2 is PSCell on the NR carrier, Cell 1 is the cell used for connection setup with the power levels set according to Table A.6.1.1-1 for this test. Cell 2 is configured according to Annex C.1.1 and C.1.2.

Table 5.5.2.2.4.1-3: General test parameters for EN-DC FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to cell1 and cell 2
DRX		ON	DRX related parameters are defined in
		ON	Table A.5.5.2.2.1-3
Measurement gap pattern		OFF	
Id		OFF	
T1	S	10	

### 5.5.2.2.4.2 Test procedure

The test consists of 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, 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.

- 1. Ensure the UE is in state FFS according to TS 38.508-1 [14] clause FFS.
- 2. Configure MCG according to TS 36.521-3 [26] Annex C.0, C.1 and SCG according to Annex C.1.1 and C.1.2 for all downlink physical channels.
- 3. The SS shall transmit an RRCConnectionReconfiguration message to configure PCell (Cell1) and PSCell (Cell2) on the MCG and SCG as per TS 36.508 [7] clause FFS with the message content exceptions defined in clause 5.5.2.2.4.3.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. The SS would ensure continuous transmission on PSCell, while not scheduling on PCell at least for 200 ms to ensure inactivity timer is expired on the UE for LTE PCell.
- 5. Set the parameters according to T1 in Table 5.5.2.2.5-1. Propagation conditions are set according to Annex C.2.1. T1 starts.
- 6. SS schedules on PSCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor ACK/NACK/DTX on PSCell.
- 7. If more than 99% of uplink transmissions are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".
- 8. If no two consecutive DTX is observed by the SS, then count a success for the event "DTX". Otherwise count a fail for the event "DTX".
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS. (if the paging fails, switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS),

or

- switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS.
- 10. Repeat step 3-9 until a test verdict has been achieved

Each of the events "ACK/NACK" and "DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is

achieved. Different events may require different times for a verdict. If all events pass, the test passes. If one event fails, the test fails.

#### 5.5.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 5.5.2.2.4.3-1: Common Exception messages

Default Message Contents		
Common contents of system information		
blocks exceptions		
Default RRC messages and information	FFS	
elements contents exceptions		

### 5.5.2.2.5 Test requirement

Table 5.5.2.2.4.1-1 and 5.5.2.2.5-1 define the primary level settings including test tolerances for EN-DC FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC test.

Table 5.5.2.2.5-1: NR cell specific test parameters for EN-DC FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter Unit		Unit	Cell 2
Connection Type			Conducted
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TBD
BW <sub>channel</sub>	Config 1,2	MHz	100: N <sub>RB,c</sub> = 66
Initial BWP Configuration	Config 1,2		TBD
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET parameters	Config 1,2		CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		TBD
OCNG Patterns	-		OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2
EPRE ratio of PSS to SSS		dB	
EPRE ratio of PBCH DMRS			
EPRE ratio of PBCH to PBC			
EPRE ratio of PDCCH DMR			
EPRE ratio of PDCCH to PI		-	0
EPRE ratio of PDSCH DMR EPRE ratio of PDSCH to PD			
EPRE ratio of OCNG DMRS			
EPRE ratio of OCNG to OC		1	
Ê <sub>s</sub> /N <sub>oc</sub>	( 1)	dB	TBD+TT
Propagation Condition			AWGN
Time offset to cell1 Note 2		ms	3
Note 1. OCNC shall b	a used such that had	th solla are full	v allocated and a constant total transmitted newer

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table 5.5.2.2.5-2: NR cell specific OTA related test parameters for EN-DC FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter	Unit	Cell 2
UE orientation around TBD axis and TBD axis		TBD
Relative difference in angle of arrival of cell 2 relative to cell 1	degrees	TBD
NR_TDD_FR2_A	dBm/15kHz <sup>Note4</sup>	TBD+TT
NR_TDD_FR2_B	UBIII/ ISKHZ	160+11

	NR_TDD_FR2_C		
$N_{oc}^{ m Note1}$	NR_TDD_FR2_D		
TV <sub>oc</sub>	NR_TDD_FR2_E		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
$N_{oc}$ Note1	NR_TDD_FR2_C		
TV <sub>oc</sub>	NR_TDD_FR2_D	dBm/SCS <sup>Note3</sup>	TBD+TT
	NR_TDD_FR2_E		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
	NR_TDD_FR2_C		
SS-RSRP <sup>Note2</sup>	NR_TDD_FR2_D	dBm/SCS Note4	TBD+TT
	NR_TDD_FR2_E		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	TBD+TT
Io <sup>Note2</sup>	NR_TDD_FR2_A	dBm/95.04 MHz Note4	TBD+TT
Note 1: Interference from	om other cells and noise sources no	t specified in the test is assume	ed to be constant over
subcarriers an	d time and shall be modeled as AWG	GN of appropriate power for $\it N$	oc to be fulfilled.
	lo levels have been derived from ot neters themselves.	her parameters for information	purposes. They are not

Table 5.5.2.2.5-3: E-UTRAN PCell DRX-Configuration for EN-DC FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Equivalent power received by an antenna with 0dBi gain at the center of the quiet zone

As observed with 0dBi gain antenna at the center of the quiet zone

SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver

Field	Cell1	Comment
Field	Value	
onDurationTimer	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer <sup>Note 1</sup>	psf1	36.331
drx-RetransmissionTimer	psf1	
longDRX-CycleStartOffset	Sf160	
shortDRX	disable	
Note 1: UE is continuously scheduled	in NR PSCel	

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 TS 38.133 section 8.2.1.

The rate of correct events observed during repeated tests shall be at least 90%.

# 5.5.2.3 EN-DC FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

### Editor's note:

Note 3:

Note 4:

Note 5:

antenna port.

- Message contents are missing.
- Some parts of TC is TBD.
- Connection diagram is TBD.
- Test tolerance is missing.

#### - Cell mapping is missing

#### 5.5.2.3.1 Test purpose

The purpose of this test is to verify EN-DC UE's ability to complete PSCell interruptions during the measurement on the deactivated NR SCC within the missed ACK/NACK rate for NR PSCell in EN-DC requirements.

#### 5.5.2.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

#### 5.5.2.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.5.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.5.5.2.3.

#### 5.5.2.3.4 Test description

#### 5.5.2.3.4.1 Initial conditions

This test shall be run in one of the configurations defined in Table 5.5.2.3.4.1-1.

Table 5.5.2.3.4.1-1: Supported test configurations for EN-DC FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Configuration	Description
5.5.2.3-1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
5.5.2.3-2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note 1: The UE	is only required to be tested in one of the supported test configurations

Configure the test equipment and the DUT according to the parameters in Table 5.5.2.3.4.1-2.

Table 5.5.2.3.4.1-2: Initial conditions for EN-DC FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parameter		Value	Comment			
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	As specified in Annex E, table E.3-1 and TS 38.508-1 [14] clause 4.3.1.				
Channel	As specified	by the test configuration selected fr	om Table 5.5.2.3.4.1-1.			
bandwidth						
Propagation	AWGN		As specified in Annex C.2.1.			
conditions						
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	A.3.TBD				
Exceptions to N/A						
connection						
diagram						

- 1. The general test parameter settings are set up according to Table 5.5.2.3.4.1-3.
- 2. Message contents are defined in clause 5.5.2.3.4.3.
- 3. There are one E-UTRAN carrier and two NR carriers and three cells specified in the test. Cell 1 is the PCell on E-UTRAN carrier, Cell 2 is the PSCell on one NR carrier and Cell 3 is the SCell on the other NR carrier. Cell 1 is the cell used for connection setup with the power level set according to [TBD]. Cell 2 and Cell 3 shall be configured according to [TBD].

Table 5.5.2.3.4.1-3: General test parameters for EN-DC FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell	number 2.		
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		OFF	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

#### 5.5.2.3.4.2 Test procedure

The test consists of three cells: Cell1, Cell2 and Cell3. Cell1 is E-UTRAN PCell, Cell2 is NR PSCell and Cell3 is deactivated NR SCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1, Cell2 and Cell3. Cell1 shall be configured as E-UTRAN PCell, Cell2 shall be configured as NR PSCell and Cell3 shall be configured as NR deactivated SCell. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1 the UE shall be continuously scheduled on E-UTRAN PCell and NR PSCell.

- 1. Ensure the UE is in state FFS according to TS 38.508-1 [14] clause TBD.
- 2. Configure MCG according to TS 36.521-3 [26] Annex C.0, C.1 and SCG according to Annex C.1.1 and C.1.2 for all downlink physical channels.
- 3. The SS shall transmit an RRCConnectionReconfiguration message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCell.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. Set the parameters according to T1 in Table 5.5.2.3.5-1. Propagation conditions are set according to Annex C.2.1. T1 starts.
- 6. SS schedules on PSCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor ACK/NACK/DTX on PSCell.
- 7. If more than 99.5% of uplink transmissions are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".
- 8. If no two consecutive DTX is observed by the SS, then count a success for the event "DTX". Otherwise count a fail for the event "DTX".
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS. (if the paging fails, switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS),

or

- switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS.
- 10. Repeat step 3-9 until a test verdict has been achieved.

Each of the events "ACK/NACK" and "DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

#### 5.5.2.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 5.5.2.3.4.3-1: Common Exception messages

Default Message Contents				
Common contents of system information				
blocks exceptions				
Default RRC messages and information	FFS			
elements contents exceptions				

#### 5.5.2.3.5 Test requirement

Table 5.5.2.3.5-1 and Table 5.5.2.3.5-2 define the primary level settings including test tolerances for FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC test configurations.

Table 5.5.2.3.5-1: NR cell specific test parameters for EN-DC FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parame	ter	Unit	Cell 2	Cell 3
Connection Type			Conducted	Conducted
Frequency Range			FR2	FR2
Duplex mode	Config 1		FDD	FDD
	Config 2	]	TDD	TDD
TDD configuration	Config 1		N.A	N.A
	Config 2		TBD	TBD
BW <sub>channel</sub>	Config 1,2	MHz	100: $N_{RB,c} = 66$	100: N <sub>RB,c</sub> = 66
Initial BWP Configuration	Config 1,2		TBD	TBD
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD	-
RMSI CORESET parameters	Config 1,2		CR.3.1 TDD	CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		TBD	TBD
OCNG Patterns			OP.1	OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2	SMTC.1 FR2
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to F				
EPRE ratio of PDCCH D				
EPRE ratio of PDCCH to				
EPRE ratio of PDSCH D		dB	0	0
	EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note				
1)		_		
EPRE ratio of OCNG to	OCNG DMRS			
(Note 1)		I.D.	TDD	TDD
Ê <sub>s</sub> /N <sub>oc</sub>		dB	TBD	TBD
Propagation Condition			AWGN	AWGN
Time offset to cell1 Note 2		μs	3	3
Time offset to cell1 Note 3		μS	-	3

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

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 5.5.2.3.5-2: NR cell specific OTA related test parameters for EN-DC FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Pa	rameter	Unit	Cell 2	Cell 3				
UE orientation around TBD axis and TBD			Т	BD				
axis			11	טכ				
Relative difference in angle of arrival of cell 2		degrees	TBD					
and cell 3 relative to		dogrood						
	NR_TDD_FR2_A							
	NR_TDD_FR2_B							
$N_{oc}^{ m Note1}$	NR_TDD_FR2_C	.= Nata 4						
1 oc	NR_TDD_FR2_D	dBm/15kHz <sup>Note4</sup>	TBD+TT	TBD+TT				
	NR_TDD_FR2_E							
	NR_TDD_FR2_F							
	NR_TDD_FR2_G							
	NR_TDD_FR2_A							
	NR_TDD_FR2_B			TBD+TT				
$N_{oc}^{ m Note1}$	NR_TDD_FR2_C	ID (O.O.Noto?	TDD TT					
oc .	NR_TDD_FR2_D	dBm/SCS <sup>Note3</sup>	TBD+TT					
	NR_TDD_FR2_E							
	NR_TDD_FR2_F							
	NR_TDD_FR2_G		TBD+TT	TBD+TT				
	NR_TDD_FR2_A							
	NR_TDD_FR2_B							
SS-RSRP <sup>Note2</sup>	NR_TDD_FR2_C	dBm/SCS Note4						
33-K3KP****	NR_TDD_FR2_D NR_TDD_FR2_E	UBIII/SUS TOO						
	NR TDD_FR2_E							
	NR TDD_FR2_F							
Ŷ. /r	NIX_TDD_LIX2_G		TDD TT	TDD TT				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	TBD+TT	TBD+TT				
Io <sup>Note2</sup>	NR_TDD_FR2_A	dBm/95.04 MHz Note4	TBD+TT	TBD+TT				
Note 1: Interference from other cells and noi		se sources not spec	ified in the test is assum	ed to be constant over				
subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.								
Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are								
	le parameters themselves.		ecified assuming independent interference and noise at each					
		e specified assumin						
	intenna port.	and the OalDist	- t th t th - '	4				
	t power received by an ant	•	-	t zone				
Note 5: As observ	rea with babi gain antenna	at the center of the	quiet zone	Note 5: As observed with 0dBi gain antenna at the center of the quiet zone				

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 5.5.2.3.5-3 and Table 5.5.2.3.5-4.

Table 5.5.2.3.5-3: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

	μ	NR Slot length (ms)	Interruption length
I	3	0.125	4

Table 5.5.2.3.5-4: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
3	0.125	8 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

# 5.5.2.4 EN-DC FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

#### Editor's note:

- Message contents are not complete.
- There are TBD in test case.
- Connection diagram is TBD.
- Test tolerance is missing.
- Cell mapping is missing

#### 5.5.2.4.1 Test purpose

The purpose of this test is to verify EN-DC UE's ability to complete PSCell interruptions during the measurement on the deactivated NR SCC within the missed ACK/NACK rate for NR PSCell in EN-DC requirements.

### 5.5.2.4.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

### 5.5.2.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.5.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.5.5.2.4.

### 5.5.2.4.4 Test description

#### 5.5.2.4.4.1 Initial conditions

This test shall be run in one of the configurations defined in Table 5.5.2.4.4.1-1.

Table 5.5.2.4.4.1-1: Supported test configurations for EN-DC FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Configuration	Description
5.5.2.4-1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
5.5.2.4-2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note 1: The UE	is only required to be tested in one of the supported test configurations

Configure the test equipment and the DUT according to the parameters in Table 5.5.2.4.4.1-2.

Table 5.5.2.4.4.1-2: Initial conditions for EN-DC FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter		Value	Comment			
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	As specified in Annex E, table E.3-1 and TS 38.508-1 [14] clause 4.3.1.				
Channel	As specified	by the test configuration selected fr	om Table 5.5.2.4.4.1-1.			
bandwidth		-				
Propagation	AWGN		As specified in Annex C.2.1.			
conditions						
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	A.3.TBD				
Exceptions to	N/A					
connection						
diagram						

- 1. The general test parameter settings are set up according to Table 5.5.2.4.4.1-3.
- 2. Message contents are defined in clause 5.5.2.4.4.3.
- 3. There are one E-UTRAN carrier and two NR carriers and three cells specified in the test. Cell 1 is the PCell on E-UTRAN carrier, Cell 2 is the PSCell on one NR carrier and Cell 3 is the SCell on the other NR carrier. Cell 1 is the cell used for connection setup with the power level set according to [TBD]. Cell 2 and Cell 3 shall be configured according to [TBD].

Table 5.5.2.4.4.1-3: General test parameters for EN-DC FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to cell1, cell 2 and cell3
AoA number		1	Applicable to cell2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		011	
SCell measurement cycle	ms	640	
(measCycleSCell)	1113	040	
T1	S	10	

#### 5.5.2.4.4.2 Test procedure

The test consists of three cells: Cell1, Cell2 and Cell3. Cell1 is E-UTRAN PCell, Cell2 is NR PSCell and Cell3 is deactivated NR SCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1, Cell2 and Cell3. Cell1 shall be configured as E-UTRAN PCell, Cell2 shall be configured as NR PSCell and Cell3 shall be configured as NR deactivated SCell. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1 the UE shall be continuously scheduled on E-UTRAN PCell and NR PSCell.

- 1. Ensure the UE is in state FFS according to TS 38.508-1 [14] clause TBD.
- 2. Configure MCG according to TS 36.521-3 [26] Annex C.0, C.1 and SCG according to Annex C.1.1 and C.1.2 for all downlink physical channels.
- 3. The SS shall transmit an RRCConnectionReconfiguration message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCell.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. Set the parameters according to T1 in Table 5.5.2.4.5-1. Propagation conditions are set according to Annex C.2.1. T1 starts.
- SS schedules on PSCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor ACK/NACK/DTX on PSCell.
- 7. If more than 99.5% of uplink transmissions are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".
- 8. If no two consecutive DTX is observed by the SS, then count a success for the event "DTX". Otherwise count a fail for the event "DTX".
- 9. After the RRC connection release, the SS:

- transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS. (if the paging fails, switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS),

or

- switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS.
- 10. Repeat step 3-9 until a test verdict has been achieved.

Each of the events "ACK/NACK" and "DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

#### 5.5.2.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 5.5.2.4.4.3-1: Common Exception messages

Default Message Contents				
Common contents of system information				
blocks exceptions				
Default RRC messages and information	FFS			
elements contents exceptions				

#### 5.5.2.4.5 Test requirement

Table 5.5.2.4.5-1 and Table 5.5.2.4.5-2 define the primary level settings including test tolerances for FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC test configurations.

Table 5.5.2.4.5-1: NR cell specific test parameters for EN-DC FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter		Unit	Cell 2	Cell 3
Connection Type			Conducted	Conducted
Frequency Range			FR2	FR2
Duplex mode	Config 1		FDD	FDD
	Config 2		TDD	TDD
TDD configuration	Config 1		N.A	N.A
_	Config 2		TBD	TBD

BW <sub>channel</sub>	Config 1,2	MHz	100: $N_{RB,c} = 66$	100: N <sub>RB,c</sub> = 66
Initial BWP	Config 1 2		TBD	TBD
Configuration	Config 1,2		IBD	טסו
PDSCH Reference	Config 1,2		SR.3.1 TDD	_
measurement channel	Coming 1,2		31X.3.1 TDD	-
RMSI CORESET	Config 1,2		CR.3.1 TDD	CR.3.1 TDD
parameters	Corning 1,2		CIX.3.1 TDD	CIN.S.T TDD
PDCCH CORESET	Config 1,2		TBD	TBD
parameters	Coming 1,2		100	100
OCNG Patterns			OP.1	OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2	SMTC.1 FR2
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 DMR				
EPRE ratio of PDSCH to PD				
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	TBD	TBD
Propagation Condition			AWGN	AWGN
Time offset to cell1 Note 2		ms	3	3
Time offset to cell1 Note 3		μs	-	3

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells
- Note 3: Receive time difference of signals received between slot timing boundary from two NR Cells including time alignment error between the two cells

Table 5.5.2.4.5-2: NR cell specific OTA related test parameters for EN-DC FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Pa	rameter	Unit	Cell 2	Cell 3
UE orientation around TBD axis and TBD				
axis			TE	3D
	n angle of arrival of cell 2	degrees	TE	BD .
and cell 3 relative to				
	NR_TDD_FR2_A	-		
	NR_TDD_FR2_B			
$N_{oc}^{}$ Note1	NR_TDD_FR2_C	Nata 4		
- 'oc	NR_TDD_FR2_D	dBm/15kHz <sup>Note4</sup>	TBD+TT	TBD+TT
	NR_TDD_FR2_E			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
λ/ Note1	NR_TDD_FR2_C			
$N_{oc}^{}$ Note1	NR_TDD_FR2_D	dBm/SCSNote3	TBD+TT	TBD+TT
	NR_TDD_FR2_E			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
	NR_TDD_FR2_C	1		
SS-RSRP <sup>Note2</sup>	NR_TDD_FR2_D	dBm/SCS Note4	TBD+TT	TBD+TT
	NR_TDD_FR2_E	1		
	NR_TDD_FR2_F	1		
	NR_TDD_FR2_G	1		

$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	TBD+TT	TBD+TT
Io <sup>Note2</sup>	NR_TDD_FR2_A	dBm/95.04 MHz Note4	TBD+TT	TBD+TT
Note 1:	Interference from other cells and noi	se sources not spec	ified in the test is assum	ed to be constant over
	subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{\!oc}$ to be fulfilled.			$V_{oc}$ to be fulfilled.
Note 2:	2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			
Note 3:	·			
Note 4:	Equivalent power received by an antenna with 0dBi gain at the center of the quiet zone			
Note 5:	As observed with 0dBi gain antenna	at the center of the	quiet zone	

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 5.5.2.4.5-3 and Table 5.5.2.4.5-4.

Table 5.5.2.4.5-3: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length	
3	0.125	4	

Table 5.5.2.4.2-4: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
3	0.125	8 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

# 5.5.2.5 EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

### Editor's note:

- Message contents are missing.
- Some parts of TC is TBD.
- Connection diagram is TBD.
- Test tolerance is missing.
- Cell mapping is missing

### 5.5.2.5.1 Test purpose

The purpose of this test is to verify EN-DC UE's ability to complete PSCell interruptions during the measurement on E-UTRAN SCC within the missed ACK/NACK rate for NR PSCell in EN-DC requirements.

### 5.5.2.5.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

5.5.2.5.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.5.2.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.5.5.2.5.

5.5.2.5.4 Test description

5.5.2.5.4.1 Initial conditions

This test shall be run in one of the configurations defined in Table 5.5.2.5.4.1-1.

Table 5.5.2.5.4.1-1: Supported test configurations for EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Configuration	Description
5.5.2.5-1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
5.5.2.5-2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

Configure the test equipment and the DUT according to the parameters in Table 5.5.2.5.4.1-2.

Table 5.5.2.5.4.1-2: Initial conditions for EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, table E.3-1 and TS 38.	508-1 [14] clause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 5.5.2.5.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.1.
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.TBD	
Exceptions to connection diagram	N/A		

- 1. The general test parameter settings are set up according to Table 5.5.2.5.4.1-3.
- 2. Message contents are defined in clause 5.5.2.5.4.3.
- 3. There are two E-UTRAN carriers and one NR carrier and three cells specified in the test. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR2 PSCell. Cell 1 is the cell used for connection setup with the power level set according to [TBD]. Cell 2 and Cell 3 shall be configured according to [TBD].

Table 5.5.2.5.4.1-3: General test parameters for EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		OFF	
SCell measurement cycle	ma	640	
(measCycleSCell)	ms	040	
T1	S	10	

### 5.5.2.5.4.2 Test procedure

The test consists of three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR2 PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1, Cell2 and Cell3. Cell1 shall be configured as E-UTRAN PCell, Cell2 shall be configured as NR PSCell and Cell3 shall be configured as NR deactivated SCell. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the E-UTRAN NR SCells is received by the UE, defines the start of time period T1. During T1 the UE shall be continuously scheduled on E-UTRAN PCell and NR PSCell.

- 1. Ensure the UE is in state FFS according to TS 38.508-1 [14] clause TBD.
- 2. Configure MCG according to TS 36.521-3 [26] Annex C.0, C.1 and SCG according to Annex C.1.1 and C.1.2 for all downlink physical channels.
- 3. The SS shall transmit an RRCConnectionReconfiguration message including measCycleSCell or allowInterruptions for the deactivated NR SCell to perform measurements on the deactivated SCC.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. Set the parameters according to T1 in Table 5.5.2.5.5-1. Propagation conditions are set according to Annex C.2.1. T1 starts.
- 6. SS schedules on PSCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor ACK/NACK/DTX on PSCell.
- 7. If more than 99.5% of uplink transmissions are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".
- 8. If no two consecutive DTX is observed by the SS, then count a success for the event "DTX". Otherwise count a fail for the event "DTX".
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS. (if the paging fails, switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS),

or

- switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS.
- 10. Repeat step 3-9 until a test verdict has been achieved.

Each of the events "ACK/NACK" and "DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

### 5.5.2.5.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 5.5.2.5.4.3-1: Common Exception messages

Default Message Contents			
Common contents of system information			
blocks exceptions			
Default RRC messages and information	FFS		
elements contents exceptions			

### 5.5.2.5.5 Test requirement

Table 5.5.2.5.5-1 defines the primary level settings including test tolerances for E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC test configurations.

Table 5.5.2.5.5-1: NR cell specific test parameters for EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter		Cell 2
Connection Type		Conducted
		FR2
Config 1,2		TDD
Config 1,2		TBD
Config 1,2	MHz	100: N <sub>RB,c</sub> = 66
Config 1,2		TBD
Config 1,2		SR.3.1 TDD
Config 1,2		CR.3.1 TDD
Config 1,2		TBD
		OP.1
Config 1,2		SMTC.1 FR2
	dB	
		0
S to SSS		•
SCH		
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	TBD+TT
		AWGN
	μs	3
	Config 1,2	Config 1,2  Config 1,2  Config 1,2  Config 1,2  Config 1,2  dB  to SSS H DMRS S to SSS CCH DMRS S to SSS CCH DMRS S to SSS SCH to SSS(Note 1) NG DMRS (Note 1)  dB

Note 1: OCNG 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 5.5.2.5.5-2: NR cell specific OTA related test parameters for EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

	Parameter	Unit	Cell 2
UE orientation around TBD axis and TBD axis			TBD
Relative difference in ang	le of arrival of cell 2 relative to cell 1	degrees	TBD
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
$N_{oc}$ Note1	NR_TDD_FR2_C		
1 voc	NR_TDD_FR2_D	dBm/15kHz <sup>Note4</sup>	TBD+TT
	NR_TDD_FR2_E		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
$N_{oc}$ Note1	NR_TDD_FR2_C		
1 voc	NR_TDD_FR2_D	dBm/SCS <sup>Note3</sup>	TBD+TT
	NR_TDD_FR2_E		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
	NR_TDD_FR2_C		
SS-RSRP <sup>Note2</sup>	NR_TDD_FR2_D	dBm/SCS Note4	TBD+TT
	NR_TDD_FR2_E		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		

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

$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	TBD+TT	
Io <sup>Note2</sup>	NR_TDD_FR2_A	dBm/95.04 MHz Note4	TBD+TT	
Note 1:	: Interference from other cells and noise sources not specified in the test is assumed to be constant over			
	subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{ m oc}$ to be fulfilled.			
Note 2:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			
Note 3:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.			
Note 4: Note 5:	1			

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 5.5.2.5.5-3 and Table 5.5.2.5.5-4.

Table 5.5.2.5.5-3: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
3	0.125	5

Table 5.5.2.5.5-4: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
3	0.125	4 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

# 5.5.2.6 EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

### Editor's note:

- Message contents are missing.
- Some parts of TC is TBD.
- Connection diagram is TBD.
- Test tolerance is missing.
- Cell mapping is missing

### 5.5.2.6.1 Test purpose

The purpose of this test is to verify EN-DC UE's ability to complete PSCell interruptions during the measurement on E-UTRAN SCC within the missed ACK/NACK rate for NR PSCell in EN-DC requirements.

### 5.5.2.6.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward supporting EN-DC.

### 5.5.2.6.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.5.2.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.5.5.2.6.

5.5.2.6.4 Test description

5.5.2.6.4.1 Initial conditions

Test 5.5.2.6 can be run in one of the configurations defined in Table 5.5.2.6.4.1-1.

Table 5.5.2.6.4.1-1: Supported test configurations for EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Configuration	Description
5.5.2.6-1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
5.5.2.6-2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

Configure the test equipment and the DUT according to the parameters in Table 5.5.2.6.4.1-2.

Table 5.5.2.6.4.1-2: Initial conditions for EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, table E.3-1 and TS 38.	508-1 [14] clause 4.3.1.
Channel	As specified	by the test configuration selected fr	om Table 5.5.2.6.4.1-1.
bandwidth			
Propagation	AWGN		As specified in Annex C.2.1.
conditions			
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.TBD	
Exceptions to	N/A		
connection			
diagram			

- 2. The general test parameter settings are set up according to Table 5.5.2.6.4.1-3.
- 4. Message contents are defined in clause 5.5.2.6.4.3.
- 5. There are two E-UTRAN carriers and one NR carrier and three cells specified in the test. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR2 PSCell. Cell 1 is the cell used for connection setup with the power level set according to [TBD]. Cell 2 and Cell 3 shall be configured according to [TBD].

Table 5.5.2.6.4.1-3: General test parameters for EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1 2	One is E-UTRAN RF channel and the
		1, 2	other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

### 5.5.2.6.4.2 Test procedure

The test consists of three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR2 PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1, Cell2 and Cell3. Cell1 shall be configured as E-UTRAN PCell, Cell2 shall be configured as NR PSCell and Cell3 shall be configured as NR deactivated SCell. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the E-UTRAN NR SCells is received by the UE, defines the start of time period T1. During T1 the UE shall be continuously scheduled on E-UTRAN PCell and NR PSCell.

- 1. Ensure the UE is in state FFS according to TS 38.508-1 [14] clause TBD.
- 2. Configure MCG according to TS 36.521-3 [26] Annex C.0, C.1 and SCG according to Annex C.1.1 and C.1.2 for all downlink physical channels.
- 3. The SS shall transmit an RRCConnectionReconfiguration message including measCycleSCell or allowInterruptions for the deactivated NR SCell to perform measurements on the deactivated SCC.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. Set the parameters according to T1 in Table 5.5.2.6.5-1. Propagation conditions are set according to Annex C.2.1. T1 starts.
- 6. SS schedules on PSCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor ACK/NACK/DTX on PSCell.
- 7. If more than 99.5% of uplink transmissions are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".
- 8. If no two consecutive DTX is observed by the SS, then count a success for the event "DTX". Otherwise count a fail for the event "DTX".
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS. (if the paging fails, switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS),

or

- switches off and on the UE and ensures the UE is in state FFS TS 38.508-1 [14] clause FFS.
- 10. Repeat step 3-9 until a test verdict has been achieved.

Each of the events "ACK/NACK" and "DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

### 5.5.2.6.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 5.5.2.6.4.3-1: Common Exception messages

Default Message Co	ntents
Common contents of system information	
blocks exceptions	
Default RRC messages and information	FFS
elements contents exceptions	

### 5.5.2.6.5 Test requirement

Table 5.5.2.6.5-1 defines the primary level settings including test tolerances for E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC test configurations.

Table 5.5.2.6.5-1: NR cell specific test parameters for EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parameter		Cell 2
Connection Type		Conducted
Frequency Range		FR2
Config 1,2		TDD
Config 1,2		TBD
Config 1,2	MHz	100: N <sub>RB,c</sub> = 66
Config 1,2		TBD
Config 1,2		SR.3.1 TDD
Config 1,2		CR.3.1 TDD
Config 1,2		TBD
OCNG Patterns		OP.1
Config 1,2		SMTC.1 FR2
SMTC Configuration Config 1,2  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 PDCCH to PDCCH DMRS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH to PDSCH  EPRE ratio of OCNG DMRS to SSS(Note 1)  EPRE ratio of OCNG to OCNG DMRS (Note 1)		0
Ês/Noc		TBD
Propagation Condition		AWGN
	ms	3
	Config 1,2 to SSS H DMRS S to SSS CCH DMRS	Config 1,2  Config 1,2  Config 1,2  Config 1,2  Config 1,2  dB  to SSS H DMRS S to SSS CCH DMRS S to SSS SCH to SSS(Note 1) NG DMRS (Note 1)  dB

Note 1: OCNG shall be 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 5.5.2.6.5-2: NR cell specific OTA related test parameters for EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

	Parameter	Unit	Cell 2
UE orientation around TBD axis and TBD axis			TBD
Relative difference in angle	e of arrival of cell 2 relative to cell 1	degrees	TBD
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
$N_{oc}$ Note1	NR_TDD_FR2_C		
TV <sub>oc</sub>	NR_TDD_FR2_D	dBm/15kHz <sup>Note4</sup>	TBD
	NR_TDD_FR2_E		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
	NR_TDD_FR2_A		TBD
	NR_TDD_FR2_B	dBm/SCS <sup>Note3</sup>	
$N_{oc}$ Note1	NR_TDD_FR2_C		
TV <sub>oc</sub>	NR_TDD_FR2_D		
	NR_TDD_FR2_E		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
	NR_TDD_FR2_C		
SS-RSRP <sup>Note2</sup>	NR_TDD_FR2_D	dBm/SCS Note4	TBD
	NR_TDD_FR2_E		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		

$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	TBD
Io <sup>Note2</sup>	NR_TDD_FR2_A	dBm/95.04 MHz Note4	TBD
Note 1:	Interference from other cells and noise sources not spec	ified in the test is assum	ed to be constant over
	subcarriers and time and shall be modeled as AWGN of	appropriate power for $\Lambda$	$I_{oc}$ to be fulfilled.
Note 2:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.		
Note 3:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.		
Note 4:	Equivalent power received by an antenna with 0dBi gain		t zone
Note 5:	As observed with 0dBi gain antenna at the center of the	quiet zone	

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 5.5.2.6.5-3 and Table 5.5.2.6.5-4.

Table 5.5.2.6.5-3: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
3	0.125	5

Table 5.5.2.6.5-4: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
3	0.125	4 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

## 5.5.3 SCell activation and deactivation delay

### 5.5.3.1 EN-DC FR2 SCell activation and deactivation intra-band in non-DRX

Editor's notes: This clause is incomplete, the following items are TBD

- The core requirements in TS 38.133 are between [.] or TBD;
- Test tolerance analysis is missing;
- Test procedure and Message content are TBD;
- Cell mapping and Connection diagram is TBD;
- Test applicability Table in TS38.522 need to be updated.

### 5.5.3.1.1 Test purpose

This test is to verify that the SCell activation and deactivation times are within the requirements, when the SCell in FR2 intra-band is known by the UE at the time of activation.

### 5.5.3.1.2 Test applicability

This test applies to all types of NR UE supporting E-UTRA and EN-DC from Release 15 onwards.

### 5.5.3.1.3 Minimum conformance requirements

Same minimum conformance requirements as described in section 4.5.3.1.3.

The normative reference for this requirement is TS 38.133 [6] clause 8.3 and A.5.5.3.1.

5.5.3.1.4 Test description

5.5.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 5.5.3.1.4.1-1.

Table 5.5.3.1.4.1-1: Supported test configurations for FR2 SCell activation case

Test Case ID	Description
5.5.3.1-1	FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
5.5.3.1-2	TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
NOTE: The UE is only required to pass in one of the supported test configurations.	

Configure the test equipment and the DUT according to the parameters in Table 5.5.3.1.4.1-2 and Table 5.5.3.1.4.1-3.

Table 5.5.3.1.4.1-2: Initial conditions for known FR2 SCell activation case

Parameter		Value	Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.		
Test frequencies	As specified	As specified in Annex E, Table E.1-1 and TS 38.508-1 [14] sclause 4.3.1.			
Channel bandwidth	As specified	by the test configuration selected fi	rom Table 4.7.1.1.2-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.		
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	TBD	1		
Exceptions to connection diagram	N/A				

Table 5.5.3.1.4.1-3: General test parameters for FR2 SCell activation case

Parameter	Unit	Value	Comment
RF Channel Number		1,2,3	One E-UTRAN radio channel (1) and two NR radio channel (2,3) are used for this test
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in section A.3.7.2.2 of TS38.133 [6]
Active PSCell		Cell 2	Primary secondary cell on NR RF channel number 2.
Configured deactivated SCell		Cell 3	Configured deactivated secondary cell on NR RF channel number 3
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
CQI/PMI periodicity and offset configuration index		0	CQI reporting for SCell every second subframe
Cell-individual offset for cells on E-UTRA RF channel number	dB	0	Individual offset for cells on primary component carrier.
Cell-individual offset for cells on NR channel number	dB	0	Individual offset for cells on secondary component carrier.
SCell measurement cycle (measCycleSCell)	ms	160	
Cell3 timing offset to cell2	μs	0	
Time alignment error between cell3 and cell2	μs	≤ Time alignment error as specified in 3GPP TS 38.104 [xx] clause 6.5.3.1. Editor's note: spec is not listed!	The value of time alignment error depends upon the type of carrier aggregation.
T1	S	[7]	During this time the PSCell shall be known and the SCell configured and detected.
T2	S	[1]	During this time the UE shall activate the SCell.
Т3	S	[1]	During this time the UE shall deactivate the SCell.
THARQ	ms	TBD	the timing between DL data transmission and acknowledgement as specified in 38.321 [12]
TCSI_Reporting	ms	[2]	the delay uncertainty in acquiring the first available CSI reporting resources as specified in 38.331 [13]
k	ms	TBD	As specified in section 4.3 of TS38.213 [8]

- 1. Message contents are defined in clause 5.5.3.1.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR2 cells in the same frequency. Cell 2 is the PSCell and Cell 3 is the deactivated SCell.

### 5.5.3.1.4.2 Test procedure

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.

During T2 the Test procedure requires the UE to send the first CSI report for SCell1 in a subframe (m+[k]), but also allows a subframe not happen outside the slot (m+1+[ $T_{HARQ}$ )) to (m+1+[ $T_{HARQ}$ +3ms+ $T_{SSB\_max}$ + $T_{SMTC\_duration}$ ]) if the subframe (m+[k]) was subject to interruption. The SS determines whether the CSI report in subframe (m+[k]) was interrupted or not by monitoring ACK/NACK sent in PSCell in subframe (m+[k]).

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508-1 [14] clause 4.5.
- 2. TBD.

### 5.5.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

### 5.5.3.1.5 Test requirement

Table 5.5.3.1.5-1 and Table 5.5.3.1.5-2 defines the primary level settings including test tolerances for all tests.

Table 5.5.3.1.5-1: Cell specific test parameters for FR2 SCell activation case

Parameter <sup>Note 5</sup>	Unit	Cell 2				Cell 3			
Parameter	Onit	T1	T2	T3	3	T1	T2	T3	
SSB ARFCN		freq2				freq2			
Duplex mode			TDD				TDD		
TDD configuration		1	DDConf.3	3.1		-	TDDConf.3	3.1	
BW <sub>channel</sub>	MHz	10	00: N <sub>RB,c</sub> =	- 66		1	00: N <sub>RB,c</sub> =	66	
PDSCH Reference measurement channel		;	SR.3.1 TD	D			SR.3.1 TD	D	
RMSI CORESET Reference Channel		(	CR.3.1 TD	D			CR.3.1 TD	D	
RMC CORESET Reference Channel		C	CR.3.1 T	DD		(	CR.3.1 TE	DD	
OCNG Patterns					OP.	.1			
SMTC configuration				Ţ,	SMT	C.1			
SSB configuration				S	SB.1	FR2			
TCI state		TBD			D				
TRS configuration			TBD						
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 note 1									
EPRE ratio of OCNG to OCNG DMRS note									
$\hat{E}_s/N_{oc}$	dB	TBD+TT							
Propagation conditions					AWC	3N		<u> </u>	

- NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over
- subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled. NOTE 3: SS-RSRP 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
- NOTE 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receive antenna port.
- NOTE 5: All parameters apply for configuration 1 and 2.

Table 5.5.3.1.5-2: OTA related test parameters for FR2 SCell activation case

Parameter <sup>note 6</sup>		Unit	Cell 2			Cell 3		
		Offic	T1			T1	T2	T3
Angle of arrival configuration			Accord	ding to tab	le A.X.X	Accord	According to table A.X.X	
	NR_TDD_FR2_A							
	NR_TDD_FR2_B							
$N_{\mathit{oc}}$ note1	NR_TDD_FR2_F	dBm/15kHz		TBD+TT			TBD+TT	
	NR_TDD_FR2_G	note4		IDD+II			וודטטו	
	NR_TDD_FR2_T							
	NR_TDD_FR2_Y							
	NR_TDD_FR2_A							
	NR_TDD_FR2_B							
$N_{\mathit{oc}}$ note1	NR_TDD_FR2_F	dBm/SCS	TBD+TT		TBD+TT			
	NR_TDD_FR2_G	note3						
	NR_TDD_FR2_T							
	NR_TDD_FR2_Y							
	NR_TDD_FR2_A							
	NR_TDD_FR2_B		TBD+TT		TBD+TT			
SS-RSRP note2	NR_TDD_FR2_F	dBm/SCS						
33-N3NF	NR_TDD_FR2_G	note4						
	NR_TDD_FR2_T							
	NR_TDD_FR2_Y							
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB		TBD+TT			TBD+TT	
	NR_TDD_FR2_A							
	NR_TDD_FR2_B							
lo note2	NR_TDD_FR2_F	dBm/95.04	TBD +TT			TBD+TT		
10	NR_TDD_FR2_G	MHz note4						
	NR_TDD_FR2_T							
	NR_TDD_FR2_Y							

NOTE 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over

subcarriers and time and shall be modelled as AWGN of appropriate power for  $\frac{N_{oc}}{N_{oc}}$  to be fulfilled.

NOTE 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

NOTE 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

NOTE 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.

NOTE 5: As observed with 0dBi gain antenna at the centre of the guiet zone.

NOTE 6: All parameters apply for configuration 1 and 2.

During T2 the UE shall send the first CSI report for SCell in a slot  $(m+1+[T_{HARQ}+3ms+T_{SSB\_max}+T_{SMTC\_duration}]+1)$  as defined in TS 38.133 [6] section 8.3 if the slot (m+k) was subject to interruption. Whether CSI report in slot (m+k) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in slot (m+k).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot  $(m+T_{HARQ}+T_{activation\_time}+T_{CSI\_Reporting})$ ,  $T_{activation\_time}=[3ms+TBD]$ , as defined in TS 38.133 [6] section 8.3.

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot ( $n+[T_{HARQ}+3ms]$ ), as defined in TS 38.133 [6] section 8.3.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot  $(m+1+[T_{HARQ}])$  to  $(m+1+[T_{HARQ}+3ms+T_{SSB\ max}+T_{SMTC\ duration}])$ , as defined in TS 38.133 [6] section 8.3.

During T3 interruption of PCell / PSCell during SCell deactivation shall not happen outside the slot  $(n+1+[T_{HARQ}])$  to  $(n+1+[T_{HARQ}+3ms])$ , as defined in TS 38.133 [6] section 8.3.

The interruption of PSCell shall not be more than the values specified for EN-DC in TS 38.133 [6] section 8.2.1.2.4.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot (m+T<sub>HARQ</sub>+T<sub>activation\_time</sub>+T<sub>CSI\_Reporting</sub>) as defined in TS 38.133 [6] section 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## 5.5.4 UE UL carrier RRC reconfiguration delay

### 5.5.5 Link recovery procedures

### 5.5.6 Active BWP switch delay

### 5.5.6.1 DCI-based and time-based active BWP switch

5.5.6.1.0 Minimum conformance requirements

**FFS** 

5.5.6.1.1 EN-DC FR2 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD
- Test procedure is TBD
- Test applicability needs to be added to TS 38.522

5.5.6.1.1.1 Test purpose

**FFS** 

5.5.6.1.1.2 Test applicability

**FFS** 

5.5.6.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.5.6.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.5.5.6.1.1.

5.5.6.1.1.4 Test description

5.5.6.1.1.4.1 Initial conditions

**FFS** 

5.5.6.1.1.4.2 Test procedure

**FFS** 

5.5.6.1.1.4.3 Message contents

**FFS** 

5.5.6.1.1.5 Test requirements

**FFS** 

5.5.6.1.2 EN-DC FR2 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD
- Test procedure is TBD
- Test applicability needs to be added to TS 38.522

5.5.6.1.2.1 Test purpose

**FFS** 

5.5.6.1.2.2 Test applicability

**FFS** 

5.5.6.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.5.6.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.5.5.6.1.2.

5.5.6.1.2.4 Test description

5.5.6.1.2.4.1 Initial conditions

**FFS** 

5.5.6.1.2.4.2 Test procedure

**FFS** 

5.5.6.1.2.4.3 Message contents

**FFS** 

5.5.6.1.2.5 Test requirements

FFS

5.5.6.2 RRC-based active BWP switch

5.5.6.2.0 Minimum conformance requirements

**FFS** 

5.5.6.2.1 EN-DC FR2 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD
- Test procedure is TBD
- Test applicability needs to be added to TS 38.522

5.5.6.2.1.1 Test purpose

**FFS** 

5.5.6.2.1.2 Test applicability

**FFS** 

5.5.6.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.5.6.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.5.5.6.2.1.

5.5.6.2.1.4 Test description

5.5.6.2.1.4.1 Initial conditions

**FFS** 

5.5.6.2.1.4.2 Test procedure

**FFS** 

5.5.6.2.1.4.3 Message contents

**FFS** 

5.5.6.2.1.5 Test requirements

**FFS** 

# 5.6 Measurement procedures

## 5.6.1 Intra-frequency measurements

### 5.6.2 Inter-frequency measurements

### 5.6.2.0 Minimum conformance requirements for Inter-frequency measurements

[TS 38.133-f50, clause 9.3.2]

The requirements in Section 9.3 apply, provided:

- The cell being identified or measured is detectable.

An inter-frequency cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in Sections 10.1.4 and 10.1.5 for FR1 and FR2, respectively, for a corresponding Band,

- SS-RSRQ related side conditions given in Sections 10.1.9 and 10.1.10 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in Sections 10.1.14 and 10.1.15 for FR1 and FR2, respectively, for a corresponding Band,
- SSB\_RP and SSB Ês/Iot according to Annex B.2.3 for a corresponding Band.

[TS 38.133-f50, clause 9.3.4]

When measurement gaps are provided, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable inter frequency cell within  $T_{identify\_inter\_without\_index}$  if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (reportQuantityRsIndexes or maxNrofRSIndexesToReport is not configured). Otherwise UE shall be able to identify a new detectable inter frequency cell within  $T_{identify\_inter\_with\_index}$ . The UE shall be able to identify a new detectable inter frequency SS block of an already detected cell within  $T_{identify\_inter\_with\_uindex}$ .

$$T_{identify\_inter\_without\_index} = (T_{PSS/SSS\_sync\_inter} + T_{SSB\_measurement\_period\_inter}) \ ms$$
 
$$T_{identify\_inter\_with\_index} = (T_{PSS/SSS\_sync\_inter} + T_{SSB\_measurement\_period\_inter} + T_{SSB\_time\_index\_inter}) \ ms$$

### 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,  $M_{pss/sss\_sync} = 40$  samples.

 $M_{SSB\_index\_inter}$ : For a UE supporting power class 1,  $M_{SSB\_index\_inter} = 40$  samples. For a vehicle mounted UE supporting power class 2,  $M_{pss/sss\_sync\_inter} = 24$  samples. For a UE supporting power class 3,  $M_{SSB\_index\_inter} = 24$  samples. For a UE supporting power class 4,  $M_{meas\_period\_inter} = 24$  samples.

 $M_{meas\_period\_inter}$ : For a UE supporting FR2 power class 1,  $M_{meas\_period\_inter}$  =64 samples. For a vehicle mounted UE supporting FR2 power class 2,  $M_{pss/sss\_sync\_inter}$ =40 samples. For a UE supporting FR2 power class 3,  $M_{meas\_period\_inter}$  =40 samples. For a UE supporting FR2 power class 4,  $M_{meas\_period\_inter}$  =40 samples.

 $CSSF_{inter}$ : it is a carrier specific scaling factor and is determined according to  $CSSF_{within\_gap,i}$  in section 9.1.5.2 for measurement conducted within measurement gaps.

Table 9.3.4-2: Time period for PSS/SSS detection, (Frequency range FR2)

Condition NOTE1,2	TPSS/SSS_sync_inter					
No DRX	max(600ms, M <sub>pss/sss_sync_inter</sub> x max(MGRP, SMTC					
	period)) x CSSF <sub>inter</sub>					
DRX cycle ≤ 320ms	max(600ms, (1.5 x M <sub>pss/sss_sync_inter</sub> ) x max(MGRP,					
	SMTC period, DRX cycle)) x CSSF <sub>inter</sub>					
DRX cycle > 320ms	Mpss/sss_sync_inter x DRX cycle x CSSFinter					
NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1						
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 3.6.1 are						
for the secondary cell group. The DRX cycle is	s 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> x max(MGRP, SMTC					
	period)) x CSSF <sub>inter</sub>					
DRX cycle ≤ 320ms	max(200ms, (1.5 x Mssb_index_inter) x max(MGRP, SMTC					
·	period, DRX cycle)) x CSSF <sub>inter</sub>					
DRX cycle > 320ms	Mssb_index_inter x DRX cycle x CSSFinter					
NOTE 1: DRX or non DRX requirements apply accor	ding to the conditions described in section 3.6.1					
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 3.6.1 are						
for the secondary cell group. The DRX cycle	e is the DRX cycle of the secondary cell group.					

[TS 38.133-f50, clause 9.3.5]

When measurement gaps are provided for inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting SS-RSRP, SS-RSRQ and SS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses 10.1.4, 10.1.5, 10.1.9, 10.1.10, 10.1.14 and 10.1.15, respectively, as shown in table 9.3.5-1 and 9.3.5-2:

Table 9.3.5-2: Measurement period for inter-frequency measurements with gaps (Frequency FR2)

Condition NOTE1,2	T ssb_measurement_period_inter					
No DRX	max(400ms, M <sub>meas_period_inter</sub> x max(MGRP, SMTC					
	period)) x CSSF <sub>inter</sub>					
DRX cycle ≤ 320ms	max(400ms, (1.5 x M <sub>meas_period_inter</sub> ) x max(MGRP,					
	SMTC period, DRX cycle)) x CSSF <sub>inter</sub>					
DRX cycle > 320ms	M <sub>meas_period_inter</sub> x DRX cycle x CSSF <sub>inter</sub>					
NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1						
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 3.6.1 are						
for the secondary cell group. The DRX cy	cle is the DRX cycle of the secondary cell group.					

[TS 38.133-f50, clause 9.3.6.3]

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is:  $2 \times TTI_{DCCH}$ . This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be within  $T_{identify\_inter\_without\_index}$  if UE is not indicated to report SSB based RRM measurement result with the associated SSB index. Otherwise UE shall be able to identify a new detectable inter frequency cell within  $T_{identify\_inter\_with\_index}$ . Both  $T_{identify\_inter\_without\_index}$  and  $T_{identify\_inter\_with\_index}$  are defined in clause 9.3.4. When L3 filtering is used an additional delay can be expected.

If a cell which has been detectable at least for the time period  $T_{identify\_inter\_without\_index}$  or  $T_{identify\_inter\_with\_index}$  defined in clause 9.3.4 and then triggers the measurement report as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than  $T_{SSB\_measurement\_period\_inter}$  defined in clause 9.3.5 provided the timing to that cell has not changed more than  $\pm$  3200 Tc while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used an additional delay can be expected.

The normative reference for this requirement is TS 38.133 [6] clause 9.3.2, 9.3.4, 9.3.5, 9.3.6.3.

### 5.6.2.1 EN-DC FR2-FR2 event-triggered reporting in non-DRX

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.

- Cell Configuration table in Annex A is undefined.
- Antenna diagram is TBD
- Message content is TBD
- Minimum conformance requirements contain [ ] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)

### 5.6.2.1.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements.

### 5.6.2.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

### 5.6.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.5.6.2.1.

### 5.6.2.1.4 Test description

### 5.6.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 5.6.2.1.4.1-1.

Table 5.6.2.1.4.1-1: EN-DC FR2-FR2 event triggered reporting tests in non-DRX supported test configurations

Test Case ID	Description				
5.6.2.1-1	LTE FDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
5.6.2.1-2	LTE TDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
Note 1: The UE is only required to be tested in one of the supported test configurations					
Note 2: target N	R cell has the same SCS, BW and duplex mode as NR serving cell				

Table 5.6.2.1.4-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value		Comment		
		configurati on	Test 1	Test 2			
E-UTRA RF Channel		Config 1,2	1		One E-UTRAN TDD carrier		
Number					frequencies is used.		
NR RF Channel		Config 1,2	1	, 2	Two FR1 NR carrier frequencies is		
Number					used.		
Active cell		Config 1,2	LTE Cell 1 (PCell) and NR cell 2 (PScell)				LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR cell 3		NR cell 3 is on NR RF channel number 2.		
Gap Pattern Id		Config 1,2	0	13	As specified in clause 9.1.2-1.		
Measurement gap offset		Config 1,2	39	39			
SMTC-SSB parameters		Config 1,2	SSB.1 FR2		As specified in clause A.3.10.2		
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Normal				
TimeToTrigger	S	Config 1,2	0				
Filter coefficient		Config 1,2	0		L3 filtering is not used		
DRX		Config 1,2	OFF		DRX is not used		
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC		
Time offset between serving and neighbour cells		Config 1,2	3μs		Synchronous cells.		
T1	s	Config 1,2	5				
T2	S	Config 1,2	5.2 for PC1; 3.5 for other PC	5.2 for PC1; 3.5 for other PC			

Table 5.6.2.1.4.1-3: Test Environment test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in non-DRX

Parameter	Value		Comment		
Test environment Test frequencies Channel	•	in Annex E, Table E.2-1 and TS 38 by the test configuration selected fr	• •		
bandwidth Propagation conditions	AWGN		As specified in Annex C.2.2.		
Connection Diagram	TE Part DUT Part	TBD TBD	As specified in TS 38.508-1 [14] Annex A.		
Exceptions to connection diagram	TBD				

- 1. Message contents are defined in clause 5.6.2.1.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in different frequencies. Cell 2 is the PSCell and Cell 3 is the target cell. The power levels and settings for Cell 2 and Cell 3 are set according to Annex C.1.2.

### 5.6.2.1.4.2 Test procedure

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.

In test 1 measurement gap pattern configuration # 0 as defined in Table 5.6.2.1.4.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table 5.6.2.1.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 5.6.2.1.4.1-2.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 5.6.2.1.4.1-2.
- 6. UE shall transmit a MeasurementReport message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delay measured from the beginning of time period T2 is less than 5120 ms for UE supporting power class 1, or 3200 ms for UE supporting other power class for Test 1 and Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the MeasurementReport message in step 6 or when T2 expires, the SS shall transmit RRCConnectionRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.), or:
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 5.6.2.1.4.1-2 as appropriate.

### 5.6.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 5.6.2.1.4.3-1: Common Exception messages for Additional EN-DC FR2-FR2 event triggered reporting tests in non-DRX test requirement

Default Message Contents					
Common contents of system information	FFS				
blocks exceptions					
Default RRC messages and information	Table H.3.2-1				
elements contents exceptions	Table H.3.2-2				
·	FFS				

5.6.2.1.5 Test requirement

Table 5.6.2.3.5-1 defines the primary level settings including test tolerances for all tests.

Table 5.6.2.1.5-1: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit Test		Cell 2		Cell 3	
		configuratio n	T1	T2	T1	T2
NR RF Channel Number		Config 1,2	1			2
Duplex mode		Config 1,2	TDD		TDD	
BW <sub>channel</sub>	MHz	Config 1,2	100: N <sub>R</sub>		100: N <sub>RB,c</sub> = 66	
BWP BW	MHz	Config 1,2	100: N <sub>R</sub>			N <sub>RB,c</sub> = 66
TDD configuration		Config 1,2	TDDC	onf.3.1	TDD	Conf.3.1
Initial DL BWP		Config 1,2	DLBW	/P.0.1	NA	
Initial UL BWP		Config 1,2	ULBW	/P.0.1		NA
Dedicated DL BWP		Config 1,2	DLBW	/P.1.1		NA
Dedicated UL BWP		Config 1,2	ULBW	/P.1.1		NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	OF	P.1	(	)P.1
TRS configuration		Config 1,2	TRS.2.	1 TDD		NA
TCI configuration		Config 1,2	CSI-RS.	-		NA
PDSCH Reference measurement channel		Config 1,2	SR.3.			-
CORESET Reference Channel		Config 1,2	CR.3.1 TDD		-	
SMTC configuration defined in A.3.11.1 and A.3.11. 2		Config 1,2	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	12	20	120	
EPRE ratio of PSS to SSS  EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to						
PDCCH DMRS EPRE ratio of PDSCH DMRS		Config 1,2	(	)	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) UE orientation around TBD axis and TBD axis	degrees	Config 1,2	N	A	7	ГВD
Relative difference in angle of arrival of cell 3 relative to cell 2	degrees	Config 1,2	NA		NA	TBD
$N_{oc}$ Note2	dBm/15 kHz Note5		TBD		TBD	
$N_{oc}$ Note2	dBm/S CS Note4	Config 1,2	TBD		TBD	
SS-RSRP Note 3	dBm/S CS Note5	Config 1,2	TBD	TBD	TBD	TBD
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	Config 1,2	TBD	TBD	TBD	TBD

$\hat{E}_s/N_{oc}$	dB	Config 1,2	TBD	TBD	TBD	TBD
IO <sup>Note3</sup>	dBm/95 .04 MHz Note5	Config 1,2	TBD	TBD	TBD	TBD
Propagation Condition		Config 1,2		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  $N_{ac}$  to be
- SS-RSRP and lo levels have been derived from other parameters for information purposes. They Note 3: are not settable parameters themselves.
- SS-RSRP minimum requirements are specified assuming independent interference and noise at Note 4: each receiver antenna port.
- Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5:
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

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% with a confidence level of 95%.

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.

#### 5.6.2.2 EN-DC FR2-FR2 event-triggered reporting in DRX

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- -The Test tolerances and Test system uncertainties applicable to this test are undefined.
- -Cell Configuration table in Annex A is undefined.
- -Antenna diagram is TBD
- -Message content is TBD
- Minimum conformance requirements contain [] and TBDs (RAN4 Pending)
- Test requirement contain TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)

#### 5.6.2.2.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements.

#### 5.6.2.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 5.6.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.5.6.2.2.

5.6.2.2.4 Test description

5.6.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 5.6.2.2.4.1-1.

Table 5.6.2.2.4.1-1: EN-DC FR2-FR2 event triggered reporting tests in DRX supported test configurations

Test Case ID	Description				
5.6.2.2-1	LTE FDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
5.6.2.2-2	LTE TDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
Note 1: The UE is only required to be tested in one of the supported test configurations					
Note 2: target N	R cell has the same SCS, BW and duplex mode as NR serving cell				

Table 5.6.2.2.4-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config 1,2		•	1		One E-UTRAN TDD carrier
Number							frequencies is used.
NR RF Channel		Config 1,2		1,	2		Two FR1 NR carrier frequencies is
Number							used.
Active cell		Config 1,2	LTE C	ell 1 (PC	Cell) and	l NR	LTE Cell 1 is on E-UTRA RF
			cell 2 (	(PScell)			channel number 1.
							NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR ce	II 3			NR cell 3 is on NR RF channel
							number 2.
Gap Pattern Id		Config 1,2	0		13		As specified in TS 38.133
							clause 9.1.2-1.
Measurement gap offset		Config 1,2	39		39		
SMTC-SSB parameters		Config 1,2	SSB.1	FR2			As specified in clause A.3
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Norma	al			
TimeToTrigger	S	Config 1,2	0				
Filter coefficient		Config 1,2	0				L3 filtering is not used
DRX		Config 1,2	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.5
Time offset between PCell and PSCell		Config 1,2	3 μs				Synchronous EN-DC
Time offset between		Config 1,2	3µs				Synchronous cells.
serving and neighbour			•				
cells							
T1	S	Config 1,2	5				
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 5.6.2.2.4.1-3: Test Environment test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in non-DRX

Parameter		Value	Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified	in Annex E, Table E.2-1 and TS 38	.508-1 [14] clause 4.3.1 and 4.4.2.		
Channel bandwidth	As specified by the test configuration selected from Table 5.6.2.2.4.1-1.				
Propagation conditions	AWGN		As specified in Annex C.2.2.		
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	TBD			
Exceptions to connection diagram	TBD				

- 1. Message contents are defined in clause 5.6.2.2.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in different frequencies. Cell 2 is the PSCell and Cell 3 is the target cell. The power levels and settings for Cell 2 and Cell 3 are set according to Annex C.1.2.

### 5.6.2.2.4.2 Test procedure

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.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 5.6.2.2.4.1-2 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 5.6.2.2.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 5.6.2.2.4.1-2.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 5.6.2.2.4.1-2.
- 6. UE shall transmit a MeasurementReport message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delay measured from the beginning of time period T2 is less than 7680 ms for UE supporting power class 1, or 4800 ms for UE supporting other power class for Test 1 and Test 3 and 81920 ms for UE supporting power class 1, or 51200 ms for UE supporting other power class for Test 2 and Test 4, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the MeasurementReport message in step 6 or when T2 expires, the SS shall transmit RRCConnectionRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]

- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.),

or:

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 5.6.2.2.4.1-2 as appropriate.

### 5.6.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 5.6.2.2.4.3-1: Common Exception messages for Additional EN-DC FR2-FR2 event triggered reporting tests without SSB time index detection in DRX test requirement

Default Message Contents						
Common contents of system information	Table H. TBD					
blocks exceptions						
Default RRC messages and information	Table H.3.2-1					
elements contents exceptions	Table H.3.2-2					
·	Table H. TBD					

### 5.6.2.2.5 Test requirement

Table 5.6.2.2.5-1 defines the primary level settings including test tolerances for all tests.

Table A.5.6.2.2.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Ce	II 2	Cell 3		
		configuratio n	T1	T2	T1	T2	
NR RF Channel Number		Config 1,2	,	1		2	
Duplex mode		Config 1,2	TE	DD	TDD		
BW <sub>channel</sub>	MHz	Config 1,2		RB,c = 66	100: N <sub>RB,c</sub> = 66		
BWP BW	MHz	Config 1,2		RB,c = 66		$N_{RB,c} = 66$	
TDD configuration		Config 1,2	TDDC	onf.3.1	יטטו	Conf.3.1	
Initial DL BWP		Config 1,2	DLBW	/P.0.1		NA	
Initial UL BWP		Config 1,2	ULBW	/P.0.1		NA	
Dedicated DL BWP		Config 1,2	DLBW	/P.1.1		NA	
Dedicated UL BWP		Config 1,2	ULBW	/P.1.1		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	OF	P.1	C	)P.1	
TRS configuration		Config 1,2	TRS.2.	.1 TDD		NA	
TRS configuration		Config 1,2	TRS.2.	.1 TDD		NA	
PDSCH Reference measurement channel		Config 1,2	SR.3.	1 TDD		-	
CORESET Reference Channel		Config 1,2	CR.3.	1 TDD		-	
SMTC configuration defined in A.3.11.1 and A.3.11. 2		Config 1,2	SMTC.1		SMTC.1		
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	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  EPRE ratio of OCNG DMRS to SSS(Note 1)  EPRE ratio of OCNG to OCNG DMRS (Note 1)  UE orientation around TBD axis and TBD axis  Relative difference in angle of arrival of cell 3 relative to cell 2  Noc Note2	degrees degrees dBm/15	Config 1,2 Config 1,2 Config 1,2	O NA NA		NA	O TBD	
IV <sub>oc</sub>	kHz Note5		TBD			<del>-</del>	
$N_{oc}$ Note2	dBm/S CS Note4	Config 1,2	TBD			ГВD	
SS-RSRP Note 3	dBm/S CS Note5	Config 1,2	TBD	TBD	TBD	TBD	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	Config 1,2	TBD	TBD	TBD	TBD	
$\hat{E}_s/N_{oc}$	dB	Config 1,2	TBD	TBD	TBD	TBD	

Io <sup>Note3</sup>		dBm/95	Config 1,2	TBD	TBD	TBD	TBD
		.04					
		MHz					
		Note5					
Propagat	ion Condition		Config 1,2		A۱	WGN	
Note 1:	OCNG shall be used	such that b	ooth cells are ful	ly allocated a	and a consta	nt total trans	mitted power
	spectral density is ac	hieved for	all OFDM symbo	ols.			
Note 2:	Interference from oth	er cells and	d noise sources	not specified	in the test is	s assumed to	be constant
	over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be						$N_{oc}$ to be
	fulfilled.						
Note 3:	: SS-RSRP and lo levels have been derived from other parameters for information purposes. They						ooses. They
	are not settable parameters themselves.						
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at						
	each receiver antenna port.						
Note 5:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone					ne	
Note 6:	As observed with 0dBi gain antenna at the centre of the quiet zone						

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% with a confidence level of 95%. In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# 5.6.2.3 EN-DC FR2-FR2 event-triggered reporting in non-DRX with SSB time index detection

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- -The Test tolerances and Test system uncertainties applicable to this test are undefined.
- -Cell Configuration table in Annex A is undefined.
- -Antenna diagram is TBD
- -Message content is TBD
- Minimum conformance requirements contain [] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)

### 5.6.2.3.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements.

5.6.2.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

5.6.2.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.5.6.2.3.

5.6.2.3.4 Test description

5.6.2.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 5.6.2.3.4.1-1.

Table 5.6.2.3.4.1-1: EN-DC FR2-FR2 event triggered reporting tests in non-DRX with SSB time index detection supported test configurations

Test Case ID	Description				
5.6.2.3-1	LTE FDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
5.6.2.3-2	LTE TDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
Note 1: The UE is only required to be tested in one of the supported test configurations					
Note 2: target N	R cell has the same SCS, BW and duplex mode as NR serving cell				

Table 5.6.2.3.4.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in DRX

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2		1	One E-UTRAN TDD carrier frequencies is used.
NR RF Channel Number		Config 1,2	1,	, 2	Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2	LTE Cell 1 (PCell) and NR cell 2 (PScell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR cell 3		NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2	0	13	As specified in TS 38.133 clause 9.1.2-1.
Measurement gap offset		Config 1,2	39	39	
SMTC-SSB parameters		Config 1,2	SSB.1 FR2		As specified in clause A.3
A3-Offset	dB	Config 1,2	-6		
Hysteresis	dB	Config 1,2	0		
CP length		Config 1,2	Normal		
TimeToTrigger	S	Config 1,2	0		
Filter coefficient		Config 1,2	0		L3 filtering is not used
DRX		Config 1,2	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2	3µs		Synchronous cells.
T1	S	Config 1,2	5		
T2	S	Config 1,2	7 for PC1; 4.5 for other PC	7 for PC1; 4.5 for other PC	

Table 5.6.2.3.4.1-3: Test Environment test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in non-DRX

Parameter		Value	Comment				
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.				
Test frequencies	As specified	As specified in Annex E, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.					
Channel bandwidth	As specified by the test configuration selected from Table 5.6.2.3.4.1-1.						
Propagation conditions	AWGN		As specified in Annex C.2.2.				
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.				
Diagram	DUT Part	TBD					
Exceptions to connection diagram	TBD						

- 1. Message contents are defined in clause 5.6.2.3.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in different frequencies. Cell 2 is the PSCell and Cell 3 is the target cell. The power levels and settings for Cell 2 and Cell 3 are set according to Annex C.1.2.

### 5.6.2.3.4.2 Test procedure

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.

In test 1 measurement gap pattern configuration # 0 as defined in Table 5.6.2.3.4.1-1 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table 5.6.2.3.4.1-1 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 5.6.2.3.4.1-2.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 5.6.2.3.4.1-2.
- 6. UE shall transmit a MeasurementReport message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delay measured from the beginning of time period T2 is less than 6720 ms for UE supporting power class 1, or 4160 ms for UE supporting other power class for Test 1 and Test 2, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the MeasurementReport message in step 6 or when T2 expires, the SS shall transmit RRCConnectionRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.), or:
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 5.6.2.3.4.1-2 as appropriate.

### 5.6.2.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 5.6.2.3.4.3-1: Common Exception messages for Additional EN-DC FR2-FR2 event triggered reporting tests without SSB time index detection in non-DRX test requirement

Default Message Contents							
Common contents of system information	Table H. TBD						
blocks exceptions							
Default RRC messages and information	Table H.3.2-1						
elements contents exceptions	Table H.3.2-2						
·	Table H. TBD						

### 5.6.2.3.5 Test requirement

Table 5.6.2.3.5-1 defines the primary level settings including test tolerances for all tests.

Table 5.6.2.3.5-1: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in DRX

Parameter	Unit	Test	Ce	II 2	Cell 3		
		configuratio n	T1	T2	T1	T2	
NR RF Channel Number		Config 1,2	,	1		2	
Duplex mode		Config 1,2	TE	DD	TDD		
BW <sub>channel</sub>	MHz	Config 1,2	100: N <sub>F</sub>	RB,c = 66	100: N <sub>RB,c</sub> = 66		
BWP BW	MHz	Config 1,2	100: N <sub>F</sub>	RB,c = 66	100: 1	N <sub>RB,c</sub> = 66	
TDD configuration		Config 1,2	TDDC	onf.3.1		Conf.3.1	
Initial DL BWP		Config 1,2	DLBW	/P.0.1		NA	
Dedicated DL BWP		Config 1,2	DLBW	/P.1.1		NA	
Initial UL BWP		Config 1,2	DLBW	/P.0.1		NA	
Dedicated UL BWP		Config 1,2	ULBW	/P.1.1		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	OF	P.1	(	OP.1	
PDSCH Reference measurement channel		Config 1,2	SR.3.	1 TDD		-	
CORESET Reference Channel		Config 1,2	CR.3.			-	
TRS configuration		Config 1,2	TRS.2.	.1 TDD		NA	
TCI configuration		Config 1,2	CSI-RS.	Config.0		NA	
SMTC configuration defined in A.3.11.1 and A.3.11.2		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 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)		-					
UE orientation around TBD axis and TBD axis	degrees	Config 1,2		Α		ΓBD	
Relative difference in angle of arrival of cell 3 relative to cell 2	degrees	Config 1,2	NA		NA	TBD	
$N_{oc}^{}$ Note2	dBm/15 kHz Note5		TBD		-	ГВО	
$N_{oc}^{}$ Note2	dBm/S CS Note4	Config 1,2	TBD		-	ТВD	
SS-RSRP Note 3	dBm/S CS Note5	Config 1,2	TBD	TBD	TBD	TBD	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	Config 1,2	TBD	TBD	TBD	TBD	
$\hat{E}_s/N_{oc}$	dB	Config 1,2	TBD	TBD	TBD	TBD	

Io <sup>Note3</sup>		dBm/95	Config 1,2	TBD	TBD	TBD	TBD
		.04	_				
		MHz					
		Note5					
Propagat	ion Condition		Config 1,2		A\	WGN	
Note 1:	OCNG shall be used	such that b	ooth cells are ful	ly allocated a	and a consta	nt total trans	mitted power
	spectral density is achieved for all OFDM symbols.						
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant						
	over subcarriers and	time and s	hall be modelled	as AWGN o	of appropriate	e power for ,	$N_{oc}$ to be
	fulfilled.						
Note 3:	SS-RSRP and lo leve	els have be	en derived from	other param	eters for info	ormation purp	ooses. They
	are not settable para	meters thei	mselves.	·			
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at						
	each receiver antenna port.						
Note 5:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone						
Note 6:	As observed with 0dl	Bi gain ante	enna at the centi	e of the quie	t zone		

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%. In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# 5.6.2.4 EN-DC FR2-FR2 event-triggered reporting in DRX with SSB time index detection

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- -The Test tolerances and Test system uncertainties applicable to this test are undefined.
- -Cell Configuration table in Annex A is undefined.
- -Antenna diagram is TBD
- -Message content is TBD
- Minimum conformance requirements contain [] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)

## 5.6.2.4.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements.

### 5.6.2.4.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

## 5.6.2.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.5.6.2.4.

5.6.2.4.4 Test description

5.6.2.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 5.6.2.4.4.1-1.

Table 5.6.2.4.4.1-1: EN-DC FR2-FR2 event triggered reporting tests in DRX with SSB time index detection supported test configurations

Test Case ID	Description			
5.6.2.4-1	LTE FDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode			
5.6.2.4-2	LTE TDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode			
Note 1: The UE is only required to be tested in one of the supported test configurations				
Note 2: target NI	R cell has the same SCS, BW and duplex mode as NR serving cell			

Table 5.6.2.4.4.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in DRX

Parameter	Unit	Test	Value			Comment	
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config 1,2		•	1		One E-UTRAN TDD carrier
Number							frequencies is used.
NR RF Channel		Config 1,2		1,	2		Two FR1 NR carrier frequencies is
Number							used.
Active cell		Config 1,2	LTE C	ell 1 (PC	Cell) and	J NR	LTE Cell 1 is on E-UTRA RF
			cell 2	(PScell)			channel number 1.
							NR Cell 2 is on NR RF channel
							number 1.
Neighbour cell		Config 1,2	NR ce	II 3			NR cell 3 is on NR RF channel
							number 2.
Gap Pattern Id		Config 1,2	0		13		As specified in TS 38.133
							clause 9.1.2-1.
Measurement gap		Config 1,2	39		39		
offset							
SMTC-SSB parameters		Config 1,2	SSB.1	FR2			As specified in clause A.3
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Norma	al			
TimeToTrigger	S	Config 1,2	0				
Filter coefficient		Config 1,2	0				L3 filtering is not used
DRX		Config 1,2	DRX .1	DRX .2	DRX .1	DRX .2	As specified in caluse A.5
Time offset between PCell and PSCell		Config 1,2	3 μs				Synchronous EN-DC
Time offset between		Config 1,2	3µs				Synchronous cells.
serving and neighbour		001g 1,2	ομο				Syricimented cone.
cells							
T1	S	Config 1,2	5				
T2	s	Config 1,2	11	108	11	108	
	_		for	for	for	for	
			PC1;	PC1;	PC1;	PC1;	
			6.5	67	6.5	67	
			for	for	for	for	
			othe	othe	othe	other	
			r PC	r PC	r PC	PC	

Table 5.6.2.4.4.1-3: Test Environment test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in DRX

Parameter		Value	Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified	in Annex E, Table E.2-1 and TS 38	3.508-1 [14] clause 4.3.1 and 4.4.2.		
Channel bandwidth	As specified	by the test configuration selected fr	rom Table 5.6.2.4.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.		
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	TBD			
Exceptions to connection diagram	TBD				

- 1. Message contents are defined in clause 5.6.2.4.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR1 cells in different frequencies. Cell 2 is the PSCell and Cell 3 is the target cell. The power levels and settings for Cell 2 and Cell 3 are set according to Annex C.1.2.

#### 5.6.2.4.4.2 Test procedure

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.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 5.6.2.4.4.1-2 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 5.6.2.4.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 5.6.2.4.4.1-2.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 5.6.2.4.4.1-2.
- 6. UE shall transmit a MeasurementReport message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delay measured from the beginning of time period T2 is less than 10080 ms for UE supporting power class 1, or 6240 ms for UE supporting other power class for Test 1 and Test 3 and 107520 ms for UE supporting power class 1, or 66560 ms for UE supporting other power class for Test 2 and Test 4, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the MeasurementReport message in step 6 or when T2 expires, the SS shall transmit RRCConnectionRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]

- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.),

or:

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 5.6.2.4.4.1-2 as appropriate.

#### 5.6.2.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 5.6.2.4.4.3-1: Common Exception messages for Additional EN-DC FR2-FR2 event triggered reporting tests with SSB time index detection in DRX test requirement

Default Message Contents							
Common contents of system information	Table H. TBD						
blocks exceptions							
Default RRC messages and information	Table H.3.2-1						
elements contents exceptions	Table H.3.2-2						
·	Table H. TBD						

#### 5.6.2.4.5 Test requirement

Table 5.6.2.4.5-1 defines the primary level settings including test tolerances for all tests.

Table 5.6.2.4.5-1: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in DRX

Parameter	Unit	Test	Cell 2		Cell 3		
		configuratio n	T1	T2	T1	T2	
NR RF Channel Number		Config 1,2	•	1		2	
Duplex mode		Config 1,2	TE	DD	TDD		
BW <sub>channel</sub>	MHz	Config 1,2	100: N <sub>F</sub>	$R_{B,c} = 66$	100: N	$N_{RB,c} = 66$	
BWP BW	MHz	Config 1,2		RB,c = 66		N <sub>RB,c</sub> = 66	
TDD configuration		Config 1,2	TDDC	onf.3.1	TDD	Conf.3.1	
Initial DL BWP		Config 1,2	DLBW	/P.0.1		NA	
Dedicated DL BWP		Config 1,2	DLBW	/P.1.1		NA	
Initial UL BWP		Config 1,2	ULBW	/P.0.1		NA	
Dedicated UL BWP		Config 1,2	ULBV	/P.1.1		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	OF	P.1	(	)P.1	
PDSCH Reference measurement channel		Config 1,2	SR.3.	1 TDD		-	
CORESET Reference Channel		Config 1,2	CR.3.			-	
TRS configuration		Config 1,2		.1 TDD		NA	
TCI configuration		Config 1,2	CSI-RS.	Config.0		NA	
SMTC configuration defined in A.3.11.1 and A.3.11. 2		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  EPRE ratio of PDCCH to							
PDCCH DMRS  EPRE ratio of PDSCH DMRS		Config 1,2	(	)	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)							
UE orientation around TBD axis and TBD axis	degrees	Config 1,2		A		ΓBD	
Relative difference in angle of arrival of cell 3 relative to cell 2	degrees	Config 1,2	NA		NA	TBD	
$N_{oc}$ Note2	dBm/15 kHz Note5		TBD		٦	ГВD	
$N_{oc}$ Note2	dBm/S CS Note4	Config 1,2	TBD		TBD		
SS-RSRP Note 3	dBm/S CS Note5	Config 1,2	TBD	TBD	TBD	TBD	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	Config 1,2	TBD	TBD	TBD	TBD	
$\hat{E}_s/N_{oc}$	dB	Config 1,2	TBD	TBD	TBD	TBD	

Io <sup>Note3</sup>		dBm/95	Config 1,2	TBD	TBD	TBD	TBD
		.04					
		MHz					
		Note5					
Propagat	ion Condition		Config 1,2		A۱	WGN	
Note 1:	OCNG shall be used			,	and a consta	nt total trans	mitted power
	spectral density is achieved for all OFDM symbols.						
Note 2:	: Interference from other cells and noise sources not specified in the test is assumed to be constant				be constant		
	over subcarriers and	time and s	hall be modelled	as AWGN o	of appropriate	e power for ,	$N_{oc}$ to be
	fulfilled.						
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They				poses. They		
	are not settable parameters themselves.						
Note 4:	3 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -						
	each receiver antenna port.						
Note 5:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone					ne	

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

Note 6:

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% with a confidence level of 95%. In test 1, 2, 3 and 4 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# 5.6.2.5 EN-DC FR1-FR2 event-triggered reporting in non-DRX

As observed with 0dBi gain antenna at the centre of the quiet zone

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.
- Cell Configuration table in Annex E is undefined.
- Antenna diagram is TBD
- Message content is TBD
- Minimum conformance requirements contain [] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)

### 5.6.2.5.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements.

#### 5.6.2.5.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

5.6.2.5.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.5.6.2.5.

5.6.2.5.4 Test description

5.6.2.5.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 5.6.2.5.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 5.6.2.5.4.1-2. Test environment parameters are given in Table 5.6.2.5.4.1-3.

Table 5.6.2.5.4.1-1 EN-DC FR1-FR2 event triggered reporting tests in non-DRX supported test configurations

Test Case ID	Description of serving cell	Description of target cell				
5.6.2.5-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,				
5.6.2.5-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	100MHz bandwidth, TDD				
5.6.2.5-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	duplex mode				
5.6.2.5-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode					
5.6.2.5-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode					
5.6.2.5-6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode					
Note 1: The UE is only required to be tested in one of the supported test configurations						
Note 2: The targ	et NR cell3 has the same SCS, BW and duplex mode as NR serving cell2					

Table 5.6.2.5.4-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection in non-DRX

Parameter	Unit	Test	Va	lue	Comment
		configurati	Test 1	Test 2	1
		on			
E-UTRA RF Channel		Config		1	One E-UTRAN TDD carrier
Number		1,2,3,4,5,6			frequencies is used.
NR RF Channel		Config	1	, 2	Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6		,	used.
Active cell		Config	LTE Cell 1 (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
					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	13	As specified in TS 38.133
		1,2,3,4,5,6			clause 9.1.2-1.
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
on NR RF Channel 1		_			
		Config 2,5	SSB.1 FR1		As specified in clause A.3
		_			
		Config 3,6	SSB.2 FR1		As specified in clause A.3
		_			
SMTC-SSB parameters		Config	SSB.1 FR2		As specified in clause A.3
on NR RF Channel 2		1,2,3,4,5,6			·
offsetMO	dB	Config	6		
		1,2,3,4,5,6			
Hysteresis	dB	Config	0		
		1,2,3,4,5,6			
a4-Threshold	dBm	Config	TBD		
		1,2,3,4,5,6			
CP length		Config	Normal		
		1,2,3,4,5,6			
TimeToTrigger	s	Config	0		
		1,2,3,4,5,6			
Filter coefficient		Config	0		L3 filtering is not used
		1,2,3,4,5,6			
DRX		Config	OFF		DRX is not used
		1,2,3,4,5,6			
Time offset between		Config	3 μs		Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6			
Time offset between		Config 1,4	3ms		Asynchronous cells.
serving and neighbour					The timing of Cell 3 is 3ms later
cells					than the timing of Cell 2.
		Config	3µs		Synchronous cells.
		2,3,5,6			
T4	_	Confin	 		
T1	S	Config	5		
TO	_	1,2,3,4,5,6	F 0 for DO4	E 0 for DO4	
T2	S	Config	5.2 for PC1;	5.2 for PC1;	
		1,2,3,4,5,6	3.5 for other	3.5 for other	
			PC	PC	

Table 4.6.2.4.4-3: Test Environment test parameters for EN-DC inter-frequency event triggered
reporting without SSB time index detection in non-DRX

Parameter		Value	Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified	in Annex E, Table TBD and TS 38.	.508-1 [14] clause TBD		
Channel bandwidth	As specified	by the test configuration selected fr	rom Table 5.6.2.5.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.		
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	TBD			
Exceptions to connection diagram	TBD				

- 1. Message contents are defined in clause 5.6.2.5.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR2 cells in different frequencies. Cell 2 is the PSCell and Cell 3 is the target cell. The power levels and settings for Cell 2 and Cell 3 are set according to Annex TBD

#### 5.6.2.5.4.2 Test procedure

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.

In test 1 measurement gap pattern configuration # 0 as defined in Table 5.6.2.5.4.1-2 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 5.6.2.5.4.1-2 is provided for UE that support per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 5.6.2.5.4.1-2.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 5.6.2.5.4.1-2.
- 6. UE shall transmit a MeasurementReport message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delay measured from the beginning of time period T2 is less than 5120 ms for UE supporting power class 1, or 3200 ms for UE supporting other power class for Test 1 and Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the MeasurementReport message in step 6 or when T2 expires, the SS shall transmit RRCConnectionRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off

and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.),

or

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 4.6.2.1.4.1-2 as appropriate.

#### 5.6.2.5.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 5.6.2.5.4.3-1: Common Exception messages for Additional EN-DC FR1-FR2 event triggered reporting tests without SSB time index detection in non-DRX test requirement

Default Message Contents						
Common contents of system information	Table H.3.2-1					
blocks exceptions	Table H.3.2-2					
•	Table H. TBD					
Default RRC messages and information	Table H. TBD					
elements contents exceptions						

### 5.6.2.5.5 Test requirement

Table 5.6.2.5.5-1 defines the primary level settings including test tolerances for all tests.

Table 5.6.2.5.5-1: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection in non-DRX

Parameter	Unit	Test	Cell 2	Cell 3		
		configuratio n	T1 T2	T1	T2	
NR RF Channel Number		Config	1	2		
Duplex mode		1,2,3,4,5,6 Config 1,4	FDD	-	TDD	
Duplex mode		Config 1,4	TDD	TDD		
		2,3,5,6	100	'		
BWchannel	MHz	Config 1,4	10: N <sub>RB,c</sub> = 52	100: 1	N <sub>RB,c</sub> = 66	
		Config 2,5	10: N <sub>RB,c</sub> = 52		$N_{RB,c} = 66$	
		Config 3,6	40: N <sub>RB,c</sub> = 106	100: N	N <sub>RB,c</sub> = 66	
BWP BW	MHz	Config 1,4	10: $N_{RB,c} = 52$	100: N	N <sub>RB,c</sub> = 66	
		Config 2,5	10: N <sub>RB,c</sub> = 52		$N_{RB,c} = 66$	
		Config 3,6	40: N <sub>RB,c</sub> = 106		V <sub>RB,c</sub> = 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	DLBWP.0.1		NA	
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1		NA	
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1		NA	
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1		NA	
OCNG Patterns defined in		Config	OP.1		)P.1	
A.3.2.1.1 (OP.1)		1,2,3,4,5,6				
PDSCH Reference		Config 1,4	SR.1.1 FDD		-	
measurement channel		Config 2,5	SR.1.1 TDD			
		Config 3,6	SR2.1 TDD			
CORESET Reference		Config 1,4	CR.1.1 FDD		-	
Channel		Config 2,5	CR.1.1 TDD			
		Config 3,6	CR2.1 TDD			
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1,4	SMTC.2	SMTC.2		
		Config 2,3,5,6	SMTC.1	SMTC.1		
PDSCH/PDCCH subcarrier	kHz	Config	15	120		
spacing		1,2,4,5				
EDDE		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		0				
PDCCH DMRS		Config 1,2,3,4,5,6	0		0	
EPRE ratio of PDSCH DMRS to SSS		1,2,3,4,3,0				
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to						
OCNG DMRS (Note 1)						
UE orientation around TBD axis and TBD axis	degrees	Config 1,2,3,4,5,6	NA	1	ΓBD	
Relative difference in angle of		Config	NA	NA	TBD	
arrival of cell 3 relative to cell	degrees	1,2,3,4,5,6				
2	l			1		

$N_{oc}^{ m Note2}$	dBm/15 kHz Note5		NA		TBD	
$N_{oc}^{ m Note2}$	dBm/S CS	Config 1,2,4,5		IA	TBD	
	Note4	Config 3,6	N	IA	7	TBD
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	NA	NA	-Infinity	TBD
	Note5	Config 3,6	NA	NA	-Infinity	TBD
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config 1,2,3,4,5,6	NA	NA	-Infinity	TBD
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3,4,5,6	NA	NA	-Infinity	TBD
Io <sup>Note3</sup>	dBm/9. 36MHz	Config 1,2,4,5	NA	NA	-	-
	dBm/38 .16MHz	Config 3,6	NA	NA	-	ı
	dBm/95 .04 MHz Note5	Config 1,2,3,4,5,6	-	-	-Infinity	TBD
Propagation Condition		Config 1,2,3,4,5,6	AWGN			

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

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% with a confidence level of 95%. In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## 5.6.2.6 EN-DC FR1-FR2 event-triggered reporting in DRX

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.
- Cell Configuration table in Annex E is undefined.
- Antenna diagram is TBD
- Message content is TBD
- Minimum conformance requirements contain [] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)

#### - Initial conditions contain TBDs (RAN4 Pending)

#### 5.6.2.6.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX within inter-frequency cell search requirements.

#### 5.6.2.6.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

## 5.6.2.6.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.5.6.2.6.

#### 5.6.2.6.4 Test description

#### 5.6.2.6.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 5.6.2.6.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 5.6.2.6.4.1-2. Test environment parameters are given in Table 5.6.2.6.4.1-3.

Table 5.6.2.6.4.1-1: EN-DC FR1-FR2 event triggered reporting tests in DRX supported test configurations

Test Case ID	Description of serving cell	Description of target cell						
5.6.2.6-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,						
5.6.2.6-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	100MHz bandwidth, TDD						
5.6.2.6-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	duplex mode						
5.6.2.6-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode							
5.6.2.6-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode							
5.6.2.6-6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode							
Note 1: The UE is only required to be tested in one of the supported test configurations								
Note 2: The tard	Note 2: The target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2							

Table 5.6.2.6.4-2: 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	
E-UTRA RF Channel		on Config	1	2	<b>3</b>	4	One E-UTRAN TDD carrier
Number		1,2,3,4,5,6	'			frequencies is used.	
NR RF Channel		Config		1,	, 2		Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6					used.
Active cell		Config	LTE C	ell 1 (PC	Cell) and	l NR	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6	cell 2 (	(PScell)	·		channel number 1.
							NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config	NR ce	II 3			NR cell 3 is on NR RF channel
		1,2,3,4,5,6					number 2.
Gap Pattern Id		Config	0		13		As specified in TS 38.133
Measurement gap		1,2,3,4,5,6 Config	39		39		clause 9.1.2-1.
offset		1,2,3,4,5,6					
SMTC-SSB parameters on NR RF Channel 1		Config 1,4	SSB.1	FR1			As specified in clause A.3
		Config 2,5	SSB.1	FR1			As specified in clause A.3
		Config 3,6	SSB.2	FR1			As specified in clause A.3
SMTC-SSB parameters		Config	SSB.1	FR2			As specified in clause A.3
on NR RF Channel 2	-ID	1,2,3,4,5,6	0				
offsetMO	dB	Config 1,2,3,4,5,6	6				
Hysteresis	dB	Config	0				
4.77	ID	1,2,3,4,5,6	TDD				
a4-Threshold	dBm	Config 1,2,3,4,5,6	TBD				
CP length		Config	Norma	al			
T. T.T.		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	DRX	DRX	DRX	DRX	As specified in clause A.5
		1,2,3,4,5,6	.1	.2	.1	.2	
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs				Synchronous EN-DC
Time offset between		Config 1,4	3ms				Asynchronous cells.
serving and neighbour cells							The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3μs			Synchronous cells.	
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	8 for PC1;	82 for	8 for PC1;	82 for	
		1,2,3,4,5,6	5 for	PC1;	5 for	PC1;	
			othe	52	othe	52	
			r PC	for othe	r PC	for other	
				r PC		PC	
		•	•				

Table 5.6.2.6.4-3: Test Environment test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection in non-DRX

Parameter	Value	Comment

Test environment	NC As specified in TS 38.508-1 [14] clause 4.1.								
Test frequencies	As specified	As specified in Annex E, Table TBD and TS 38.508-1 [14] clause TBD							
Channel bandwidth	As specified by the test configuration selected from Table 4.6.2.3.4.1-1.								
Propagation conditions	AWGN		As specified in Annex C.2.2.						
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.						
Diagram	DUT Part	TBD							
Exceptions to connection diagram	TBD								

- 1. Message contents are defined in clause 4.6.2.3.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR2 cells in different frequencies. Cell 2 is the PSCell and Cell 3 is the target cell. The power levels and settings for Cell 2 and Cell 3 are set according to Annex TBD

#### 5.6.2.6.4.2 Test procedure

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.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 5.6.2.6.4-2 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 5.6.2.6.4-2 is provided for UE that support per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 5.6.2.6.4-2.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 5.6.2.6.4-2.
- 6. UE shall transmit a MeasurementReport message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delay measured from the beginning of time period T2 is less than 7680 ms for UE supporting power class 1, or 4800 ms for UE supporting other power class for Test 1 and Test 3 and 81920 ms for UE supporting power class 1, or 51200 ms for UE supporting other power class for Test 2 and Test 4, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the MeasurementReport message in step 6 or when T2 expires, the SS shall transmit RRCConnectionRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and

SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.),

or:

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 5.6.2.6.4-2 as appropriate.

#### 5.6.2.6.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 5.6.2.6.4.3-1: Common Exception messages for Additional EN-DC FR1-FR2 event triggered reporting tests without SSB time index detection in DRX test requirement

Default Message Contents						
Common contents of system information	Table H.3.2-1					
blocks exceptions	Table H.3.2-2					
	Table H. TBD					
Default RRC messages and information	Table H. TBD					
elements contents exceptions						

## 5.6.2.6.5 Test requirement

Table 5.6.2.6.5-1 defines the primary level settings including test tolerances for all tests.

Table 5.6.2.6.5-1: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell	12	С	ell 3
		configuratio	T1	T2	T1	T2
NR RF Channel Number		n Config	1			2
		1,2,3,4,5,6	·			_
Duplex mode		Config 1,4	FD			DD
		Config	TDD		1	DD
BWchannel	MHz	2,3,5,6 Config 1,4	10: N <sub>RB</sub> ,	o = 52	100· N	√RB,c = 66
DVV Chamer	IVIIIZ	Config 2,5	10: N <sub>RB</sub> ,			$\sqrt{RB,c} = 66$
		Config 3,6	40: N <sub>RB,c</sub>	= 106		√RB,c = 66
BWP BW	MHz	Config 1,4	10: N <sub>RB,</sub>			N <sub>RB,c</sub> = 66
		Config 2,5	10: N <sub>RB</sub> ,			NRB,c = 66
TDD configuration		Config 3,6	40: N <sub>RB,c</sub>			$N_{RB,c} = 66$ Conf.3.1
TDD configuration		Config 2,5	10000	111.1.1	100	50111.5.1
		Config 3,6	TDDCo	nf.2.1	TDD	Conf.3.1
Initial DL BWP		Config	DLBW	P 0 1		NA
miliai DE DVVI		1,2,3,4,5,6	525			
Initial UL BWP		Config	ULBW	P.0.1		NA
		1,2,3,4,5,6				
Dedicated DL BWP		Config	DLBW	P.1.1		NA
		1,2,3,4,5,6		5		
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBW			NA
OCNG Patterns defined in		Config	OP.1			)P.1
A.3.2.1.1 (OP.1)		1,2,3,4,5,6				
PDSCH Reference measurement channel		Config 1,4	SR.1.1 FDD		1	-
measurement chamile		Config 2,5	SR.1.1 TDD		1	
CORESET Reference		Config 3,6 Config 1,4	SR2.1 CR.1.1			_
Channel		Config 1,4	CR.1.1		-	-
		Config 3,6	CR2.1		1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1,4	SMT	C.2	SMTC.2	
		Config 2,3,5,6	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier	kHz	Config	15	:	120	
spacing		1,2,4,5				
EPRE ratio of PSS to SSS		Config 3,6	30	)	120	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH		-				
DMRS						
EPRE ratio of PDCCH DMRS						
to SSS EPRE ratio of PDCCH to		-				
PDCCH DMRS		Config	0			0
EPRE ratio of PDSCH DMRS		1,2,3,4,5,6				
to SSS						
EPRE ratio of PDSCH to						
PDSCH EPRE ratio of OCNG DMRS						
to SSS(Note 1)						
EPRE ratio of OCNG to		1				
OCNG DMRS (Note 1)		6 "			_	
UE orientation around TBD axis and TBD axis	degrees	Config 1,2,3,4,5,6	N/	4	]	TBD
Relative difference in angle of		Config	N.A	4	NA	TBD
arrival of cell 3 relative to cell	degrees	1,2,3,4,5,6			,	
2						

$N_{oc}$ Note2	dBm/15 kHz Note5		NA		TBD	
$N_{oc}^{ m Note2}$	dBm/S CS	Config 1,2,4,5		IA	TBD	
	Note4	Config 3,6	N	IA	-	TBD
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	NA	NA	TBD	TBD
	Note5	Config 3,6	NA	NA	TBD	TBD
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config 1,2,3,4,5,6	NA	NA	TBD	TBD
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3,4,5,6	NA	NA	TBD	TBD
Io <sup>Note3</sup>	dBm/9. 36MHz	Config 1,2,4,5	NA	NA	-	-
	dBm/38 .16MHz	Config 3,6	NA	NA	-	-
	dBm/95 .04 MHz Note5	Config 1,2,3,4,5,6	-	-	TBD	TBD
Propagation Condition		Config 1,2,3,4,5,6	AWGN			

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

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% with the confidence level of 95%.

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.

# 5.6.2.7 EN-DC FR1-FR2 event-triggered reporting in non-DRX with SSB time index detection

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.

- Cell Configuration table in Annex E is undefined.
- Antenna diagram is TBD
- Message content is TBD
- Minimum conformance requirements contain [ ] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)

#### 5.6.2.7.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements with SSB time index detection.

#### 5.6.2.7.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

#### 5.6.2.7.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.5.6.2.7.

### 5.6.2.7.4 Test description

#### 5.6.2.7.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 5.6.2.7.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 5.6.2.7.4.1-2. Test environment parameters are given in Table 5.6.2.7.4.1-3.

Table 5.6.2.7.4.1-1: EN-DC FR1-FR2 event triggered reporting tests in non-DRX with SSB time index detection supported test configurations

Test Case ID	Description of serving cell	Description of target cell				
5.6.2.7-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,				
5.6.2.7-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	100MHz bandwidth, TDD				
5.6.2.7-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	duplex mode				
5.6.2.7-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode					
5.6.2.7-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode					
5.6.2.7-6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode					
Note 1: The UE is only required to be tested in one of the supported test configurations						
Note 2: The targ	et NR cell3 has the same SCS, BW and duplex mode as NR serving cell2					

Table 5.6.2.7.4-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6		1	One E-UTRAN TDD carrier frequencies is used.
NR RF Channel Number		Config 1,2,3,4,5,6	1	, 2	Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (Pocell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	NR cell 3		NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0	13	As specified in TS 38.133 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
		Config 2,5	SSB.1 FR1		As specified in clause A.3
		Config 3,6	SSB.2 FR1		As specified in clause A.3
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3,4,5,6	SSB.1 FR2		As specified in clause A.3
offsetMO	dB	Config 1,2,3,4,5,6	6		
Hysteresis	dB	Config 1,2,3,4,5,6	0		
a4-Threshold	dBm	Config 1,2,3,4,5,6	TBD		
CP length		Config 1,2,3,4,5,6	Normal		
TimeToTrigger	S	Config 1,2,3,4,5,6	0		
Filter coefficient		Config 1,2,3,4,5,6	0		L3 filtering is not used
DRX		Config 1,2,3,4,5,6	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3µs		Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5		
T2	S	Config 1,2,3,4,5,6	7 for PC1; 4.5 for other PC	7 for PC1; 4.5 for other PC	

Table 5.6.2.7.4-3: Test Environment test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection in non-DRX

Parameter	Value	Comment

Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.					
Test frequencies	As specified	As specified in Annex E, Table TBD and TS 38.508-1 [14] clause TBD						
Channel bandwidth	As specified	As specified by the test configuration selected from Table 4.6.2.3.4.1-1.						
Propagation conditions	AWGN		As specified in Annex C.2.2.					
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.					
Diagram	DUT Part	TBD						
Exceptions to connection diagram	TBD							

- 1. Message contents are defined in clause 5.6.2.7.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR2 cells in different frequencies. Cell 2 is the PSCell and Cell 3 is the target cell. The power levels and settings for Cell 2 and Cell 3 are set according to Annex TBD

#### 5.6.2.7.4.2 Test procedure

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.

In test 1 measurement gap pattern configuration # 0 as defined in Table 5.6.2.7.4.1-2 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 5.6.2.7.4.1-2 is provided for UE that support per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 5.6.2.7.4-2.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 5.6.2.7.4.1-2.
- 6. UE shall transmit a MeasurementReport message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delay measured from the beginning of time period T2 is less than 6720 ms for UE supporting power class 1, or 4160 ms for UE supporting other power class for Test 1 and Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the MeasurementReport message in step 6 or when T2 expires, the SS shall transmit RRCConnectionRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.),

or:

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 5.6.2.7.41.-2 as appropriate.

#### 5.6.2.7.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 5.6.2.7.4.3-1: Common Exception messages for Additional EN-DC FR1-FR2 event triggered reporting tests with SSB time index detection in non-DRX test requirement

Default Message Contents							
Common contents of system information	Table H.3.2-1						
blocks exceptions	Table H.3.2-2						
·	Table H. TBD						
Default RRC messages and information	Table H. TBD						
elements contents exceptions							

## 5.6.2.7.5 Test requirement

Table 5.6.2.7.5-1 defines the primary level settings including test tolerances for all tests.

Table 5.6.2.7.5-1: 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	T1 T2		T1	T2
NR RF Channel Number		n Config	1			2
With Charmer Warmber		1,2,3,4,5,6	'			2
Duplex mode		Config 1,4	FD	D	7	DD
		Config	TD	TDD		DD
BW <sub>channel</sub>	MHz	2,3,5,6 Config 1,4	10: No.	10: N <sub>RB,c</sub> = 52		√RB,c = 66
DVV channel	IVII IZ	Config 1,4	10: NRE			NRB,c = 66
		Config 3,6	40: N <sub>RB</sub>			√RB,c = 66
BWP BW	MHz	Config 1,4	10: N <sub>RE</sub>		100: N	N <sub>RB,c</sub> = 66
		Config 2,5	10: NRE			N <sub>RB,c</sub> = 66
OCNG Patterns defined in		Config 3,6 Config	40: N <sub>RB</sub>	<sub>c</sub> = 106	100: N	N <sub>RB,c</sub> = 66
A.3.2.1.1 (OP.1)		1,2,3,4,5,6	OF	P.1		)P.1
PDSCH Reference		Config 1,4	SR.1.1			-
measurement channel		Config 2,5	SR.1.1			
		Config 3,6	SR2.1			
CORESET Reference		Config 1,4	CR.1.1			-
Channel		Config 2,5	CR.1.			
		Config 3,6	CR2.1			
TDD configuration		Config 2,5	TDDC			Conf.3.1
		Config 3,6	TDDC			Conf.3.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1		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	ULBW	/P.1.1	NA	
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1,4	SMT	C.2	SMTC.2	
		Config 2,3,5,6	SMT	C.1	SMTC.1	
PDSCH/PDCCH subcarrier	kHz	Config	1:	5		120
spacing		1,2,4,5 Config 3,6	30		120	
EPRE ratio of PSS to SSS		Coming 5,6		0	120	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH						
DMRS						
EPRE ratio of PDCCH DMRS						
to SSS EPRE ratio of PDCCH to						
PDCCH DMRS		Config 1,2,3,4,5,6	C	)		0
EPRE ratio of PDSCH DMRS		1,2,3,4,5,6				
to SSS  EPRE ratio of PDSCH to						
PDSCH EPRE ratio of OCNG DMRS						
to SSS(Note 1) EPRE ratio of OCNG to						
OCNG DMRS (Note 1)						
UE orientation around TBD axis and TBD axis	degrees	Config 1,2,3,4,5,6	N			BD
Relative difference in angle of arrival of cell 3 relative to cell 2	degrees	Config 1,2,3,4,5,6	N.	A	NA	TBD

$N_{oc}^{ m Note2}$	dBm/15 kHz		N	NA		ГВD	
	Note5						
$N_{oc}^{ m Note2}$	dBm/S	Config	N	IA	1	ΓBD	
- voc	CS	1,2,4,5					
	Note4	Config 3,6	N	IA	٦	ΓBD	
SS-RSRP Note 3	dBm/S	Config	NA	NA	-Infinity	TBD	
	CS	1,2,4,5					
	Note5	Config 3,6	NA	NA	-Infinity	TBD	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config	NA	NA	-Infinity	TBD	
Z <sub>s</sub> / T <sub>ot</sub>		1,2,3,4,5,6					
$\hat{E}_s/N_{oc}$	dB	Config	NA	NA	-Infinity	TBD	
		1,2,3,4,5,6					
Io <sup>Note3</sup>	dBm/9.	Config	NA	NA	-	-	
	36MHz	1,2,4,5					
	dBm/38	Config 3,6	NA	NA	-	-	
	.16MHz						
	dBm/95	Config	-	-	-Infinity	TBD	
	.04	1,2,3,4,5,6					
	MHz						
	Note5						
Propagation Condition		Config		P	WGN		
-		1,2,3,4,5,6					

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# 5.6.2.8 EN-DC FR1-FR2 event-triggered reporting in DRX with SSB time index detection

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.
- Cell Configuration table in Annex E is undefined.
- Antenna diagram is TBD
- Message content is TBD
- Minimum conformance requirements contain [ ] and TBDs (RAN4 Pending)

- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)

#### 5.6.2.8.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX within inter-frequency cell search requirements with SSB time index detection.

#### 5.6.2.8.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting EN-DC.

## 5.6.2.8.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 5.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.5.6.2.8.5.6.2.8.4 Test description

#### 5.6.2.8.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 5.6.2.8.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 5.6.2.8.4.1-2. Test environment parameters are given in Table 5.6.2.8.4.1-3.

Table 5.6.2.8.4.1-1: EN-DC FR1-FR2 event triggered reporting tests in DRX with SSB time index detection supported test configurations

Test Case ID	Description of serving cell	Description of target cell
5.6.2.8-1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,
5.6.2.8-2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	100MHz bandwidth, TDD
5.6.2.8-3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	duplex mode
5.6.2.8-4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
5.6.2.8-5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
5.6.2.8-6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	
Note 1: The UE		
Note 2: The targ	et NR cell3 has the same SCS, BW and duplex mode as NR serving cell2	

Table A.5.6.2.8.4.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in DRX

Parameter	Unit	Test	Value			Comment	
		configurati	Test	Test	Test	Test	
E-UTRA RF Channel		on Config	1	2	<b>3</b>	4	One E-UTRAN TDD carrier
Number		1,2,3,4,5,6	1			frequencies is used.	
NR RF Channel		Config	1, 2			Two FR1 NR carrier frequencies is	
Number		1,2,3,4,5,6					used.
Active cell		Config		ell 1 (Po		NR E	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 1,2,3,4,5,6	NR ce	II 3			NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config	0		13		As specified in TS 38.133
Management		1,2,3,4,5,6	39		39		clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	39		39		
SMTC-SSB parameters		Config 1,4	SSB.1	FR1	I		As specified in clause A.3
on NR RF Channel 1							
		Config 2,5	SSB.1	FR1			As specified in clause A.3
		Config 3,6	SSB.2	FR1			As specified in clause A.3
SMTC-SSB parameters		Config	SSB.1	FR2			As specified in clause A.3
on NR RF Channel 2 offsetMO	dB	1,2,3,4,5,6 Config	6				
Oliselivio	uБ	1,2,3,4,5,6	0				
Hysteresis	dB	Config	0				
4.77		1,2,3,4,5,6	<b>TDD</b>				
a4-Threshold	dBm	Config 1,2,3,4,5,6	TBD				
CP length		Config	Norma	al			
Time of Tartician and		1,2,3,4,5,6	0				
TimeToTrigger	S	Config 1,2,3,4,5,6	U				
Filter coefficient		Config 1,2,3,4,5,6	0				L3 filtering is not used
DRX		Config 1,2,3,4,5,6	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.5
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs				Synchronous EN-DC
Time offset between		Config 1,4	3ms				Asynchronous cells.
serving and neighbour cells							The timing of Cell 3 is 3ms later than the timing of Cell 2.
		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	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 5.6.2.8.4-3: Test Environment test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in DRX

Parameter	Value	Comment

Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1				
Test frequencies	As specified	As specified in Annex E, Table TBD and TS 38.508-1 [14] clause TBD					
Channel bandwidth	As specified	As specified by the test configuration selected from Table 4.6.2.3.4.1-1.					
Propagation conditions	AWGN		As specified in Annex C.2.2.				
Connection Diagram	TE Part  DUT Part	TBD TBD	As specified in TS 38.508-1 [14] Annex A.				
Exceptions to connection diagram	TBD						

- 1. Message contents are defined in clause 5.6.2.8.4.3.
- 2. Cell 1 is the E-UTRA serving cell (PCell) for the EN-DC setup. The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 and Cell 3 are NR FR2 cells in different frequencies. Cell 2 is the PSCell and Cell 3 is the target cell. The power levels and settings for Cell 2 and Cell 3 are set according to Annex TBD.

#### 5.6.2.8.4.2 Test procedure

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.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 5.6.2.8.4.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table 5.6.2.8.4.1-2 is provided for UE that support per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 5.6.2.8.4-2.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 5.6.2.8.4.1-2.
- 6. UE shall transmit a MeasurementReport message triggered by Event A3 embedded in E-UTRA RRC message *ULInformationTransferMRDC*. If the overall delay measured from the beginning of time period T2 is less than 10080 ms for UE supporting power class 1, or 6240 ms for UE supporting other power class for Test 1 and Test 3 and 107520 ms for UE supporting power class 1, or 66560 ms for UE supporting other power class for Test 2 and Test 4, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the MeasurementReport message in step 6 or when T2 expires, the SS shall transmit RRCConnectionRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:

- transmits in Cell 1 a Paging message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.),

or:

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 5.6.2.8.4.1-2 as appropriate.

## TBD5.6.2.8.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 5.6.2.8.4.3-1: Common Exception messages for Additional EN-DC FR1-FR2 event triggered reporting tests with SSB time index detection in DRX test requirement

Default Message Contents							
Common contents of system information	Table H.3.2-1						
blocks exceptions	Table H.3.2-2						
	Table H. TBD						
Default RRC messages and information	Table H. TBD						
elements contents exceptions							

**TBD** 

#### 5.6.2.8.5 Test requirement

Table 5.6.2.8.5-1 defines the primary level settings including test tolerances for all tests.

Table 5.6.2.8.5-1: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection in DRX

Parameter	Unit	Test	Cell 2		Cell 3	
		configuratio	T1	T1 T2		T2
NR RF Channel Number		n Config	1			2
		1,2,3,4,5,6	·	'		
Duplex mode		Config 1,4	FD		TDD	
		Config 2,3,5,6	TD	TDD		TDD
BWchannel	MHz	2,5,5,6 Config 1,4	10: N <sub>RE</sub>	10: N <sub>RB,c</sub> = 52		N <sub>RB,c</sub> = 66
		Config 2,5	10: N <sub>RE</sub>		100: N	N <sub>RB,c</sub> = 66
		Config 3,6	40: N <sub>RB</sub> ,			N <sub>RB,c</sub> = 66
BWP BW	MHz	Config 1,4	10: N <sub>RE</sub>			V <sub>RB,c</sub> = 66
		Config 2,5 Config 3,6	10: N <sub>RB</sub>			N <sub>RB,c</sub> = 66 N <sub>RB,c</sub> = 66
OCNG Patterns defined in		Config	40. INRB,	c = 100	100.1	NRB,c = 00
A.3.2.1.1 (OP.1)		1,2,3,4,5,6	OF	P.1		)P.1
PDSCH Reference		Config 1,4	SR.1.1	FDD		-
measurement channel		Config 2,5	SR.1.1	I TDD	1	
		Config 3,6	SR2.1			
CORESET Reference		Config 1,4	CR.1.1			-
Channel		Config 2,5	CR.1.1		_	
TDD configuration		Config 3,6	CR2.1		TDD	Conf.3.1
Configuration		Config 2,5				
		Config 3,6	TDDCc			Conf.3.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBW		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.3.11.1 and A.3.11.2		Config 1,4	SMT	C.2	SMTC.2	
		Config 2,3,5,6	SMT	C.1	SMTC.1	
PDSCH/PDCCH subcarrier	kHz	Config	1:	5		120
spacing		1,2,4,5				
EPRE ratio of PSS to SSS		Config 3,6	30	U	120	
EPRE ratio of PBCH DMRS						
to SSS  EPRE ratio of PBCH to PBCH						
DMRS						
EPRE ratio of PDCCH DMRS						
to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config	C	)		0
EPRE ratio of PDSCH DMRS		1,2,3,4,5,6	•			
to SSS						
EPRE ratio of PDSCH to						
PDSCH EPRE ratio of OCNG DMRS						
to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
UE orientation around TBD axis and TBD axis	degrees	Config 1,2,3,4,5,6	N.		1	ΓBD
Relative difference in angle of arrival of cell 3 relative to cell 2	degrees	Config 1,2,3,4,5,6	N.	A	NA	TBD

$N_{oc}$ Note2	dBm/15 kHz Note5		NA		TBD	
$N_{oc}^{ m Note2}$	dBm/S CS	Config 1,2,4,5		IA	TBD	
	Note4	Config 3,6	N	IA	-	TBD
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	NA	NA	TBD	TBD
	Note5	Config 3,6	NA	NA	TBD	TBD
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config 1,2,3,4,5,6	NA	NA	TBD	TBD
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3,4,5,6	NA	NA	TBD	TBD
Io <sup>Note3</sup>	dBm/9. 36MHz	Config 1,2,4,5	NA	NA	-	-
	dBm/38 .16MHz	Config 3,6	NA	NA	-	-
	dBm/95 .04 MHz Note5	Config 1,2,3,4,5,6	-	-	TBD	TBD
Propagation Condition		Config 1,2,3,4,5,6	AWGN			

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

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% with a confidence level of 95%.

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.

# 5.7 Measurement performance requirements

## 5.7.1 SS-RSRP

- 5.7.1.1 Intra-frequency measurements
- 5.7.1.2 Inter-frequency measurements
- 5.7.2 SS-RSRQ
- 5.7.3 SS-SINR

# 6 NR standalone in FR1

This section contains test scenarios for NR standalone. This configuration is also known as SA Option 2. All NR cells are in Frequency Range 1.

# 6.1 RRC IDLE state mobility

## 6.1.1 NR cell re-selection

## 6.1.1.0 Minimum conformance requirements

## 6.1.1.0.1 Minimum conformance requirements for intra-frequency cell re-selection

The cell re-selection delay shall be less than  $T_{evaluate\ NR\ Intra} + T_{SI-NR}$  in RRC\_IDLE state.

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 [30] within  $T_{\text{detect},NR\_Intra}$  as defined in table 4.2.2.3-1 of TS 38.133 [6] when that Treselection= 0 . An intra frequency cell is considered to be detectable according to the conditions defined in Annex B.1.2 of TS 38.133 [6] 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 of TS 38.133 [6]) 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 within  $T_{\text{evaluate,NR\_Intra}}$  when  $T_{\text{reselection}} = 0$  as specified in table 4.2.2.3-1 of TS 38.133 [6] provided that the cell has at least [3]dB better ranked.

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 [30], 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.

The normative reference for this requirement is TS 38.133 [6] clause 4.2.2.2 and 4.2.2.3.

## 6.1.1.0.2 Minimum conformance requirements for inter-frequency cell re-selection

The cell re-selection delay shall be less than T<sub>evaluate NR\_Intra</sub> + T<sub>SI-NR</sub> in RRC\_IDLE state.

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 of TS 38.133 [6].

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

The UE shall be able to evaluate whether a newly detectable inter-frequency cell meets the reselection criteria defined in TS38.304 [30] 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 for reselections based on ranking or [6]dB for SS-RSRP reselections based on absolute priorities or [4]dB 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 of TS 38.133 [6] for a corresponding Band.

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

The UE shall measure SS-RSRP or SS-RSRQ at least every  $K_{carrier} * T_{measure,NR\_Inter}$  (see table 4.2.2.4-1 of TS 38.133 [6]) 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 [30] within  $K_{carrier} * T_{evaluate,NR\_Inter}$  when  $T_{reselection} = 0$  as specified in table 4.2.2.4-1 of TS 38.133 [6] provided that the reselection criteria is met by

- the condition when performing equal priority reselection and the cell has at least [5]dB better ranked
- [6]dB for SS-RSRP reselections based on absolute priorities or
- [4]dB 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 of TS 38.133 [6] under the following conditions:

- T<sub>SMTC\_intra</sub> = T<sub>SMTC\_inter</sub> = 160 ms; where T<sub>SMTC\_intra</sub> and T<sub>SMTC\_inter</sub> are periodicities of the SMTC occasions configured for the intra-frequency carrier and the inter-frequency carrier respectively,
- SMTC occasions configured for the inter-frequency carrier occur up to TBD ms before the start or up to TBD ms after the end of the SMTC occasions configured for the intra-frequency carrier and
- SMTC occasions configured for the intra-frequency carrier and for the inter-frequency carrier occur up to TBD ms before the start or up to TBD ms after the end of the paging occasion [1].

The normative reference for this requirement is TS 38.133 [6] clause 4.2.2.4.

### 6.1.1.1 NR SA FR1 cell re-selection

## 6.1.1.1.1 Test purpose

The purpose of this test is to verify that when the current and target cell operates on the same carrier frequency the UE is able to search and measure cells to meet the intra-frequency NR cell re-selection requirements.

### 6.1.1.1.2 Test applicability

This test applies to all types of NR UE release 15.

### 6.1.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.1.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.1.1.1.

## 6.1.1.1.4 Test description

## 6.1.1.4.1 Initial conditions

This test shall be run in one of the configurations defined in Table 6.1.1.1.4.1-1.

Table 6.1.1.1.4.1-1: Supported test configurations for NR SA FR1 cell re-selection

Configuration	Description			
6.1.1.1-1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode			
6.1.1.1-2	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode			
6.1.1.1-3	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations.				

Configure the test equipment and the DUT according to the parameters in Table 6.1.1.1.4.1-2.

Table 6.1.1.1.4.1-2: Initial conditions for NR SA FR1 cell re-selection

Parameter		Value	Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified	in Annex E, table E.4-1 and TS 38.	508-1 [14] clause 4.3.1.		
Channel bandwidth	As specified by the test configuration selected from Table 6.1.1.4.1-1.				
Propagation conditions	AWGN		As specified in Annex C.2.2.		
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.2.3.4			
Exceptions to connection diagram		pable UEs without any 2Rx RF  3.2.5.2 for DUT part and			

- 1. The general test parameter settings are set up according to Table 6.1.1.1.4.1-3.
- 2. Message contents are defined in clause 6.1.1.1.4.3.
- 3. There is one NR carrier and 2 NR Cells specified in the test. Cell 1 is the PCell and Cell 2 is the neighbour cell. Cell 1 and Cell 2 are configured according to Annex C.1.1 and C.1.2.

Table 6.1.1.1.4.1-3: General test parameters for NR SA FR1 cell re-selection

	Parameter	Unit	Test configuration	Value	Comment
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
T2 end	Active cell		1, 2, 3	Cell2	
condition	Neighbour cells		1, 2, 3	Cell1	
Final condition	Active cell		1, 2, 3	Cell1	
RF Chann	el Number		1, 2, 3	1	
Time offse	t between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
Access Ba	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR1	·
,	•		2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	SMTC configuration		1	SMTC.2	
			2	SMTC.1	
			3	SMTC.1	
DRX cycle	DRX cycle length		1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH co	PRACH configuration index		1, 2, 3	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2, 3	Not configured	
T1		S	1, 2, 3	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2
T2		S	1, 2, 3	40	T2 needs to be defined so that cell reselection reaction time is taken into account.
T3		S	1, 2, 3	15	T3 needs to be defined so that cell reselection reaction time is taken into account.

#### 6.1.1.4.2 Test procedure

Two cells are deployed in the test, which are one FR1 NR PCell (Cell 1) and an NR neighbour cell (Cell 2) on the same frequency. The test consists of 3 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.

In the following test procedure "UE responds" means "UE starts transmitting preamble on PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure.

- 1. Ensure the UE is in state RRC\_IDLE with generic procedure parameters Connectivity NR according to TS 38.508-1 [14] clause 4.5. Set Cell 2 physical cell identity = initial cell 2 physical cell identity.
- 2. Set the parameters according to T1 in Table 6.1.1.1.5-1. T1 starts.
- 3. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for one iteration of the test procedure loop.
- 4. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.1.1.1.5-1.
- 5. The SS waits for random access requests information from the UE to perform cell re-selection to a newly detectable cell, Cell 2.
- 6. If the UE responds on the newly detectable cell, Cell 2 during time duration T2 within 34 seconds from the beginning of time period T2, then count a success for the event "Re-select newly detected Cell 2". Otherwise count a fail for the event "Re-select newly detected Cell 2".
- 7. If the UE has re-selected Cell 2 within T2, after the re-selection or when T2 expires, continue with step 8. Otherwise, if T2 expires and the UE has not yet re-selected Cell 2, skip to step 12.
- 8. The SS shall switch the power setting from T2 to T3 as specified in Table 6.1.1.1.5-1.
- 9. The SS waits for random access requests information from the UE to perform cell re-selection to an already detected cell, Cell 1.
- 10. If the UE responds on the already detected cell, Cell 1 during time duration T3 within 8 seconds from the beginning of time period T3, then count a success for the event "Re-select already detected Cell 1". Otherwise count a fail for the event "Re-select already detected Cell 1".
- 11. If the UE has re-selected Cell 1 within T3, after the re-selection or when T3 expires, skip to step 13. Otherwise, if T3 expires and the UE has not yet re-selected Cell 1, continue with step 12.
- 12. Switch off and on the UE and ensure the UE is in state RRC\_IDLE with generic procedure parameters Connectivity NR according to TS 38.508-1 [14] clause 4.5 in Cell 1.
- 13. Repeat step 2-12 until a test verdict has been achieved.
  Each of the events "Re-select newly detected Cell 2" and "Re-select already detected Cell 1" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G clause G.2 is achieved. Different events may require different times for a verdict.
  - If both events pass, the test passes. If one event fails, the test fails.

## 6.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.1.1.1.4.3-1: Common Exception messages

Defect Messes of						
Default Message Contents						
Common contents of system information blocks exceptions	Table H.2.1-1 with Condition SMTC.2 and Asynchronous cells for configuration 6.1.1.1-1 Table H.2.1-1 with Condition SMTC.1 and synchronous cells for configuration 6.1.1.1-2 Table H.2.1-1 with Condition SMTC.1 and synchronous cells for configuration 6.1.1.1-3 Table H.2.1-2 Table H.2.1-2 Table H.2.3-1					
Default RRC messages and information	Table H.3.2-1					
elements contents exceptions						

## 6.1.1.1.5 Test requirement

Tables 6.1.1.1.4.1-3 and 6.1.1.1.5-1 define the primary level settings including test tolerances for intra frequency NR cell re-selection test case.

Table 6.1.1.1.5-1: Cell specific test parameters for NR SA FR1 cell re-selection

Parameter	Unit	Test		Cell 1			Cell 2	
		configuration	T1	T2	Т3	T1	T2	Т3
TDD configuration		1		N/A	•		N/A	
-		2	Т	DDConf.1.	1	Т	DDConf.1.	.1
		3	Т	DDConf.2.	1	TDDConf.2.1		
PDSCH RMC		1	,	SR.1.1 FDD	)		N/A	
configuration		2	,	SR.1.1 TDD	)			
		3		SR.2.1 TDD	)			
RMSI CORESET		1		CR.1.1 FDD		(	CR.1.1 FDI	)
RMC configuration		2		CR.1.1 TDD			CR.1.1 TDI	
3		3		CR.2.1 TDD			R.2.1 TDI	
Dedicated CORESET		1		CR.1.1 FD			CR.1.1 FD	
RMC configuration		2		CR.1.1 TD			CR.1.1 TD	
3		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		DLBWP.0.1			DLBWP.0.	
configuration		1, 2, 0	'	D_DTT .0		-	J	•
Initial UL BWP		1, 2, 3		ULBWP.0.1		l	JLBWP.0.	1
configuration		1, _, -						-
RLM-RS		1, 2, 3		SSB			SSB	
Qrxlevmin	dBm/SCS	1, 2		-140		-140		
		3		-137		-137		
Pcompensation	dB	1, 2, 3	0			0		
Qhyst <sub>s</sub>	dB	1, 2, 3	0		0			
Qoffset <sub>s, n</sub>	dB	1, 2, 3	0			0		
Cell_selection_and_	<u> </u>	1, 2, 3						
reselection_quality_		1, 2, 0	SS-RSRP SS-RSRP					
measurement								
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1	16	-3.55	3.24	-infinity	3.24	-3.55
$\mathbf{E}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		2				,		
		3						
$N_{oc}$ Note2	dBm/SCS	1		1	-98		ı	
TV <sub>oc</sub>		2			-98			
		3			-95			
λ7 Note2	dBm/15 kHz	1			-98			
$N_{oc}$ Note2		2						
		3						
$\hat{E}_s/N_{oc}$	dB	1	16	13	16.45	-infinity	16.45	13
$E_s/IV_{oc}$		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-82	-85	-81.55	-infinity	-81.55	-85
	a5111/000	2	-82	-85	-82+TT	-infinity	-82+TT	-
		_	02		02.11	ii iii ii ii y	02111	85+TT
		3	-79	-82	-79+TT	-infinity	-79+TT	-
		Ŭ	. 0	02			10	82+TT
lo	dBm/9.36 MHz	1	-53.94 -51.91 -51.91 Specified in Cell					
· <del>-</del>	dBm/9.36 MHz	2	-53.94 -51.91 -51.91 columns			•		
•	dBm/38.16 MHz	3	-47.85	-45.81	-45.81			
Treselection	S	1, 2, 3	0	0	0	0	0	0
Sintrasearch	dB	1, 2, 3		Not sent			Not sent	
Propagation	<u> </u>	1, 2, 3	AWGN					
Condition		1, 2, 3			AVVG	4		
SCHOOL I			<del></del>					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed 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.

The cell re-selection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell test requirement in this case is expressed as:

Cell re-selection delay to a newly detectable cell =  $T_{detect,NR Intra} + T_{SI-NR}$ 

 $T_{detect,NR Intra} = 32 \text{ s}$ ; as specified in TS 38.133 [6] clause 4.2.2.3.

 $T_{SI-NR} = 1280$  ms; maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell is assumed in this test.

The cell re-selection delay to a newly detectable cell shall be less than a total of 33.28 seconds in this test case (note: this gives a total of 33.28 seconds but the test allows 34 seconds).

The cell re-selection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell test requirement in this case is expressed as:

Cell re-selection to an already detected cell delay =  $T_{evaluate,NR}$  Intra +  $T_{SI-NR}$ 

 $T_{evaluate,NR\_Intra} = 6.4 \text{ s}$ ; as specified in TS 38.133 [6] clause 4.2.2.3.

 $T_{SI-NR} = 1280$  ms; maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell is assumed in this test.

The cell re-selection delay to an already detected cell shall be less than a total of 7.68 seconds in this test case (note: this gives a total of 7.68 seconds but the test allows 8 seconds).

For the test to pass, both events above shall pass.

The statistical pass/ fail decisions are done separated for each event. For an event to pass, the total number of successful loops shall be more than 90% of the cases with a confidence level of 95%.

### 6.1.1.2 NR SA FR1-FR1 cell re-selection

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are missing.

### 6.1.1.2.1 Test purpose

The purpose of this test is to verify the requirement for the inter frequency NR cell reselection.

### 6.1.1.2.2 Test applicability

This test applies to all types of NR UE release 15.

### 6.1.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.1.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.6.1.1.2.

### 6.1.1.2.4 Test description

#### 6.1.1.2.4.1 Initial conditions

This test shall be run in one of the configurations defined in Table 6.1.1.2.4.1-1.

Table 6.1.1.2.4.1-1: Supported test configurations for NR SA FR1-FR1 cell re-selection

Configuration	Description of serving cell	Description of target cell				
6.1.1.2-1	15 kHz SSB SCS, 10MHz bandwidth, FDD	15 kHz SSB SCS, 10MHz bandwidth, FDD				
	duplex mode	duplex mode				
6.1.1.2-2	15 kHz SSB SCS, 10MHz bandwidth, TDD	15 kHz SSB SCS, 10MHz bandwidth, TDD				
	duplex mode	duplex mode				
6.1.1.2-3	30 kHz SSB SCS, 40MHz bandwidth, TDD	30 kHz SSB SCS, 40MHz bandwidth, TDD				
duplex mode duplex mode						
Note: The L	Note: The UE is only required to be tested in one of the supported test configurations.					

Configure the test equipment and the DUT according to the parameters in Table 6.1.1.2.4.1-2.

Table 6.1.1.2.4.1-2: Initial conditions for NR SA FR1-FR1 cell re-selection

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, table E.4-1 and TS 38.	508-1 [14] clause 4.3.1.
Channel bandwidth	As specified	by the test configuration selected fr	rom Table 6.1.1.2.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

- 1. The general test parameter settings are set up according to Table 6.1.1.2.4.1-3.
- 2. Message contents are defined in clause 6.1.1.2.4.3.
- 3. There is two NR carrier and 2 NR Cells specified in the test. Cell 1 is the PCell and Cell 2 is the neighbour cell in a different carrier than cell 1. Cell 1 and Cell 2 are configured according to Annex C.1.2.

Table 6.1.1.2.4.1-3: General test parameters for NR SA FR1-FR1 cell re-selection

Parameter L		Unit	Test	Value	Comment
	. aramoto.		configuration	14.40	- Commont
Initial	Active cell		1, 2, 3	Cell2	The UE camps on cell 2 in the initial
condition					phase and during T1 period the UE
					reselects to cell 1
T1 end	Active cell		1, 2, 3	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cells		1, 2, 3	Cell2	during T1
T3 end	Active cell		1, 2, 3	Cell2	The UE shall perform reselection to cell 2
condition					with higher priority during T3
RF Channe			1, 2, 3	1, 2	
Time offset	t between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
Access Bar	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access
					procedure.
SSB config	juration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC conf	figuration		1	SMTC	
				pattern 2	
			2	SMTC	
				pattern 1	
			3	SMTC	
DDV I	1 (1		1.0.0	pattern 1	T
DRX cycle		S	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH co	nfiguration index		1, 2, 3	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2, 3	Not	
				configured	
T1		S	1, 2, 3	15	T1 needs to be defined so that cell re-
					selection reaction time is taken into
					account.
T2		S	1, 2, 3	>7	During T2, cell 2 shall be powered off,
					and during the off time the physical cell
					identity shall be changed. The intention is
					to ensure that cell 2 has not been
					detected by the UE prior to the start of
To			4.0.0	75	period T3.  T3 needs to be defined so that cell re-
T3		S	1, 2, 3	75	selection reaction time is taken into
					account.
			<u> </u>	l	account.

### 6.1.1.2.4.2 Test procedure

The test consists of one active cell and one neighbour cell. The UE is requested to monitor the neighbouring cell on one of the NR carriers. 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 1.

In the following test procedure "UE responds" means "UE starts transmitting preamble on PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure.

- 1. Ensure the UE is in state RRC\_IDLE with generic procedure parameters Connectivity NR according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.1.1.2.5-1. Propagation conditions are set according to Annex B clause B.1.1. T1 starts.
- 3. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for one iteration of the test procedure loop.

- 4. The SS waits for random access requests information from the UE to perform cell re-selection on the lower priority cell, Cell 1.
- 5. If the UE responds on lower priority cell, Cell 1 during time duration T1 within 8 seconds from the beginning of time period T1, then count a success for the event "Re-select lower priority Cell 1". Otherwise count a fail for the event "Re-select lower priority Cell 1".
- 6. If the UE has re-selected Cell 1 within T1, after the re-selection or when T1 expires, continue with step 7. Otherwise, if T1 expires and the UE has not yet re-selected Cell 1, skip to step 12.
- 7. The SS shall switch the power setting from T1 to T2 as specified in Table 6.1.1.2.5-1. During time duration T2, Cell 2 shall be powered OFF and the physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) shall be changed to ensure Cell 2 is not detected by the UE.
- 8. When T2 expires, the SS shall switch the power setting from T2 to T3 as specified in Table 6.1.1.2.5-1.
- 9. The SS waits for random access requests information from the UE to perform cell re-selection on the higher priority cell, Cell 2.
- 10. If the UE responds on higher priority cell, Cell 2 during time duration T3 within 68 seconds from the beginning of time period T3, then count a success for the event "Re-select higher priority Cell 2". Otherwise count a fail for the event "Re-select higher priority Cell 2".
- 11. If the UE has re-selected Cell 2 within T3, after the re-selection or when T3 expires, skip to step 13. Otherwise, if T3 expires and the UE has not yet re-selected Cell 2, continue with step 12.
- 12. Switch off and on the UE and ensure the UE is in state RRC\_IDLE with generic procedure parameters Connectivity NR according to TS 38.508-1 [14] clause 4.5 in Cell 2.
- 13. Repeat step 3-12 until a test verdict has been achieved.

Each of the events "Re-select lower priority Cell 1" and "Re-select higher priority Cell 2" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G clause G.2 is achieved. Different events may require different times for a verdict.

If both events pass, the test passes. If one event fails, the test fails.

### 6.1.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.1.1.2.4.3-1: Common Exception messages

Default Message Contents				
Common contents of system information				
blocks exceptions				
Default RRC messages and information	FFS			
elements contents exceptions				

## 6.1.1.2.5 Test requirement

Tables 6.1.1.2.4.1-2 and 6.1.1.2.5-1 define the primary level settings including test tolerances for inter frequency NR cell re-selection test case.

Table 6.1.1.2.5-1: Cell specific test parameters for NR SA FR1-FR1 cell re-selection

Parameter	Unit	Test		Cell 1		<u></u>	Cell 2	
		configuration	T1	T2	Т3	T1	T2	T3
TDD configuration		1		N/A			N/A	
ŭ		2	Т	DDConf.1.	1	Т	DDConf.1.	1
		3		DDConf.2.		TDDConf.2.1		
PDSCH RMC		1		SR.1.1 FDD		N/A		
configuration		2		SR.1.1 TDD				
g		3		SR.2.1 TDD		_		
RMSI CORESET		1		CR.1.1 FDC		(	CR.1.1 FDI	)
RMC configuration		2		CR.1.1 TDD			CR.1.1 TDI	
rune comigaration		3		CR.2.1 TDD			CR.2.1 TDI	
Dedicated CORESET		1		CR.1.1 FDI			CR.1.1 FD	
RMC configuration		2		CR.1.1 TDI			CR.1.1 TD	
ravio coringulation		3		CR.1.1 TDI			CR.2.1 TD	
OCNG Pattern		1, 2, 3		defined in A			defined in A	
Initial DL BWP		1, 2, 3		DLBWP.0.1			DLBWP.0.	
configuration		1, 2, 3	L	JLBVVF.U. I		L	JLBVVF.U.	l
Initial UL BWP		1, 2, 3	-	JLBWP.0.1			JLBWP.0.	1
configuration		1, 2, 3	,	JLBVVF.U. I		,	JLBVVP.U.	l
RLM-RS		1, 2, 3		SSB			SSB	
	dD/CCC							
Qrxlevmin	dBm/SCS	1, 2		-140		-140		
D	-ID	3	-137		-137			
Pcompensation	dB	1, 2, 3	0		0			
Qhyst <sub>s</sub>	dB	1, 2, 3	0		0			
Qoffset <sub>s, n</sub>	dB	1, 2, 3	0		0			
Cell_selection_and_		1, 2, 3	00 0000					
reselection_quality_			SS-RSRP		SS-RSRP			
measurement							1	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	15.6	15.6	15.6	-3.6	-infinity	13.6
s / Ot		2						
		3						
$N_{oc}$ Note2	dBm/SCS	1		-98		-100	-98	-98
<i>oc</i>		2		-98		-100	-98	-98
		3		-95		-97	-95	-95
$N_{oc}^{}$ Note2	dBm/15 kHz	1		-98		-100	-98	-98
· oc		2						
		3						
$\hat{E}_s/N_{oc}$	dB	1	15.6	15.6	15.6	-3.6	-infinity	13.6
$E_s/V_{oc}$		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-82.4	-82.4	-82.4	-103.6	-infinity	-84.4
		2	-82.4	-82.4	-82.4	-103.6	-infinity	-84.4
		3	-79.39	-79.39	-79.39	-	-infinity	-81.39
						100.59		
lo	dBm/9.36 MHz	1	-54.33	-54.33	-54.33	-70.46	-infinity	-56.26
	dBm/9.36 MHz	2	-54.33	-54.33	-54.33	-70.46	-infinity	-56.26
	dBm/38.16 MHz	3	-48.23	-48.23	-48.23	-67.37	-infinity	-53.17
Treselection	S	1, 2, 3	0	0	0	0	0	0
Snonintrasearch	dB	1, 2, 3		50	<u> </u>		Not sent	<u> </u>
Thresh <sub>x, high</sub>	dB	1, 2, 3	48			48		
Thresh <sub>serving, low</sub>	dB	1, 2, 3	_			44		
	dB		44					
Thresh <sub>x, low</sub>	UD	1, 2, 3	50 50 50 AWGN					
Propagation Condition		1, 2, 3			AVVG	JIN .		
		th calla ara fully alla						

Note 1: OCNG 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 over subcarriers Note 2:

and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled. SS-RSRP levels have been derived from other parameters for information purposes. They are not settable Note 3: parameters themselves.

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 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 RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 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:

Thigher\_priority\_search See clause 4.2.2.7 of TS 38.133 [6]

T<sub>evaluate, NR\_ inter</sub> See Table 4.2.2.4-1 in clause 4.2.2.4 of TS 38.133 [6]

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 reselection delay to a lower priority cell in the test case, which we allow 8 s.

For the test to pass, both events above shall pass.

The statistical pass/ fail decisions are done separated for each event. For an event to pass, the total number of successful loops shall be more than 90% of the cases with a confidence level of 95%.

## 6.1.2 NR – E-UTRA cell re-selection

## 6.1.2.0 Minimum conformance requirements

### 6.1.2.0.1 Minimum conformance requirements for NR – E-UTRA cell re-selection

The cell re-selection delay to a higher priority cell shall be less than  $T_{higher\_priority\_search} + T_{evaluate, EUTRAN} + T_{SI-E-UTRA}$  in RRC\_IDLE state.

The cell re-selection delay to a lower priority E-UTRA cell shall be less than  $T_{evaluate,\;E-UTRAN} + T_{SI-E-UTRA}$  in RRC\_IDLE state.

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 of TS 38.133 [6].

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

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

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

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

The UE shall be able to evaluate whether a newly detectable inter-RAT E-UTRAN cell meets the reselection criteria defined in TS38.304 [30] within ( $N_{EUTRA\_carrier}$ ) \*  $T_{detect,EUTRAN}$  when  $Srxlev \leq S_{nonIntraSearchP}$  or  $Squal \leq S_{nonIntraSearchQ}$  when  $T_{reselection} = 0$  provided that the reselection criteria is met by a margin of at least 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities.

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

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

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

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

For a cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that an already identified inter-RAT E-UTRA cell has met reselection criterion defined in TS 38.304~[30] within ( $N_{EUTRA\_carrier}$ ) \*  $T_{evaluate,EUTRAN}$  when  $T_{reselection} = 0$  as speficied in table 4.2.2.5-1 of TS 38.133~[6] 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 [30], 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.

The normative reference for this requirement is TS 38.133 [6] clause 4.2.2.5.

## 6.1.2.1 NR SA FR1 – E-UTRA cell re-selection to higher priority E-UTRA

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.

## 6.1.2.1.1 Test purpose

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 of TS 38.133 [6] when the E-UTRAN cell is of higher priority.

#### 6.1.2.1.2 Test applicability

This test applies to all types of NR UE release 15.

### 6.1.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.1.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.1.2.1.

6.1.2.1.4 Test description

6.1.2.1.4.1 Initial conditions

The Test shall be tested using any of the test configuration in Table 6.1.2.1.4.1-1.

Table 6.1.2.1.4.1-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
6.1.2.1-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD	LTE 10MHz bandwidth, TDD duplex mode
	duplex mode	
6.1.2.1-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD	LTE 10MHz bandwidth, TDD duplex mode
	duplex mode	
6.1.2.1-3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD	LTE 10MHz bandwidth, TDD duplex mode
	duplex mode	
6.1.2.1-4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD	LTE 10MHz bandwidth, FDD duplex mode
	duplex mode	
6.1.2.1-5	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD	LTE 10MHz bandwidth, FDD duplex mode
	duplex mode	
6.1.2.1-6	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD	LTE 10MHz bandwidth, FDD duplex mode
	duplex mode	
Note: The UE	is only required to be tested in one of the supported	d test configurations.

Configure the test equirement and the DUT according to the parameters in Table 6.1.2.1.4.1-2.

Table 6.1.2.1.4.1-2: Initial conditions for NR SA FR1 – E-URTA cell re-selection o higher priority E-UTRA

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies		in Annex E, Table E.4-1 and TS 38	
Channel	As specified	by the test configuration selected fr	om Table 6.1.2.1.4.1-1.
bandwidth			
Propagation	AWGN		As specified in Annex C.2.2.
conditions			
Connection	TE Part	A.3.1.6.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.2	
Exceptions to	N/A		
connection			
diagram			

- 1. The general test parameter settings are set up according to Table 6.1.2.1.4.1-3.
- 2. Message contents are defined in clause 6.1.2.1.4.3.
- 3. The test scenario comprises of one NR cell and one E-UTRAN cell. Cell 1 is the NR PCell and Cell 2 is the E-UTRA neighbour cell. Cell 1 is configured according to Annex C.1.1 and C.1.2, Cell 2 is configured according to TS 36.521-3 [26] Annex C.1.0 and C.1.1.

Table 6.1.2.1.4.1-3: General test parameters for NR to higher priority E-UTRAN cell re-selection test case

	Parameter	Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial phase and during T2 period the UE reselects to cell 2.
T2 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cells		1, 2, 3, 4, 5, 6	Cell1	during T2.
T3 end	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cells		1, 2, 3, 4, 5, 6	Cell2	during T3 for iteration of the tests.

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	87	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	4	As specified in table 5.7.1-2 in TS 36.211
T1	S	1, 2, 3, 4, 5, 6	>7	During T1, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2.
T2	S	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re- selection reaction time is taken into account.
Т3	S	1, 2, 3, 4, 5, 6	15	T3 needs to be defined so that cell re- selection reaction time is taken into account.

#### 6.1.2.1.4.2 Test procedure

Two cells are deployed in the test, which are one FR1 NR PCell (Cell 1) and an E-UTRA neighbour cell (Cell 2). 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.

Before T1 the UE is camped on to cell 1. During T1, cell 2 shall be powered off. At the start of T2 the UE is expected to detect cell 2, send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Routing Area Update procedure on cell 2. At the start of T3 cell 2 becomes weaker than cell 1, and the UE reselects to Cell 1.

In the following test procedure "UE responds" means "UE starts transmitting preamble on PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure.

- 1. Ensure the UE is in state RRC\_IDLE with generic procedure parameters Connectivity NR according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.1.2.1.5-1 and 6.1.2.1.5-2. T1 starts.
- 3. During T1, Cell 2 shall be powered off and set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for one iteration of the test procedure loop.
- 4. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.1.2.1.5-1 and 6.1.2.1.5-2.
- 5. The SS waits for random access requests information from the UE to perform cell re-selection to a higher priority cell, Cell 2.
- 6. If the UE responds on Cell 2 during time duration T2 within 68 seconds from the beginning of time period T2, then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.
- 7. If the UE has re-selected Cell 2 within T2, after the re-selection or when T2 expires, continue with step 8. Otherwise, if T2 expires and the UE has not yet re-selected Cell 2, skip to step 11.
- 8. The SS shall switch the power setting from T2 to T3 as specified in Table 6.1.2.1.5-1 and 6.1.2.1.5-2.
- 9. The SS waits for random access requests information from the UE to perform cell re-selection to a lower priority cell, Cell 1.
- 10. If the UE has re-selected Cell 1 within T3, after the re-selection or when T3 expires, skip to step 12. Otherwise, if T3 expires and the UE has not yet re-selected Cell 1, continue with step 11.

- 11. Switch off and on the UE and ensure the UE is in state RRC\_IDLE with generic procedure parameters Connectivity NR according to TS 38.508-1 [14] clause 4.5.
- 12. Repeat step 2-11 until a test verdict has been achieved.

## 6.1.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.1.2.1.4.3-1: Common Exception messages

Default Message Contents					
Common contents of system information					
blocks exceptions					
Default RRC messages and information	FFS				
elements contents exceptions					

## 6.1.2.1.5 Test requirement

Tables 6.1.2.1.4.1-3, 6.1.2.1.5-1 and 6.1.2.1.5-2 define the primary level settings including test tolerances for higher priority E-UTRA cell re-selection test case.

Table 6.1.2.1.5-1: Cell specific test parameters for NR cell 1

Parameter	Unit	Test configuration		Cell 1	
			T1	T2	T3
TDD configuration		1, 4		N/A	
		2, 5	TDDConf.1.1		.1
		3, 6		DDConf.2	
PDSCH parameters		1, 4	5	R.1.1 FD	D
		2, 5	5	SR.1.1 TD	D
		3, 6		R.2.1 TD	
RMSI CORESET		1, 4	(	R.1.1 FD	D
parameters		2, 5		R.1.1 TD	
i i		3, 6		R.2.1 TD	
Dedicated CORESET		1, 4	С	CR.1.1 FE	DD
parameters		2, 5		CR.1.1 TE	
		3, 6	С	CR.2.1 TE	DD
SSB parameters		1, 4		SSB.1 FR	
		2, 5		SSB.1 FR	
		3, 6		SSB.2 FR	
NR SMTC parameters		1, 4	SM	ITC patter	n 2
·		2, 5		ITC patter	
		3, 6	SMTC pattern 1		
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 c	defined in	A.3.2.1
Initial DL BWP configuration		1, 2, 3, 4, 5, 6		DLBWP.0.	
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	Į	JLBWP.0.	1
RLM-RS		1, 2, 3, 4, 5, 6		SSB	
Qrxlevmin	dBm/SCS	1, 2, 4, 5		-140	
		3, 6		-137	
$N_{oc}$	dBm/SCS	1, 4		-98	
1 oc		2, 5	-98		
		3, 6	-95		
$N_{oc}$	dBm/15 kHz	1, 2, 3, 4, 5, 6	-98		
SS-RSRP	dBm/SCS	1, 4	-84	-82.4	-82.4
		2, 5	-84	-82.4	-82.4
		3, 6	-81	-79.39	-79.39
$\hat{E}_{s}/I_{ot}$	dB	1, 4			15.6
<u>~</u> s / •ot		2, 5			
		3, 6			
$\hat{E}_s/N_{oc}$	dB	1, 4	14 15.6 15		15.6
s/ Toc		2, 5			
		3, 6			

lo	dBm/9.36 MHz	1, 4	-55.88	-54.33	-54.33
	dBm/9.36 MHz	2, 5	-55.88	-55.88 -54.33 -5	
	dBm/38.16 MHz	3, 6	-49.79	-48.23	-48.23
Treselection	S	1, 2, 3, 4, 5, 6		0	
Snonintrasearch	dB	1, 2, 3, 4, 5, 6	50		
Thresh <sub>x, high (Note 2)</sub>	dB	1, 2, 3, 4, 5, 6	48		
Thresh <sub>serving, low</sub>	dB	1, 2, 3, 4, 5, 6	44		
Thresh <sub>x, low</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 6.1.2.1.5-2: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit		Cell 2	
		T1	T2	Т3
E-UTRA RF Channel			1	
number				
BW <sub>channel</sub>	MHz		10	
OCNG Patterns defined in		OP.2	2 TDD for	test
TS 36.133 clause A.3.2			uration 1	
			2 FDD for	
		config	guration 4	, 5, 6
PBCH_RA	dB			
PBCH_RB	dB			
PSS_RA	dB			
SSS_RA	dB			
PCFICH_RB	dB			
PHICH_RA	dB		•	
PHICH_RB	dB		0	
PDCCH_RA	dB			
PDCCH_RB	dB			
PDSCH_RA	dB			
PDSCH_RB	dB			
OCNG_RA <sup>Note 1</sup>	dB			
OCNG_RB <sup>Note 1</sup>	dB			
Qrxlevmin	dBm		-140	
$N_{oc}$	dBm/15 kHz	-98	-98	-100
RSRP	dBm/15 KHz	-infinity	-84.4	-103.6
$\hat{E}_{s}/I_{ot}$	dB	-infinity	13.6	-3.6
$\hat{E}_s/N_{oc}$	dB	-infinity	13.6	-3.6
Treselection <sub>EUTRAN</sub>	S	0		
Snonintrasearch	dB	Not sent		
Thresh <sub>x, high (Note 2)</sub>	dB	48		
Thresh <sub>serving</sub> , low	dB	44		
Thresh <sub>x, low</sub>	dB	50		
Propagation Condition		4111	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, high</sub> which is included in E-UTRA system information, and is a threshold for the NR target cell

The cell reselection delay to a higher priority E-UTRAN cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as:  $T_{higher\_priority\_search} + T_{evaluate, E-UTRAN} + T_{SI-E-UTRA}$ ,

#### Where:

 $T_{higher\_priority\_search}$  See clause 4.2.2.7 of TS 38.133 [6]

T<sub>evaluate, E-UTRAN</sub> See Table 4.2.2.5-1 in clause 4.2.2.5 of TS 38.133 [6]

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.

## 6.1.2.2 NR SA FR1 – E-UTRA cell re-selection to lower priority E-UTRA

#### Editor's note:

- Message contents are not complete.
- Connection diagram is TBD.
- Update cell1/2 due to power levels for test procedure change.
- -TT is incomplete.
- Cell mapping is missing.
- Some parts of TC are TBDs.

### 6.1.2.2.1 Test purpose

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 of TS 38.133 [6] when the E-UTRAN cell is of lower priority.

### 6.1.2.2.2 Test applicability

This test applies to all types of NR UE release 15.

### 6.1.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.1.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.1.2.2.

### 6.1.2.2.4 Test description

## 6.1.2.2.4.1 Initial conditions

The Test shall be tested using any of the test configuration in Table 6.1.2.2.4.1-1.

Table 6.1.2.2.4.1-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell					
6.1.2.2-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	LTE 10MHz bandwidth, TDD duplex mode					
6.1.2.2-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	LTE 10MHz bandwidth, TDD duplex mode					
6.1.2.2-3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	LTE 10MHz bandwidth, TDD duplex mode					
6.1.2.2-4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	LTE 10MHz bandwidth, FDD duplex mode					
6.1.2.2-5	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	LTE 10MHz bandwidth, FDD duplex mode					
6.1.2.2-6	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	LTE 10MHz bandwidth, FDD duplex mode					
Note: The UE	Note: The UE is only required to be tested in one of the supported test configurations.						

Configure the test equirement and the DUT according to the parameters in Table 6.1.2.2.4.1-2.

Table 6.1.2.2.4.1-2: Initial conditions for NR SA FR1 – E-URTA cell re-selection o lower priority E-UTRA

Parameter		Value	Comment	
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.	
Test frequencies	As specified	I in Annex E, Table E.4-1 and TS 38	.508-1 [14] clause 4.3.1.	
Channel bandwidth	As specified by the test configuration selected from Table 6.1.2.2.4.1-1.			
Propagation conditions	AWGN		As specified in Annex C.2.1.	
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.	
Diagram	DUT Part	A.3.TBD		
Exceptions to connection diagram	N/A			

- 1. The general test parameter settings are set up according to Table 6.1.2.2.4.1-3.
- 2. Message contents are defined in clause 6.1.2.2.4.3.
- 3. There is one E-UTRA carrier and 1 E-UTRA cell specified in the test. There is one NR carrier and 1 NR Cells specified in the test. Cell 1 is the NR PCell and Cell 2 is the E-UTRA neighbour cell. Cell 1 and Cell 2 are configured according to Annex C.1.1 and C.1.2.

Table 6.1.2.2.4.1-3: General test parameters for NR to lower priority E-UTRAN cell re-selection test case

	Parameter	Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE camps on cell 1 in the initial phase.
T1 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cells		1, 2, 3, 4, 5, 6	Cell1	during T1.
T2 end	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cells		1, 2, 3, 4, 5, 6	Cell2	during T2 for iteration of the tests.
Access Ba	Access Barring Information		1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.
DRX cycle	DRX cycle length		1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the test.
NR PRACE	NR PRACH configuration index		1, 2, 3, 4, 5, 6	87	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	4	As specified in table 5.7.1-2 in TS 36.211
T1		S	1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell re- selection reaction time is taken into account.
T2		S	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re- selection reaction time is taken into account.

### 6.1.2.2.4.2 Test procedure

Two cells are deployed in the test, which are one FR1 NR PCell (Cell 1) and an E-UTRA neighbour cell (Cell 2). The test consists of three successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

At T1 the UE is camped on to Cell 1. Cell 2 is of lower priority than Cell 1. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

In the following test procedure "UE responds" means "UE starts transmitting preamble on PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure according to TS 38.508-1 [14] clause TBD".

- 1. Ensure the UE is in State [TBD] according to TS 38.508-1 [14] clause [TBD].
- 2. Set the parameters according to T1 in Table 6.1.2.2.5-1 and 6.1.2.2.5-2. Propagation conditions are set according to Annex C clause C.2.2. T1 starts. If the UE is already camped in Cell 1, wait until T1expires and skip to step 5.
- 3. The SS waits for random access requests information from the UE to perform cell re-selection on Cell 1.
- 4. If the UE has re-selected Cell 1 within T1, after the re-selection or when T1 expires, continue with step 5. Otherwise, if T1 expires and the UE has not yet re-selected Cell 1, skip to step 9.
- 5. The SS shall switch the power setting from T1 to T2 as specified in Table 6.1.2.2.5-1 and 6.1.2.2.5-2.
- 6. The SS waits for random access requests information from the UE to perform cell re-selection on Cell 2.
- 7. If the UE responds on Cell 2 during time duration T2 within 8 seconds from the beginning of time period T2 then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.
- 8. If the UE has re-selected Cell 2 within T2, after the re-selection or when T2 expires, skip to step 10. Otherwise, if T2 expires and the UE has not yet re-selected Cell 2, continue with step 9.
- 9. Switch off and on the UE and ensure the UE is in State [TBD] according to TS 38.508-1 [14] clause [TBD].
- 10. Repeat step 2-9 until a test verdict has been achieved.

## 6.1.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.1.2.2.4.3-1: Common Exception messages

Default Message Contents					
Common contents of system information					
blocks exceptions					
Default RRC messages and information	FFS				
elements contents exceptions					

## 6.1.2.2.5 Test requirement

Tables 6.1.2.2.4.1-3, 6.1.2.2.5-1 and 6.1.2.2.5-2 define the primary level settings including test tolerances for higher priority E-UTRA cell re-selection test case.

Table 6.1.2.2.5-1: Cell specific test parameters for NR cell 1

Time	Parameter	Unit	Test configuration	Cell 1	
PDSCH RMC configuration			· ·		
PDSCH RMC configuration	TDD configuration		1, 4	N/	Á
PDSCH RMC configuration	_		2, 5	TDDCc	nf.1.1
RMSI CORESET RMC			3, 6	TDDCc	nf.2.1
SMSI CORESET RMC	PDSCH RMC configuration		1, 4	SR.1.1	FDD
RMSI CORESET RMC configuration         1, 4         CR.1.1 FDD           configuration         2, 5         CR.1.1 TDD           Dedicated CORESET RMC configuration         1, 4         CCR.1.1 FDD           Configuration         2, 5         CCR.1.1 FDD           SSB configuration         1, 4         SSB.1 FR1           SSB configuration         1, 4         SSB.1 FR1           SMTC configuration         1, 4         SMTC pattern 2           SMTC configuration         1, 4         SMTC pattern 2           SMTC pattern 1         2, 5         SMTC pattern 1           OCNG Pattern         1, 2, 3, 4, 5, 6         OP.1 defined in A.3.2.1           Initial DL BWP configuration         1, 2, 3, 4, 5, 6         ULBWP.0           Initial DL BWP configuration         1, 2, 3, 4, 5, 6         ULBWP.0           RLM-RS         1, 2, 3, 4, 5, 6         ULBWP.0           Qrxlevmin         dBm/SCS         1, 2, 4, 5         SSB           Qrxlevmin         dBm/SCS         1, 2, 3, 4, 5, 6         ULBWP.0           Noc         dBm/SCS         1, 4         -98           SS-RSRP         dBm/SCS         1, 4         -102         -86           3, 6         -95         -98         -83			2, 5	SR.1.1	TDD
$ \begin{array}{c} \text{configuration} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$			3, 6	SR.2.1	TDD
Dedicated CORESET RMC	RMSI CORESET RMC		1, 4	CR.1.1	FDD
Dedicated CORESET RMC	configuration		2, 5	CR.1.1	TDD
Dedicated CORESET RMC	_		3, 6	CR.2.1	TDD
SSB configuration	Dedicated CORESET RMC			CCR.1.	1 FDD
SSB configuration	configuration		2, 5	CCR.1.	1 TDD
SSB configuration				CCR.2.	1 TDD
SMTC configuration	SSB configuration				
SMTC configuration         3, 6         SSB.2 FR1           SMTC configuration         1, 4         SMTC pattern 1           2, 5         SMTC pattern 1           3, 6         SMTC pattern 1           1, 2, 3, 4, 5, 6         OP.1 defined in A.3.2.1           Initial DL BWP configuration         1, 2, 3, 4, 5, 6         DLBWP.0           Initial UL BWP configuration         1, 2, 3, 4, 5, 6         DLBWP.0           RLM-RS         1, 2, 3, 4, 5, 6         SSB           Qrxlevmin         dBm/SCS         1, 2, 4, 5         -140           3, 6         -137         -140         -98           2, 5         -98         -98           3, 6         -95         -98           Noc         dBm/SCS         1, 4         -102         -86           2, 5         -98         -98           SS-RSRP         dBm/SCS         1, 4         -102         -86           \$\hat{2}\$, \$I_0\$         -4         12         -2, 5           \$\hat{2}\$, \$I_0\$         -4         12         -2, 5           \$\hat{3}\$, 6         -99         -83         -8           \$\hat{2}\$, \$I_0\$         -4         12         -2, 5			2, 5		
SMTC configuration         1, 4         SMTC pattern 2           QCNG Pattern         3, 6         SMTC pattern 1           OCNG Pattern         1, 2, 3, 4, 5, 6         OP.1 defined in A.3.2.1           Initial DL BWP configuration         1, 2, 3, 4, 5, 6         DLBWP.0           Initial UL BWP configuration         1, 2, 3, 4, 5, 6         ULBWP.0           RLM-RS         1, 2, 3, 4, 5, 6         SSB           Qrxlevmin         dBm/SCS         1, 2, 3, 4, 5, 6         SSB           Qrxlevmin         dBm/SCS         1, 4         -98           2, 5         -98         -95           Noc         dBm/SCS         1, 4         -98           2, 5         -98         -95           Noc         dBm/SCS         1, 4         -98           2, 5         -98         -95           Noc         dBm/SCS         1, 4         -102         -86           3, 6         -95         -102         -86           3, 6         -99         -83         -8           Ê <sub>s</sub> /I ot         dB         1, 4         -4         12           Ê <sub>s</sub> /N <sub>oc</sub> dB         1, 4         -4         12           dBm				SSB.2	FR1
CONG Pattern   3,6	SMTC configuration			SMTC pa	attern 2
SMTC pattern 1   1, 2, 3, 4, 5, 6   OP.1 defined in A.3.2.1	Ğ			SMTC pa	attern 1
OCNG Pattern         1, 2, 3, 4, 5, 6         OP.1 defined in A.3.2.1           Initial DL BWP configuration         1, 2, 3, 4, 5, 6         DLBWP.0           Initial UL BWP configuration         1, 2, 3, 4, 5, 6         ULBWP.0           RLM-RS         1, 2, 3, 4, 5, 6         SSB           Qrxlevmin         dBm/SCS         1, 2, 4, 5         -140           3, 6         -137           Noc         dBm/SCS         1, 4         -98           2, 5         -98         3, 6         -95           Noc         dBm/15 kHz         1, 2, 3, 4, 5, 6         -98           SS-RSRP         dBm/SCS         1, 4         -102         -86           2, 5         -102         -86         -95           3, 6         -99         -83         -99         -83           Ê <sub>s</sub> /I <sub>ot</sub> dB         1, 4         -4         12           2, 5         3, 6         -99         -83           Ê <sub>s</sub> /N <sub>oc</sub> dB         1, 4         -4         12           2, 5         3, 6         -99         -83           Initial UL Bwr         -68.60         -57.78           B         1, 4         -102         -86 <t< td=""><td></td><td></td><td></td><td>SMTC pa</td><td>attern 1</td></t<>				SMTC pa	attern 1
Initial DL BWP configuration	OCNG Pattern				
Initial UL BWP configuration   1, 2, 3, 4, 5, 6   SSB	Initial DL BWP configuration				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			•		
$N_{oc} = \begin{bmatrix} 3,6 & -137 \\ 1,4 & -98 \\ 2,5 & -98 \\ 3,6 & -95 \end{bmatrix}$ $N_{oc} = \begin{bmatrix} ABm/SCS & 1,4 & -102 & -86 \\ 2,5 & -102 & -86 \\ 2,5 & -102 & -86 \\ 3,6 & -99 & -83 \end{bmatrix}$ $\hat{E}_s/I_{ot} = \begin{bmatrix} ABm/SCS & 1,4 & -102 & -86 \\ 2,5 & -102 & -86 \\ 3,6 & -99 & -83 \end{bmatrix}$ $\hat{E}_s/N_{oc} = \begin{bmatrix} ABm/SCS & 1,4 & -4 & 12 \\ 2,5 & -102 & -86 \\ 3,6 & -99 & -83 \end{bmatrix}$ $ABB = \begin{bmatrix} ABBM/SCS & 1,4 & -4 & 12 \\ 2,5 & -3,6 & -99 & -83 \end{bmatrix}$ $ABB = \begin{bmatrix} ABBM/SCS & 1,4 & -4 & 12 \\ 2,5 & -3,6 & -99 & -83 \end{bmatrix}$ $ABBM/SCS = \begin{bmatrix} ABBM/SCS & 1,4 & -4 & 12 \\ 2,5 & -3,6 & -4 & 12 \\ -2,5 & -3,6 & -4 & -4 & 12 \end{bmatrix}$ $ABM/SCS = \begin{bmatrix} ABM/SCS & 1,4 & -68.60 & -57.78 \\ -2,5 & -68.60 & -57.78 \\ -$		dBm/SCS	1, 2, 4, 5	-14	10
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	M	dBm/SCS		-9	8
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$IV_{oc}$		2, 5		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				-9	5
	$N_{oc}$	dBm/15 kHz		-9	8
	SS-RSRP	dBm/SCS	1, 4	-102	-86
				-102	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				-99	-83
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	£/I	dB	1, 4		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\mathbf{L}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			3, 6		
Color	$\hat{F}/N$	dB		-4	12
Second Residue   Seco	$E_s/I_{oc}$		2, 5		
Io         dBm/9.36 MHz         1, 4         -68.60         -57.78           dBm/9.36 MHz         2, 5         -68.60         -57.78           dBm/38.16 MHz         3, 6         -62.50         -51.69           Treselection         S         1, 2, 3, 4, 5, 6         0           Snonintrasearch         dB         1, 2, 3, 4, 5, 6         50           Thresh <sub>x, high (Note 2)</sub> dB         1, 2, 3, 4, 5, 6         48           Thresh <sub>serving, low</sub> dB         1, 2, 3, 4, 5, 6         44           Thresh <sub>x, low</sub> dB         1, 2, 3, 4, 5, 6         50					
dBm/9.36 MHz         2, 5         -68.60         -57.78           dBm/38.16 MHz         3, 6         -62.50         -51.69           Treselection         S         1, 2, 3, 4, 5, 6         0           Snonintrasearch         dB         1, 2, 3, 4, 5, 6         50           Thresh <sub>x, high (Note 2)</sub> dB         1, 2, 3, 4, 5, 6         48           Thresh <sub>serving, low</sub> dB         1, 2, 3, 4, 5, 6         44           Thresh <sub>x, low</sub> dB         1, 2, 3, 4, 5, 6         50	lo	dBm/9.36 MHz		-68.60	-57.78
dBm/38.16 MHz         3, 6         -62.50         -51.69           Treselection         S         1, 2, 3, 4, 5, 6         0           Snonintrasearch         dB         1, 2, 3, 4, 5, 6         50           Thresh <sub>x, high (Note 2)</sub> dB         1, 2, 3, 4, 5, 6         48           Thresh <sub>serving, low</sub> dB         1, 2, 3, 4, 5, 6         44           Thresh <sub>x, low</sub> dB         1, 2, 3, 4, 5, 6         50					
Treselection         S         1, 2, 3, 4, 5, 6         0           Snonintrasearch         dB         1, 2, 3, 4, 5, 6         50           Thresh <sub>x, high (Note 2)</sub> dB         1, 2, 3, 4, 5, 6         48           Thresh <sub>serving, low</sub> dB         1, 2, 3, 4, 5, 6         44           Thresh <sub>x, low</sub> dB         1, 2, 3, 4, 5, 6         50					-51.69
Snonintrasearch         dB         1, 2, 3, 4, 5, 6         50           Thresh <sub>x, high (Note 2)</sub> dB         1, 2, 3, 4, 5, 6         48           Thresh <sub>serving, low</sub> dB         1, 2, 3, 4, 5, 6         44           Thresh <sub>x, low</sub> dB         1, 2, 3, 4, 5, 6         50	Treselection	S		_	
Thresh <sub>serving, low</sub> dB         1, 2, 3, 4, 5, 6         44           Thresh <sub>x, low</sub> dB         1, 2, 3, 4, 5, 6         50	Snonintrasearch	dB			
Thresh <sub>serving, low</sub> dB         1, 2, 3, 4, 5, 6         44           Thresh <sub>x, low</sub> dB         1, 2, 3, 4, 5, 6         50	Thresh <sub>x, high (Note 2)</sub>	dB	1, 2, 3, 4, 5, 6	48	3
Thresh <sub>x, low</sub> dB 1, 2, 3, 4, 5, 6 50		dB			
		dB			
				AW	GN

OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

This refers to the value of Thresh<sub>x</sub>, high which is included in NR system information, and is a threshold for the E-UTRA target cell Note 1:

Note 2:

Table 6.1.2.2.5-2: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Cell 2			
		T1	T2		
E-UTRA RF Channel		T3			
number			I		
BW <sub>channel</sub>	MHz		10		
OCNG Patterns defined in	IVIDZ		DD for test		
TS 36.133 clause A.3.2			tion 1, 2, 3;		
13 30.133 Clause A.3.2			DD for test		
		-	tion 4, 5, 6		
PBCH RA	dB	Comigara	11011 4, 0, 0		
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	1			
OCNG_RA <sup>Note 1</sup>	dB				
OCNG_RB <sup>Note 1</sup>	dB				
Qrxlevmin	dBm	-1	40		
$N_{oc}$	dBm/15 kHz	=	98		
RSRP	dBm/15 KHz	-84	-84		
$\hat{E}_{s}/I_{ot}$	dB	14	14		
$\hat{E}_s/N_{oc}$	dB	14	14		
TreselectionEUTRAN	S		0		
Snonintrasearch	dB	Not sent			
Thresh <sub>x, high (Note 2)</sub>	dB	48			
Thresh <sub>serving, low</sub>	dB	44			
Thresh <sub>x, low</sub>	dB	50			
Propagation Condition AWGN					
Note 1: OCNG shall be used such that both cells are fully allocated					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: This refers to the value of Thresh<sub>x, high</sub> which is included in E-UTRA system information, and is a threshold for the NR target cell

The cell reselection delay to a lower priority E-UTRAN cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as:  $T_{evaluate, E-UTRAN} + T_{SI-E-UTRA}$ ,

Where:

T<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.

# 6.2 RRC\_INACTIVE state mobility

# 6.3 RRC CONNECTED state mobility

## 6.3.1 Handover

### 6.3.1.0 Minimum conformance requirements

### 6.3.1.0.1 Minimum conformance requirements for NR – E-UTRAN handover

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

$$D_{handover} = T_{RRC\_procedure\_delay} + T_{interruption}$$

Where:

T<sub>RRC</sub> procedure delay: it is the RRC procedure delay, which is 50ms

 $T_{interruption}$ : it is the time between end of the last TTI containing the RRC command on the NR PDSCH and the time the UE starts transmission of the PRACH in E-UTRAN, excluding  $T_{RRC\_procedure\_delay}$ .

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

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

Where:

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

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

NOTE: The actual value of T<sub>IU</sub> shall depend upon the PRACH configuration used in the target cell.

In the interruption requirement a cell is know 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 TS 36.133 [6] clause [9.4.1].

The normative reference for this requirement is TS 38.133 [6] clause 6.1.2.1.

### 6.3.1.4 NR SA FR1 – E-UTRA handover with known target cell

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- Connection diagram is TBD.

### 6.3.1.4.1 Test purpose

To verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1.

### 6.3.1.4.2 Test applicability

This test applies to all types of NR UE release 15.

## 6.3.1.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.3.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.3.1.4.

6.3.1.4.4 Test description

6.3.1.4.4.1 Initial conditions

The Test shall be tested using any of the test configuration in Table 6.3.1.4.4.1-1.

Table 6.3.1.4.4.1-1: Supported test configurations

Configuration	Description			
6.3.1.4-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode, LTE FDD			
6.3.1.4-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE FDD			
6.3.1.4-3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE FDD			
6.3.1.4-4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode, LTE TDD			
6.3.1.4-5	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE TDD			
6.3.1.4-6	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE TDD			
Note: The UE is only required to be tested in one of the supported test configurations.				

Configure the test equirement and the DUT according to the parameters in Table 6.3.1.4.4.1-2.

Table 6.3.1.4.4.1-2: Initial conditions for NR SA FR1 – E-UTRA handover with known target cell

Parameter		Value	Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified	in Annex E, Table E.4-1 and TS 38	.508-1 [14] clause 4.3.1.		
Channel	As specified	by the test configuration selected fr	om Table 6.3.1.4.4.1-1.		
bandwidth					
Propagation	AWGN		As specified in Annex C.2.2.		
conditions					
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.TBD			
Exceptions to connection	N/A				
diagram					

- 1. The general test parameter settings are set up according to Table 6.3.1.4.4.1-3.
- 2. Message contents are defined in clause 6.3.1.4.4.3.
- 3. There is one E-UTRAN carrier and 1 E-UTRAN neighbour cell specified in the test. There is one NR carrier and 1 NR PCell specified in the test. Cell 1 is the NR PCell and Cell 2 is the E-UTRAN neighbour cell. Cell 1 is configured according to Annex C.1.1 and C.1.2, Cell 2 is configured according to TS 36.521-3 [26] Annex C.1.0 and C.1.1.

Table 6.3.1.4.4.1-3: 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
			6.3.1.4.5-1	for event B2
b2-Threshold2EUT	ΓRAN	dBm	-98	Absolute E-UTRAN RSRP
				threshold for event B2
Hysteresis		dB	0	
TimeToTrigger		S	0	
Filter coefficient			0	L3 filtering is not used
DRX			OFF	Non-DRX test
Access Barring Inf	ormation	-	Not sent	No additional delays in random
				access procedure
Time offset between	en cells		3 ms	Asynchronous cells
Gap pattern config	uration Id		0	As specified in TS 38.133 [6],
				table 9.1.2-1 started before T2
				starts
T1		S	5	
T2		S	≤5	
T3	·	S	1	

### 6.3.1.4.4.2 Test procedure

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 of TS 38.133 [6] is configured before T2 begins to enable inter-RAT frequency monitoring.

- 1. Ensure the UE is in State RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.
- 2. Set the parameters according to T1 in Table 6.3.1.4.5-1 and 6.3.1.4.5-2. Propagation conditions are set according to Annex C clause C.2.2. T1 starts.
- 3. The SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.3.1.4.5-1 and 6.3.1.4.5-2.
- 6. UE shall transmit a MeasurementReport message triggered by Event B2.
- 7. SS shall transmit an RRCReconfiguration message implying handover to Cell 2.
- 8. The start of T3 is the instant when the last TTI containing the RRC Connection reconfiguration message implying handover is sent to the UE, at that instant the SS shall switch the power setting from T2 to T3 as specified in Table 6.3.1.4.5-1 and 6.3.1.4.5-2.
- 9. The UE shall transmit RRCReconfigurationComplete message.
- 10. If the UE transmits the uplink PRACH channel to Cell 2 less than 85 ms from the beginning of time period T3 then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.

- 11. After T3 expires, cause UE handover back to Cell 1 (if the handover fails, switch off the UE) or switch off the UE. Then ensure the UE is in State RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.
- 12. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 13. Repeat step 2-12 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

### 6.3.1.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.3.1.4.4.3-1: Common Exception messages

Default Message Contents					
Common contents of system information					
blocks exceptions					
Default RRC messages and information	FFS				
elements contents exceptions					

## 6.3.1.4.5 Test requirement

Tables 6.3.1.4.4.1-3, 6.3.1.4.5-1 and 6.3.1.4.5-2 define the primary level settings including test tolerances for intra frequency NR cell re-selection test case.

Table 6.3.1.4.5-1: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

Para	meter	Unit	Configuration		Cell 1	
				T1	T2	Т3
RF channel numb	er		1, 2, 3, 4, 5, 6	1		
Duplex mode			1, 4		FDD	
			2, 3, 5, 6		TDD	
TDD Configuratio	n		2, 5		TDDConf.1.1	
			3, 6		TDDConf.2.1	
BW <sub>channel</sub>		MHz	1, 4		$N_{RB,c} = 52 (FI)$	
			2, 5		$N_{RB,c} = 52$ (TI	
			3, 6	40:	$N_{RB,c} = 106 (T$	DD)
PDSCH reference	e measurement		1, 4		SR.1.1 FDD	
channel			2, 5		SR.1.1 TDD	
			3, 6		SR.2.1 TDD	
CORSET reference	ce channel		1, 4		CR.1.1 FDD	
			2, 5		CR.1.1 TDD	
O O N I O Note	4		3, 6		CR.2.1 TDD	
OCNG pattern <sup>Note</sup>			1, 2, 3, 4, 5, 6		OP.1	
BWP	Initial DL BWP		1, 2, 3, 4, 5, 6		DL BWP.0.1	
	Dedicated DL				DL BWP.1.1	
	BWP Initial UL BWP	4			III DWD 0.4	
					UL BWP.0.1	
	Dedicated UL BWP				UL BWP.1.1	
SMTC configurati			1, 2, 3, 4, 5, 6		SMTC.1	
SSB configuration			1, 2, 3, 4, 5, 6		SSB.1 FR1	
SSB configuration	ı		3, 6		SSB.2 FR1	
b2-Threshold1			1, 2, 4, 5		-96	
DZ 111100110101		dBm	3, 6		-93	
EPRE ratio of PS	S to SSS		1, 2, 3, 4, 5, 6		- 55	
EPRE ratio of PB		_	., _, 0, ., 0, 0			
SSS	o					
EPRE ratio of PB	CH to					
PBCH_DMRS						
EPRE ratio of PD	CCH_DMRS to					
SSS						
EPRE ratio of PD	CCH to					
PDCCH_DMRS		dB			0	
EPRE ratio of PD	SCH_DMRS to					
SSS	00114					
EPRE ratio of PD	SCH to					
PDSCH_DMRS	NO DMDO 4-					
EPRE ratio of OC	ING DIMRS to					
SSS EPRE ratio of OC	NC to OCNC	_				
DMRS	ING to OCING					
N <sub>oc</sub> Note2		dBm/15 KHz	1, 2, 3, 4, 5, 6		-100	
		dBm/SCS	1, 2, 3, 4, 5, 6		-100	
N <sub>oc</sub> Note2		ubili/303	3, 6		-100 -97	
Ê <sub>s</sub> /N <sub>oc</sub>		dB	1, 2, 3, 4, 5, 6	13.55	-5.55	-5.55
Ê <sub>s</sub> /I <sub>ot</sub> Note3		dB	1, 2, 3, 4, 5, 6	13.55	-5.55	-5.55
SS-RSRP <sup>Note3</sup>		dBm/SCS	1, 2, 4, 5	-86.45	-105.55	-105.55
22 <del></del>			3, 6	-83.44	-102.54	-102.54
		dBm/9.36	1, 2, 4, 5	-58.31	-70.98	-70.98
IoNote3		MHz	, , , -			
10110160		dBm/38.16	3, 6	-52.21	-64.88	-64.88
		MHz	<u> </u>			
Propagation cond	lition		1, 2, 3, 4, 5, 6		AWGN	
Antenna Configur			1, 2, 3, 4, 5, 6		1x2 Low	
Correlation Matrix						
Note 1: OCNG	shall be used such	that both calls ar	e fully allocated an	d a constant t	otal transmitta	d nower

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed 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 6.3.1.4.5-2: 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	13
Duplex mode		1, 2, 3		FDD	
Duplex mode		4, 5, 6		TDD	
TDD special subframe		4, 5, 6		6	
configuration <sup>Note1</sup>		1, 0, 0		Ü	
TDD uplink-downlink		4, 5, 6		1	
configuration <sup>Note1</sup>		1, 0, 0		·	
BWchannel	MHz	1, 2, 3, 4, 5, 6		5MHz: N <sub>RB,c</sub> = 25	
_ : · o.m		1, =, =, 1, 1, =, =		$10MHz: N_{RB,c} = 50$	
				0MHz: N <sub>RB,c</sub> = 10	
PRACH ConfigurationNote2		1, 2, 3		4	
G		4, 5, 6		53	
PDSCH parameters:		1, 2, 3		5MHz: R.7 FDD	
DL Reference Measurement				10MHz: R.3 FDD	
Channel <sup>Note3</sup>				20MHz: R.6 FDD	1
		4, 5, 6		5MHz: R.4 TDD	
				10MHz: R.0 TDD	
				20MHz: R.3 TDD	<u> </u>
PCFICH/PDCCH/PHICH		1, 2, 3		5MHz: R.11 FDD	
parameters:				10MHz: R.6 FDD	
DL Reference Measurement				20MHz: R.10 FDE	
Channel <sup>Note3</sup>		4, 5, 6		5MHz: R.11 TDD	
				10MHz: R.6 TDD	
OON O D Noto?		4.0.0		20MHz: R.10 TDE	
OCNG Patterns <sup>Note3</sup>		1, 2, 3	5MHz: OP.20 FDD		
			10MHz: OP.10 FDD		
		4.5.6		OMHz: OP.17 FD	
		4, 5, 6		5MHz: OP.9 TDD  OMHz: OP.1 TDI	
			20MHz: OP.7 TDD		
PBCH_RA		1, 2, 3, 4, 5, 6		101VII 12. OI .7 1DI	
PBCH_RB		1, 2, 0, 1, 0, 0			
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB			0	
PDCCH_RA				-	
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA <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	9.55	9.55
Ê <sub>s</sub> /I <sub>ot</sub> Note6	dB	1, 2, 3, 4, 5, 6	-Infinity	9.55	9.55
RSRP <sup>Note6</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-88.45	-88.45
SCH_RP <sup>Note6</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-88.45	-88.45
	dBm/Ch	1, 2, 3, 4, 5, 6	-67.21	-57.20	-57.20
Io <sup>Note6</sup>	BW		+10log	+10log	+10log
<u> </u>			(N <sub>RB,c</sub> /100)	(N <sub>RB,c</sub> /100)	(N <sub>RB,c</sub> /100)
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN	
Antenna Configuration and		1, 2, 3, 4, 5, 6		1x2 Low	
Correlation Matrix Note7					
			141 11 11		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.

Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211.

Note 3: DL RMCs and OCNG patterns are specified in sections A 3.1 and A 3.2 of TS 36.133 respectively.

Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 6: 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 7: Propagation condition and correlation matrix are defined in section B.2 in TS 36.101 [25].

The UE shall start to transmit the PRACH to Cell 2 less than 85 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay +  $T_{interrupt}$ , where:

RRC procedure delay = 50 ms and is specified in section 6.1.2.1 of TS 38.133 [6].

 $T_{interrupt} = 35$  ms in the test;  $T_{interrupt}$  is defined in section 6.1.2.1 of TS 38.133 [6].

This gives a total of 85 ms.

## 6.3.1.5 NR SA FR1 – E-UTRA handover with unknown target cell

#### Editor's note:

- Message contents are not complete.
- Connection diagram is TBD.
- -TT is incomplete.
- Cell mapping is missing.
- Some parts of TC are TBDs.

### 6.3.1.5.1 Test purpose

To verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements for the case when the target E-UTRAN cell is unknown as specified in section 6.1.2.1 of TS 38.133 [6].

### 6.3.1.5.2 Test applicability

This test applies to all types of NR UE release 15.

## 6.3.1.5.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.3.1.0.x.

The normative reference for this requirement is TS 38.133 [6] clause A.6.3.1.2.

## 6.3.1.5.4 Test description

#### 6.3.1.5.4.1 Initial conditions

The Test shall be tested using any of the test configuration in Table 6.3.1.5.4.1-1.

Table 6.3.1.5.4.1-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	Description
---------------	-------------

6.3.1.5-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode, LTE FDD		
6.3.1.5-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE FDD		
6.3.1.5-3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE FDD		
6.3.1.5-4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode, LTE TDD		
6.3.1.5-5	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE TDD		
6.3.1.5-6	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE TDD		
Note: The UE is only required to be tested in one of the supported test configurations.			

Configure the test equirement and the DUT according to the parameters in Table 6.3.1.5.4.1-2.

Table 6.3.1.5.4.1-2: Initial conditions for NR SA FR1 – E-UTRA handover with unknown target cell

Parameter		Value	Comment			
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	As specified in Annex E, Table E.4-1 and TS 38.508-1 [14] clause 4.3.1.				
Channel bandwidth	As specified by the test configuration selected from Table 6.3.1.5.4.1-1.					
Propagation conditions	AWGN		As specified in Annex C.2.1.			
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	A.3.TBD				
Exceptions to connection diagram	N/A					

- 1. The general test parameter settings are set up according to Table 6.3.1.5.4.1-3.
- 2. Message contents are defined in clause 6.3.1.5.4.3.
- 3. There is one E-UTRAN carrier and 1 E-UTRAN neighbour cell specified in the test. There is one NR carrier and 1 NR PCell specified in the test. Cell 1 is the NR PCell and Cell 2 is the E-UTRAN neighbour cell. Cell 1 and Cell 2 are configured according to Annex C.1.1 and C.1.2.

Table 6.3.1.5.4.1-3: General test parameters for SA inter-RAT E-UTRAN handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in
				the test
LTE RF Channel N	lumber		2	1 E-UTRAN carrier frequency is
				used in the test
Initial conditions	Active cell		Cell 1	NR cell
	Neighbouring cell		Cell 2	E-UTRAN cell
Final condition	Active cell		Cell 2	
NR measurement	quantity		SS-RSRP	
E-UTRAN measur	ement quantity		RSRP	
b2-Threshold1		dBm	As specified in Table	Absolute NR SS-RSRP threshold
			A.6.3.1.5-3	for event B2
b2-Threshold2EUTRAN		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 cells			3 ms	Asynchronous cells
T1		S	≤5	
T2		S	1	

#### 6.3.1.5.4.2 Test procedure

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. 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.

An RRC message implying handover shall be sent to the UE during period T1. The start of T2 is the instant when the last subframe containing the RRC message implying handover is sent to the UE. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and start to transmit the PRACH to Cell 2.

- 1. Ensure the UE is in State [TBD] according to TS 38.508-1 [14] clause [TBD]. Cell 1 is the active cell.
- 2. Set the parameters according to T1 in Table 6.3.1.5.5-1 and 6.3.1.5.5-2. Propagation conditions are set according to Annex C clause C.2.2. T1 starts.
- 3. SS shall transmit an RRCConnectionReconfiguration message implying handover to Cell 2.
- 4. The start of T2 is the instant when the last subframe containing the RRC connection reconfiguration message implying handover is sent to the UE, at that instant the SS shall switch the power settings from T1 to T2 as specified in Table 6.3.1.5.5-1 and 6.3.1.5.5-2. T2 starts.
- 5. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 6. If the UE transmits the uplink PRACH channel to Cell 2 less than 165 ms from the beginning of time period T2 then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.
- 7. After T3 expires, cause UE handover back to Cell 1 (if the handover fails, switch off the UE) or switch off the UE. Then ensure the UE is in State [TBD] according to TS 38.508-1 [14] clause [TBD]. Cell 1 is the active cell.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. Repeat step 2-8 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 6.3.1.5.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.3.1.5.4.3-1: Common Exception messages

Default Message Contents				
Common contents of system information				
blocks exceptions				
Default RRC messages and information	FFS			
elements contents exceptions				

# 6.3.1.5.5 Test requirement

Tables 6.3.1.5.4.1-3, 6.3.1.5.5-1 and 6.3.1.5.5-2 define the primary level settings including test tolerances for inter-RAT E-UTRAN handover: unknown target cell test.

Table 6.3.1.5.5-1: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

Parameter	Unit Configuration		Cel	Cell 1		
			T1	T2		
RF channel number		1, 2, 3, 4, 5, 6	1			
Duplex mode		1, 4	FD	D		
·		2, 3, 5, 6	TD	D		
TDD Configuration		2, 5	TDDCc	onf.1.1		
•		3, 6	TDDCc	onf.1.2		
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 measurement		1, 4	SR.1.1			
channel		2, 5	SR.1.1	TDD		
		3, 6	SR.2.1	TDD		
CORSET reference channel		1, 4	CR.1.1	FDD		
		2, 5	CR.1.1	TDD		
		3, 6	CR.2.1	TDD		
OCNG pattern <sup>Note1</sup>		1, 2, 3, 4, 5, 6	OP			
SMTC configuration		1, 2, 3, 4, 5, 6	SMT			
SSB configuration		1, 2, 4, 5	SSB.1			
		3, 6	SSB.2	FR1		
b2-Threshold1	dBm	1, 2, 4, 5	-90			
	ubili	3, 6	-8	7		
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6				
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to						
PDCCH_DMRS	dB		0			
EPRE ratio of PDSCH_DMRS to SSS						
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSS						
EPRE ratio of OCNG to OCNG						
DMRS						
N <sub>oc</sub> Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6	-9	8		
N <sub>oc</sub> Note2	dBm/SCS	1, 2, 4, 5	-9			
		3, 6	-9			
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		
IU*****	dBm/38.16 MHz	3, 6	-60.94	-60.94		
Propagation condition		1, 2, 3, 4, 5, 6	AW	GN		
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 l			
Correlation Matrix		, , = , , = , =				
N ( 4 00NO 1 III 1 1 1				100		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: Ê<sub>s</sub>/I<sub>ot</sub>, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table 6.3.1.5.5-2: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration	Cell	Cell 2		
			T1	T2		
RF channel number		1, 2, 3, 4, 5, 6	2			
Duplex mode		1, 2, 3	FD	D		
		4, 5, 6	TDI	D		
TDD special subframe configuration <sup>Note1</sup>		4, 5, 6	6			
TDD uplink-downlink		4, 5, 6	1			
configuration <sup>Note1</sup>						
BW <sub>channel</sub>	MHz	1, 2, 3, 4, 5, 6	5MHz: N <sub>R</sub>			
			10MHz: N			
			20MHz: N <sub>F</sub>			
PRACH Configuration <sup>Note2</sup>		1, 2, 3	4			
		4, 5, 6	53			
PDSCH parameters:		1, 2, 3	5MHz: R			
DL Reference Measurement			10MHz: R			
Channel <sup>Note3</sup>			20MHz: R			
		4, 5, 6	5MHz: R			
			10MHz: R			
			20MHz: R			
PCFICH/PDCCH/PHICH		1, 2, 3	5MHz: R.			
parameters:			10MHz: R			
DL Reference Measurement			20MHz: R			
Channel <sup>Note3</sup>		4, 5, 6	5MHz: R.			
			10MHz: R			
N. 6			20MHz: R			
OCNG Patterns <sup>Note3</sup>		1, 2, 3	5MHz: OP			
			10MHz: OF			
			20MHz: OF			
		4, 5, 6	5MHz: OF			
			10MHz: O			
DDCII DA		400450	20MHz: O	טטו 2.7		
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>	-ID /45111	400450				
N <sub>oc</sub> Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-98			
Ês/Noc	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		
RSRPNote6	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-91		
SCH_RPNote6	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	AWO			
Antenna Configuration and Correlation Matrix Note7		1, 2, 3, 4, 5, 6	1x2 L	.OW		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.

Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211.

Note 3: DL RMCs and OCNG patterns are specified in sections A 3.1 and A 3.2 of TS 36.133 respectively.

Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 6: 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 7: Propagation condition and correlation matrix are defined in section B.2 in TS 36.101 [25].

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 section 6.1.2.1 of TS 38.133 [6].

 $T_{interrupt} = 115$  ms in the test;  $T_{interrupt}$  is defined in section 6.1.2.1 of TS 38.133 [6].

This gives a total of 165 ms.

# 6.3.2 RRC connection mobility control

## 6.3.2.1 RRC re-establishment

## 6.3.2.1.0 Minimum conformance requirements

### 6.3.2.1.0.1 Minimum conformance requirements for FR1 RRC re-establishment

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

$$T_{re-establish\_delay} = T_{UE\_re-establish\_delay} + T_{UL\_grant}$$

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

The UE re-establishment delay ( $T_{UE\_re-establish\_delay}$ ) is 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 + T_{identify\_intra\_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH} + T_{SI-NR} $

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

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

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

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

 $T_{identify\_intra\_NR}$ : It is the time to identify the target intra-frequency NR cell and it depends on whether the target NR cell is known cell or unknown cell and on the frequency range (FR) of the target NR cell. If the UE is not configured with intra-frequency NR carrier for RRC re-establishment then  $T_{identify\_intra\_NR}$ =0; otherwise  $T_{identify\_intra\_NR}$  shall not exceed the values defined in table 6.3.2.1.0.1-1.

 $T_{identify\_inter\_NR,i}$ : It is the time to identify the target inter-frequency NR cell on inter-frequency carrier *i* configured for RRC re-establishment and it depends on whether the target NR cell is known cell or unknown cell and on the frequency range (FR) of the target NR cell.  $T_{identify\_inter\_NR,i}$  shall not exceed the values defined in table 6.3.2.1.0.1-2.

 $T_{SMTC}$ : 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.

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

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

 $N_{freq}$ : It is the total number of NR frequencies to be monitored for RRC re-establishment;  $N_{freq} = 1$  if the target intra-frequency NR cell is known, else  $N_{freq} = 2$  and  $T_{identify\ intra\ NR} = 0$  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 6.3.2.1.0.1-1: Time to identify target NR cell for RRC connection re-establishment to NR intrafrequency cell

Serving cell	Frequency range	Tidentify_intra_NR [ms]				
SSB Ês/lot (dB)	(FR) of target NR cell	Known NR cell	Unknown NR cell			
≥ [-8]	FR1	MAX (200 ms, [5] x T <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 Ê	s/lot < [-8] dB.					

Table 6.3.2.1.0.1-2: Time to identify target NR cell for RRC connection re-establishment to NR interfrequency cell

Serving cell SSB	Frequency range	Tidentify	y_inter_NR, i [ms]			
Ês/lot (dB)	(FR) of target NR	Known NR cell	Unknown NR cell			
	cell					
≥ [-8]	FR1	MAX (200 ms, [6] x T <sub>SMTC, i</sub> )	MAX (800 ms, [13] x T <sub>SMTC, i</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>			
Note 1: The UE is not required to successfully identify a cell on any NR frequency layer when T <sub>SMTC,i</sub> > 20 ms and						
serving cell SSB Ês	/lot < [-8] dB.					

The normative reference for this requirement is TS 38.133 [6] clauses 6.2.1.2.1.

# 6.3.2.1.1 NR SA FR1 RRC re-establishment

Editor's Note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- Connection diagram is TBD.
- Test tolerance analysis is missing.
- The core requirements in TS 38.133 are between [.] or TBD.

# 6.3.2.1.1.1 Test purpose

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.

# 6.3.2.1.1.2 Test applicability

This test applies to all types of NR UE release 15.

### 6.3.2.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.3.2.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.3.2.1.1.

# 6.3.2.1.1.4 Test description

### 6.3.2.1.1.4.1 Initial conditions

The Test shall be tested using any of the test configuration in Table 6.3.2.1.1.4.1-1

Table 6.3.2.1.1.4.1-1: Supported test configurations

Configuration	Description				
6.3.2.1.1-1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode				
6.3.2.1.1-2	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
6.3.2.1.1-3	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations.					

Configure the test equirement and the DUT according to the parameters in Table 6.3.2.1.1.4.1-2

Table 6.3.2.1.1.4.1-2: Initial conditions for NR Intra-frequency RRC Re-establishment in FR1

Parameter		Value	Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified	in Annex E, Table E.4-1 and TS 38	.508-1 [14] clause 4.3.1.		
Channel bandwidth	As specified by the test configuration selected from Table 6.3.2.1.1.4.1-1.				
Propagation conditions	AWGN		As specified in Annex C.2.2.		
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.TBD			
Exceptions to connection diagram	N/A				

- 1. The general test parameter settings are set up according to Table 6.3.2.1.1.4.1-3.
- 2. Message contents are defined in clause 6.3.2.1.1.4.3.

There is one NR carrier and two cells specified in the test. Cell 1 is the cell used for registration with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 6.3.2.1.1.4.1-3: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter		Unit	Test	Value	Comment				
	T		configuration	0 "1					
Initial	Active cell		1, 2, 3 1, 2, 3	Cell1					
condition	Neighbour cells		1, 2, 3	Cell2					
Final condition	Active cell		1, 2, 3	Cell2					
RF Channe	el Number		1, 2, 3	1					
Time offset	between cells		1	3 ms	Asynchronous cells				
			2	3 μs	Synchronous cells				
			3	3 μs	Synchronous cells				
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers				
N311	N311		311		311		1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1, 2, 3	0	Radio link failure timer; T310 is disabled				
T311			1, 2, 3 1, 2, 3	3000	RRC re-establishment timer				
Access Bar	Access Barring Information		1, 2, 3	Not Sent	No additional delays in random access procedure.				
SSB config	juration		1	SSB.1 FR1	·				
			2	SSB.1 FR1					
			3	SSB.2 FR1					
SMTC conf	figuration		1	SMTC					
	·			pattern 2					
			2	SMTC					
				pattern 1					
			3	SMTC					
				pattern 1					
	DRX cycle length		1, 2, 3 1, 2, 3	OFF					
	nfiguration index		1, 2, 3	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2				
T1		S	1, 2, 3	5					
T2		ms	1, 2, 3	200	Time for the UE to detect RLF				
T3		S	1, 2, 3	2					

### 6.3.2.1.1.4.2 Test procedure

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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.3.2.1.1.5-1. T1 starts.
- 3. SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.3.2.1.1.5-1. T2 starts
- 6. When T2 expires, the SS shall switch the power setting from T2 to T3 as specified in Table 6.3.2.1.1.5-1. T3 starts
- 7. If the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2 within [1.6] s from the beginning of time period T3, then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.

- 8. After T3 expires, cause UE handover back to Cell 1 (if the handover fails, switch off the UE) or switch off the UE. Then ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.
- 9. Repeat step 2-8 until the confidence level according to Table G.2.3-1 in Annex G clause G.2 is achieved.

6.3.2.1.1.4.3 Message contents

**FFS** 

6.3.2.1.1.5 Test requirement

Table 6.3.2.1.1.5-1 defines the primary level settings including test tolerances for NR Intra-frequency RRC Reestablishment in FR1 test case.

Table 6.3.2.1.1.5-1: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test				Cell 2		
		configuration	T1	T2	Т3	T1	T2	T3
TDD configuration		1	N/A			N/A		
-	2	TDDConf.1.1			TDDConf.1.1			
		3	Т	DDConf.2.	1	T	DDConf.2.	1
PDSCH RMC		1	9	SR.1.1 FDD	)		N/A	
configuration		2		SR.1.1 TDD				
		3		SR.2.1 TDD	)			
RMSI CORESET		1		CR.1.1 FDD		(	CR.1.1 FDI	)
RMC configuration		2		CR.1.1 TDD			CR.1.1 TDI	
G		3		CR.2.1 TDD			R.2.1 TDI	
Dedicated CORESET		1		CR.1.1 FD			CR.1.1 FD	
RMC configuration		2		CR.1.1 TD			CR.1.1 TD	
3		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		DLBWP.0.1			DLBWP.0.	
configuration		., _, •	DEBWI .0.1			•		
Initial UL BWP		1, 2, 3	ULBWP.0.1			ULBWP.0.1		
configuration		., _, 0	OLDWI ISII			•		
RLM-RS		1, 2, 3		SSB		SSB		
$\hat{E}_{s}/I_{ot}$	dB	1	1.54	-infinity	-infinity	-3.79	4	4
$\mathbf{L}_{\mathrm{s}}/1_{\mathrm{ot}}$		2		1				
		3						
$N_{oc}$ Note2	dBm/SCS	1			-98	•	•	•
¹ voc		2			-98			
		3			-95			
$N_{oc}$ Note2	dBm/15 kHz	1			-98			
¹ voc		2						
		3						
$\hat{E}_s/N_{oc}$	dB	1	7	-infinity	-infinity	4	4	4
$E_s/W_{oc}$		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-91	-infinity	-infinity	-94	-94	-94
		2	-91	-infinity	-infinity	-94	-94	-94
		3	-88	-infinity	-infinity	-91	-91	-91
lo	dBm/9.36 MHz	1	-60.74	-infinity	-infinity	-60.74	-64.59	-64.59
	dBm/9.36 MHz	2	-60.74	-infinity	-infinity	-60.74	-64.59	-64.59
	dBm/38.16 MHz	3	-54.65	-infinity	-infinity	-54.65	-58.50	-58.50
Propagation		1, 2, 3		<u>-</u>	AWG			
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. SS-RSRP levels have been derived from other parameters for information purposes. They are not settable

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known NR intra frequency cell shall be less than [1.6] s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

 $T_{re-establish\_delay} = T_{UL\_grant} + T_{UE\_re-establish\_delay}.$ 

Where:

Note 3:

parameters themselves.

 $T_{UL\_grant}$  = 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.

$$T_{UE\_re-establish\_delay} = 50 + T_{identify\_intra\_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$ 

 $T_{identify\_intra\_NR} = 200 \text{ ms}$ 

 $T_{SI} = [1280]$  ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

 $T_{PRACH} = [15]$  ms; it is the additional delay caused by the random access procedure.

This gives a total of [1545] ms, allow [1.6] s in the test case.

### 6.3.2.1.2 NR SA FR1 - FR1 RRC re-establishment

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- Connection diagram is TBD.
- Test tolerance analysis is missing.
- The core requirements in TS 38.133 are between [.] or TBD.

## 6.3.2.1.2.1 Test purpose

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.

#### 6.3.2.1.2.2 Test applicability

This test applies to all types of NR UE release 15.

# 6.3.2.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.3.2.1.0.1.

The normative reference for this requirement is TS 38.133 [6] A.6.3.2.1.2.

## 6.3.2.1.2.4 Test description

#### 6.3.2.1.2.4.1 Initial conditions

The Test shall be tested using any of the test configuration in Table 6.3.2.1.2.4.1-1

Table 6.3.2.1.2.4.1-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell		
6.3.2.1.2-1	15 kHz SSB SCS, 10MHz bandwidth, FDD	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex		
	duplex mode	mode		
6.3.2.1.2-2	15 kHz SSB SCS, 10MHz bandwidth, TDD	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex		
	duplex mode	mode		
6.3.2.1.2-3	30 kHz SSB SCS, 40MHz bandwidth, TDD	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex		
duplex mode mode				
Note: The UE is only required to be tested in one of the supported test configurations.				

Configure the test equirement and the DUT according to the parameters in Table 6.3.2.1.2.4.1-2

Table 6.3.2.1.2.4.1-2: Initial conditions for NR Inter-frequency RRC Re-establishment in FR1

Parameter		Value	Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified	I in Annex E, Table E.4-1 and TS 38	.508-1 [14] clause 4.3.1.		
Channel bandwidth	As specified by the test configuration selected from Table 6.3.2.1.2.4.1-1.				
Propagation conditions	AWGN		As specified in Annex C.2.2.		
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.TBD			
Exceptions to connection diagram	N/A				

- 1. The general test parameter settings are set up according to Table 6.3.2.1.2.4.1-3.
- 2. Message contents are defined in clause 6.3.2.1.2.4.3.

There is one NR carrier and two cells specified in the test. Cell 1 is the cell used for registration with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 6.3.2.1.2.4.1-3: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1

Parameter		Unit	Test configuration	Value	Comment				
Initial	Active cell		1, 2, 3	Cell1					
condition	Neighbour cells		1, 2, 3	Cell2					
Final condition	Active cell		1, 2, 3	Cell2					
RF Channe	el Number		1, 2, 3	1, 2					
Time offset	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	311		311		311		1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1, 2, 3	0	Radio link failure timer; T310 is disabled				
T311		ms	1, 2, 3	5000	RRC re-establishment timer				
Access Bar	Access Barring Information		1, 2, 3	Not Sent	No additional delays in random access procedure.				
SSB config	juration		1	SSB.1 FR1	·				
			2	SSB.1 FR1					
			3	SSB.2 FR1					
SMTC conf	figuration		1	SMTC					
				pattern 2					
			2	SMTC					
				pattern 1					
			3	SMTC					
				pattern 1					
DRX cycle		S	1, 2, 3 1, 2, 3	OFF					
PRACH configuration index				87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2				
T1		S	1, 2, 3	5					
T2		ms	1, 2, 3	200	Time for the UE to detect RLF				
T3		S	1, 2, 3	5					

#### 6.3.2.1.2.4.2 Test procedure

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 cofigured 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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.3.2.1.2.5-1. T1 starts.
- 3. SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.3.2.1.2.5-1. T2 starts
- 6. When T2 expires, the SS shall switch the power setting from T2 to T3 as specified in Table 6.3.2.1.2.5-1. T3 starts
- 7. If the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2 within [3] s from the beginning of time period T3, then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.
- 8. After T3 expires, cause UE handover back to Cell 1 (if the handover fails, switch off the UE) or switch off the UE. Then ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.
- 9. Repeat step 2-8 until the confidence level according to Table G.2.3-1 in Annex G clause G.2 is achieved.

# 6.3.2.1.2.4.3 Message contents

**FFS** 

#### 6.3.2.1.2.5 Test requirement

Table 6.3.2.1.2.5-1 defines the primary level settings including test tolerances for NR Inter-frequency RRC Reestablishment in FR1 test case.

Table 6.3.2.1.2.5-1: 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	Т	DDConf.1.	1	TDDConf.1.1		1
		3	Т	DDConf.2.	1	Т	DDConf.2.	1
PDSCH RMC		1		R.1.1 FDD			N/A	
configuration		2		R.1.1 TDD				
		3		SR.2.1 TDD				
RMSI CORESET		1		R.1.1 FDD			CR.1.1 FD	
RMC configuration		2	C	CR.1.1 TDD	)		R.1.1 TDI	
		3		R.2.1 TDD			CR.2.1 TDE	
Dedicated CORESET		1		CR.1.1 FDI			CR.1.1 FD	
RMC configuration		2		CR.1.1 TDI			CR.1.1 TD	
		3		CR.2.1 TDI		С	CR.2.1 TD	D
OCNG Pattern		1, 2, 3	OP.1 c	defined in A	3.2.1	OP.1 c	defined in A	۸.3.2.1
Initial DL BWP		1, 2, 3		DLBWP.0			DLBWP.0	
configuration								
Initial UL BWP		1, 2, 3	ULBWP.0 ULBWP.0					
configuration								
RLM-RS		1, 2, 3		SSB			SSB	
$\hat{E}_{s}/I_{ot}$	dB	1	4	-infinity	-infinity	-infinity	-infinity	7
-s / -ot		2						
		3						
$N_{oc}$ Note2	dBm/SCS	1	-98					
oc		2	-98					
		3			-95			
$N_{oc}^{$	dBm/15 kHz	1			-98			
- voc		2						
		3						
$\hat{E}_s/N_{oc}$	dB	1	4	-infinity	-infinity	-infinity	-infinity	7
= s / 1 · oc		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	-infinity	-infinity	-infinity	-infinity	-62.26
	dBm/9.36 MHz	2	-64.59	-infinity	-infinity	-infinity	-infinity	-62.26
	dBm/38.16 MHz	3	-58.50	-infinity	-infinity	-infinity	-infinity	-57.17
Propagation Condition		1, 2, 3	AWGN					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

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.

$$T_{UE\_re-establish\_delay} = 50 + T_{identify\_intra\_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{\text{freq}} = 2$ 

 $T_{identify\ intra\ NR} = 800\ ms$ 

 $T_{identify inter NR} = 800 \text{ ms}$ 

T<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 inter-frequency NR cell.

 $T_{PRACH} = [15]$  ms; it is the additional delay caused by the random access procedure.

This gives a total of [2945] ms, allow [3] s in the test case.

### 6.3.2.2 Random access

# 6.3.2.2.0 Minimum conformance requirements

#### 6.3.2.2.0.1 Minimum conformance requirements for Contention based random access

The random access procedure is used when establishing the layer 1 communication between the UE and NG-RAN. The random access is as defined in TS 38.213 [8] clause 7.4 and the control of the RACH transmission is as defined in TS 38.321 [12] clause 5.1.

The UE shall have capability to calculate PRACH transmission power according to the PRACH power formula as defined in TS 38.213 [8] clause 7.4 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 defined in TS 38.101-1 [2] Table 6.3.4.2-1. The relative power applied to additional preambles shall have an accuracy as specified in TS 38.101-1 [2] Table 6.3.4.3-1.

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 TS 38.321 [12] clause 5.1.4.

With the UE selected SSB with SS-RSRP above *rsrp-ThresholdSSB*, UE shall have the capability to select a Random Access Preamble randomly with equal probability from the Random Access Preambles associated with the selected SSB if the association between Random Access Preambles and SS blocks is configured, as specified in clause 5.1.2 in TS 38.321 [12].

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 [12].

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 [12], 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.

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [12], 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 [12].

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

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 [12], 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.

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.

The normative reference for this requirement is TS 38.133 [6] clauses 6.2.2.

#### 6.3.2.2.0.2 Minimum conformance requirements for Non-Contention based random access

The random access procedure is used when establishing the layer 1 communication between the UE and NG-RAN. The random access is as defined in TS 38.213 [8] clause 7.4 and the control of the RACH transmission is as defined in TS 38.321 [12] clause 5.1.

The UE shall have capability to calculate PRACH transmission power according to the PRACH power formula as defined in TS 38.213 [8] clause 7.4 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 defined in TS 38.101-1 [2] Table 6.3.4.2-1. The relative power applied to additional preambles shall have an accuracy as specified in TS 38.101-1 [2] Table 6.3.4.3-1.

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 TS 38.321 [12] clause 5.1.4.

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 [12].

If the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs is configured, with the UE selected CSI-RS with CSI-RSRP above *cfra-csirs-DedicatedRACH-Threshold* amongst the associated CSI-RSs, UE shall have the capability to select the Random Access Preamble corresponding to the selected CSI-RS, and to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions in *ra-OccasionList* corresponding to the selected CSI-RS, and PRACH occasion shall be randomly selected with equal probability amongst the selected CSI-RS associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [12].

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 shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [12] 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.

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [12] 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 [12].

The normative reference for this requirement is TS 38.133 [6] clauses 6.2.2.

Non-contention based random access procedure is not initialized for Other SI requested from UE or for beam failure recovery, so the requirements related to those features are omitted.

### 6.3.2.2.1 Contention based random access test in FR1 for NR standalone

## 6.3.2.2.1.1 Test purpose

The purpose of this test is to verify that the behaviour of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits.

#### 6.3.2.2.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 6.3.2.2.1.3 Minimum conformance requirement

The minimum conformance requirements are specified in clause 6.3.2.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clauses A.6.3.2.2.1.

### 6.3.2.2.1.4 Test description

#### 6.3.2.2.1.4.1 Initial conditions

This test can be run in the configurations defined in Table 6.3.2.2.1.4.1-1.

Table 6.3.2.2.1.4.1-1: Contention based random access test in FR1 for NR standalone supported test configurations

Test Case ID	Test Config Index	Description	
6.3.2.2.1-1	1	NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD	
6.3.2.2.1-2 2 NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD			
Note: The UE is only required to be tested in one of the supported test configurations			

Configure the test equipment and the DUT according to the parameters in Table 6.3.2.2.1.4.1-2.

Table 6.3.2.2.1.4.1-2: Initial conditions for Contention based random access test in FR1 for NR standalone

Parameter	Value		Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified in Annex E, Table E.1-1 and TS 38.508-1 [14] subclause 4.3.1.				
Channel	As specified by the test configuration selected from Table 6.3.2.2.1.4.1-1.				
bandwidth					
Propagation	AWGN		As specified in Annex C.2.2.		
conditions					
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.2.3.4			
Exceptions to	N/A				
connection					
diagram					

- 1. Message contents are defined in clause 6.3.2.2.1.4.3.
- 2. Cell 1 is the NR FR1 serving cell (PCell). The connection setup is done according to the settings in Annex C.1.1 and C.1.2.

### 6.3.2.2.1.4.2 Test procedure

The test consists of a single cell, configured as PCell in FR1. The System Simulator shall not explicitly assign a random access preamble via dedicated signalling in the downlink.

1. Ensure the UE is in state RRC\_IDLE with generic procedure parameters Connectivity *NR* according to TS 38.508-1 [14] clause 4.5.

- 2. Set the parameters according to Table 6.3.2.2.1.5-1.
- 3. The UE shall establish a connection setup with SS, the random access procedure within the connection setup is used in the test.
- 4. Test 1: Correct behaviour when transmitting Random Access Preamble
  - 4.1. The UE shall send a preamble to the System Simulator. The System Simulator shall check that the Random Access Preamble belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured rsrp-ThresholdSSB.
- 5. Test 2: Correct behaviour when receiving Random Access Response
  - 5.1. Repeat steps 1-3.
  - 5.2. The UE shall send preambles to the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response containing Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.
  - 5.3. As the received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble, the UE shall perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [12], and transmit with the calculated PRACH transmission power when the backoff time expires.
  - 5.4. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator.
  - 5.5. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE shall transmit the msg3.
  - 5.6. Measure the power and timing of the first preamble and it shall not exceed the values specified in 6.3.2.2.1.5. Measure the relative power and timing applied to additional preambles (last 4 preambles) and it shall not exceed the values specified in 6.3.2.2.1.5.
- 6. Test 3: Correct behaviour when not receiving Random Access Response
  - 6.1. Repeat steps 1-3.
  - 6.2. The UE shall send preambles to the System Simulator. The System Simulator shall not respond to the first 4 preambles.
  - 6.3. As no Random Access Response was received within the RA Response window, the UE shall perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [12], and transmit with the calculated PRACH transmission power when the backoff time expires.
  - 6.4. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator.
  - 6.5. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE shall transmit the msg3.
  - 6.6. Measure the power and timing of the first preamble and it shall not exceed the values specified in 6.3.2.2.1.5. Measure the relative power and timing applied to additional preambles (last 4 preambles) and it shall not exceed the values specified in 6.3.2.2.1.5.
- 7. Test 4: Correct behaviour when receiving a NACK on msg3
  - 7.1. Repeat steps 1-3.
  - 7.2. The UE shall send a preamble to the System Simulator. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble.

- 7.3. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE shall transmit the msg3.
- 7.4. The System Simulator shall NACK all UE msg3s.
- 7.5. The UE shall re-transmit the msg3 until the maximum number of HARQ re-transmissions is reached.
- 7.6. The System Simulator shall count the UE msg3s, and check that transmission stops when the maximum number of HARQ re-transmissions is reached.
- 8. Test 5: Correct behaviour when receiving an unsuccessful UE Contention Resolution
  - 8.1. Repeat steps 1-3.
  - 8.2. The UE shall send a preamble to the System Simulator. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble.
  - 8.3. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE shall transmit the msg3.
  - 8.4. 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.
  - 8.5. As the UE Contention Resolution Identity included in the MAC control element did not match the CCCH SDU transmitted in the uplink message, the UE shall perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [12], and transmit with the calculated PRACH transmission power when the backoff time expires.
  - 8.6. Measure the power and timing of the first preamble and it shall not exceed the values specified in 6.3.2.2.1.5.
- 9. Test 6: Correct behaviour when receiving a successful UE Contention Resolution
  - 9.1. Repeat steps 1-3.
  - 9.2. The UE shall send a preamble to the System Simulator. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble.
  - 9.3. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE shall transmit the msg3.
  - 9.4. 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 msg3 uplink message.
  - 9.5. As the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU, the Contention Resolution is successful and the UE shall send ACK.
- 10. Test 7: Correct behaviour when contention Resolution timer expires
  - 10.1. Repeat steps 1-3.
  - 10.2. The UE shall send a preamble to the System Simulator. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble.
  - 10.3. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE shall transmit the msg3.
  - 10.4. The System Simulator shall not send a response.

- 10.5. As there was no response, the UE shall perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [12], and transmit with the calculated PRACH transmission power when the Contention Resolution Timer expires and then after the backoff timer expires.
- 10.6. Measure the power and timing of the first preamble and it shall not exceed the values specified in 6.3.2.2.1.5.

# 6.3.2.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.3.2.2.1.4.3-1: FrequencyInfoUL-SIB for Contention Based Random Access

Derivation Path: TS 38.508-1 [14], table 4.6.3-62			
Information Element	Value/remark	Comment	Condition
FrequencyInfoUL-SIB SEQUENCE {			
p-Max	23	23 dBm	
}			

# Table 6.3.2.2.1.4.3-2: RACH-ConfigCommon for Contention Based Random Access

Derivation Path: TS 38.508-1 [14], table 4.6.3-128			
Information Element	Value/remark	Comment	Condition
RACH-ConfigCommon::= SEQUENCE {			
rach-ConfigGeneric	RACH-ConfigGeneric		
totalNumberOfRA-Preambles	48		
ssb-perRACH-OccasionAndCB-PreamblesPerSSB CHOICE {			
oneFourth	n48		FR1
}			
groupBconfigured SEQUENCE {			
numberOfRA-PreamblesGroupA	48		
}			
ra-ContentionResolutionTimer	sf48		
rsrp-ThresholdSSB	RSRP_51		
prach-RootSequenceIndex CHOICE {			
0			
}			
msg1-SubcarrierSpacing	kHz 15		
	kHz 30		
}			

# Table 6.3.2.2.1.4.3-3: RACH-ConfigGeneric for Contention Based Random Access

Derivation Path: TS 38.508-1 [14], table 4.6.3-13	30		
Information Element	Value/remark	Comment	Condition
RACH-ConfigGeneric ::= SEQUENCE {			
prach-ConfigurationIndex	87		FR1
msg1-FDM	one		FR1
zeroCorrelationZoneConfig	11		
preambleReceivedTargetPower	-120		
preambleTransMax	n6		
powerRampingStep	dB2		
ra-ResponseWindow	sl10		
}			

Table 6.3.2.2.1.4.3-4: ServingCellConfigCommonSIB for Contention Based Random Access

Derivation Path: TS 38.508-1 [14], table 4.6.3-169					
Information Element	Value/remark	Comment	Condition		
ServingCellConfigCommonSIB ::= SEQUENCE {					
ssb-PositionsInBurst SEQUENCE {					
inOneGroup	'1100 0000'B				
}					
ss-PBCH-BlockPower	-5				
}					

# 6.3.2.2.1.5 Test requirement

Table 6.3.2.2.1.5-1 defines the primary level settings for contention based random access test in FR1 for NR Standalone. Tables 6.3.2.2.1.5-2, 6.3.2.2.1.5-3 and 6.3.2.2.1.5-4 define the Absolute power limits, Relative power limits and uplink timing error limits respectively, and all include test tolerances.

Table 6.3.2.2.1.5-1: General test parameters for contention based random access test in FR1 for NR Standalone

Parameter			Unit	Test-1	Comments
SSB Configu	ration	Config 1		SSB.1 FR1	As defined in A.3.1,
3		Config 2		SSB.2 FR1	except for number of
		J			SSBs per SS-burst and
					SS/PBCH block index as
					below
Number of S	SBs per SS	-burst		2	Different from the
					definition in A.3.1
SS/PBCH blo	ock index			0,1	Different from the
					definition in A.3.1
Duplex Mode	for Cell 2	Config 1		FDD	
		Config 2		TDD	
TDD Configu	ration	Config 2		TDDConf.1.2	
OCNG Patte				OCNG pattern 1	As defined in A.3.2.1
PDSCH para	meters	Config 1		SR.1.1 FDD	As defined in A.3.1.1
Note 4		Config 2		SR.2.1 TDD	=
NR RF Chan	nel Numbei	r		1	
EPRE ratio o			dB		
EPRE ratio o			dB		
		PBCH_DMRS	dB		
			dB	<b>1</b> o	
	EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS		dB	7	
		DMRS to SSS	dB		
		PDSCH_DMRS	dB		
SSB with index 0	$\hat{E}_s/I_{ot}$	· · - · · · · · · · · · · · · · · · · ·	dB	3	Power of SSB with index 0 is set to be above
index 0	$N_{oc}$	Config 1	dBm/15kHz	-98	configured rsrp-
	1 voc	Config 2	1	-101	ThresholdSSB
	$\hat{E}_s/N_{oc}$		dB	3	1
	SS-RSR	P Note 3	dBm/ SCS	-95	
SSB with index 1	$\hat{E}_s/I_{ot}$		dB	-17	Power of SSB with index  1 is set to be below
IIIGEX I	$N_{oc}$	Config 1	dBm/15kHz	-98	configured rsrp-
	- · oc	Config 2	1	-101	ThresholdSSB
	$\hat{E}_s/N_{oc}$		dB	-17	
	SS-RSR		dBm/ SCS	-115	4
	33-K3K		dBm dBm	-65.3/9.36MHz	For symbols without SSB
lo Note 2	Io Note 2 Config 1 Config 2		чын		index 1
			JD / 000	-62.2/38.16MHz	
ss-PBCH-BlockPower		dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [13].	
Configured UE transmitted power (		dBm	23	As defined in clause	
$P_{ m CMAX,f,c})$				6.2.4 in TS 38.101-1 [2].	
PRACH Configuration			FR1 PRACH configuration 1 FR1	As defined in A.3.x.	
Propagation	Condition		-	AWGN	
		o used such that th	o call is fully allo	ocated and a constant total trans	mittad power spectral

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: Es/lot, SS-RSRP and lo level 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.

## Test 1: Correct behaviour when transmitting Random Access Preamble

- The Random Access Preamble shall be one of the Random Access Preambles associated with SSB index 0.

Test 2: Correct behaviour when receiving Random Access Response

- The power of the first preamble shall be -30 dBm within the accuracy specified in Table 6.3.2.2.1.5-2.
- The relative power for preamble ramping step shall be 2 dB within the accuracy specified in Table 6.3.2.2.1.5-3.
- The transmit timing of all PRACH transmissions shall be within the accuracy specified in Table 6.3.2.2.1.5-4.

Test 3: Correct behaviour when not receiving Random Access Response

- The power of the first preamble shall be -30 dBm within the accuracy specified in Table 6.3.2.2.1.5-2.
- The relative power for preamble ramping step shall be 2 dB within the accuracy specified in Table 6.3.2.2.1.5-3.
- The transmit timing of all PRACH transmissions shall be within the accuracy specified in Table 6.3.2.2.1.5-4.

Test 4: Correct behaviour when receiving a NACK on msg3

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

Test 5: Correct behaviour when receiving an incorrect message over Temporary C-RNTI

- The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the back off time expires.
- The power of the first preamble shall be -30 dBm within the accuracy specified in Table 6.3.2.2.1.5-2.
- The transmit timing of the PRACH transmission shall be within the accuracy specified in Table 6.3.2.2.1.5-4.

Test 6: Correct behaviour when receiving a correct message over Temporary C-RNTI

- The UE shall send ACK if the contention resolution is successful.

Test 7: Correct behaviour when contention resolution timer expires

- The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the back off time expires if the contention resolution timer expires.
- The power of the first preamble shall be -30 dBm within the accuracy specified in Table 6.3.2.2.1.5-2.
- The transmit timing of the PRACH transmission shall be within the accuracy specified in Table 6.3.2.2.1.5-4.

Table 6.3.2.2.1.5-2 Absolute power tolerance Test requirements

Conditions	Tolerance
Normal	± 11.1 dB

Table 6.3.2.2.1.5-3 Relative power tolerance Test requirements

Power step ∆P (Up or down) (dB)	PRACH (dB)
2 ≤ ΔP < 3	± 3.2

Table 6.3.2.2.1.5-4: Te Timing error Test requirements

Frequency Range	SCS of SSB signals (kHz)	SCS of uplink signals s(KHz)	Te	
4	15	15	880*T <sub>c</sub>	
1	30	30	624*T <sub>c</sub>	
Note 1: T <sub>c</sub> is the basic timing unit defined in TS 38.211 [7]				

### 6.3.2.2.2 Non-Contention based random access test in FR1 for NR standalone

## 6.3.2.2.2.1 Test purpose

The purpose of this test is to verify that the behaviour of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits.

#### 6.3.2.2.2.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 6.3.2.2.2.3 Minimum conformance requirement

The minimum conformance requirements are specified in clause 6.3.2.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clauses A.6.3.2.2.2.

### 6.3.2.2.4 Test description

#### 6.3.2.2.4.1 Initial conditions

This test can be run in the configurations defined in Table 6.3.2.2.2.4.1-1.

Table 6.3.2.2.2.4.1-1: Non-Contention based random access test in FR1 for NR standalone supported test configurations

Test Case ID	Test Config Index	Description	
6.3.2.2.2-1	1	NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD	
6.3.2.2.2-2 2 NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD			
Note: The UE is only required to be tested in one of the supported test configurations			

Configure the test equipment and the DUT according to the parameters in Table 6.3.2.2.2.4.1-2.

Table 6.3.2.2.4.1-2: Initial conditions for Non-Contention based random access test in FR1 for NR standalone

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, Table E.1-1 and TS 38	.508-1 [14] subclause 4.3.1.
Channel	As specified	by the test configuration selected fr	om Table 6.3.2.2.2.4.1-1.
bandwidth			
Propagation	AWGN		As specified in Annex C.2.2.
conditions			
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to	N/A		
connection			
diagram			

- 1. Message contents are defined in clause 6.3.2.2.2.4.3.
- 2. Cell 1 is the NR FR1 serving cell (PCell). The connection setup is done according to the settings in Annex C.1.1 and C.1.2.

### 6.3.2.2.4.2 Test procedure

The test consists of a single cell, configured as PCell in FR1. The System Simulator shall explicitly assign a random access preamble via dedicated signalling in the downlink. There are two subtests, to test both SSB-based non-contention based random access (subtest 1) and CSI-RS-based non-contention based random access (subtest 2).

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to Table 6.3.2.2.5-1 Subtest 1.
- 3. The SS shall signal a Random Access Preamble ID via a PDCCH order to the UE and initiate a Non-contention based Random Access procedure.
- 4. Test 1: Correct behaviour when transmitting SSB-based Random Access Preamble
  - 4.1. The UE shall send a preamble to the System Simulator. The System Simulator shall check that the Random Access Preamble has the Preamble Index associated with the SSB with index 0, that it arrives on a PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and that the selected PRACH occasion belongs to the PRACH occasions permitted by the restrictions given by the ra-ssb-OccasionMaskIndex.
- 5. Test 2: Correct behaviour when transmitting CSI-RS-based Random Access Preamble
  - 5.1. Set the parameters according to Table 6.3.2.2.2.5-1 Subtest 2.
  - 5.2. Repeat steps 1-3
  - 5.3. The UE shall send a preamble to the System Simulator. The System Simulator shall check that the Random Access Preamble has the Preamble Index associated with the CSI-RS configured, that it arrives on a PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and that the selected PRACH occasion belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.
- 6. Test 3: Correct behaviour when receiving Random Access Response
  - 6.1. Repeat steps 1-3
  - 6.2. The UE shall send preambles to the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response containing Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.
  - 6.3. As the received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble, the UE shall perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [12], and transmit with the calculated PRACH transmission power.
  - 6.4. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator.
  - 6.5. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE may stop monitoring for Random Access Response(s).
  - 6.6. Measure the power and timing of the first preamble and it shall not exceed the values specified in 6.3.2.2.2.5. Measure the relative power and timing applied to additional preambles (last 4 preambles) and it shall not exceed the values specified in 6.3.2.2.2.5.
- 7. Test 4: Correct behaviour when not receiving Random Access Response
  - 7.1. Repeat steps 1-3.
  - 7.2. The UE shall send preambles to the System Simulator. The System Simulator shall not respond to the first 4 preambles.
  - 7.3. As no Random Access Response was received within the RA Response window configured in *RACH-ConfigCommon*, the UE shall perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [12], and transmit with the calculated PRACH transmission power.
  - 7.4. The System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier matching the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator.

- 7.5. As the received Random Access Response contains a Random Access Preamble identifier that matches the transmitted Random Access Preamble, the UE may stop monitoring for Random Access Response(s).
- 7.6. Measure the power and timing of the first preamble and it shall not exceed the values specified in 6.3.2.2.2.5. Measure the relative power and timing applied to additional preambles (last 4 preambles) and it shall not exceed the values specified in 6.3.2.2.2.5.

# 6.3.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.3.2.2.2.4.3-1: FrequencyInfoUL-SIB for Non-Contention Based Random Access

Derivation Path: TS 38.508-1 [14], table 4.6.3-62			
Information Element	Value/remark	Comment	Condition
FrequencyInfoUL-SIB SEQUENCE {			
p-Max	23	23 dBm	
}			

# Table 6.3.2.2.4.3-2: RACH-ConfigCommon for Non-Contention Based Random Access

Derivation Path: TS 38.508-1 [14], table 4.6.3-12	28		
Information Element	Value/remark	Comment	Condition
RACH-ConfigCommon::= SEQUENCE {			
rach-ConfigGeneric	RACH-ConfigGeneric		
totalNumberOfRA-Preambles	48		
groupBconfigured SEQUENCE {			
numberOfRA-PreamblesGroupA	48		
}			
ra-ContentionResolutionTimer	Not present		
rsrp-ThresholdSSB	RSRP_51		Subtest 1
prach-RootSequenceIndex CHOICE {			
0			
}			
msg1-SubcarrierSpacing	kHz 15		
	kHz 30		
}			

Table 6.3.2.2.2.4.3-3: RACH-ConfigDedicated for Non-Contention Based Random Access

Derivation Path: TS 38.508-1 [14], table 4.6.3-129			
Information Element	Value/remark	Comment	Condition
RACH-ConfigDedicated::= SEQUENCE {			
cfra SEQUENCE {			
occasions SEQUENCE {			
ssb-perRACH-Occasion	oneFourth		
}			
resources CHOICE {			
ssb SEQUENCE {			
ssb-ResourceList SEQUENCE (SIZE(1maxRA-	2 entries		
SSB-Resources)) OF {			
ssb[1]	0		
ssb[2]	1		
ra-PreambleIndex[1]	50		Subtest 1
}			
ra-ssb-OccasionMaskIndex	1		Subtest 1
}			
csirs SEQUENCE {			
csirs-ResourceList SEQUENCE			
(SIZE(1maxRA- CSIRS -Resources)) OF {			
ra-OccasionList	1		Subtest 2
ra-PreambleIndex[1]	50		Subtest 2
}			
rsrp-ThresholdCSI-RS	RSRP_51		Subtest 2
}			
}			
}			
}			

Table 6.3.2.2.2.4.3-4: RACH-ConfigGeneric for Non-Contention Based Random Access

Derivation Path: TS 38.508-1 [14], table 4.6.3-130			
Information Element	Value/remark	Comment	Condition
RACH-ConfigGeneric ::= SEQUENCE {			
prach-ConfigurationIndex	87		FR1
msg1-FDM	one		FR1
zeroCorrelationZoneConfig	11		
preambleReceivedTargetPower	-120		
preambleTransMax	n6		
powerRampingStep	dB2		
ra-ResponseWindow	sl10		
}			

# Table 6.3.2.2.4.3-5: ServingCellConfigCommonSIB for Non-Contention Based Random Access

Derivation Path: TS 38.508-1 [14], table 4.6.3-169			
Information Element	Value/remark	Comment	Condition
ServingCellConfigCommonSIB ::= SEQUENCE {			
ssb-PositionsInBurst SEQUENCE {			
inOneGroup	'1100 0000'B		
}			
ss-PBCH-BlockPower	-5		
}			

# 6.3.2.2.5 Test requirement

Table 6.3.2.2.2.5-1 defines the primary level settings for non-contention based random access test in FR1 for NR Standalone. Tables 6.3.2.2.2.5-2, 6.3.2.2.2.5-3 and 6.3.2.2.2.5-4 define the Absolute power limits, Relative power limits and uplink timing error limits respectively, and all include test tolerances.

Table 6.3.2.2.2.5-1: General test parameters for non-contention based random access test in FR1 for NR Standalone

Parameter			Unit	Subtest 1	Subtest 2	Comments
SSB Configur	ration	Config 1		SSB.1 FR1	SSB.1 FR1	As defined in
		Config 2		SSB.2 FR1	SSB.2 FR1	A.3.10, except for number of SSBs per SS-burst and
						SS/PBCH block index as below
Number of SS	SBs per SS	-burst		2	2	Different from the
00/0001111						definition in A.3.10
SS/PBCH blo		1		0,1	0,1	Different from the definition in A.3.10
CSI-RS Confi	iguration	Config 1 Config 2	-	N/A	CSI-RS.1.1 FDD CSI-RS.2.1 TDD	As defined in A.3.1.4
Duplex Mode	for Cell 2	Config 1		FDD	FDD	7
		Config 2		TDD	TDD	†
TDD Configu	ration	Config 2		TDDConf.1.2	TDDConf.1.2	
OCNG Patter	'n <sup>Note 1</sup>			OCNG pattern 1	OCNG pattern 1	As defined in A.3.2.1.
PDSCH para	meters	Config 1		SR.1.1 FDD	SR.1.1 FDD	As defined in
Note 4		Config 2		SR.2.1 TDD	SR.2.1 TDD	A.3.1.1.
NR RF Chan				1	1	
EPRE ratio of			dB			
EPRE ratio of			dB	_		
EPRE ratio of			dB	0		
EPRE ratio of		DMRS to SSS DPDCCH_DMRS	dB dB		0	
EPRE ratio of			dB			
		PDSCH_DMRS	dB	-		
SSB with index 0	$\hat{E}_s/I_{ot}$		dB	3	3	Power of SSB with index 0 is set to be
	$N_{oc}$	Config 1	dBm/15kHz	-98	-98	above configured
	ОС	Config 2		-101	-101	rsrp-ThresholdSSB
	$\hat{E}_s/N_{oc}$		dB	3	3	
	SS-RSRI	P Note 3	dBm/ SCS	-95	-95	
SSB with index 1	$\hat{E}_s/I_{ot}$		dB	-17	-17	Power of SSB with index 1 is set to be
	$N_{oc}$	Config 1	dBm/15kHz	-98	-98	below configured
		Config 2		-101	-101	rsrp-ThresholdSSB
	$\hat{E}_s/N_{oc}$		dB	-17	-17	
	SS-RSRI	P Note 3	dBm/ SCS	-115	-115	
lo Note 2		Config 1	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without
10 2		Config 2		-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1
ss-PBCH-Blo	ckPower		dBm/ SCS	-5	-5	As defined in clause 6.3.2 in TS 38.331 [13].
Configured UE transmitted power ( $P_{ m CMAX, \ f,c}$ )		dBm	23	23	As defined in clause 6.2.4 in TS 38.101-1 [2].	
PRACH Configuration			FR1 PRACH configuration 2	FR1 PRACH configuration 3	As defined in A.3.8.	
Propagation (	Condition		_	AWGN	AWGN	
. ropagation (	o or idition		<del></del>	1 / 144 O14	1,111011	

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: Es/lot, SS-RSRP and lo level 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.

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Test 1: Correct behaviour when transmitting SSB-based Random Access Preamble

- The Random Access Preamble shall be one of the Random Access Preambles associated with SSB index 0.
- The Random Access Preamble shall arrive on a PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0.
- The selected PRACH occasion shall belong to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

Test 2: Correct behaviour when transmitting CSI-RS-based Random Access Preamble

- The Random Access Preamble shall have the Preamble Index associated with the CSI-RS configured.
- The Random Access Preamble shall arrive on a PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured.
- The selected PRACH occasion belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

Test 3: Correct behaviour when receiving Random Access Response

- The power of the first preamble shall be -30 dBm within the accuracy specified in Table 6.3.2.2.2.5-2.
- The relative power for preamble ramping step shall be 2 dB within the accuracy specified in Table 6.3.2.2.2.5-3.
- The transmit timing of all PRACH transmissions shall be within the accuracy specified in Table 6.3.2.2.2.5-4.

Test 4: Correct behaviour when not receiving Random Access Response

- The power of the first preamble shall be -30 dBm within the accuracy specified in Table 6.3.2.2.2.5-2.
- The relative power for preamble ramping step shall be 2 dB within the accuracy specified in Table 6.3.2.2.2.5-3.
- The transmit timing of all PRACH transmissions shall be within the accuracy specified in Table 6.3.2.2.2.5-4.

Table 6.3.2.2.2.5-2 Absolute power tolerance Test requirements

Conditions	Tolerance
Normal	± 11.1 dB

Table 6.3.2.2.5-3 Relative power tolerance Test requirements

Power step ΔP (Up or down) (dB)	PRACH (dB)
2 ≤ ΔP < 3	± 3.2

Table 6.3.2.2.2.5-4: Te Timing error Test requirements

Frequency Range	SCS of SSB signals (kHz)	SCS of uplink signals s(KHz)	Te
1	15	15	880*T <sub>c</sub>
I	30	30	624*T <sub>c</sub>
Note 1: T <sub>c</sub> is the basic timing unit defined in TS 38.211 [7]			

# 6.3.2.3 RRC connection release with redirection

## 6.3.2.3.0 Minimum conformance requirements

6.3.2.3.0.1 Minimum conformance requirements for FR1 RRC connection release with redirection

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,

- SSB\_RP and SSB Ês/Iot according to Annex B.2.5 for a corresponding NR Band.

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

 $T_{identify-NR}$ : It is the time to identify the target NR cell and depend on the frequency range (FR) of the target NR cell. It is defined in table 6.3.2.3.0.1-1. Note that  $T_{identify-NR} = T_{PSS/SSS-sync} + T_{meas}$ , in which  $T_{PSS/SSS-sync}$  is the cell search time and  $T_{meas}$  is the measurement time due to cell selection criteria evaluation.

 $T_{SI-NR}$ : It is the time required for acquiring all the relevant system information of the target NR cell. This time depends upon whether the UE is provided with the relevant system information of the target NR cell or not by the old NR cell before the RRC connection is released.  $T_{SI-NR}=0$  provided the UE is provided with the SI (including MIB and all relevant SIBs) of the target NR cell before the RRC connection is released by the old NR cell.

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

 $T_{rs}$  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 configured in the measObjectNR having the same SSB frequency and subcarrier spacing configured for the RRC connection release with redirection. If the UE is not provided with SMTC configuration or measurement object for the frequency which is also configured for the RRC connection release with redirection then:

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

Table 6.3.2.3.0.1-1: Time to identify target NR cell for RRC connection release with redirection to NR

Frequency range (FR) of target NR cell		T <sub>identify-NR</sub>
FR1		MAX (680 ms, [11] x T <sub>rs</sub> )
FR2		MAX (880 ms, 8x[11] x T <sub>rs</sub> )
Note:		nigher layer in TS 38.331 [2] signaling of <i>smtc2</i> prior to the ws <i>smtc1</i> or <i>smtc2</i> according to the physical cell ID of the target cell.

The normative reference for this requirement is TS 38.133 [6] clauses 6.2.3.2.1.

6.3.2.3.0.2 Minimum conformance requirements for FR1 – E-UTRAN RRC connection release with redirection

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 when for each relevant SSB:

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

T<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].

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

 $T_{SI\text{-}E\text{-}UTRA}$ : It is the time required for acquiring all the relevant system information of the target E-UTRA cell. This time depends upon whether the UE is provided with the relevant system information (SI) of the target E-UTRA cell or not by the old NR cell before the RRC connection is released.  $T_{SI\text{-}E\text{-}UTRA} = 0$  provided the UE is provided with the SI (including MIB and all relevant SIBs) of the target E-UTRA cell before the RRC connection is released by the old NR cell.

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

The normative reference for this requirement is TS 38.133 [6] clauses 6.2.3.2.2.

### 6.3.2.3.1 NR SA FR1 RRC connection release with redirection

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- Connection diagram is TBD.
- Test tolerance analysis is missing.
- The core requirements in TS 38.133 are between [.] or TBD.

#### 6.3.2.3.1.1 Test purpose

This test is to verify RRC connection release with redirection from NR to NR.

## 6.3.2.3.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 6.3.2.3.1.3 Minimum conformance requirement

The minimum conformance requirements are specified in clause 6.3.2.3.0.1.

The normative reference for this requirement is TS 38.133 [6] A.6.3.2.3.1.

### 6.3.2.3.1.4 Test description

#### 6.3.2.3.1.4.1 Initial conditions

This test can be run in the configurations defined in Table 6.3.2.3.1.4.1-1.

Table 6.3.2.3.1.4.1-1: Redirection from NR to NR test configurations

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Configuration	Description of serving cell	Description of target cell
6.3.2.3.1-1	15 kHz SSB SCS, 10MHz bandwidth, FDD	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex
	duplex mode	mode
6.3.2.3.1-2	15 kHz SSB SCS, 10MHz bandwidth, TDD	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex
	duplex mode	mode
6.3.2.3.1-3	30 kHz SSB SCS, 40MHz bandwidth, TDD	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex
	duplex mode	mode
Note: The U	IE is only required to be tested in one of the suppo	orted test configurations.

Configure the test equipment and the DUT according to the parameters in Table 6.3.2.3.1.4.1-2.

Table 6.3.2.3.1.4.1-2: Initial conditions for Redirection from NR to NR test case

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	l in Annex E, Table E.4-1 and TS 38	.508-1 [14] clause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 6.3.2.3.1.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.TBD	
Exceptions to connection diagram	N/A		

- 1. The general test parameters for PCell and neighbour cell are given in Table 6.3.2.3.1.4.1-3 below.
- 2. Message contents are defined in clause 6.3.2.3.1.4.3.
- 3. There are two carriers and two NR cells specified in the test. Cell 1 and Cell 2 are configured according to Annex C.1.1 and C.1.2.

Table 6.3.2.3.1.4.1-3: General test parameters for Redirection from NR to NR test case

Parameter		Unit	Value	Comment
Initial conditions			Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	1	

# 6.3.2.3.1.4.2 Test procedure

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The "RRCRelease" message containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.
- 2. Set the parameters according to T1 in Table 6.3.2.3.1.5-1. T1 starts.
- 3. SS shall transmit an *RRCRelease* containing the relevant system information of Cell 2 during period T1.
- 4. The SS shall start T2 timer when the last TTI containing the RRCRelease message is sent to UE.

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- 5. When T2 starts, the SS shall switch the power setting from T1 to T2 as specified in Table 6.3.2.3.1.5-1.
- 6. If the UE transmits the PRACH to Cell 2 less than [960] ms from the beginning of time period T2 then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.
- 7. After T2 expires, the UE shall be switched off. Then ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.
- 8. The SS shall set Cell 2 primary scrambling code = ((current cell 2 primary scrambling code 50) mod 200 + 100) for next iteration of the test procedure loop.
- 9. Repeat step 2-8 until the confidence level according to Table G.2.3-1 in Annex G clause G.2 is achieved.

## 6.3.2.3.1.4.3 Message contents

**FFS** 

# 6.3.2.3.1.5 Test requirement

Table 6.3.2.3.1.5-1 defines the primary level settings for Redirection from NR to NR test case.

Table 6.3.2.3.1.5-1: Cell specific test parameters for Redirection from NR to NR test case

Parameter	Unit	Cell 1		Cell 2	
Parameter		T1	T2	T1	T2
NR RF Channel Number			1	2	)

Duplex mode Config 1			FDD				
Config 2,3 Config 1			TDD  Not Applicable				
TDDfirmentian		_					
TDD configuration	Config 2	_		TDDC			
	Config 3			TDDC			
D144	Config 1	<u></u> .	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				$a_{c} = 106$		
DRx Cycle		ms	Not Applicable				
PDSCH Reference	Config 1		SR.1.1 FDD				
measurement channel	Config 2		SR.1.1 TDD				
	Config 3			SR2.1	I TDD		
00050550-4	Config 1			CR.1.	1 FDD		
CORESET Reference Channel	Config 2			CR.1.	1 TDD		
onamoi	Config 3			CR2.	1 TDD		
OCNG Patterns				OCNG p	oattern 1		
CMTC configuration	Config 1,2			SMTC	.1 FR1		
SMTC configuration	Config 3			SMTC	.2 FR1		
PDSCH/PDCCH	Config 1,2	1.11-		15	kHz		
subcarrier spacing	Config 3	KHZ	kHz 30 kHz				
PUCCH/PUSCH	Config 1,2		15 kHz				
subcarrier spacing	Config 3	kHz	30 kHz				
PRACH configuration	1		FR1 PRACH configuration 1				
BWP configuration	Initial DL BWP		DLBWP.0.1				
	Dedicated DL		DLBWP.1.1				
	BWP Initial UL BWP			ULBW	/P 0 1		
	Dedicated UL		ULBWP.1.1				
	BWP		OLDWI .I.I				
EPRE ratio of PSS to S							
EPRE ratio of PBCH DN EPRE ratio of PBCH to							
EPRE ratio of PDCCH D	OMRS to SSS		0				
EPRE ratio of PDCCH to		dB					
EPRE ratio of PDSCH to EPRE ratio of PDSCH to							
EPRE ratio of OCNG DI							
EPRE ratio of OCNG to OCNG DMRS (Note							
1)		dBm/15kH					
N <sub>oc</sub> Note2		Z Z	-98				
N <sub>oc</sub> Note2 Config 1,2 Config 3		dBm/SCS	-98 -95				
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	4	4	-infinity	4		
$\hat{E}_s/N_{oc}$		dB	4	4	-infinity	4	
Config 1,2		dBm/ 9.36MHz	-67.11	-67.11	-70.05	-67.11	
Io <sup>Note3</sup> Config 3		dBm/ 38.16MHz	-62.27	-62.27	-63.96	-62.27	
Propagation condition	-		AW	'GN			

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral
	density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over
	subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3:	lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

The UE shall start to transmit the PRACH to Cell 2 less than [960] ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

 $T_{connection\_release\_redirect\_NR} = T_{RRC\_procedure\_delay} + T_{identify\_NR} + T_{SI\_NR} + T_{RACH}$ 

where:

 $T_{RRC procedure delay} = [110]$  ms and is specified in clause 12 in TS 38.331 [2].

 $T_{identify-NR} = [680]$  ms in the test.

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

 $T_{RACH} = [170]$  ms in the test.

This gives a total of [960] ms.

#### 6.3.2.3.2 NR SA FR1 – E-UTRA RRC connection release with redirection

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- Connection diagram is TBD.
- Test tolerance analysis is missing.
- The core requirements in TS 38.133 are between [.] or TBD.

# 6.3.2.3.2.1 Test purpose

This test is to verify RRC connection release with redirection from NR to E-UTRAN.

# 6.3.2.3.2.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

# 6.3.2.3.2.3 Minimum conformance requirement

The minimum conformance requirements are specified in clause 6.3.2.3.0.2.

The normative reference for this requirement is TS 38.133 [6] A.6.3.2.3.2.

# 6.3.2.3.2.4 Test description

#### 6.3.2.3.2.4.1 Initial conditions

This test can be run in the configurations defined in Table 6.3.2.3.2.4.1-1.

Table 6.3.2.3.2.4.1-1: Redirection from NR to E-UTRAN test configurations

Configuration	Description		
6.3.2.3.2-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode, LTE FDD		
6.3.2.3.2-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE FDD		
6.3.2.3.2-3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE FDD		
6.3.2.3.2-4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode, LTE TDD		
6.3.2.3.2-5	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE TDD		
6.3.2.3.2-6	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE TDD		
Note: The UE is only required to be tested in one of the supported test configurations			

Configure the test equipment and the DUT according to the parameters in Table 6.3.2.3.2.4.1-2.

Table 6.3.2.3.2.4.1-2: Initial conditions for Redirection from NR to E-UTRAN test case

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, Table E.4-1 and TS 38	.508-1 [14] clause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 6.3.2.3.2.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.TBD	
Exceptions to connection diagram	N/A		

- 1. The general test parameters settings are given in Table 6.3.2.3.2.4.1-3 below.
- 2. Message contents are defined in clause 6.3.2.3.2.4.3.
- 3. There are two cells specified in the test. Cell 1 is the NR PCell and Cell 2 is the E-UTRAN neighbour cell. Cell 1 is configured according to Annex C.1.1 and C.1.2, Cell 2 is configured according to TS 36.521-3 [26] Annex C.1.0 and C.1.1.

Table 6.3.2.3.2.4.1-3: 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	1	

### 6.3.2.3.2.4.2 Test procedure

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The "RRCRelease" message containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.
- 2. Set the parameters according to T1 in Table 6.3.2.3.2.5-1 and 6.3.2.3.2.5-2. T1 starts.
- 3. SS shall transmit an *RRCRelease* containing the relevant system information of Cell 2 during period T1.

- 4. The SS shall start T2 timer when the last TTI containing the RRCRelease message is sent to UE.
- 5. When T2 starts, the SS shall switch the power setting from T1 to T2 as specified in Table 6.3.2.3.2.5-1 for Cell 1 and Table 6.3.2.3.2.5-2 for Cell 2.
- 6. If the UE transmits the PRACH to Cell 2 less than [925] ms from the beginning of time period T2 then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.
- 7. After T2 expires, the UE shall be switched off. Then ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5. Cell 1 is the active cell.
- 8. The SS shall set Cell 2 primary scrambling code = ((current cell 2 primary scrambling code 50) mod 200 + 100) for next iteration of the test procedure loop.
- 9. Repeat step 2-8 until the confidence level according to Table G.2.3-1 in Annex G clause G.2 is achieved.

6.3.2.3.2.4.3 Message contents

**FFS** 

6.3.2.3.2.5 Test requirement

Table 6.3.2.3.2.5-1 and 6.3.2.3.2.5-2 define the primary level settings for Redirection from NR to E-UTRAN test case.

Table 6.3.2.3.2.5-1: Cell specific test parameters for Redirection from NR to E-UTRAN test case(Cell 1)

Parameter	Unit	Cell 1	
Parameter		T1	T2
RF Channel Number		1	

		Config 1		FD	D	
Duplex mod	de	Config 2,3		TD		
	Config 1			Not App		
TDD config	uration	Config 2		TDDCo		
		Config 3		TDDCo		
		Config 1		10: N <sub>RB</sub>		
BW <sub>channel</sub>		Config 2	MHz	10: N <sub>RB</sub>	,	
DVV channel			IVII IZ		,	
		Config 3		40: N <sub>RB,</sub>		
		Config 1		10: N <sub>RB</sub>	·	
BWP BW		Config 2	MHz	10: N <sub>RB,c</sub> = 52		
		Config 3		40: N <sub>RB</sub> ,		
DRx Cycle		T	ms	Not App		
DDCCII Da	·	Config 1		SR.1.1	FDD	
PDSCH Re measureme		Config 2		SR.1.1	TDD	
		Config 3		SR2.1	TDD	
		Config 1		CR.1.1	FDD	
CORESET Channel	Reference	Config 2		CR.1.1	TDD	
Chamilei		Config 3		CR2.1	TDD	
OCNG Patt	terns			OCNG p	attern 1	
		Config 1,2		SMTC.		
SMTC conf	iguration	Config 3		SMTC.		
DD0011/DD	20011	Config 1,2				
	PDSCH/PDCCH subcarrier spacing Config 3		kHz	15 kHz 30 kHz		
	Confin 4.0					
	1 0001/1 03011		kHz	15 k		
	-	Config 3		30 k		
PRACH co		L ::: LDL DWD		FR1 PRACH c	<del>_</del>	
BWP config	guraiton	Initial DL BWP		DLBW		
		Dedicated DL BWP		DLBW	P.1.1	
		Initial UL BWP		ULBW	P.0.1	
		Dedicated UL		ULBW		
		BWP				
	of PSS to SS					
	of PBCH to	PBCH DMRS				
		MRS to SSS				
EPRE ratio	of PDCCH to	PDCCH DMRS	dB	0		
		MRS to SSS	QD.	0		
	of PDSCH to					
	EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note					
1)						
$N_{oc}^{$		dBm/15kH z	-9	8		
N <sub>oc</sub> Note2 Config 1,2 Config 3		dBm/SCS	-9. -9.			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	4	4		
$\hat{E}_s/N_{oc}$		dB	4	4		
Io <sup>Note3</sup>	Config 1,2		dBm/ 9.36MHz	-67.11	-67.11	
10.13.00	Config 3		dBm/ 38.16MHz	-62.27	-62.27	
Propagation condition		-	AW	GN		

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral
	density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over
	subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{ac}$ to be fulfilled.

lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3:

Table 6.3.2.3.2.5-1: Cell specific test parameters for Redirection from NR to E-UTRAN test case(Cell 2)

Parameter	Unit	Configuration	Cell 2	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	2	
Duplex mode		1, 2, 3	FDD	)
		4, 5, 6	TDD	
TDD special subframe		4, 5, 6	6	
configuration <sup>Note1</sup>		., 0, 0	•	
TDD uplink-downlink		4, 5, 6	1	
configuration <sup>Note1</sup>		., 0, 0	·	
BW <sub>channel</sub>	MHz	1, 2, 3, 4, 5, 6	5MHz: N <sub>RE</sub>	s <sub>c</sub> = 25
onao.		, , -, , -, -	10MHz: N <sub>R</sub>	
			20MHz: N <sub>RE</sub>	
PRACH ConfigurationNote2		1, 2, 3	4	-,-
		4, 5, 6	53	
PDSCH parameters:		1, 2, 3	5MHz: R.	7 FDD
DL Reference Measurement		1, 2, 0	10MHz: R.	
Channel <sup>Note3</sup>			20MHz: R.	
		4, 5, 6	5MHz: R.	
		1, 0, 0	10MHz: R.	
			20MHz: R.	
PCFICH/PDCCH/PHICH		1, 2, 3	5MHz: R.1	
parameters:		., _, •	10MHz: R.	
DL Reference Measurement			20MHz: R.:	
Channel <sup>Note3</sup>		4, 5, 6	5MHz: R.1	
		., 0, 0	10MHz: R.	
			20MHz: R.:	10 TDD
OCNG Patterns <sup>Note3</sup>		1, 2, 3	5MHz: OP.	
		, ,	10MHz: OP	
			20MHz: OP	.17 FDD
		4, 5, 6	5MHz: OP	.9 TDD
			10MHz: OF	.1 TDD
			20MHz: OF	P.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	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	4
Ês/Iot <sup>Note6</sup>	dB	1, 2, 3, 4, 5, 6	-Infinity	4
RSRP <sup>Note6</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-94
SCH_RP <sup>Note6</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-94
Io <sup>Note6</sup>	dBm/9MHz	1, 2, 3, 4, 5, 6	-70.22	-64.76
Propagation Condition	5.=, <b>5</b> 12	1, 2, 3, 4, 5, 6	AWG	
Note 1: Special subframe and	unlink downlink o		ecified in table 4.2-1 in TS	

Note 2:

PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211.

DL RMCs and OCNG patterns are specified in sections A 3.1 and A 3.2 of TS 36.133 respectively. Note 3:

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.

Interference from other cells and noise sources not specified in the test is assumed to be constant over Note 5: subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{\text{oc}}$  to be fulfilled.

Ê<sub>s</sub>/I<sub>ot</sub>, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. Note 6: They are not settable parameters themselves.

Propagation condition and correlation matrix are defined in section B.2 in TS 36.101 [25]. Note 7:

The UE shall start to transmit the PRACH to Cell 2 less than [925] ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to E-UTRAN observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

 $T_{connection\_release\_redirect\_E-UTRA} = T_{RRC\_procedure\_delay} + T_{identify-E-UTRA} + T_{SI-E-UTRA} + T_{RACH},$ 

where:

 $T_{RRC\_procedure\_delay} = [110]$  ms and is specified in clause 12 in TS 38.331 [2].

 $T_{identify-NR} = [800]$  ms in the test.

 $T_{SI-NR} = 0$  ms is assumed, since the UE is provided with the SI (including MIB and all relevant SIBs) of the target E-UTRAN cell before the RRC connection is released by the old NR cell.

 $T_{RACH} = [15]$  ms in the test.

This gives a total of [925] ms.

# 6.4 Timing

# 6.4.1 UE transmit timing

# 6.4.2 UE timer accuracy

# 6.4.3 Timing advance

# 6.4.3.0 Minimum conformance requirement

# 6.4.3.0.1 Minimum conformance requirement for timing advance adjustment

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 6.4.3.1.3-1, to the signalled timing advance value compared to the timing of preceding uplink transmission. The timing advance command step is defined in TS38.213 [8].

Table 6.4.3.1.3-1: UE Timing Advance adjustment accuracy

Sub Carrier Spacing, SCS 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>

# 6.4.3.1 NR SA FR1 timing advance adjustment accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing

### 6.4.3.1.1 Test purpose

The purpose of the test is to verify UE timing advance adjustment delay and accuracy requirement defined in clause 7.3 of TS 38.133 [6].

# 6.4.3.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 6.4.3.1.3 Minimum conformance requirement

The minimum conformance requirements are specified in clause 6.4.3.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.4.3.1.

# 6.4.3.1.4 Test description

#### 6.4.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1 and Table 5.3.6-1 of 38.521-1 [17].

This test shall be tested using any of the test configurations in Table 6.4.3.1.4.1-1.

Table 6.4.3.1.4.1-1: NA SA FR1 timing advance adjustment accuracy supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note: The UE is only require	ed to be tested in one of the supported test configurations

Configure the test equipment and the DUT according to the parameters in Table 6.4.3.1.4.1-2

Table 6.4.3.1.4.1-2: Initial conditions for EN-DC FR1 timing advance adjustment accuracy

Parameter	Value		Comment	
Test environment		NC	As specified in TS 38.508-1 [14] clause 4.1.	
Test frequencies	As	specified in Annex E.1.2, Table E.4	.4-1 and TS 38.508-1 [14] clause 4.3.1.	
Channel bandwidth		As specified by the test configuration	on selected from Table 6.4.3.1.4.1-1	
Propagation conditions	AWGN		As specified in Annex C.2.2.	
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.	
Diagram	DUT Part	A.3.2.3.4		
Exceptions to connection diagram		N/A		

Parameter	Unit	Value	Comment
RF channel number		1	
Initial DL BWP		DLBWP.0.1	As specified in Table A.8.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.8.1-2
Initial UL BWP		ULBWP.0.1	As specified in Table A.8.2-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.8.2-2
Timing Advance Command ( <i>T<sub>A</sub></i> ) 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	$N_{TA\_new} = N_{TA\_old} + 8192 * T_c$ (based on equation in TS38.213 section 4.2)
T1	S	5	
T2	S	5	

Table 6.4.3.1.4.1-3: General test parameters for timing advance

- 1. Message contents are defined in clause 6.4.3.1.4.3.
- 2. Single Cell is used, which is NR FR1 PCell. The connection setup is done according to the settings in Annex C.1.2 and C.1.3.
- 3. The test parameters are given in Table 6.4.3.1.4.1-3 above.
- 4. Downlink signals for NR cell are initially set up according to Annex C.1.2 and C.1.3.
- 5. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [10] clause 4.5.

#### 6.4.3.1.4.2 Test Procedure

The test consists of single cell. The test consists of two successive time periods, with time durations 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 6.4.3.1.5-1, 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. 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.

- 1. Set the parameters according to values in Tables 6.4.3.1.4.1-3.
- 2. SS shall transmit an RRCReconfiguration message.
- 3. The UE shall transmit RRCReconfigurationComplete message.
- 4. 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. The Timing Advance Command value shall be set to 31, which according to Clause 4.2 in TS 38.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.
- 5. 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 39 as specified in table 6.4.3.1.4.1-3. 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.
- 6. As specified in Clause 7.3.2.1 of TS 38.133 [6], 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.
- 7. 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.
- 8. The result from the SRS and adjustment of the timing advance in step 7) is used to measure that the UE adjusts the timing of its transmission with a relative accuracy better than or equal to value specified in Table 6.4.3.1.3-1 to the signalled timing advance value compared to the timing of preceding uplink transmission.

- 9. If the UE adjust the timing of its transmission within a relative accuracy greater than or equal to value specified in Table 6.4.3.1.3-1 to the signalled timing advance value compared to the timing of preceding uplink transmission then the number of successful tests is increased by one. Otherwise, the number of failure tests is increased by one.
- 10. The SS shall transmit RRCConnectionRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 11. After the RRC connection release, the SS:

[transmits in Cell a Paging message (including PagingRecord with ue-Identity) for the UE and ensures the UE is in State RRC\_CONNECTED according to [TS 38.508-1] [14] clause 4.5.4 (if the paging fails, switch off and on the UE and ensure the UE is in RRC\_CONNECTED according to [TS 38.508-1] [14] clause 4.5.4)],

or

- [if the paging fails, switch off and on the UE and ensure the UE in RRC\_CONNECTED according to [TS 38.508-1] [14] clause 4.5.4)].
- 12. Repeat step 2-11 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 6.4.3.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1., with exceptions listed below in the Table 4.4.3.1.4.3-1

Table 6.4.3.1.4.3-1: srs-Config setup

Derivation Path: TS 38.508-1, Table 4.6.3-182			
Information Element	Value/remark	Comment	Condition
SRS-Config ::= SEQUENCE {			
srs-ResourceSetToAddModList SEQUENCE	[1 entry]		
(SIZE(0maxNrofSRS-ResourceSets)) OF			
SEQUENCE {			
srs-ResourceSetId	0		
srs-ResourceldList SEQUENCE	1 entry		
(SIZE(1maxNrofSRS-ResourcesPerSet)) OF {			
SRS-Resourceld[1]	0		
}			
resourceType CHOICE {			
periodic SEQUENCE {			
}			
}			
Usage	nonCodebook		
-			
pathlossReferenceRS CHOICE {			
ssb-Index	SSB-Index		
}			
srs-ResourceToAddModList SEQUENCE	1 entry		
(SIZE(1maxNrofSRS-Resources)) OF SEQUENCE {			
srs-Resourceld	0		
nrofSRS-Ports	port1		
transmissionComb CHOICE {			
n2 SEQUENCE {			
combOffset-n2	0		
cyclicShift-n2	0		
}			
}			
resourceMapping SEQUENCE {			
startPosition	0		
nrofSymbols	n1		
repetitionFactor	n1		
}			
freqDomainPosition	0		
freqDomainShift	0		
freqHopping SEQUENCE {			
c-SRS	12	Config 1,2	
	24	Config 3	
b-SRS	0	Ĭ	
b-hop	0		
}			
groupOrSequenceHopping	neither		
resourceType CHOICE {			
periodic SEQUENCE {	periodic		
}			
periodicityAndOffset-p	sl5 : 0	Once every 5 Slots	
}			
}			
}			
	t e e e e e e e e e e e e e e e e e e e	1	1

# 6.4.3.1.5 Test Requirement

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. k slots after the reception of the timing advance command, where:

k = 4 for Config 1, 2, and

k = 7 for Config 3

The Timing Advance adjustment accuracy shall be within the limits specified in Table 6.4.3.1.3-1.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

Table 6.4.3.1.5-1 and Table 6.4.3.1.5-2 define the primary level settings.

Table 6.4.3.1.5-1: Cell specific test parameters for timing advance

Parameter	Unit	Test1	
Parameter	Offic	T1	T2

Dunlo	v mada	Config 1		FDD
Duple	Duplex mode Config 1 Config 2,3			TDD
		Config 1		Not Applicable
TDD cor	nfiguration	Config 2		TDDConf.1.1
		Config 3		TDDConf.2.1
		Config 1		10: N <sub>RB,c</sub> = 52
BW	channel	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
BW	P BW	Config 2	MHz	10: N <sub>RB,c</sub> = 52
		Config 3		40: N <sub>RB,c</sub> = 106
	DRx Cy	-	ms	Not Applicable
	2.0.09			
		Config 1		SR.1.1 FDD
	Reference nent channel	Config 2		SR.1.1 TDD
		Config 3		SR2.1 TDD
		Config 1		CR.1.1 FDD
	T Reference annel	Config 2		CR.1.1 TDD
		Config 3		CR2.1 TDD
OCNG Patterns			OCNG pattern 1	
01.470		Config 1,2		SMTC.1 FR1
SMIC co	SMTC configuration Config 3			SMTC.2 FR1
PDSCF	I/PDCCH	Config 1,2		15 kHz
	er spacing	Config 3	kHz	30 kHz
PLICCE	H/PUSCH	Config 1,2		15 kHz
	er spacing	Config 3	kHz	30 kHz
Е	PRE ratio of P	PSS to SSS		00.11.12
EPRE EPRE ra EPRE EPRE EPRE EPRE ratio	ratio of PBCH ratio of PDCC tio of PDCCH ratio of PDSCI E ratio of PDS o of OCNG DN	to PBCH DMRS to PBCH DMRS H DMRS to SSS to PDCCH DMRS H DMRS to SSS CH to PDSCH MRS to SSS(Note 1) OCNG DMRS (Note	dB	0
$N_{oc}^{}$ Note2		dBm/15kH	-98	
N/ Note?	N <sub>oc</sub> Note2 Config 1,2		Z dDm/CCC	-98
Config 3		dBm/SCS	-95	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	3	
$\hat{E}_s/N_{oc}$		dB	3	
Io <sup>Note3</sup>	C	config 1,2	dBm/ 9.36MHz	-67.57
		Config 3	dBm/ 38.16MHz	-62.58
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.
NISAS O.	Interference from other cells and point accuracy not appointed in the test is accuracy to be constant as an

- Note 2: Interference from other cells and noise sources not 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 6.4.3.1.5-2: Sounding Reference Symbol Configuration for timing advance

Field		Value	Comment
c-SRS	Config 1,2	12	
C-5K5	Config 3	24	Fraguescy happing is disabled
b-S	RS	0	Frequency hopping is disabled
b-h	пор	0	
freqDoma	inPosition	0	Frequency domain position of SRS
freqDom	nainShift	0	
groupOrSequ	enceHopping	neither	No group or sequence hopping
SRS-PeriodicityAndOffset		sl5=0	Once every 5 slots
pathlossReferenceRS		ssb-Index=0	SSB #0 is used for SRS path loss estimation
usage		nonCodebook	Non-codebook based UL transmission
startPo	osition	0	resourceMapping setting. SRS on last
nrofSy	nrofSymbols		symbol of slot, and 1symbols for SRS
repetitio	nFactor	n1	without repetition.
combO	combOffset-n2		transmission Comb setting
cyclicShift-n2		0	transmissionComb setting
nrofSR	nrofSRS-Ports		Number of antenna ports used for SRS
			transmission
Note: For further information see clause 6		3.3.2 in TS 38.331.	

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

# 6.5 Signaling characteristics

# 6.5.1 Radio link monitoring

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

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

The threshold  $Q_{out}$  is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to the out-of-sync block error rate (BLER<sub>out</sub>) as defined in Table 6.5.1-1. For SSB based radio link monitoring,  $Q_{out\_SSB}$  is derived based on the hypothetical PDCCH transmission parameters listed in Table 6.5.1.1.4.1-3. For CSI-RS based radio link monitoring,  $Q_{out\_CSI-RS}$  is derived based on the hypothetical PDCCH transmission parameters listed in Table [4.x.x.x-x].

The threshold  $Q_{in}$  is defined as the level at which the downlink radio link quality can be significantly more reliably received than at  $Q_{out}$  and shall correspond to the in-sync block error rate (BLER<sub>in</sub>) as defined in Table 6.5.1-1. For SSB based radio link monitoring,  $Q_{in\_SSB}$  is derived based on the hypothetical PDCCH transmission parameters listed in Table 6.5.1.1.4.1-3. For CSI-RS based radio link monitoring,  $Q_{in\_CSI-RS}$  is derived based on the hypothetical PDCCH transmission parameters listed in Table [4.x.x.x-x]

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 *RLM-IS-OOS-thresholdConfig* from the network, UE determines out-of-sync and in-sync block error rates from Configuration #0 in Table 6.5.1-1 as default. All requirements here are applicable for BLER Configuration #0 in Table 6.5.1-1.

Table 6.5.1-1: Out-of-sync and in-sync block error rates

Configuration	BLERout	BLERin	
0	10%	2%	

UE shall be able to monitor up to  $X_{RLM-RS}$  RLM-RS resources of the same or different types in each corresponding carrier frequency range, where  $X_{RLM-RS}$  is specified in Table 6.5.1-2, and meet the requirements as specified in this section.

Table 6.5.1-2: Maximum number of RLM-RS resources X<sub>RLM-RS</sub>

Maximum number of RLM-RS resources, X <sub>RLM-RS</sub>	Carrier frequency range of PCell/Pcell	
2	FR1, ≤ 3 GHz	
4	FR1, > 3 GHz	
8	FR2	

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

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 [4]) means uplink signal
- UE output power equal to or less than Transmit OFF power [-50] dBm (as defined in TS 38.101-3 [4]) means no uplink signal.

# 6.5.1.0 Minimum conformance requirements

#### 6.5.1.0.1 Minimum conformance requirements for out-of-sync SSB-based RLM

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last  $T_{\text{Evaluate\_out\_SSB}}$  [ms] period becomes worse than the threshold  $Q_{\text{out\_SSB}}$  within  $T_{\text{Evaluate\_out\_SSB}}$  [ms] evaluation period. The requirements in this section apply for each SSB based RLM-RS resource configured for PSCell, provided that the SSB configured for RLM is transmitted within UE active DL BWP during the entire evaluation period defined in Table 6.5.1.0.1-1.

 $T_{Evaluate\_out\_SSB}$  is defined in Table 6.5.1.0.1-1 for FR1.

Table 6.5.1.0.1-1: Evaluation period T<sub>Evaluate\_out</sub> for FR1

Configuration	T <sub>Evaluate_out_SSB</sub> (ms)		
no DRX	max(200,ceil(10*P)*T <sub>SSB</sub> )		
DRX cycle≤320	max(200,ceil(15*P)*max(T <sub>DRX</sub> ,T <sub>SSB</sub> ))		
DRX cycle>320	ceil(10*P)*T <sub>DRX</sub>		
NOTE: T <sub>SSB</sub> is the periodicity of SSB configured for RLM.			

For FR1,

- P=1/(1 T<sub>SSB</sub>/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

If the high layer in TS 38.331 [13] signaling of smtc2 is present,  $T_{SMTCperiod}$  follows smtc2; otherwise  $T_{SMTCperiod}$  follows smtc1.

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

When the downlink radio link quality on all the configured RLM-RS resources is worse than Q<sub>out</sub>, 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 [13].

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 [8]. Two successive indications from Layer 1 shall be separated by at least T<sub>Indication interval</sub>.

If DRX is used, 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-RS resources to a second configuration of RLM-RS resources that is different from the first configuration,

or

- the UE transitions between DRX and no DRX or DRX cycle periodicity changes,

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

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

When DRX is used, TIndication\_interval is max(10ms, 1.5\*DRX\_cycle\_length, 1.5\*TRLM-RS,M) if DRX cycle\_length is less than or equal to 320ms, and TIndication\_interval is DRX\_cycle\_length if DRX cycle\_length is greater than 320ms. Upon start of T310 timer as specified in TS 38.331 [13], 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.

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 [13].

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

For UE which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to radio link monitoring based on SSB as RLM-RS. For UE which do not support *simultaneousRxDataSSB-DiffNumerology* [11] the following restrictions apply due to radio link monitoring based on SSB as RLM-RS.

 The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on SSB symbols to be measured for radio link monitoring.

The normative reference for this requirement is TS 38.133 [6] clauses 8.1.2, 8.1.4, 8.1.5, 8.1.6 and 8.1.7.

# 6.5.1.0.2 Minimum conformance requirements for in-sync SSB-based RLM

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

 $T_{Evaluate\_out\_SSB}$  and  $T_{Evaluate\_in\_SSB}$  are defined in Table 6.5.1.0.2-1 for FR1.

#### For FR1,

- P=1/(1 T<sub>SSB</sub>/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

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

Note: The overlap between CSI-RS RLM and SMTC means that CSI-RS based RLM is within the SMTC window duration.Longer evaluation period would be expected if the combination of RLM-RS, SMTC occasion and measurement gap configurations does not meet pervious conditions.

The values of  $M_{out}$  and  $M_{in}$  used in Table 6.5.1.2.3-1 are defined as:

-  $M_{out} = 20$  and  $M_{in} = 10$ , if the CSI-RS resource configured for RLM is transmitted with Density =3.

Configuration	T <sub>Evaluate_out</sub> (ms)	T <sub>Evaluate_in</sub> (ms)		
no DRX	max(200, ceil(Mout×P)×Tcsl-Rs)	max(100, ceil(M <sub>in</sub> ×P) × T <sub>CSI-RS</sub> )		
DRX ≤ 320ms	max(200, ceil(1.5×M <sub>out</sub> ×P)×	max(100, ceil(1.5×Min×P)× max(TDRX, TCSI-		
	max(T <sub>DRX</sub> , T <sub>CSI-RS</sub> ))	RS))		
DRX > 320ms	$ceil(M_{out} \times P) \times T_{DRX}$	$ceil(M_{in} \times P) \times T_{DRX}$		
NOTE: T <sub>CSI-RS</sub> is the periodicity of CSI-RS resource configured for RLM. T <sub>DRX</sub> is the DRX cycle length.				

Table 6.5.1.0.2-1: Evaluation period T<sub>Evaluate out</sub> and T<sub>Evaluate in</sub> for FR1

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

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

When DRX is not used  $T_{Indication\_interval}$  is max(10ms,  $T_{RLM-RS,M}$ ), where  $T_{RLM,M}$  is the shortest periodicity of all configured RLM-RS resources for the monitored cell, which corresponds to  $T_{SSB}$  specified in section 8.1.2 of TS 38.133 [6] if the RLM-RS resource is SSB, or  $T_{CSI-RS}$  specified later in this if the RLM-RS resource is CSI-RS.

When DRX is used, TIndication\_interval is max(10ms, 1.5\*DRX\_cycle\_length, 1.5\*TRLM-RS,M) if DRX cycle\_length is less than or equal to 320ms, and TIndication\_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.

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-RS resources to a second configuration of RLM-RS resources that is different from the first configuration, for each RLM-RS resource present in the second configuration,

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

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 [13].

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

For UE which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to radio link monitoring based on SSB as RLM-RS. For UE which do not support *simultaneousRxDataSSB-DiffNumerology* [11] the following restrictions apply due to radio link monitoring based on SSB as RLM-RS.

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on SSB symbols to be measured for radio link monitoring.

The normative reference for this requirement is TS 38.133 [6] clauses 8.1.2, 8.1.4, 8.1.5, 8.1.6, 8.1.7 and A.7.5.1.

# 6.5.1.0.3 Minimum conformance requirements for out-of-sync and in-sync CSI-RS based RI M

[TS 38.133 clause 8.1.3.2]

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.

#### For FR1,

- P=1/(1 T<sub>CSI-RS</sub>/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

If the high layer in TS 38.331 [2] signaling of *smtc2* is present, T<sub>SMTCperiod</sub> follows *smtc2*; Otherwise T<sub>SMTCperiod</sub> follows *smtc1*.

Note: The overlap between CSI-RS RLM and SMTC means that CSI-RS based RLM is within the SMTC window duration. Longer evaluation period would be expected if the combination of RLM-RS, SMTC occasion and measurement gap configurations does not meet pervious conditions.

The values of M<sub>out</sub> and M<sub>in</sub> used in Table 8.1.3.2-1 are defined as:

-  $M_{out} = 20$  and  $M_{in} = 10$ , if the CSI-RS resource configured for RLM is transmitted with Density =3.

Table 6.5.1.0.3-1: Evaluation period T<sub>Evaluate\_out</sub> and T<sub>Evaluate\_in</sub> for FR1

Configuration	T <sub>Evaluate_out</sub> (ms)	T <sub>Evaluate_in</sub> (ms)	
no DRX	max(200, ceil(M <sub>out</sub> ×P)×T <sub>CSI-RS</sub> )	max(100, ceil(M <sub>in</sub> xP) x T <sub>CSI-RS</sub> )	
DRX ≤ 320ms	max(200, ceil(1.5×M <sub>out</sub> ×P)×	max(100, ceil(1.5×Min×P)× max(TDRX, TCSI-	
	max(T <sub>DRX</sub> , T <sub>CSI-RS</sub> ))	RS))	
DRX > 320ms	$ceil(M_{out} \times P) \times T_{DRX}$	$ceil(M_{in} \times P) \times T_{DRX}$	
NOTE: Tcsl-Rs is the periodicity of CSI-RS resource configured for RLM. TpRx is the DRX cycle length.			

[TS 38.133 clause 8.1.6]

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

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

The out-of-sync and in-sync evaluations for the configured RLM-RS resources shall be performed as specified in clause 5 in TS 38.213 [3]. Two successive indications from Layer 1 shall be separated by at least T<sub>Indication interval</sub>.

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

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

[TS 38.133 clause 8.1.5]

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].

The normative reference for this requirement is TS 38.133 [6] clause 8.1.3.2, 8.1.6 and 8.1.5.

# 6.5.1.1 NR SA FR1 radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- -Test Requirement has some
- Message Exceptions is FFS

#### 6.5.1.1.1 Test purpose

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PCell configured with SSB-based RLM RS in non-DRX mode. This test will partly verify the NR cell radio link monitoring requirements in TS 38.133 [6] section 8.1.2.

#### 6.5.1.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 6.5.1.1.3 Minimum conformance requirement

The minimum conformance requirements are specified in clause 6.5.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.5.1.1.

#### 6.5.1.1.4 Test description

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 6.5.1.1.4-1 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.

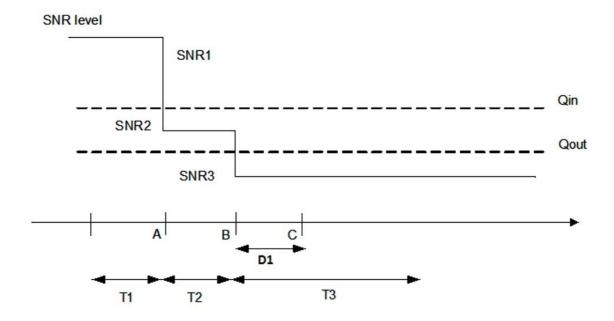


Figure 6.5.1.1.4-1: SNR variation for out-of-sync testing

#### 6.5.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1 and Table 5.3.6-1 of 38.521-1 [17].

This test shall be tested using any of the test configurations in Table 6.5.1.1.4.1-1.

Table 6.5.1.1.4.1-1: NA SA FR1 radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode supported test configurations

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

Configure the test equipment and the DUT according to the parameters in Table 6.5.1.1.4.1-2

Table 6.5.1.1.4.1-2: Initial conditions for NR SA FR1 radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode

Parameter	Value		Comment
Test environment		NC	As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As	specified in Annex E.1.2, Table E.4	4-1 and TS 38.508-1 [14] clause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 6.5.1.1.4.1-1		
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		N/A	

PDCCH transmission parameters are given in Table 6.5.1.1.4.1-3

Table 6.5.1.1.4.1-3: PDCCH transmission parameters for out-of-sync

Attribute	Value for BLER Configuration #0
DCI format	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH RE energy to average SSS RE energy	4dB
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	4dB
Bandwidth (MHz)	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

- 1. Message contents are defined in clause 6.5.1.1.4.3.
- 2. Single Cell is used, which is NR FR1 Pcell. The connection setup is done according to the settings in Annex C.1.2 and C.1.3.
- 3. The test parameters are given in Table 6.5.1.1.4.1-4 below.
- 4. Downlink signals for NR cell are initially set up according to Annex C.1.2 and C.1.3.
- 5. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [10] clause 4.5.

Table 6.5.1.1.4.1-4: General test parameters for FR1 out-of-sync testing in non-DRX mode

P	Parameter	Unit	Value
			Test 1
A :: 50 !!			0.11.4
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: $N_{RB,c} = 52$
	Config 2		10: $N_{RB,c} = 52$
	Config 3		40: N <sub>RB,c</sub> = 106

DL initial BWP co	nfiguration	Config 1, 2, 3		DLBWP.0.1
		Config 1, 2, 3		
configuration		cog ., _, c		DLBWP.1.1
UL initial BWP configuration Config 1, 2, 3			ULBWP.0.1	
UL dedicated BWP Config 1, 2, 3 configuration			ULBWP.1.1	
TDD Configuration	n	Config 1		Not Applicable
122 Comigarano	•••	Config 2		TDDConf.1.1
		Config 3		TDDConf.2.1
CORESET Refer	ence Channel	Config 1		CR.1.1 FDD
CONLOCATIONS	ondo Onamio	Config 2		CR.1.1 TDD
		Config 3		CR.2.1 TDD
SSB Configuratio	n .	Config 1		SSB.1 FR1
33D Configuratio	11	Config 2		SSB.1 FR1
				SSB.1 FR1
CMTC Configuration	<u> </u>	Config 3		
SMTC Configurat	ion	Config 1, 2		SMTC.1
		Config 3		SMTC.1
PDSCH/PDCCH	subcarrier	Config 1, 2		15 KHz
spacing		Config 3		30 KHz
PRACH Configura	ation	Config 1, 2		Table A.3.8.2.4-1
		Config 3		Table A.3.8.2.4-1
SSB index assign	ned as RLM RS			0
OCNG parameter	rs			OP.1
CP length				Normal
Correlation Matrix	cand Antenna C	Configuration		2x2 Low
Out of sync	DCI format			1-0
transmission parameters	Number of Co	Number of Control OFDM symbols		2
paramotoro	Aggregation le	evel	CCE	8
		atio of hypothetical PDCCH RE ergy to average SSS RE energy		4
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy		dB	4
	DMRS precod	der granularity		REG bundle size
	REG bundle s	size		6
DRX				OFF
Gap pattern ID			<del>                                     </del>	gp0
Layer 3 filtering				Enabled
T310 timer			ms	0
T311 timer			ms	1000
N310			1	
N311				1
CSI-RS configuration Config 1		Config 1, 4		[CSI-RS.1.3 FDD]
		Config 2, 5		[CSI-RS.1.3 TDD]
		Config 3, 6		[CSI-RS.2.3 TDD]
T1			S	1
T2			S	0.6
T3			s	0.6
D1				0.44
	figurations are:	assigned to the UE prior to	the start of time r	
1		not transmitted after T1 st		

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

#### 6.5.1.1.4.2 Test Procedure

There is one cell (Cell 1), which is the active NR cell, in the test. Prior to the start of the time duration T1, the UE shall be fully synchronized to PCell. The UE shall be configured for periodic CQI reporting in PUCCH [format 1] with a reporting periodicity as mentioned in the above table 6.5.1.1.4.1-4..

- 1. Set the parameters according to T1 in Table 6.5.1.1.4.4-1. Propagation conditions are set according to Annex C.2.2. T1 starts.
- 2. When T1 expires the SS shall change the SNR value to T2 as specified in Table 6.5.1.1.4.4-1. T2 starts.
- 3. When T2 expires the SS shall change the SNR value to T3 as specified in Table 6.5.1.1.4.4-1. T3 starts.
- 4. If the SS:
  - a) detects uplink power equal to or higher than [-50 dBm] in each subframe configured for CQI transmission (according to configured CQI periodicity on PUCCH [format 1]) during the period from time point A to time point B

#### and

b) does not detect any uplink power higher than [-50 dBm] from time point C (240 ms after the start of T3) until T3 expires,

the number of successful tests is increased by one.

- 5. Otherwise the number of failed tests is increased by one.
- 6. When T3 expires the SS shall change the SNR value to T1 as specified in Table 6.5.1.1.4.4-1.
- 7. If the UE has not re-established the connection in at least 1s, the UE is switched off and then on. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [10] clause 4.5.
- 8. Repeat steps 2-7 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 6.5.1.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1.

Table 6.5.1.1.4.3-1: PDCCH Search Space

Derivation Path: TS 38.508-1 [14], Table 4.6.3-162			
Information Element	Value/remark	Comment	Condition
SearchSpace ::= SEQUENCE {			
searchSpaceId	0	SearchSpaceId with condition CSS	CSS
controlResourceSetId	0	ControlResourceS etId	
monitoringSlotPeriodicityAndOffset CHOICE {			
sl1	NULL		
}			
duration	2		
monitoringSymbolsWithinSlot	11000000000000	Symbols 0 and 1	
nrofCandidates SEQUENCE {			
aggregationLevel1	n0		
aggregationLevel2	n0		
aggregationLevel4	n0		
aggregationLevel8	n1	AL8	
aggregationLevel16	n0		
}			
searchSpaceType CHOICE {			
common SEQUENCE {			CSS, SISS
ue-Specific SEQUENCE {			USS
dci-Formats	formats0-0-And-1-0	DCI Format 1_0	
}			
}			
}			

Table 6.5.1.1.4.3-2: UE-TimersAndConstants

Derivation Path: TS 38.508-1 [14], Table 4.6.3-200			
Information Element	Value/remark	Comment	Condition
UE-TimersAndConstants ::= SEQUENCE {			
t310	ms0		
n310	n1		
t311	ms1000		
n311	n1		
}			

Table 6.5.1.1.4.3-3: CSI-FrequencyOccupation

Derivation Path: TS 38.508-1 [14], Table 4.6.3-33			
Information Element	Value/remark	Comment	Condition
CSI-FrequencyOccupation ::= SEQUENCE {			
startingRB	0		
nrofRBs	52	10 MHz (Test 1,	
		2)	
	106	40 MHz (Test 3)	
}			

#### 6.5.1.1.5 Test Requirement

Table 6.5.1.1.5-1 defines the cell specific primary level settings.

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%.

Table 6.5.1.1.5-1: Cell specific test parameters for FR1 (Cell 2) for out-of-sync radio link monitoring tests in non-DRX mode

Parameter		Unit		Test 1	
			T1	T2	T3
EPRE ratio of	of PDCCH DMRS to SSS	dB	4		
EPRE ratio of	of PDCCH to PDCCH DMRS	dB		0	
EPRE ratio o	of PBCH DMRS to SSS	dB			
EPRE ratio o	of PBCH to PBCH DMRS	dB			
EPRE ratio o	of PSS to SSS	dB			
EPRE ratio o	of PDSCH DMRS to SSS	dB		0	
EPRE ratio o	of PDSCH to PDSCH DMRS	dB			
EPRE ratio o	of OCNG DMRS to SSS	dB			
EPRE ratio o	of OCNG to OCNG DMRS	dB			
SNR	Config 1	dB	1	-7	-15
	Config 2		1	-7	-15
	Config 3		1	-7	-15
M	Config 1	dBm/15K		-98	
$N_{oc}$	Config 2	Hz	•	-98	
	Config 3			-98	

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Propagat	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.		allocated and a constant total transmitted		
Note 2:	The signal contains PDCCH for UEs other than the	device unde	er test as part of OCNG.	
Note 3:	e 3: SNR levels correspond to the signal to noise ratio over the SSS REs.			
Note 4:	e 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:	te 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 6.5.1.1.5-2: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field	Test 1	
Field	Value	
gapOffset	0	
Note Ensure that RLM RS is partially overlapped with measurement gap		

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

# 6.5.1.2 NR SA FR1 radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode

Editor's Notes: This test case is incomplete. The following aspects are either missing or not yet determined

- Test tolerance analysis is TBD
- CSI-RS config and some PDCCH parameters for In-Sync are in square brackets pending RAN4 updates

#### 6.5.1.2.1 Test purpose

The purpose of this test is to verify that the UE properly detects in sync for the purpose of monitoring downlink radio link quality of the PCell, when DRX is not used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.2.

# 6.5.1.2.2 Test applicability

This test applies to all types of NR UEs supporting Release 15 and forwared

#### 6.5.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.5.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.6.5.1.2.

# 6.5.1.2.4 Test Description

There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. The UE is configured to perform interfrequency measurements using Gap Pattern ID #0 (40ms) in test 2.

Cell 1 SNR level SNR level SNR<sub>1</sub> SNR5 SNR<sub>2</sub> SNR4 Cell 2 SNR level SNR3 В С D F D1 T1 **T3** T4 T5 T2

Figure 6.5.1.2.4-1 - SNR variation for in-sync testing

#### 6.5.1.2.5 Test Requirements

#### 6.5.1.2.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table [5.3.5-1] and Table [5.3.6-1] of 38.521-1 [17].

This test shall be tested using any of the test configurations in Table 6.5.1.2.4.1-1.

Table 6.5.1.2.4.1-1: Supported test configurations for FR1 PSCell

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

Configure the test equipment and the DUT according to the parameters in Table 6.5.1.2.4.1-2

Table 6.5.1.2.4.1-2: Initial conditions for SA FR1 radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode

Parameter		Value	Comment		
Test environment		NC As specified in TS 38.508-1 [14] cla			
Test frequencies	As	specified in Annex E.1.1, Table E.2	2-1 and TS 38.508-1 [14] clause 4.3.1.		
Channel		As specified by the test configurat	ion selected from Table 6.5.1.2.5-1		
bandwidth					
Propagation		AWGN	As specified in Annex C.2.2.		
conditions					
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.2.3.4			

Exceptions to	N/A	
connection		
diagram		

PDCCH transmission parameters are given in Table 6.5.1.2.4.1-3

Table 6.5.1.2.4.1-3: PDCCH transmission parameters for in-sync

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

- 1. Message contents are defined in clause 4.5.1.3.4.3.
- 2. The power levels and settings for Cell 1 are set according to Annex A.6, Table A.6.1.1-1. Cell 2 is NR FR1 PSCell. The connection setup is done according to the settings in Annex C.1.3, and the downlink signal levels as per Annex C.1.2
- 3. The general test parameters are given in Table 6.5.1.2.5-4 below.
- 4. Downlink signals for NR cell are initially set up according to Annex C.1.

Table 6.5.1.2.4.1-4: General test parameters for FR1 in-sync testing in non-DRX mode

Р	arameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			11
Duplex mode	Config 1		FDD
BW <sub>channel</sub>	Config 2, 3 Config 1	MHz	TDD 10: N <sub>RB,c</sub> = 52
DVV channel	Config 2	IVIDZ	10. $N_{RB,c} = 52$ 10: $N_{RB,c} = 52$
	Config 2		40: N <sub>RB,c</sub> = 106
DL initial BWP	Config 1, 2, 3		
configuration	, <u>, , , , , , , , , , , , , , , , , , </u>		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
000000	Config 3		TDDConf.2.1
CORESET Reference	Config 1		CR.1.1 FDD
Channel	Config 2		CR.1.1 TDD
000 0 " "	Config 3		CR.2.1 TDD
SSB Configuration	Config 1	+	SSB.1 FR1
	Config 2		SSB.1 FR1
CMTC Configuration	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
PDSCH/PDCCH	Config 3 Config 1, 2		SMTC.1 15 KHz
subcarrier spacing	-		
	Config 3		30 KHz
PRACH Configuration	Config 1, 2		Table A.3.8.2.4-1
	Config 3		Table A.3.8.2.4-1
SSB index assigned as	RLM RS		0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and			2x2 Low
In sync transmission	DCI format  Number of Control OFDM		1-0 2
parameters	symbols	CCE	<u>-</u>
	Aggregation level Ratio of hypothetical PDCCH	CCE	4
	RE energy to average SSS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF

Gap pattern ID			N.A.	
Layer 3 filtering			Enabled	
T310 timer		ms	2000	
T311 timer		ms	1000	
N310			1	
N311			1	
CSI-RS configuration	Config 1		[CSI-RS.1.3 FDD]	
	Config 2		[CSI-RS.1.3 TDD]	
	Config 3		[CSI-RS.2.3 TDD]	
T1		S	0.5	
T2		S	0.4	
T3		S	1.46	
T4		S	0.4	
T5		S	1	
D1 s		S	0.42	
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	er T1 starts.	•	

#### 6.5.1.2.4.2 Test Procedure

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 PCell. The UE shall be configured for periodic CQI reporting in PUCCH [format 1] with a reporting periodicity as mentioned in the above table 4.5.1.4.4.1-4.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* NR, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.
- 2. Set the parameters according to T1 in Table 4.5.1.4.4-1 for subtest 1 and 2. Propagation conditions are set according to Annex TBD. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 4.5.1.4.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.4.5-1. T3 starts.
- 5. When T3 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.4.5-1. T4 starts.
- 6. When T4 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.4.5-1. T5 starts.
- 7. If the SS detects uplink power equal to or higher than -39 dBm in the On-duration part of every DRX cycle in the subframe according the configured CQI reporting mode (PUCCH 1-0) during the period from time point A to time point F (1120 ms after the start of time duration T5) the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

8. Repeat steps 2-7 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 6.5.1.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1 with the following exceptions.

Table 4.5.1.1.4.3-2: PDCCH Search Space

Derivation Path: TS 38.508-1 [14], Table 4.6.3-162			
Information Element	Value/remark	Comment	Condition
SearchSpace ::= SEQUENCE {			
searchSpaceId	0	SearchSpaceId with condition CSS	CSS
controlResourceSetId	0	ControlResourceS etId	
monitoringSlotPeriodicityAndOffset CHOICE {			
sl1	NULL		
}			
duration	2		
monitoringSymbolsWithinSlot	11000000000000	Symbols 0 and 1	
nrofCandidates SEQUENCE {			
aggregationLevel1	n0		
aggregationLevel2	n0		
aggregationLevel4	n0		
aggregationLevel8	n1	AL8	
aggregationLevel16	n0		
}			
searchSpaceType CHOICE {			
common SEQUENCE {			CSS, SISS
ue-Specific SEQUENCE {			USS
dci-Formats	formats0-0-And-1-0	DCI Format 1_0	
}			
}			
}	· ·		

#### Table 4.5.1.1.4.3-2: UE-TimersAndConstants

Derivation Path: TS 38.508-1 [14], Table 4.6.3-200			
Information Element	Value/remark	Comment	Condition
UE-TimersAndConstants ::= SEQUENCE {			
t310	ms0		
n310	n1		
t311	ms1000		
n311	n1		
}			

# Table 4.5.1.1.4.3-3: CSI-FrequencyOccupation

Derivation Path: TS 38.508-1 [14], Table 4.6.3-33					
Information Element	Value/remark	Comment	Condition		
CSI-FrequencyOccupation ::= SEQUENCE {					
startingRB	0				
nrofRBs	52	10 MHz (Test 1, 2,			
		4, 5)			
	106	40 MHz (Test 3,			
		6)			
}					

# 6.5.1.2.5 Test Requirement

The requirements in this section apply for each SSB based RLM-RS resource configured for the PCell, provided that the SSB configured for RLM are actually transmitted within UE active DL BWP during the entire evaluation period specified in section 6.5.1.2.3.

Table 6.5.1.2.5-1 defines the cell specific primary level settings.

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% with a confidence interval of 95%.

Table A.6.5.1.2.5-1: Cell specific test parameters for FR1 for in-sync radio link monitoring tests in non-DRX mode

	Parameter	Unit			Test 1		
			T1	T2	T3	T4	T5
EPRE	ratio of PDCCH DMRS to SSS	dB			4		
EPRE	ratio of PDCCH to PDCCH DMRS	dB			0		
EPRE	ratio of PBCH DMRS to SSS	dB					
EPRE	ratio of PBCH to PBCH DMRS	dB					
EPRE	ratio of PSS to SSS	dB					
EPRE	ratio of PDSCH DMRS to SSS	dB			0		
EPRE	ratio of PDSCH to PDSCH DMRS	dB					
EPRE	ratio of OCNG DMRS to SSS	dB					
EPRE	ratio of OCNG to OCNG DMRS	dB					
SNR	Config 1	dB	1	-7	-15	-4.5	1
	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
$N_{oc}$	Config 1	dBm/			-98		
1 voc	Config 2	15			-98		
	Config 3	KHz			-98		
Propag	ation condition					100Hz	
Note 1:							
	and a constant total transmitted OFDM symbols.	power sp	ectral	density	is ach	ieved fo	or all
Note 2:	The signal contains PDCCH for part of OCNG.	UEs othe	r than	the dev	vice un	der tes	t as
Note 3:	Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.						
Note 4:	Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1,						
	SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.6.5.1.2.1-1.						
Note 5:	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	ed as spe	cified i	n secti	on A.3.	6.	

# 6.5.1.3 NR SA FR1 radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message Exceptions is FFS

#### 6.5.1.3.1 Test purpose

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PCell configured with SSB-based RLM RS when DRX is used. This test will partly verify the NR cell radio link monitoring requirements in TS 38.133 [6] section 8.1.2.

#### 6.5.1.3.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

### 6.5.1.3.3 Minimum conformance requirement

The minimum conformance requirements are specified in clause 6.5.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.5.1.3.

#### 6.5.1.3.4 Test description

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 6.5.1.3.4-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. The UE is configured to perform interfrequency measurements using Gap Pattern ID #0 (40ms).

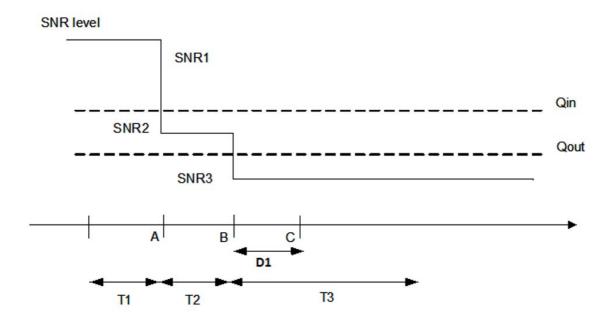


Figure 6.5.1.3.4-1: SNR variation for out-of-sync testing

#### 6.5.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table 5.3.5-1 and Table 5.3.6-1 of 38.521-1 [7].

This test shall be tested using any of the test configurations in Table 6.5.1.3.4.1-1.

Table 6.5.1.3.4.1-1: NA SA FR1 radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in DRX mode supported test configurations

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

Configure the test equipment and the DUT according to the parameters in Table 6.5.1.3.4.1-2

Table 6.5.1.3.4.1-2: Initial conditions for NR SA FR1 radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in DRX mode

Parameter	Value		Value		Comment
Test environment		NC	As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As	specified in Annex E.1.2, Table E.4	4-1 and TS 38.508-1 [14] clause 4.3.1.		
Channel bandwidth	As specified by the test configuration selected from Table 6.5.1.3.4.1-1				
Propagation conditions		AWGN	As specified in Annex C.2.2.		
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.2.3.4			
Exceptions to connection diagram		N/A			

PDCCH transmission parameters are given in Table 6.5.1.3.4.1-3

Table 6.5.1.3.4.1-3: PDCCH transmission parameters for out-of-sync

Attribute	Value for BLER Configuration #0
DCI format	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH RE energy to average SSS RE energy	4dB
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	4dB
Bandwidth (MHz)	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

- 1. Message contents are defined in clause 6.5.1.3.4.3.
- 2. Single Cell is used, which is NR FR1 PCell. The connection setup is done according to the settings in Annex C.1.2 and C.1.3.
- 3. The test parameters are given in Table 6.5.1.3.4.1-4 below.
- 4. Downlink signals for NR cell are initially set up according to Annex C.1.2 and C.1.3.
- 5. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [10] clause 4.5.

Table 6.5.1.3.4.1-4: General test parameters for FR1 out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active Pcell			Cell 1
RF Channel Numbe	r		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

		1	_
DL initial BWP	Config 1, 2, 3		DLBWP.0.1
configuration			525W1.0.1
DL dedicated BWP	Config 1, 2, 3		DLBWP.1.1
configuration			525777.111
UL initial BWP	Config 1, 2, 3		ULBWP.0.1
configuration			OLBVII.0.1
UL dedicated BWP	Config 1, 2, 3		ULBWP.1.1
configuration			
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
CORESET Reference	Config 1		CR.1.1 FDD
Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
G	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
ga.a	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 KHz
subcarrier spacing	•		
Sabournor opaoning	Config 3		30 KHz
PRACH Configuration	Config 1, 2		Table A.3.8.2.4-1
3	Config 3		Table A.3.8.2.4-1
	· ·		Table A.3.8.2.4-1
SSB index assigned as	RLM RS		0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
	5017		4.0
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	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 Configuration	·		[DRX.4]
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.1.3 FDD]
	Config 2		[CSI-RS.1.3 TDD]
	Config 3		[CSI-RS.2.3 TDD]
T1	<u> </u>	s	4
T2		S	7
T3		S	7
D1		S	6.44
וטו			

All configurations are assigned to the UE prior to the start of time period T1. UE-specific PDCCH is not transmitted after T1 starts. Note 1:

Note 2:

#### 6.5.1.3.4.2 Test Procedure

There is one cell (Cell 1), which is the active NR cell, in the test. Prior to the start of the time duration T1, the UE shall be fully synchronized to PCell. The UE shall be configured for periodic CQI reporting in PUCCH [format 1] with a reporting periodicity as mentioned in the above table 6.5.1.3.4.1-4.

- 1. Set the parameters according to T1 in Table 6.5.1.3.4.4-1. Propagation conditions are set according to Annex TBD. T1 starts.
- 2. When T1 expires the SS shall change the SNR value to T2 as specified in Table 6.5.1.3.4.4-1. T2 starts.
- 3. When T2 expires the SS shall change the SNR value to T3 as specified in Table 6.5.1.3.4.4-1. T3 starts.
- 4. If the SS:
  - a) detects uplink power equal to or higher than [-50 dBm] in each subframe configured for CQI transmission (according to configured CQI periodicity on PUCCH [format 1]) during the period from time point A to time point B

and

b) does not detect any uplink power higher than [-50 dBm] from time point C (240 ms after the start of T3) until T3 expires,

the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

- 5. When T3 expires the SS shall change the SNR value to T1 as specified in Table 6.5.1.3.4.4-1 for subtests 1 and 2.
- 6. If the UE has not re-established the connection in at least 1s, the UE is switched off and then on. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [10] clause 4.5.
- 7. Repeat steps 2-7 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

### 6.5.1.3.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1.

Table 6.5.1.3.4.3-1: PDCCH Search Space

Derivation Path: TS 38.508-1 [14], Table 4.6.3-162			
Information Element	Value/remark	Comment	Condition
SearchSpace ::= SEQUENCE {			
searchSpaceId	0	SearchSpaceId with condition CSS	CSS
controlResourceSetId	0	ControlResourceS etId	
monitoringSlotPeriodicityAndOffset CHOICE {			
sl1	NULL		
}			
duration	2		
monitoringSymbolsWithinSlot	11000000000000	Symbols 0 and 1	
nrofCandidates SEQUENCE {			
aggregationLevel1	n0		
aggregationLevel2	n0		
aggregationLevel4	n0		
aggregationLevel8	n1	AL8	
aggregationLevel16	n0		
}			
searchSpaceType CHOICE {			
common SEQUENCE {			CSS, SISS
ue-Specific SEQUENCE {			USS
dci-Formats	formats0-0-And-1-0	DCI Format 1_0	
}			
}			
}			

#### Table 6.5.1.3.4.3-2: UE-TimersAndConstants

Derivation Path: TS 38.508-1 [14], Table 4.6.3-200			
Information Element	Value/remark	Comment	Condition
UE-TimersAndConstants ::= SEQUENCE {			
t310	ms0		
n310	n1		
t311	ms1000		
n311	n1		
}			

# Table 6.5.1.3.4.3-3: CSI-FrequencyOccupation

Derivation Path: TS 38.508-1 [14], Table 4.6.3-33			
Information Element	Value/remark	Comment	Condition
CSI-FrequencyOccupation ::= SEQUENCE {			
startingRB	0		
nrofRBs	52	10 MHz (Test 1,	
		2)	
	106	40 MHz (Test 3)	
}			

# 6.5.1.3.5 Test Requirement

Table 6.5.1.3.5-1 defines the cell specific primary level settings.

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

The rate of correct events observed during repeated tests shall be at least 90%.

Table 6.5.1.3.5-1: Cell specific test parameters for FR1 (Cell 1) 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			
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	Config 1	dB	1	-7	-15
	Config 2		1	-7	-15
	Config 3		1	-7	-15
M	Config 1	dBm/15	-98 -98		
$N_{oc}$	Config 2	KHz			
	Config 3			-98	
Propagatio	n condition		TDL-C 300ns 100Hz		

OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total Note 1: transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

SNR levels correspond to the signal to noise ratio over the SSS REs. Note 3:

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.

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

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

#### 6.5.1.4 NR SA FR1 radio link monitoring in-sync test for PCell configured with SSBbased RLM RS in DRX mode

Editor's Notes: This test case is incomplete. The following aspects are either missing or not yet determined

- Test tolerance analysis is TBD
- Exceptions to Message contents are TBD
- CSI-RS config and some PDCCH parameters for In-Sync are in square brackets pending RAN4 updates

#### 6.5.1.4.1 Test purpose

The purpose of this test is to verify that the UE properly detects 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 8.1.2.

#### 6.5.1.4.2 Test applicability

This test applies to all types of NR UEs supporting Release 15 and forward

#### 6.5.1.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.5.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.6.5.1.4.

#### 6.5.1.4.4 Test Description

There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. Editor note: whether to revise power level to be gradually changed

SNR level

SNR1

SNR5

Qin

SNR2

Cell 2 SNR level

SNR3

Cell 2 SNR level

A B C
D E F
D1

T1 T2 T3 T4 T5

Figure 6.5.1.4.4-1 - SNR variation for in-sync testing

# 6.5.1.4.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and subcarrier spacing based on NR operating bands specified in Table [5.3.5-1] and Table [5.3.6-1] of 38.521-1 [17].

This test shall be tested using any of the test configurations in Table 4.5.1.4.4.1-1.

Table 6.5.1.4.4.1-1: Supported test configurations for NR FR1 PCell

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

Configure the test equipment and the DUT according to the parameters in Table 4.5.1.4.4.1-2

Table 6.5.1.4.4.1-2: Initial conditions for SA FR1 radio link monitoring in-sync test for NR PCell configured with SSB-based RLM RS in DRX mode

Parameter	Value		Value Comment		Comment
Test environment		NC	As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As	specified in Annex E.1.2, Table E.4	4-1 and TS 38.508-1 [14] clause 4.3.1.		
Channel bandwidth	As specified by the test configuration selected from Table 6.5.1.4.4.1-1				
Propagation conditions		AWGN	As specified in Annex C.2.2.		
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.2.3.4			
Exceptions to connection diagram		N/A			

PDCCH transmission parameters are given in Table 4.5.1.4.4.1-3

Table 6.5.1.4.4.1-3: PDCCH transmission parameters for in-sync

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

- 1. Message contents are defined in clause 6.5.1.4.4.3.
- 2. There is one cell (Cell 1), which is the active NR cell, in the test. The power levels and settings are set according to Annex TBD, Table TBD. The connection setup is done according to the settings in Annex C.1.3, and the downlink signal levels as per Annex C.1.2
- 3. The general test parameters are given in Table 6.5.1.4.5-4 below.
- 4. Downlink signals for NR cell are initially set up according to Annex C.1.

Table 6.5.1.4.4.1-4: General test parameters for FR1 in-sync testing in DRX mode

Parameter			Unit	Value
				Test 1
Active PCell				Cell 1
RF Channel Number				1
Duplex mode		Config 1		FDD
				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 configurat	ion	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP		Config 1, 2, 3		DLBWP.1.1
configuration UL initial BWP configurat	ion	Config 1 2 2		ULBWP.0.1
UL dedicated BWP	.1011	Config 1, 2, 3 Config 1, 2, 3		
configuration		Coming 1, 2, 3		ULBWP.1.1
TDD Configuration		Config 1		Not Applicable
· · · · · · · · · · · · · · · · · · ·		Config 2		TDDConf.1.1
		Config 3		TDDConf.2.1
CORESET Reference Ch	nannel	Config 1		CR.1.1 FDD
		Config 2		CR.1.1 TDD
		Config 3		CR.2.1 TDD
SSB Configuration		Config 1		SSB.1 FR1
		Config 2		SSB.1 FR1
		Config 3		SSB.2 FR1
SMTC Configuration		Config 1, 2		SMTC.1
		Config 3		SMTC.1
PDSCH/PDCCH subcarr	ier	Config 1, 2		15 KHz
spacing		Config 3		30 KHz
PRACH Configuration		Config 1, 2		Table A.3.8.2.4-1
1 To Corr Cornigaration		-		
		Config 3		Table A.3.8.2.4-1
SSB index assigned as F	RLM RS			0
OCNG parameters				OP.1
CP length		<u> </u>		Normal
Correlation Matrix and A				2x2 Low
In sync transmission	DCI fo			1-0
parameters		er of Control OFDM		2
	symb		005	,
		egation level of hypothetical PDCCH	CCE dB	4 0
		nergy to average SSS	иБ	U
	DMRS	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy		0
	DMR	S precoder granularity		REG bundle size
	REG	bundle size		6
Out of sync	DCI fo			1-0
transmission		per of Control OFDM		2
parameters	symb			
		egation level	CCE	8
RE		of hypothetical PDCCH nergy to average SSS nergy	dB	4
	Ratio	of hypothetical PDCCH	dB	4
		S energy to average RE energy		
1		S precoder granularity		REG bundle size
		bundle size		6
DRX Configuration				Table A.3.3.3-1
Gap pattern ID				N.A.
Oap pattern iD				

Layer 3 filtering			Enabled
T310 timer			2000
T311 timer		ms	1000
N310			1
N311	N311		1
CSI-RS configuration	Config 1		[CSI-RS.1.3 FDD]
	Config 2		[CSI-RS.1.3 TDD]
	Config 3		[CSI-RS.2.3 TDD]
T1		S	4
T2		S	1.6
T3		S	1.36
T4		S	0.4
T5		S	1.4
D1		S	1

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

#### 6.5.1.4.4.2 Test Procedure

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 PCell. The UE shall be configured for periodic CQI reporting in PUCCH [format 1] with a reporting periodicity as mentioned in the above table 4.5.1.4.4.1-4.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters *Connectivity* NR, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.
- 2. Set the parameters according to T1 in Table 4.5.1.4.4-1 for subtest 1 and 2. Propagation conditions are set according to Annex TBD. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 4.5.1.4.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.4.5-1. T3 starts.
- 5. When T3 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.4.5-1. T4 starts.
- 6. When T4 expires the SS shall change the SNR value to T3 as specified in Table 4.5.1.4.5-1. T5 starts.
- 7. If the SS detects uplink power equal to or higher than -39 dBm in the On-duration part of every DRX cycle in the subframe according the configured CQI reporting mode (PUCCH 1-0) during the period from time point A to time point F (1120 ms after the start of time duration T5) the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

8. Repeat steps 2-7 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 6.5.1.4.4.3 Message Contents

Message contents are according to TS 38.508-1 [14] clause 4.6.1 with the following exceptions.

Table 4.5.1.1.4.3-2: PDCCH Search Space

Derivation Path: TS 38.508-1 [14], Table 4.6.3-162					
Information Element	Value/remark	Comment	Condition		
SearchSpace ::= SEQUENCE {					
searchSpaceId	0	SearchSpaceId with condition CSS	CSS		
controlResourceSetId	0	ControlResourceS etId			
monitoringSlotPeriodicityAndOffset CHOICE {					
sl1	NULL				
}					
duration	2				
monitoringSymbolsWithinSlot	11000000000000	Symbols 0 and 1			
nrofCandidates SEQUENCE {					
aggregationLevel1	n0				
aggregationLevel2	n0				
aggregationLevel4	n0				
aggregationLevel8	n1	AL8			
aggregationLevel16	n0				
}					
searchSpaceType CHOICE {					
common SEQUENCE {			CSS, SISS		
ue-Specific SEQUENCE {			USS		
dci-Formats	formats0-0-And-1-0	DCI Format 1_0			
}					
}					
}	· ·				

Table 4.5.1.1.4.3-2: UE-TimersAndConstants

Derivation Path: TS 38.508-1 [14], Table 4.6.3-200					
Information Element	Value/remark	Comment	Condition		
UE-TimersAndConstants ::= SEQUENCE {					
t310	ms0				
n310	n1				
t311	ms1000				
n311	n1				
}					

Table 4.5.1.1.4.3-3: CSI-FrequencyOccupation

Derivation Path: TS 38.508-1 [14], Table 4.6.3-33					
Information Element	Value/remark	Comment	Condition		
CSI-FrequencyOccupation ::= SEQUENCE {					
startingRB	0				
nrofRBs	52	10 MHz (Test 1, 2,			
		4, 5)			
	106	40 MHz (Test 3,			
		6)			
}					

### 6.5.1.4.5 Test Requirement

The requirements in this section apply for each SSB based RLM-RS resource configured for the PCell, provided that the SSB configured for RLM are actually transmitted within UE active DL BWP during the entire evaluation period specified in section 6.5.1.4.3.

Table 6.5.1.4.5-1 defines the cell specific primary level settings.

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% with a confidence interval of 95%.

Table A.4.5.1.4.5-1: Cell specific test parameters for FR1 for in-sync radio link monitoring tests in DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
EPRE	ratio of PDCCH DMRS to SSS	dB			4	-	
EPRE	ratio of PDCCH to PDCCH DMRS	dB			0		
EPRE	ratio of PBCH DMRS to SSS	dB					
EPRE	ratio of PBCH to PBCH DMRS	dB					
EPRE	ratio of PSS to SSS	dB					
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	Config 1	dB	1	-7	-15	-4.5	1
	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
$N_{oc}$	Config 1	dBm/15	-98				
1 voc	Config 2	KHz		-98			
	Config 3		-98				
Propag	gation condition				-C 300ns 1		
Note 1						a constant to	otal
	transmitted power spectral density						
Note 2						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					4 and		
<b>.</b>	SNR5 respectively in Figure A.6.5.1.4.1-1.					_	
Note 5	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						
		x on all ba	inas, the Si	NK auring I	3 and 14 is	s modified a	as
	specified in section A.3.6.						

# 6.5.1.5 NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- There are brackets in test requirements.
- Some parts of TC are TBDs.
- -TT is incomplete.

#### 6.5.1.5.1 Test purpose

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 TS 38.133 [6] clause 8.1.

#### 6.5.1.5.2 Test applicability

This test applies to all types of NR UE release 15 and forward supporting CSI-RS based RLM.

#### 6.5.1.5.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.5.1.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.6.5.1.5.

#### 6.5.1.5.4 Test description

The test consists of two subtests with one cell configured, the NR PCell; the difference between the two subtests is whether the measurement gap is configured on the PCell or not. Each subtest consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure 6.5.1.5.4-1 shows the three different time durations and the corresponding variation of the downlink SNR in the active cell to emulate out-of-sync states.

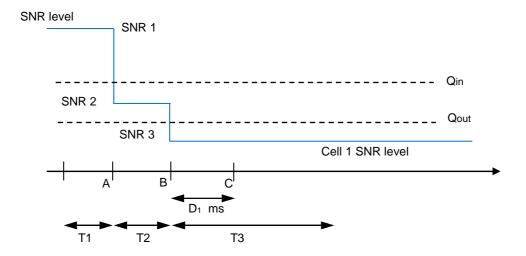


Figure 6.5.1.5.4-1: SNR variation for out-of-sync testing

# 6.5.1.5.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.5.1.5.4.1-1.

Table 6.5.1.5.4.1-1: Supported test configurations for NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX

Configuration	Description			
6.5.1.5-1	FDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth			
6.5.1.5-2	TDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth			
6.5.1.5-3	TDD duplex mode, 30kHz SSB SCS, 40MHz bandwidth			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Configure the test equirement and the DUT according to the parameters in Table 6.5.1.5.4.1-2.

Table 6.5.1.5.4.1-2: Initial conditions for NR SA radio link monitoring NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX

Parameter		Value	Comment	
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.	
Test frequencies	As specified	I in Annex E, Table E.4-1 and TS 38	.508-1 [14] clause 4.3.1.	
Channel bandwidth	As specified by the test configuration selected from Table 6.5.1.5.4.1-1.			
Propagation conditions	AWGN		As specified in Annex C.2.2	
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.	
Diagram	DUT Part	A.3.2.3.4		
Exceptions to connection diagram	N/A			

- 1. The general test parameter settings are set up according to Table 6.5.1.5.4.1-3. The measurement gap configuration for subtest 2 is according to Table 6.5.1.5.4.1-4. The NZP-CSI-RS configuration for subtest 1 and 2 is according to Table 6.5.1.5.4.1-5.
- 2. Message contents are defined in clause 6.5.1.5.4.3.
- 3. There are one cell in the test, where Cell 1 is the NR PCell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table 6.5.1.5.5-1 for this test. Cell 1 is configured according to Annex C.1.1 and C.1.2.

Table 6.5.1.5.4.1-3: General test parameters for NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX

Parameter		Unit	Va	lue
			Test 1	Test 2
Active PCell			Cell 1	Cell 1
RF Channel			1	1
Duplex mode			FDD	FDD
TDD	Config 2, 3		TDD	TDD
TDD	Config 1		Not Applicable	Not Applicable
Configuration			[TDDConf.1.1]	[TDDConf.1.1]
CORESET	Config 3 Config 1		[TDDConf.2.1] [CR. 1.1 FDD]	[TDDConf.2.1] [CR. 1.1 FDD]
Reference	Config 2		[CR. 1.1 FDD]	[CR. 1.1 FDD]
Channel	Config 3		[CR. 2.1 TDD]	[CR. 2.1 TDD]
SSB	Config 1		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
Configuration			TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
gg	Config 3	-	TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
SMTC	Config 1, 2		FR1 pattern 1	FR1 pattern 1
Configuration			FR1 pattern 2	FR1 pattern 2
PDSCH/PDC			15 KHz	15 KHz
H subcarrier	Config 3	1	30 KHz	30 KHz
spacing	9			
csi-RS-Index RS	assigned as RLM		[0]	[0]
OCNG paran	neters		TBD	TBD
CP length			Normal	Normal
	Matrix and Antenna		[2x2 Low]	[2x2 Low]
Configuration				
Out of sync	DCI format		1-0	1-0
transmissio	Number of Control		2	2
n parameters	OFDM symbols Aggregation level	CC	8	8
parametere		Е		
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4	4
	Ratio of hypothetical PDCCH DMRS energy to average	dB	4	4
	CSI-RS RE energy DMRS precoder granularity		REG bundle size	REG bundle size
	REG bundle size		6	6
DRX			OFF	OFF
Gap pattern	ID		[N.A.]	*[ <i>gp0</i> ]
Layer 3 filteri			Enabled	Enabled
T310 timer		ms	0	0
T311 timer		ms	1000	1000
N310			1	1
N311			1	1
NZP CSI-RS	configuration		[Resourceld 1]	[Resourceld 0]
ZP CSI-RS c			TBD	TBD
CSI-IM config	CSI-IM configuration		TBD	TBD
Periodic CSI reporting			PUCCH	PUCCH
CSI reporting	Config 1, 2	slot	[5]	[5]
periodicity	Config 3	1	[10]	[10]
T1		S	1	1
T2		S	0.4	0.4
T3		S	[0.6]	[0.6]
D1		s	[0.24]	[0.44]
Note 1: Uf	E-specific PDCCH is no	ot transr	nitted after T1 starts.	

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# Table 6.5.1.5.4.1-4: Measurement gap configuration for NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX

Field	Test 2
rieid	Value
gapOffset	[0]

Table 6.5.1.5.4.1-5: NZP-CSI-RS resource configuration for NR SA FR1 radio link monitoring out-ofsync test for PCell configured with CSI-RS-based RLM RS in non-DRX

Field		Resourceld 0	Resourceld 1
		Value	Value
frequencyDomainA Ilocation <sup>Note 1</sup>		row1	row2
startingR	В	0	0
nrofRBs		Note 2	Note 2
Note 1:	TS 38.211	[6] table 7.4.1.5.3-	1
Note 2:	nrofRBs is	derived based on t	he
	Configura	tion in TS 38.133 [6]	] Table
	A.6.5.1.5.	1-1	

#### 6.5.1.5.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [5] or [10] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in subtest 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of Cell 1 according to T1 in Table 6.5.1.5.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 6.5.1.5.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 6.5.1.5.5-1. T3 starts.
- 5. If the SS:
  - a) detects uplink power equal to or higher than [-39] dBm in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point B

and

b) does not detect any uplink power higher than [-48.5] dBm from time point C (D1 after the start of T3) until T3 expires,

the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

- 6. When T3 expires the SS shall change the SNR value to T1 as specified in Table 6.5.1.5.5-1.
- 7. If the UE has not re-established the connection in at least 1s, the UE is switched off and then on. Ensure the UE is in RRC\_CONNECTED according to TS 38.508-1 [14] clause FFS.
- 8. Repeat steps 2-7 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 6.5.1.5.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.5.1.5.4.3-1: Common Exception messages for NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode

Default Message Contents				
Common contents of system information				
blocks exceptions				
Default RRC messages and information	FFS			
elements contents exceptions				

#### 6.5.1.5.5 Test requirement

Tables 6.5.1.5.4.1-3 and 6.5.1.5.5-1 define the primary level settings including test tolerances for Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode.

Table 6.5.1.5.5-1: Cell specific test parameters for NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode

Par	ameter	Unit		Test 1			Test 2		
			T1	T2	T3	T1	T2	T3	
PDCCH_	_beta	dB		4		4			
PDCCH_	_DMRS_bet	dB		4			4		
а									
PBCH_b	eta	dB							
PSS_bet	a	dB							
SSS_bet	a	dB		0			0		
PDSCH_	beta	dB							
OCNG_b	eta	dB							
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	
$N_{oc}$	Config 1	dBm/		[-98] + TT			[-98] + TT		
1 oc	Config 2	15K		[-98] + TT			[-98] + TT		
	Config 3	Hz		[-98] + TT			[-98] + TT		
Propaga	tion		[TDL-C 300ns 100Hz]		[TDL-C 300ns 100Hz]				
condition									
Note 1:						located and a c	onstant total tra	nsmitted	
	power spectral density is achieved for all OFDM symbols.								
Note 2:	The uplink i	resource	s for CSI report	ting are assigne	ed to the UE pri	or to the start o	f time period T	l.	

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

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].

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

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

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C ( $D_1$  ms after the start of the time duration T3,  $D_1 = 240$  for sub-test 1 and  $D_1 = 440$  for sub-test 2) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

# 6.5.1.6 NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- There are brackets in test requirements.
- Some parts of TC are TBDs.
- -TT is incomplete.

#### 6.5.1.6.1 Test purpose

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 TS 38.133 [6] clause 8.1.

#### 6.5.1.6.2 Test applicability

This test applies to all types of NR UE release 15 and forward supporting CSI-RS based RLM.

#### 6.5.1.6.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.5.1.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.6.5.1.6.

#### 6.5.1.6.4 Test description

The test consists of two subtests with one cell configured, the NR PCell; the difference between the two subtests is whether the measurement gap is configured on the PCell or not. Each subtest consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 6.5.1.6.4-1 shows the five different time durations and the corresponding variation of the downlink SNR in the active cell to emulate in-sync states.

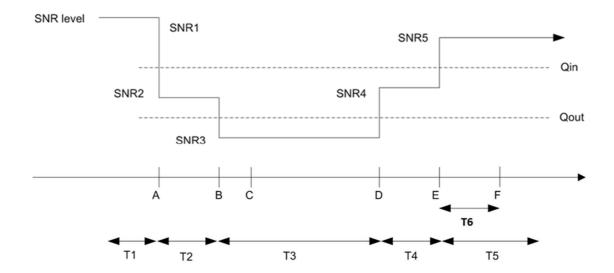


Figure 6.5.1.6.4-1: SNR variation for In-sync testing

#### 6.5.1.6.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.5.1.6.4.1-1.

Table 6.5.1.6.4.1-1: Supported test configurations for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode

Configuration	Description				
6.5.1.6-1	FDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth				
6.5.1.6-2	TDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth				
6.5.1.6-3	TDD duplex mode, 30kHz SSB SCS, 40MHz bandwidth				
Note: The UE is only required to pass in one of the supported test configurations in FR1					

Configure the test equirement and the DUT according to the parameters in Table 6.5.1.6.4.1-2.

Table 6.5.1.6.4.1-2: Initial conditions for for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	I in Annex E, Table E.4-1 and TS 38	.508-1 [14] clause 4.3.1.
Channel	As specified	by the test configuration selected fr	om Table 6.5.1.6.4.1-1.
bandwidth			
Propagation	AWGN		As specified in Annex C.2.2
conditions			
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to	N/A		
connection			
diagram			

- 1. The general test parameter settings are set up according to Table 6.5.1.6.4.1-3. The measurement gap configuration for subtest 2 is according to Table 6.5.1.6.4.1-4. The NZP-CSI-RS configuration for subtest 1 and 2 is according to Table 6.5.1.6.4.1-5.
- 2. Message contents are defined in clause 6.5.1.6.4.3.
- 3. There are one cell in the test, where Cell 1 is the NR PCell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table 6.5.1.6.5-1 for this test. Cell 1 is configured according to Annex C.1.1 and C.1.2.

Table 6.5.1.6.4.1-3: General test parameters for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode

Parameter		Unit	Va	lue
			Test 1	Test 2
Active PCell			Cell 1	Cell 1
RF Channel			1	1
Duplex mode			FDD	FDD
	Config 2, 3		TDD	TDD
TDD	Config 1	] ]	Not Applicable	Not Applicable
Configuration		] ]	[TDDConf.1.1]	[TDDConf.1.1]
	Config 3		[TDDConf.2.1]	[TDDConf.2.1]
CORESET	Config 1	] ]	[CR. 1.1 FDD]	[CR. 1.1 FDD]
Reference	Config 2	] ]	[CR. 1.1 TDD]	[CR. 1.1 TDD]
Channel	Config 3		[CR. 2.1 TDD]	[CR. 2.1 TDD]
SSB	Config 1	] ]	TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
Configuration		]	TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
	Config 3		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
SMTC	Config 1, 2		FR1 pattern 1	FR1 pattern 1
Configuration			FR1 pattern 2	FR1 pattern 2
PDSCH/PDC	CC Config 1, 2		15 KHz	15 KHz
H subcarrier	Config 3	}	30 KHz	30 KHz
spacing				
csi-RS-Index RS	assigned as RLM		[0]	[0]
OCNG parar	neters		TBD	TBD
CP length			Normal	Normal
Correlation N Configuration	Matrix and Antenna		[2x2 Low]	[2x2 Low]
Out of sync	DCI format		1-0	1-0
transmissio n	Number of Control OFDM symbols		2	2
parameters	Aggregation level	CC E	8	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	4
	DMRS precoder granularity		REG bundle size	REG bundle size
	REG bundle size		6	6
In sync	DCI format		1-0	1-0
transmissio n	Number of Control OFDM symbols		2	2
parameters	Aggregation level	CC E	4	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0
	DMRS precoder granularity		REG bundle size	REG bundle size
	REG bundle size		6	6
DRX			OFF	OFF
Gap pattern	ID		[N.A.]	*[ <i>gp0</i> ]
Layer 3 filteri	ing		Enabled	Enabled

T310 timer		ms	0	0		
T311 timer		ms	1000	1000		
N310			1	1		
N311			1	1		
NZP CSI-RS co	onfiguration		[Resourceld 1]	[Resourceld 0]		
ZP CSI-RS con	figuation		TBD	TBD		
CSI-IM configur	CSI-IM configuration		configuration		TBD	TBD
Periodic CSI re	porting		PUCCH	PUCCH		
CSI reporting	Config 1, 2	slot	[5]	[5]		
periodicity	Config 3		[10]	[10]		
T1		S	1	1		
T2	? s		0.4	0.4		
T3	T3		[0.6]	[0.6]		
D1		S	[0.24]	[0.44]		
Note 1: UE-s	pecific PDCCH is	not transm	itted after T1 starts.			

Table 6.5.1.6.4.1-4: Measurement gap configuration for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode

	Field				
	gapOffset	[0]			
Note 1:	RLM RS is partially overlapped with measurement gap				

Table 6.5.1.6.4.1-5: NZP-CSI-RS resource configuration for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode

Field		Resourceld 0	Resourceld 1		
		Value	Value		
frequencyDomainA Ilocation <sup>Note 1</sup>		row1	row2		
startingR	В	0	0		
nrofRBs		Note 2	Note 2		
Note 1: Note 2:	TS 38.211 [6] table 7.4.1.5.3-1 nrofRBs is derived based on the				
Configuration in TS 38.133 [6] Table					

A.4.5.1.6.1-1

#### 6.5.1.6.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [5] or [10] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in subtest 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of Cell 1 according to T1 in Table 6.5.1.6.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 6.5.1.6.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 6.5.1.6.5-1. T3 starts.
- 5. When T3 expires the SS shall change the SNR value to T4 as specified in Table 6.5.1.6.5-1. T4 starts.
- 6. When T4 expires the SS shall change the SNR value to T5 as specified in Table 6.5.1.6.5-1. T5 starts.

7. If the SS detects uplink power equal to or higher than [-39] dBm in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point F (T6 after the start of time duration T5) the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

8. After T5 expires, repeat steps 2-7 for both subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

# 6.5.1.6.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.5.1.6.4.3-1: Common Exception messages for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode

Default Message Contents					
Common contents of system information					
blocks exceptions					
Default RRC messages and information	FFS				
elements contents exceptions					

#### 6.5.1.6.5 Test requirement

Tables 6.5.1.6.4.1-3 and 6.5.1.6.5-1 define the primary level settings including test tolerances for Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode.

Table 6.5.1.6.5-1: Cell specific test parameters for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode

Parameter		Unit	Test 1				Test 2	
			T1	T2	Т3	T1	T2	T3
PDCCH	_beta	dB	4				4	
PDCCH	_DMRS_bet	dB		4			4	
a								
PBCH_b	oeta	dB						
PSS_be	ta	dB						
SSS_be	ta	dB		0			0	
PDSCH	_beta	dB						
OCNG_	beta	dB						
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD
$N_{oc}$	Config 1	dBm/		[-98] + TT			[-98] + TT	
1 oc	Config 2	15K	[-98] + TT		[-98] + TT			
	Config 3	Hz	[-98] + TT				[-98] + TT	
Propaga condition			[TC	DL-C 300ns 100	Hz]	[TDL-C 300ns 100Hz]		Hz]

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.6.1-1.
- 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].

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% with a confidence level of 95%.

# 6.5.1.7 NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- There are brackets in test requirements.
- Some parts of TC are TBDs.
- -TT is incomplete.

#### 6.5.1.7.1 Test purpose

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 TS 38.133 [6] clause 8.1.

#### 6.5.1.7.2 Test applicability

This test applies to all types of NR UE release 15 and forward supporting CSI-RS based RLM and long DRX cycle.

#### 6.5.1.7.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.5.1.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.6.5.1.7.

#### 6.5.1.7.4 Test description

The test consists of two subtests with one cell configured, the NR PCell; the difference between the two subtests is whether the measurement gap is configured on the PCell or not. Each subtest consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure 6.5.1.7.4-1 shows the three different time durations and the corresponding variation of the downlink SNR in the active cell to emulate out-of-sync states.

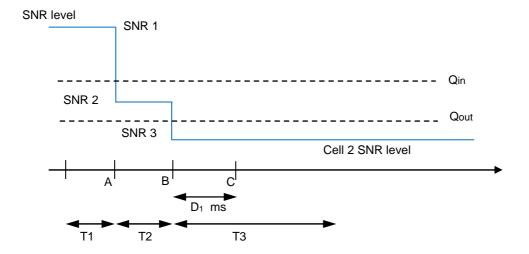


Figure 6.5.1.7.4-1: SNR variation for out-of-sync testing

#### 6.5.1.7.4.1 Initial conditions

This test shall be run in one of the configurations defined in Table 6.5.1.7.4.1-1.

Table 6.5.1.7.4.1-1: Supported test configurations for NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Configuration	Description			
6.5.1.7-1	FDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth			
6.5.1.7-2	TDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth			
6.5.1.7-3	TDD duplex mode, 30kHz SSB SCS, 40MHz bandwidth			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Configure the test equirement and the DUT according to the parameters in Table 6.5.1.7.4.1-2.

Table 6.5.1.7.4.1-2: Initial conditions for NR SA radio link monitoring for NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Parameter		Value	Comment	
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.	
Test frequencies	As specified	in Annex E, Table E.4-1 and TS 38	.508-1 [14] clause 4.3.1.	
Channel bandwidth	As specified by the test configuration selected from Table 6.5.1.7.4.1-1.			
Propagation conditions	AWGN		As specified in Annex C.2.2	
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.	
Diagram	DUT Part	A.3.2.3.4		
Exceptions to connection diagram	N/A			

- 1. The general test parameter settings are set up according to Table 6.5.1.7.4.1-3. The measurement gap configuration for subtest 2 is according to Table 6.5.1.7.4.1-4. The NZP-CSI-RS configuration for subtest 1 and 2 is according to Table 6.5.1.7.4.1-5. The DRX configuration for subtest 1 and 2 is according to Table 6.5.1.7.4.1-6. The time alignment timer configuration for subtest 1 and 2 is according to Table 6.5.1.7.4.1-7.
- 2. Message contents are defined in clause 6.5.1.7.4.3.
- 3. There are one cell in the test, where Cell 1 is the NR PCell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table 6.5.1.7.5-1 for this test. Cell 1 is configured according to Annex C.1.1 and C.1.2.

Table 6.5.1.7.4.1-3: General test parameters for NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

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

Table 6.5.1.7.4.1-4: Measurement gap configuration for NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

	Test 2			
	Field			
	gapOffset	[0]		
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned. (Ensure that RLM partially overlapped with m gap)	oundary RS is		

Table 6.5.1.7.4.1-5: NZP-CSI-RS resource configuration for NR SA FR1 radio link monitoring out-ofsync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Fi	eld	Resourceld 0	Resourceld 1	
		Value		
frequencyDomainA Ilocation <sup>Note 1</sup>		row1	row2	
startingRB		0	0	
nrofRBs		Note 2	Note 2	
Note 1: Note 2:	TS 38.211 [6] table 7.4.1.5.3-1 nrofRBs is derived based on the Configuration in TS 38.133 [6] Table A.4.5.1.7.1-1			

Table 6.5.1.7.4.1-6: DRX Configuration for NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Field	Test 1	Test 2
Field	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx-	[sl1]	[sl1]
RetransmissionTimerDL		
drx-	[sl1]	[sl1]
RetransmissionTimerUL		
longDRX-	[ms640]	[ms40]
CycleStartOffset		
shortDRX	disable	disable

Table 6.5.1.7.4.1-7: TimeAlignmentTimer Configuration for NR SA FR1 radio link monitoring out-ofsync test for PCell configured with CSI-RS-based RLM RS in DRX mode

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

### 6.5.1.7.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [5] or [10] ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in subtest 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause FFS.
- 2. Set the parameters of Cell 1 according to T1 in Table 6.5.1.7.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 6.5.1.7.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 6.5.1.7.5-1. T3 starts.
- 5. If the SS:
  - a) detects uplink power equal to or higher than [-39] dBm in the On-duration part of every DRX cycle in the slots configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point B

and

b) does not detect any uplink power higher than [-48.5] dBm from time point C (D1 after the start of T3) until T3 expires,

the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

- 6. When T3 expires the SS shall change the SNR value to T1 as specified in Table 6.5.1.7.5-1.
- 7. If the UE has not re-established the connection in at least 1s, the UE is switched off and then on. Ensure the UE is in RRC\_CONNECTED according to TS 38.508-1 [14] clause FFS.
- 8. Repeat steps 2-7 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 6.5.1.7.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause FFS with the following exceptions:

Table 6.5.1.7.4.3-1: Common Exception messages for NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Default Message Contents			
Common contents of system information			
blocks exceptions			
Default RRC messages and information	FFS		
elements contents exceptions			

#### 6.5.1.7.5 Test requirement

Tables 6.5.1.7.4.1-3 and 6.5.1.7.5-1 define the primary level settings including test tolerances for Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode.

Table 6.5.1.7.5-1: Cell specific test parameters for FR1 for NR SA FR1 radio link monitoring out-ofsync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Parameter		Unit		Test 1			Test 2	
			T1	T2	T3	T1	T2	T3
PDCCH	l_beta	dB	4			4		
PDCCH	I_DMRS_bet	dB		4			4	
а								
PBCH_I	beta	dB						
PSS_be	eta	dB						
SSS_be	eta	dB		0			0	
PDSCH_beta		dB						
OCNG_	beta	dB						
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD
$N_{oc}$	Config 1	dBm/		[-98] + TT			[-98] + TT	
Config 2		15K	[-98] + TT			[-98] + TT		
	Config 3	Hz		[-98] + TT			[-98] + TT	•
Propaga conditio			[TC	DL-C 300ns 100	)Hz]	[TDL-C 300ns 100Hz]		Hz]

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.7.1-1.
- 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].

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

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on PCell.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C ( $D_1$  ms after the start of the time duration T3, D = 240 for test 1 and D = 440 for test 2) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

# 6.5.1.8 NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- There are brackets in test requirements.
- Some parts of TC are TBDs.
- TT is incomplete.

#### 6.5.1.8.1 Test purpose

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR1 PCell CSI-RS insync radio link monitoring requirements in TS 38.133 [6] clause 8.1.

#### 6.5.1.8.2 Test applicability

This test applies to all types of NR UE release 15 and forward supporting CSI-RS based RLM and long DRX cycle.

#### 6.5.1.8.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.5.1.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.6.5.1.8.

#### 6.5.1.8.4 Test description

The test consists of two subtests with one cell configured, the NR PCell; the difference between the two subtests is whether the measurement gap is configured on the PCell or not. Each subtest consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 6.5.1.8.4-1 shows the five different time durations and the corresponding variation of the downlink SNR in the active cell to emulate in-sync states.

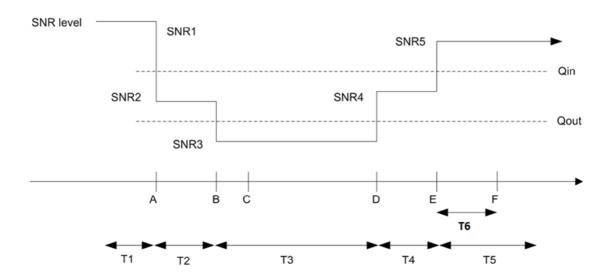


Figure 6.5.1.8.4-1: SNR variation for In-sync testing

#### 6.5.1.8.4.1 Initial conditions

This test shall be run in one of the configurations defined in Table 6.5.1.8.4.1-1.

Table 6.5.1.8.4.1-1: Supported test configurations for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Configuration	Description			
6.5.1.8-1	FDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth			
6.5.1.8-2	TDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth			
6.5.1.8-3	TDD duplex mode, 30kHz SSB SCS, 40MHz bandwidth			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Configure the test equirement and the DUT according to the parameters in Table 6.5.1.8.4.1-2.

Table 6.5.1.8.4.1-2: Initial conditions for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Parameter		Value	Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified	I in Annex E, Table E.4-1 and TS 38	.508-1 [14] clause 4.3.1.		
Channel bandwidth	As specified by the test configuration selected from Table 6.5.1.8.4.1-1.				
Propagation conditions	AWGN		As specified in Annex C.2.2		
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.2.3.4			
Exceptions to connection diagram	N/A				

- 1. The general test parameter settings are set up according to Table 6.5.1.8.4.1-3. The measurement gap configuration for subtest 2 is according to Table 6.5.1.8.4.1-4. The NZP-CSI-RS configuration for subtest 1 and 2 is according to Table 6.5.1.8.4.1-5. The DRX configuration for subtest 1 and 2 is according to Table 6.5.1.8.4.1-6. The time alignment timer configuration for subtest 1 and 2 is according to Table 6.5.1.8.4.1-7.
- 2. Message contents are defined in clause 6.5.1.8.4.3.
- 3. There are one cell in the test, where Cell 1 is the NR PCell on the NR carrier. Cell 1 is the cell used for connection setup with the power level set according to Table A.6.1.1-1 for this test. Cell 1 is configured according to Annex C.1.1 and C.1.2.

Table 6.5.1.8.4.1-3: General test parameters for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Parameter		Unit	Va	lue
			Test 1	Test 2
Active PCell			Cell 1	Cell 1
	RF Channel Number		1	1
Duplex mode	Duplex mode Config 1		FDD	FDD
	Config 2, 3		TDD	TDD
TDD	Config 1		Not Applicable	Not Applicable
Configuration			[TDDConf.1.1]	[TDDConf.1.1]
CORESET	Config 3		[TDDConf.2.1] [CR. 1.1 FDD]	[TDDConf.2.1] [CR. 1.1 FDD]
Reference	Config 1 Config 2		[CR. 1.1 FDD]	[CR. 1.1 FDD]
Channel	Config 3	-	[CR. 2.1 TDD]	[CR. 2.1 TDD]
SSB	Config 1		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
Configuration		-	TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
· ·	Config 3		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
SMTC	Config 1, 2		FR1 pattern 1	FR1 pattern 1
Configuration	Config 3		FR1 pattern 2	FR1 pattern 2
PDSCH/PDC	CC Config 1, 2		15 KHz	15 KHz
H subcarrier	Config 3		30 KHz	30 KHz
spacing	-			
csi-RS-Index RS	assigned as RLM		[0]	[0]
OCNG parar	neters		TBD	TBD
CP length			Normal	Normal
Correlation N Configuration	Matrix and Antenna า		[2x2 Low]	[2x2 Low]
Out of sync	DCI format		1-0	1-0
transmissio n	Number of Control OFDM symbols		2	2
parameters	Aggregation level	CC E	8	8
	Ratio of	dB	4	4
	hypothetical PDCCH RE energy to average CSI-RS RE energy			
	Ratio of hypothetical PDCCH DMRS	dB	4	4
	energy to average CSI-RS RE energy			
	DMRS precoder granularity		REG bundle size	REG bundle size
	REG bundle size		6	6
In sync	DCI format		1-0	1-0
transmissio n	Number of Control OFDM symbols		2	2
parameters	Aggregation level	CC E	4	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0
	DMRS precoder granularity		REG bundle size	REG bundle size
	REG bundle size		6	6
DRX			640	640
Gap pattern			[N.A.]	*[ <i>gp0</i> ]
Layer 3 filteri	ing		Enabled	Enabled
T310 timer		ms	0	0
1310 timer			•	•

T311 timer		ms	1000	1000		
N310			1	1		
N311			1	1		
NZP CSI-RS co	nfiguration		[Resourceld 1]	[Resourceld 0]		
ZP CSI-RS con	figuation		TBD	TBD		
CSI-IM configur	ation		TBD	TBD		
Periodic CSI rep	Periodic CSI reporting		PUCCH	PUCCH		
CSI reporting	Config 1, 2, 4, 5	slot	[5]	[5]		
periodicity	Config 3, 6		[10]	[10]		
T1		S	1	1		
T2		S	0.4	0.4		
T3		S	[0.6]	[0.6]		
D1		S	[0.24]	[0.44]		
Note 1: UE-s	Note 1: UE-specific PDCCH is not transmitted after T1 starts.					

Table 6.5.1.8.4.1-4: Measurement gap configuration for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Field	Test 2
Field	Value
gapOffset	[0]
Note 1: RLM RS is partially overlappe	ed with
measurement gap	

Table 6.5.1.8.4.1-5: NZP-CSI-RS resource configuration for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Field	Resourceld 0	Resourceld 1
	Value	Value
frequencyDomainA Ilocation <sup>Note 1</sup>	row1	row2
startingRB	0	0
nrofRBs	Note 2	Note 2
Note 1: TS 38.211	[6] table 7.4.1.5.3-	1

Note 1: 15 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the

Configuration in TS 38.133 [6] Table

A.4.5.1.8.1-1

Table 6.5.1.8.4.1-6: DRX Configuration for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Field	Test 1	Test 2
Field	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx-	[sl1]	[sl1]
RetransmissionTimerDL		
drx-	[sl1]	[sl1]
RetransmissionTimerUL		
longDRX-	[ms640]	[ms40]
CycleStartOffset		
shortDRX	disable	disable

Table 6.5.1.8.4.1-7: TimeAlignmentTimer Configuration for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

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

### 6.5.1.8.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [5] or [10] ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in subtest 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of Cell 1 according to T1 in Table 6.5.1.8.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 6.5.1.8.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 6.5.1.8.5-1. T3 starts.
- 5. When T3 expires the SS shall change the SNR value to T4 as specified in Table 6.5.1.8.5-1. T4 starts.
- 6. When T4 expires the SS shall change the SNR value to T5 as specified in Table 6.5.1.8.5-1. T5 starts.
- 7. If the SS detects uplink power equal to or higher than [-39] dBm in the On-duration part of every DRX cycle in the configured slots for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point F (T6 after the start of time duration T5) the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

8. After T5 expires, repeat steps 2-7 for both subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 6.5.1.8.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.5.1.8.4.3-1: Common Exception messages for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Default Message Contents			
Common contents of system information			
blocks exceptions			
Default RRC messages and information	FFS		
elements contents exceptions			

#### 6.5.1.8.5 Test requirement

Tables 6.5.1.8.4.1-3 and 6.5.1.8.5-1 define the primary level settings including test tolerances for Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode.

Table 6.5.1.8.5-1: Cell specific test parameters for NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode

Parameter		Unit		Test 1			Test 2	
			T1	T2	T3	T1	T2	T3
PDCCH_beta		dB		4			4	
PDCCH	_DMRS_bet	dB		4			4	
а								
PBCH_I	oeta	dB		0			0	
PSS_be	eta	dB						
SSS_be	eta	dB						
PDSCH	_beta	dB						
OCNG_	beta	dB						
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD
$N_{oc}$	Config 1	dBm/		[-98] + TT			[-98] + TT	
Config 2 15K		[-98] + TT		[-98] + TT				
	Config 3	Hz	[-98] + TT				[-98] + TT	
Propagation condition			[TC	DL-C 300ns 100	)Hz]	[T[	DL-C 300ns 100	Hz]

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

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% with a confidence level of 95%.

# 6.5.2 Interruption

### 6.5.2.1 NR SA FR1 interruptions during measurements on deactivated NR SCC

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- RAN4 dependency: There are brackets in core requirements and test parameters.
- TT analysis is missing

#### 6.5.2.1.1 Test purpose

To verify UE's ability to complete NR PCell interruptions during the measurement on the deactivated NR SCC within the missed ACK/NACK rate in standalone NR requirements..

#### 6.5.2.1.2 Test applicability

This test applies to all types of NR UE release 15 and forward.

#### 6.5.2.1.3 Minimum conformance requirements

[TS 38.133, clause 8.2.2.2.3]

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

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

[TS 38.133, clause 8.2.2.2.2]

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

μ	NR Slot length (ms) of victim cell	Interruption length (slot)		
0	1		1	
1	0.5		1	
2	0.25	Aggressor cell is on FR2	2	
		Aggressor cell is on FR1	3	
3	0.125	Aggressor cell is on FR2	4	
		Aggressor cell is on FR1	5	
Note:	T <sub>SMTC_duration</sub>	is		

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

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

μ	NR Slot length (ms)	Interruption length
0	1	1 + T <sub>SMTC_duration</sub>
1	0.5	1 + T <sub>SMTC_duration</sub>
2	0.25	2 + T <sub>SMTC_duration</sub>
3	0.125	4 + T <sub>SMTC_duration</sub>
- 3 1 -	above activated SCell being activated; activated; the longest SM activated serving	ITC duration among all serving cells and the vated when one SCell ITC duration among all g cells in the same SCell is deactivated.

The normative reference for this requirement is TS 38.133 [6] clause 8.2.2.2, A.6.5.2.1.

6.5.2.1.4 Test description

6.5.2.1.4.1 Initial conditions

Test 6.5.2.1 can be run in one of the configurations defined in Table 6.5.2.1.4.1-1.

Table 6.5.2.1.4.1-1: Supported test configurations

	Config	Description	
1		NR 15 kHz SSB SCS, 10MHz bandwidth, FDD – FDD duplex mode	
2		NR 15 kHz SSB SCS, 10MHz bandwidth, TDD – TDD duplex mode	
3		NR 15 kHz SSB SCS, 10MHz bandwidth, TDD – FDD duplex mode	
4		NR 15 kHz SSB SCS, 10MHz bandwidth, FDD – TDD duplex mode	
5		NR 30kHz SSB SCS, 40MHz bandwidth, TDD – TDD duplex mode	
Note:	Note: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 6.5.2.1.4.1-2.

Table 6.5.2.1.4.1-2: Initial conditions for NR SA FR1 interruptions during measurements on deactivated NR SCC

Parameter		Value	Comment	
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.	
Test frequencies	As specified	in Annex E, table E.4-1 and TS 38.	508-1 [14] clause 4.3.1 and 4.4.2.	
Channel bandwidth	As specified by the test configuration selected from Table 6.5.2.1.4.1-1.			
Propagation conditions	AWGN		As specified in Annex C.2.2.	
Connection	TE Part	A.3.1.8.1	As specified in TS 38.508-1 [14] Annex A.	
Diagram	DUT Part	A.3.2.3.4		
Exceptions to connection diagram	N/A			

- 1. The general test parameter settings are set up according to Table 6.5.2.1.4.1-3
- 2. Message contents are defined in clause 6.5.2.1.4.3.
- 3. Propagation conditions are set according to Annex [C.2.1]
- 4. There are two NR carriers and two cells specified in the test. Cell 1 is the PCell on one NR carrier, Cell 2 is the SCell on the other NR carrier. Cell 1 and Cell 2 shall be configured according to Annex C.1.1 and C.1.2.

Table 6.5.2.1.4.1-3: General test parameters for NR SA FR1 interruptions during measurements on deactivated NR SCC

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 Cell 2
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

#### 6.5.2.1.4.2 Test procedure

The test consists of two cells: Cell1 and Cell2. Cell1 is PCell and Cell2 is deactivated 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, Cell1 shall be configured as PCell and Cell2 shall be configured as SCell. 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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- The SS shall transmit an RRCConnectionReconfiguration message including measCycleSCell or allowInterruptions for the deactivated NR SCell.
- 3. The UE shall transmit RRCConnectionReconfigurationComplete message.
- 4. Set the parameters according to Table 6.5.2.1.5-1. Propagation conditions are set according to Annex C.2.1. T1 starts.
- 5. SS schedules on PCell continuously and UE shall start sending ACK/NACK reports. The SS shall monitor ACK/NACK/DTX on PCell.
- 6. If more than 99.5% of uplink transmissions are received by SS then count a success for the event "ACK/NACK". Otherwise count a fail for the event "ACK/NACK".
- 7. If no two consecutive DTX is observed by the SS, then count a success for the event "DTX". Otherwise count a fail for the event "DTX".
- 8. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED TS 38.508-1 [14] clause 4.5),

or

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 9. Repeat step 2-8 until a test verdict has been achieved.

Each of the events "ACK/NACK" and "DTX" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to Table G.2.3-1 in Annex G.2 is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

#### 6.5.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.5.2.1.4.3-1: Common Exception messages

Default Message Contents				
Common contents of system information				
blocks exceptions				
Default RRC messages and information	FFS			
elements contents exceptions				

#### 6.5.2.1.5 Test requirement

Table 6.5.2.1.5-1 defines the primary level settings including test tolerances for NR SA FR1 interruptions during measurements on deactivated NR SCC.

Table 6.5.2.1.5-1: NR cell specific test parameters for NR SA FR1 interruptions during measurements on deactivated NR SCC

Parameter		Unit	Cell1	Cell2
Frequency Range			FR1	FR1
Duplex mode	Config 1		FDD	FDD
	Config 2,5		TDD	TDD
	Config 3		TDD	FDD

	Config 4		FDD	TDD	
TDD configuration	Config 1		Not Applicable	Not Applicable	
נוטט טטוווguration	Config 1	<del> </del>	TDDConf.1.1	TDDConf.1.1	
	Config 3	-	TDDConf.1.1	Not Applicable	
	Config 4	}	Not Applicable	TDDConf.1.1	
	Config 5	}	TDDConf.1.2	TDDConf.1.2	
BW <sub>channel</sub>	Config 1,2,3,4		10 MHz: N <sub>RB,c</sub> = 52	10 MHz: N <sub>RB,c</sub> = 52	
DVV channel	Config 5	-{	40 MHz: N <sub>RB,c</sub> = 32	40 MHz: N <sub>RB,c</sub> = 106	
Initial BWP	Corning 5		40 Wil 12. NRB,c = 100 DLBWP.		
Configuration			DLBWF	.0.2	
PDSCH Reference	Config 1		SR.1.1 FDD	SR.1.1 FDD	
measurement channel	Config 1	-	SR.1.1 TDD	SR.1.1 TDD	
measurement channel	Config 3	+	SR.1.1 TDD	SR.1.1 FDD	
	Config 4	-	SR.1.1 FDD	SR.1.1 TDD	
	Confiq 5	-	SR.2.1 TDD	SR.2.1 TDD	
RMSI CORESET	Config 1		CR.1.1 FDD	CR.1.1 FDD	
parameters		<del> </del>	CR.1.1 TDD		
ραιαιτισισιο	Config 2 Config 3	<del> </del>	CR.1.1 TDD CR.1.1 TDD	CR.1.1 TDD CR.1.1 FDD	
	Config 4	-{	CR.1.1 FDD	CR.1.1 TDD	
	Config 5	-{	CR.2.1 TDD	CR.2.1 TDD	
Dedicated CORESET	Config 1,4		CR.2.1 100 CCR.1.1 FDD	CR.2.1 IDD	
		-{	CCR.1.1 FDD CCR.1.1 TDD		
parameters	Config 2,5	-{		CCR.1.1 TDD	
	Config 3,6		CCR.1.1 TDD	CCR.1.1 FDD	
		-	CCR.1.1 FDD	CCR.1.1 TDD	
OONO Detterne			CCR.2.1 TDD	CCR.2.1 TDD	
OCNG Patterns			OP.1	OP.1	
SMTC Configuration	0		SMTC.1	SMTC.1	
SSB Configuration	Config 1,2,4,5	-	SSB.1 FR1	SSB.1 FR1	
O	Config 3,6		SSB.2 FR1	SSB.2 FR1	
Correlation Matrix and A	intenna		1x2 Low	1x2 Low	
Configuration  EPRE ratio of PSS to SSS					
EPRE ratio of PBCH DMRS	S to 999				
EPRE ratio of PBCH to PBC					
EPRE ratio of PDCCH DMF					
EPRE ratio of PDCCH to P		dB	0	0	
EPRE ratio of PDSCH DMF					
EPRE ratio of PDSCH to PI					
EPRE ratio of OCNG DMRS		_			
EPRE ratio of OCNG to OC	NG DMRS (Note 1)	ID /45			
N <sub>oc</sub> Note 2		dBm/15 kHz	[-104]	[-104]	
SS-RSRP Note 3		dBm/15	[-87]	[-87]	
		kHz			
Ê <sub>s</sub> /I <sub>ot</sub>		dB	17	17	
Ê <sub>s</sub> /N <sub>oc</sub>		dB	17	17	
Noc <sup>Note 2</sup>	Config 1,2,4,5	dBm/S	[-104]	[-104]	
	Config 3,6		[-101]	[-101]	
Io <sup>Note3</sup>	Config 1,2,4,5	dBm/	[-59]	[-59]	
	Config 3,6	9.36MHz dBm/	[-61.9]	[-61.9]	
magnet pp ,	_	38.16MHz			
Time offset to cell1 Note 4		μs	33	33	
Time offset to cell2 Note 5		μs	-	3	
Propagation Condition			AWGN	AWGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.
- Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.
- Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells
- Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
- Note 6: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in TS 38.213 [3] section 12.

The UE shall be continuously scheduled on PCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on PCell.

The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on PCell shall not exceed the value defined in Table 6.5.2.1.5-2 if the PCell is not in the same band as the deactivated SCell or Table 6.5.2.1.5-3 if the PCell is in the same band as the deactivated SCell.

Table 6.5.2.1.5-2: 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 6.5.2.1.5-3: Interruption duration if the PCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1 + SMTC duration
1	0.5	2 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

# 6.5.3 SCell activation and deactivation delay

# 6.5.4 UE UL carrier RRC reconfiguration delay

#### 6.5.4.0 Minimum conformance requirements

# 6.5.4.0.1 Minimum conformance requirements for UL carrier RRC reconfiguration delay

[TS 38.133, clause 8.4.2]

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

 $T_{UL\_carrier\_config}$  equals the maximum RRC procedure delay defined in clause x.y in TS 38.331 [2] plus the interruption time specified in TS 38.133 [6] section 8.2.1.2.6.

[TS 38.133, clause 8.4.3]

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

T<sub>UL\_carrier\_deconfig</sub> equals the maximum RRC procedure delay defined in clause x.y in TS 38.331 [2].

The normative reference for this requirement is TS 38.133 [6] clause 8.4.

# 6.5.4.1 NR SA FR1 UE UL carrier RRC reconfiguration delay

#### Editor's note:

- Message contents are not complete.
- Connection diagram is TBD.
- There are brackets in test requirements.
- Some parts of TC are TBDs.
- -TT is incomplete.
- Cell mapping is missing.

#### 6.5.4.1.1 Test purpose

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 TS 38.133 [6] section 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively.

## 6.5.4.1.2 Test applicability

This test applies to UE release 15 supporting NR standalone.

#### 6.5.4.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.5.4.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.5.4.1.

#### 6.5.4.1.4 Test description

#### 6.5.4.1.4.1 Initial conditions

The Test shall be tested using any of the test configuration in Table 6.5.4.1.4.1-1.

Table 6.5.4.1.4.1-1: Supported test configurations

Configuration	PSCell (Cell 1)	SCell (Cell 2)
6.5.4.1-1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
6.5.4.1-2	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
6.5.4.1-3	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40MHz bandwidth, SUL duplex mode
6.5.4.1-4	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
6.5.4.1-5	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
6.5.4.1-6	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40MHz bandwidth, SUL duplex mode
6.5.4.1-7	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
6.5.4.1-8	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
6.5.4.1-9	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40MHz bandwidth, SUL duplex mode
Note: The UP	E is only required to be tested in one of the supported te	est configurations

Configure the test equirement and the DUT according to the parameters in Table 6.5.4.1.4.1-2.

Table 6.3.4.1.4.1-2: Initial conditions for NR SA FR1 UE UL carrier RRC reconfiguration delay

Parameter		Value	Comment			
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	As specified in Annex E, Table E.4-1 and TS 38.508-1 [14] clause 4.3.1.				
Channel bandwidth	As specified	l by the test configuration selected fr	rom Table 6.5.4.1.4.1-1.			
Propagation conditions	AWGN		As specified in Annex C.2.1.			
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	A.3.TBD	1			
Exceptions to connection diagram	N/A					

- 1. The general test parameter settings are set up according to Table 6.5.4.1.4.1-3.
- 2. Message contents are defined in clause 6.5.4.1.4.3.
- 3. There are two NR FR1 carriers and two cells in the test. Cell 1 is PCell on the primary component carrier, Cell 2 is SCell on the secondary component carrier. Cell 1 is the cell used for connection setup with the power levels set according to Table A. 6.5.4.1.5-1 for this test. Cell 2 is configured according to Annex C.1.1 and C.1.2.

Table 6.5.4.1.4.1-3: 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	Three radio channels are used for these
Number		5, 6, 7, 8, 9		two tests.
Active cell		Config 1,2,3, 4,	Cell 1: FR1 PCell	E-UTRAN PCell on RF channel number 1
		5, 6, 7, 8, 9	Cell 2: FR1 SCell	FR1 SCell on RF channel number 2
CP length		Config 1,2,3, 4,	Normal	
		5, 6, 7, 8, 9		
DRX		Config 1,2,3, 4,	OFF	
		5, 6, 7, 8, 9		
Measurement gap		Config 1,2,3, 4,	OFF	
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		

#### 6.5.4.1.4.2 Test procedure

There are two cells: FR1 PCell (cell 1) and FR1 SCell (cell 2). Both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB*. 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*.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters according to TS 38.508-1 [14] FFS
- 2. Both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB*. The test parameters for PCell and SCell are given in Table 6.5.4.1.5-1. Propagation conditions are set according to Annex C clause C.2.2. T1 starts.
- 3. The SS shall configure SCell (Cell 2) on the SCC as per TS 38.508-1 [14] clause FFS with the message content exceptions defined in clause 6.5.4.1.4.3.
- 4. In test 1 NR uplink of cell 2 is configured to UE then UE shall transmit data on NR UL carrier only. If UE transmits data on NR UL carrier on SCell within [20] ms from the start of T1, then count a success for the event "reconfiguration" otherwise count a failure for event "reconfiguration".

In test 2 supplementray uplink on cell 2 is configured to UE, then UE shall transmit data on SUL carrier only. If UE transmits data on SUL carrier on SCell within [20] ms from the start of T1, then count a success for the event "reconfiguration" otherwise count a failure for event "reconfiguration".

5. In test 1, 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. If UE transmits data on both on the NR uplink and supplementary uplink from the start of T2, then count a success for the event "reconfiguration" otherwise count a failure for event "reconfiguration".

In test 2, 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. If UE transmits data on both on the NR uplink and supplementary uplink from the start of T2, then count a success for the event "reconfiguration" otherwise count a failure for event "reconfiguration".

6. In test 1, at the start of T3, the supplementary uplink is released through RRCReconfiguration then UE shall transmit data on SUL carrier only. If UE transmits data on SUL carrier on SCell within [20]ms from the start of T3, then count a success for the event "deconfiguration" otherwise count a failure for event "deconfiguration".

In test 2, at the start of T3, the NR uplink is released through RRCReconfiguration, then UE shall transmit data on NR UL carrier only. If UE transmits data on NR UL carrier on SCell within [20]ms from the start of T3, then count a success for the event "deconfiguration" otherwise count a failure for event "deconfiguration".

7. Repeat steps 3-6 until a test verdict has been achieved.

Each of the events "reconfiguration" and "deconfiguration" is evaluated independently for the statistic, resulting in an event verdict: pass or fail. Each event is evaluated only until the confidence level according to FFS in Annex FFS is achieved. Different events may require different times for a verdict.

If all events pass, the test passes. If one event fails, the test fails.

## 6.5.4.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 4.6.1.5.4.3-1: Common Exception messages

Default Message Contents						
Common contents of system information						
blocks exceptions						
Default RRC messages and information	FFS					
elements contents exceptions						

#### 6.5.4.1.5 Test requirement

Table 6.5.4.1.5.1-1 and 6.5.4.1.5-2 define the primary level settings including test tolerances for UE UL carrier RRC reconfiguration delay test.

Table 6.5.4.1.5-1: 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	

			ı					
Channel number		Conf 1, 2, 3, 4,		2			2	
		5, 6, 7, 8, 9 Conf 1, 2, 3		N/A			N/A	
TDD configuration		Conf 4, 5, 6	т	DD Conf.1	1	т	DD Conf.1.	1
TDD corniguration		Conf 7, 8, 9		DD Conf.2			DD Conf.2.	
		Conf 1, 2, 3	10: N <sub>RB,c</sub> = 52				0: $N_{RB,c} = 5$	
BW <sub>channel</sub>	MHz	Conf 4, 5, 6	1	0: $N_{RB,c} = 3$	52		0: $N_{RB,c} = 5$	
DVV channel	IVII IZ	Conf 7, 8, 9	//	0. $N_{RB,c} = 3$ 0. $N_{RB,c} = 1$	06	1	0: $N_{RB,c} = 3$	<u>~</u> 16
PDSCH reference		Conf 1, 2, 3		SR.1.1 FDI			SR.1.1 FDD	
measurement		Conf 4, 5, 6		SR.1.1 TDI			SR.1.1 TDD	
channel as defined		Conf 7, 8, 9						
in A.3.1.1		00111 7 , 0 , 0	,	SR 2.1 TDI	)	;	SR 2.1 TDD	)
RMSI CORESET		Conf 1, 2, 3	(	CR.1.1 FD	D	(	CR.1.1 FDD	)
reference		Conf 4, 5, 6	(	CR.1.1 TDI	D	(	CR.1.1 TDD	)
measurement		Conf 7, 8, 9						
channel as defined			(	CR.2.1 TDI	D	(	CR.2.1 TDD	)
in A.3.1.2					_			
RMC CORESET		Conf 1, 2, 3		CR.1.1 FD			CR.1.1 FDI	
reference		Conf 4, 5, 6	C	CR.1.1 TD	)D	C	CR.1.1 TDI	D
measurement		Conf 7, 8, 9		OD 0 4 TD	. 5		000 0 4 TD	_
channel as defined				CR.2.1 TD	טט	C	CR.2.1 TDI	ט
in A.3.1.3		Conf 1 2 2 4						
OCNG Pattern Note 1		Conf 1, 2, 3, 4,		OP.1			OP.1	
		5, 6, 7, 8, 9 Conf 1, 2, 3, 4,						
SSB configuration		5, 6		SSB.1 FR	1		SSB.1 FR1	
OOD conliguration		Conf 7, 8, 9		SSB.2 FR	1		SSB.2 FR1	
		Conf 1, 2, 3, 4,						
SMTC configuration		5, 6, 7, 8, 9		SMTC.1			SMTC.1	
DL initial BWP		Conf 1, 2, 3, 4,			4	DI DIVID O 4		
configuration		5, 6, 7, 8, 9		DLBWP.0.	Ī	DLBWP.0.1		
DL dedicated BWP		Conf 1, 2, 3, 4,		DLBWP.1.	1	DLBWP.1.1		
configuration		5, 6, 7, 8, 9		DLDVVI .1.	!	B25W1.11.1		
UL dedicated BWP		Conf 1, 2, 3, 4,		ULBWP.1.	1	ULBWP.1.1		
configuration		5, 6, 7, 8, 9						
EPRE ratio of PSS								
to SSS EPRE ratio of								
PBCH_DMRS to								
SSS SS								
EPRE ratio of PBCH								
to PBCH_DMRS								
EPRE ratio of								
PDCCH_DMRS to								
SSS								
EPRE ratio of								
PDCCH to		Conf 1, 2, 3, 4,						
PDCCH_DMRS	dB	5, 6, 7, 8, 9		0			0	
EPRE ratio of		3, 0, 7, 0, 3						
PDSCH_DMRS to								
SSS								
EPRE ratio of								
PDSCH to								
PDSCH_DMRS								
EPRE ratio of OCNG DMRS to								
SSS DIVIRS TO								
EPRE ratio of								
OCNG to OCNG								
DMRS								
	dBm /	Conf 1, 2, 3, 4,		-102+TT			-102+TT	
	15kHz	5, 6, 7, 8, 9		- · · ·				
$N_{oc\ Note\ 2}$		Conf		-102+TT			-102+TT	
<u>.</u>	dBm/ SCS	1,2,3,4,5,6						
	303	Conf 7,8,9		-99+TT			-99+TT	
$\hat{E}_s/N_{oc}$	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16+TT	16+TT	16+TT	16+TT	16+TT	16+TT

$\hat{E}_{_{s}}/I_{_{ot}}$ Note 3	dB	Conf 1, 2, 3, 4,	16+TT	16+TT	16+TT	16+TT	16+TT	16+TT
SS-RSRP Note 3	dBm/	5, 6, 7, 8, 9 Conf 1,2,3,4,5,6	-86+TT	-86+TT	-86+TT	-86+TT	-86+TT	-86+TT
00-101(I	SCS	Conf 7,8,9	-83+TT	-83+TT	-83+TT	-83+TT	-83+TT	-83+TT
Io Note 3	dBm/ 9.36 MHz	Conf 1,2,3,4,5,6	- 57.9+T T	- 57.9+T T	- 57.9+T T	- 57.9+TT	- 57.9+TT	- 57.9+TT
	dBm/ 38.16 MHz	Conf 7,8,9	- 51.8+T T	- 51.8+T T	- 51.8+T T	- 51.8+TT	51.8+TT	- 51.8+TT
Propagation		Conf 1, 2, 3, 4,		AWGN			AWGN	
Condition		5, 6, 7, 8, 9						
Antenna configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		1 x 2			1 x 2	

NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

NOTE 3:  $\hat{E}_{_{s}}/I_{_{ot}}$ , Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table 6.5.4.1.5-2 : NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on SCell (Cell 2)

Parameter	Unit	Test	Test 1			Test 2		
		Configuration	T1	T2	T3	T1	T2	T3

Channal acceptan		Cart 4 0 0 4	2		3			
Channel number		Conf 1, 2, 3, 4,	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		
TDD configuration		Conf 3, 6, 9	TDDConf.2			TDDConf.2.1		
DW	N 41 1-	Conf 1, 4, 7	10: N <sub>RB,c</sub> = 5			10: $N_{RB,c} = 52$		
BW <sub>channel</sub>	MHz	Conf 2, 5, 8	10: N <sub>RB,c</sub> = 5			10: N <sub>RB,c</sub> = 52	,	
		Conf 3, 6, 9	40: N <sub>RB,c</sub> = 1			40: N <sub>RB,c</sub> = 106		
PUSCH parameters		Conf 1, 4, 7	[TBD] [TBD]	[TBD]	N/A	[TBD]	N/A	
for NR UL carrier		Conf 2, 5, 8	[TBD] [TBD]	[TBD]	N/A	[TBD]	N/A	
		Conf 3, 6, 9	[TBD] [TBD]	[TBD]	N/A	[TBD]	N/A	
PUCCH parameters		Conf 1, 4, 7	[TBD] [TBD]	[TBD]	N/A	[TBD]	N/A	
For NR UL carrier		Conf 2, 5, 8	[TBD] [TBD]	[TBD]	N/A	[TBD]	N/A	
		Conf 3, 6, 9	[TBD] [TBD]	[TBD]	N/A	[TBD]	N/A	
PUSCH parameters		Conf 1, 4, 7	N/A [TBD]	N/A	[TBD]	[TBD]	[TBD]	
for supplementary		Conf 2, 5, 8	N/A [TBD]	N/A	[TBD]	[TBD]	[TBD]	
UL		Conf 3, 6, 9	N/A [TBD]	N/A	[TBD]	[TBD]	[TBD]	
PUCCH parameters		Conf 1, 4, 7	N/A [TBD]	N/A	[TBD]	[TBD]	[TBD]	
for supplementary		Conf 2, 5, 8	N/A [TBD]	N/A	[TBD]	[TBD]	[TBD]	
UL		Conf 3, 6, 9	N/A [TBD]	N/A	[TBD]	[TBD]	[TBD]	
PDSCH reference		Conf 1, 4, 7	SR.1.1 FD			SR.1.1 FDD		
measurement		Conf 2, 5, 8	SR.1.1 TD			SR.1.1 TDD		
channel as defined		Conf 3, 6, 9						
in A.3.1.1			SR 2.1 TD	ט		SR 2.1 TDD		
RMSI CORESET		Conf 1, 4, 7	CR.1.1 FD	D		CR.1.1 FDD		
reference		Conf 2, 5, 8	CR.1.1 TD			CR.1.1 TDD		
measurement		Conf 3, 6, 9	0		CK.T.T TDD			
channel as defined		00111 0, 0, 0	CR.2.1 TD	D	CR.2.1 TDD			
in A.3.1.2			J	_	011.2.1 122			
RMC CORESET		Conf 1, 4, 7	CCR.1.1 FI	DD .	CCR.1.1 FDD			
reference		Conf 2, 5, 8	CCR.1.1 TI		CCR.1.1 TDD			
measurement		Conf 3, 6, 9	001111111					
channel as defined		00111 0, 0, 0	CCR.2.1 TI	סס	(	CCR.2.1 TDE	)	
in A.3.1.3			0011.2.1 11		CCIV.Z.1 1DD			
OCNG Pattern Note 1		Conf 1, 2, 3	OP.1		OP.1			
outo i attom		Conf 1, 2, 4, 5,						
SSB configuration		7,8	SSB.1 FR	1		SSB.1 FR1		
COD configuration		Conf 3, 6, 9	SSB.2 FR	1		SSB.2 FR1		
		Conf 1, 2, 3, 4,		•				
SMTC configuration		5, 6, 7, 8, 9	SMTC.1		SMTC.1			
DL initial BWP		Conf 1, 2, 3, 4,						
configuration		5, 6, 7, 8, 9	DLBWP.0.		DLBWP.0.1			
DL dedicated BWP								
configuration		Conf 1, 2, 3, 4,	DLBWP.1.		DLBWP.1.1			
UL dedicated BWP		5, 6, 7, 8, 9 Conf 1, 2, 3, 4,						
configuration			ULBWP.1.	1		ULBWP.1.1		
EPRE ratio of PSS		5, 6, 7, 8, 9						
to SSS								
EPRE ratio of								
PBCH_DMRS to								
SSS								
EPRE ratio of PBCH								
to PBCH_DMRS								
EPRE ratio of								
PDCCH_DMRS to		Conf 1, 2, 3, 4,	2.3.4.					
SSS	dB	5, 6, 7, 8, 9	0			0		
EPRE ratio of		5, 0, 7, 0, 8						
PDCCH to								
PDCCH_DMRS								
EPRE ratio of								
PDSCH_DMRS to								
SSS								
EPRE ratio of								
PDSCH to								
PDSCH_DMRS								
- POOLI_PIVITO		1						

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+TT			-102+TT	
N <sub>oc Note 2</sub>	dBm/ SCS	Conf 1, 2, 4, 5, 7,8		-102+TT			-102+TT	
	303	Conf 3, 6, 9		-99+TT			-99+TT	
$\hat{E}_s/N_{oc}$	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16+TT	16+TT	16+TT	16+TT	16+TT	16+TT
$\hat{E}_{s}/I_{ot\ Note\ 3}$	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16+TT	16+TT	16+TT	16+TT	16+TT	16+TT
SS-RSRP Note 3	dBm/ SCS	Conf 1, 2, 4, 5, 7,8	-86+TT	-86+TT	-86+TT	-86+TT	-86+TT	-86+TT
	303	Conf 3, 6, 9	-83+TT	-83+TT	-83+TT	-83+TT	-83+TT	-83+TT
	dBm/	Conf 1, 2, 4, 5,	-	-	-	_	_	_
Io Note 3	9.36 MHz	7,8	57.9+T T	57.9+T T	57.9+T T	57.9+TT	57.9+TT	57.9+TT
10	dBm/ 38.16 MHz	Conf 3, 6, 9	- 51.8+T T	- 51.8+T T	- 51.8+T T	- 51.8+TT	- 51.8+TT	- 51.8+TT
Propagation Condition		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		AWGN			AWGN	
Antenna configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		1 x 2			1 x 2	

NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{ac}$  to be fulfilled.

NOTE 3:  $\hat{E}_{_{s}}/I_{_{ot}}$ , Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within [20] ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within [20] ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within [20] ms from the start of T2

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within [20] ms from the start of T3.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

# 6.5.5 Link recovery procedures

#### 6.5.5.0 Minimum conformance requirements

# 6.5.5.0.1 Minimum conformance requirements for SSB-based BFD and link recovery procedures

UE shall be able to evaluate whether the downlink radio link quality on the configured SSB resource in set  $q_0$  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 6.5.5.0.1-1 for FR1.

#### For FR1,

- P=1/(1 T<sub>SSB</sub>/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

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

Table 6.5.5.0.1-1: Evaluation period T<sub>Evaluate\_BFD\_SSB</sub> for FR1

Configuration		T <sub>Evaluate_BFD_SSB</sub> (ms)				
no DRX		max([50], ceil(5*P)*T <sub>SSB</sub> )				
DRX cycle ≤ 320ms		max([50], ceil(7.5*P)*max(T <sub>DRX</sub> ,T <sub>SSB</sub> ))				
DRX cycle > 320ms		ceil(5*P)*T <sub>DRX</sub>				
Note: T <sub>SSB</sub> is the pe		priodicity of SSB in the set $\overline{q}_{\!\scriptscriptstyle 0}$ . $$ $$ $$ $$ $$ $$ $$ $$ $$ $$				
	length.					

When the radio link quality on all the configured RS resources in set  $\overline{q}_0$  is worse than  $Q_{\text{out\_LR}}$ , Layer 1 of the UE shall send a beam failure instance indication to the higher layers. A Layer 3 filter may be applied to the beam failure instance indications as specified in TS 38.331 [13].

The beam failure instance evaluation for the configured RS resources in set  $\overline{q}_0$  shall be performed as specified in section 6 in TS 38.213 [8]. Two successive indications from Layer 1 shall be separated by at least  $T_{Indication\_interval\_BFD}$ .

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

When DRX is used,  $T_{Indication\_interval\_BFD}$  is max(1.5\*DRX\_cycle\_length, 1.5\* $T_{BFD-RS,M}$ ) if DRX cycle\_length is less than or equal to 320ms, and  $T_{Indication\_interval}$  is DRX\_cycle\_length if DRX cycle\_length is greater than 320ms.

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  $\hat{E}$ s/Iot are according to Annex Table B.2.4.1 for a corresponding band.

The value of  $T_{Evaluate\ CBD\ SSB}$  is defined in Table 6.5.5.0.1-2 for FR1.

#### For FR1,

- P=1/(1 T<sub>SSB</sub>/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

In both FR1 and FR2, if different SCS is used for SSB and CSI-RS, and the UE does not support simultaneousRxDataSSB-DiffNumerology, it is assumed that the SSB configured for candidate beam detection and each CSI-RS resource shall be TDMed transmited.

Table 6.5.5.0.1-2: Evaluation period T<sub>Evaluate\_CBD\_SSB</sub> for FR1

Con	figuration	T <sub>Evaluate_CBD_SSB</sub> (ms)				
n	on-DRX	ceil([3]*P) * T <sub>SSB</sub>				
DRX c	ycle ≤ 320ms	ceil([3]*P*1.5) * max(T <sub>DRX</sub> ,T <sub>SSB</sub> )				
DRX c	ycle > 320ms	ceil([3]*P) * T <sub>DRX</sub>				
Note:	$T_{\text{SSB}}$ is the pe	riodicity of SSB in the set $\overline{q}_{ m l}$ . ${ m T}_{ m DRX}$ is the DRX cycle				
	length.					

The normative reference for this requirement is TS 38.133 [6] clause 8.5.2.2, 8.5.4 and 8.5.5.2.

# 6.5.5.0.2 Minimum conformance requirements for CSI-RS-based BFD and link recovery procedures

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

The value of T<sub>Evaluate\_BFD\_CSI-RS</sub> is defined in Table 8.5.3.2-1 for FR1.

#### For FR1,

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

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

The values of  $M_{BFD}$  used in Table 6.5.5.0.2-1 is defined as

-  $M_{BFD} = 10$ , if the CSI-RS resource configured for BFD is transmitted with Density = 3.

Table 6.5.5.0.2-1: Evaluation period T<sub>Evaluate BFD CSI-RS</sub> for FR1

Con	figuration	T <sub>Evaluate_BFD_CSI-RS</sub> (ms)				
r	no DRX	max([50], [M <sub>BFD</sub> *P] * T <sub>CSI-RS</sub> )				
DRX c	ycle ≤ 320ms	max([50], [1.5xM <sub>BFD</sub> *P]*max(T <sub>DRX</sub> , T <sub>CSI-RS</sub> ))				
DRX c	ycle > 320ms	[M <sub>BFD</sub> *P] * T <sub>DRX</sub>				
Note:	T <sub>CSI-RS</sub> is the	periodicity of CSI-RS resource in the set $\overline{q}_{\scriptscriptstyle 0}^{}$ . ${\sf T}_{\sf DRX}$ is the				
	DRX cycle ler	ngth.				

When the radio link quality on all the configured RS resources in set  $\overline{q}_0$  is worse than  $Q_{out\_LR}$ , Layer 1 of the UE shall send a beam failure instance indication to the higher layers. A Layer 3 filter may be applied to the beam failure instance indications as specified in TS 38.331 [13].

The beam failure instance evaluation for the configured RS resources in set  $\overline{q}_0$  shall be performed as specified in section 6 in TS 38.213 [8]. Two successive indications from Layer 1 shall be separated by at least T<sub>Indication\_interval\_BFD</sub>.

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

When DRX is used,  $T_{Indication\_interval\_BFD}$  is max(1.5\*DRX\_cycle\_length, 1.5\* $T_{BFD-RS,M}$ ) if DRX cycle\_length is less than or equal to 320ms, and  $T_{Indication\_interval}$  is DRX\_cycle\_length if DRX cycle\_length is greater than 320ms.

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 Ês/Iot is according to Annex Table B.2.4.2 for a corresponding band.

The value of T<sub>Evaluate\_CBD\_CSI-RS</sub> is defined in Table 6.5.5.0.2-2 for FR1.

#### For FR1,

- P=1/(1 T<sub>CSI-RS</sub>/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

In both FR1 and FR2, if different SCS is used for SSB and CSI-RS, and the UE does not support simultaneousRxDataSSB-DiffNumerology, it iss assumed that the CSI-RS configured for candidate beam detection and each SSB shall be TDMed transmitted.

The values of M<sub>CBD</sub> used in Table 6.5.5.0.2-2 is defined as

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

Table 6.5.5.0.2-2: Evaluation period T<sub>Evaluate\_CBD\_CSI-RS</sub> for FR1

Note:  $T_{\text{CSI-RS}}$  is the periodicity of CSI-RS resource in the set  $\overline{q}_{\text{I}}$ .  $T_{\text{DRX}}$  is the DRX cycle length.

The normative reference for this requirement is TS 38.133 [6] clause 8.5.3.2, 8.5.4 and 8.5.6.2.

# 6.5.5.3 NR SA FR1 CSI-RS-based beam failure detection and link recovery in non-DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- Test requirements are between brackets.
- Some parameters are TBD

## 6.5.5.3.1 Test purpose

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  $q_1$ .

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.

To partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in TS 38.133 [6] clause 8.5.

#### 6.5.5.3.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

#### 6.5.5.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.5.5.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.6.5.5.3.

#### 6.5.5.3.4 Test description

The test consists of two subtests with one NR serving cell configured. The difference between the two subtests is whether the measurement gap is configured on the NR serving Cell or not. Each subtest consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 6.5.5.3.4-1 shows the five different time durations and the corresponding variation of the downlink SNR in the active cell to emulate CSI-RS based beam failure.

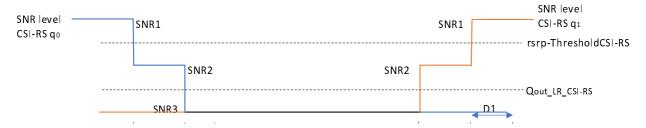


Figure 6.5.5.3.4-1: SNR variation CSI-RS for NR SA FR1 CSI-RS-based beam failure detection and link recovery in non-DRX

#### 6.5.5.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.5.5.3.4.1-1.

Table 6.5.5.3.4.1-1: Supported test configurations for NR SA FR1 CSI-RS-based beam failure detection and link recovery in non-DRX

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

Configure the test equipment and the DUT according to the parameters in Table 6.5.5.3.4.1-2.

Table 6.5.5.3.4.1-2: Initial conditions for NR SA FR1 CSI-RS-based beam failure detection and link recovery in non-DRX

Parameter		Value	Comment						
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.						
Test frequencies	As specified	As specified in Annex E, table E.4-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.							
Channel	As specified	by the test configuration selected fr	om Table 6.5.5.3.4.1-1.						
bandwidth									
Propagation	AWGN		As specified in Annex C.2.2.						
conditions									
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.						
Diagram	DUT Part	A.3.2.3.4							
Exceptions to	N/A								
connection									
diagram									

- 1. The general test parameter settings are set up according to Table 6.5.5.3.4.1-3. The measurement gap configuration for sub-test 2 is according to Table 6.5.5.3.4.1-4. The NZP-CSI-RS configuration for sub-test 1 and 2 is according to Table 6.5.5.3.4.1-5.
- 2. Message contents are defined in clause 6.5.5.3.4.3.
- 3. There is one NR carrier and one NR cells specified in the test. Cell 1 is the NR cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 6.5.5.3.4.1-3: General test parameters for NR SA FR1 CSI-RS-based beam failure detection and link recovery in non-DRX

Pa	Parameter		Val	Comment	
		t	Test 1	Test 2	
Active P	Cell		Cell 1	Cell 1	
	nnel Number		1	1	
Duplex mode	Config 1,		FDD	FDD	
	Config 2,		TDD	TDD	
TDD Configur	Config 1,		Not Applicable	Not Applicable	
ation	Config 2		[TDDConf.1.1]	[TDDConf.1.1]	
	Config 4		[TDDConf.2.1]	[TDDConf.2.1]	
CORES	Config 1		[CR. 1.1 FDD]	[CR. 1.1 FDD]	A.3.1.2
ET	Config 2		[CR. 1.1 TDD]	[CR. 1.1 TDD]	
Reference	Config 3		[CR. 2.1 FDD]	[CR. 2.1 FDD]	
е	Config 4		[CR. 2.1 TDD]	[CR. 2.1 TDD]	
Channel			00D 4 FD4	000 4 504	1 0 10
SSB	Config 1		SSB.1 FR1	SSB.1 FR1	A.3.10
Configur			SSB.1 FR1	SSB.1 FR1	
ation	Config 3		SSB.2 FR1	SSB.2 FR1	
OMTO	Config 4		SSB.2 FR1	SSB.2 FR1	A O 44
SMTC Configur			FR1 pattern 1	FR1 pattern 1	A.3.11
ation	Config 3,		FR1 pattern 2	FR1 pattern 2	
PDSCH/ PDCCH	2		15 KHz	15 KHz	
subcarrie r spacing	9 4		30 KHz	30 KHz	
csi-RS-Ir	ndex d as beam		[0]	[0]	
failure R					
OCNG p	arameters		TBD	TBD	A.3.2.1
CP lengt			Normal	Normal	
Correlati Antenna Configur			[2x2 Low]	[2x2 Low]	
Beam	DCI format		1-0	1-0	
failure	Number of		2	2	
detect ion trans	Control OFDM symbols				
missio	Aggregation	CC	8	8	
n	level	Е			
param eters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0	
	Ratio of	dB	0	0	
	hypothetical PDCCH DMRS energy to				
	average CSI-RS RE energy				
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
DRX			OFF	OFF	
Gap patt	ern ID		[N.A.]	*[ <i>gp0</i> ]	

csi-RS-Index			2	2	Number of SSB indexes used for beam failure detection
rlmInSyncC Threshold	rlmInSyncOutOfSync Threshold		absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-Thresh	noldSSB		TBD	TBD	Threshold used for Qout_LR_SSB
powerCont S	rolOffsetS		db0	db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailur MaxCount	elnstance		n2	n2	see TS 38.321 [7], section 5.17
beamFailur Timer	beamFailureDetection Timer		pbfd4	pbfd4	see TS 38.321 [7], section 5.17
NZP CSI-R configuration	-		[Resourceld 1]	[Resourceld 0]	
ZP CSI-RS configuation			TBD	TBD	
Periodic CS	SI reporting		PUCCH	PUCCH	
CSI reporting	Config 1, 2	slot	[5]	[5]	
periodicit y	Config 3		[10] [10]		
T1		S	1	1	During this time the UE shall be fully synchronized to cell
T2		S	0.4	0.4	
T3		S	[TBD]	[TBD]	
D1		S	[0.24]	[0.44]	
Note 1:	JE-specific F	טCCH	is not transmitted after	I1 starts.	

Table 6.5.5.3.4.1-4: Measurement gap configuration for NR SA FR1 CSI-RS-based beam failure detection and link recovery in non-DRX

Field	Test 2		
rieid	Value		
gapOffset	[0]		

Table 6.5.5.3.4.1-5: NZP-CSI-RS resource configuration for NR SA FR1 CSI-RS-based beam failure detection and link recovery in non-DRX

Field		Resourceld 0	Resourceld 1
		Value	Value
frequencyD omainAlloca tion <sup>Note 1</sup>		row1	row2
startingRB		0	0
nrofRBs		Note 2	Note 2
Note 2: n	rof on	38.211 [6] table RBs is derived ifiguration in TS le A.4.5.1.7.1-	based on the 38.133 [6]

## 6.5.5.3.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to NR Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in subtest 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of NR Cell 1 according to T1 in Table 6.5.5.3.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 6.5.5.3.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 6.5.5.3.5-1. T3 starts.
- 5. When T3 expires the SS shall change the SNR value to T4 as specified in Table 6.5.5.3.5-1. T4 starts.
- 6. When T4 expires the SS shall change the SNR value to T5 as specified in Table 6.5.5.3.5-1. T5 starts.
- 7. If the SS:
  - a) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point B

and

b) does not detect any uplink power on NR carrier higher than OFF power defined in TS 38.521-1 [17] clause 6.3.2.5 from time point C until T3 expires

and

c) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point F (D1 after the start of T5) until T5 expires,

the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

- 8. When T5 expires the SS shall change the SNR value to T1 as specified in Table 6.5.5.3.5-1.
- 9. Wait [1s] for the UE to re-establish the connection or continue directly to step 10. If the UE re-establishes the connection within [1s] continue to step 11. Otherwise continue to step 10.
- 10. Switch the UE on and off. Ensure the UE is in RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 11. Repeat steps 2-10 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 6.5.5.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

# Table 6.5.5.3.4.3-1: Common Exception messages for NR SA FR1 CSI-RS-based beam failure detection and link recovery in non-DRX

Default Message Contents						
Common contents of system information						
blocks exceptions						
Default RRC messages and information	FSS					
elements contents exceptions						

#### 6.5.5.3.5 Test requirement

Tables 6.5.5.3.4.1-3 and 6.5.5.3.5-1 define the primary level settings including test tolerances for NR SA FR1 CSI-RS-based beam failure detection and link recovery in non-DRX.

Table 6.5.5.3.5-1: NR Cell specific test parameters for NR SA FR1 CSI-RS-based beam failure detection and link recovery in non-DRX

Par	ameter	Unit		Test	1 and T	est 2	Test 1 and Test 2					
				CSI	-RS of se	et q₀		CSI-RS of set q <sub>1</sub>				
			T1	T2	Т3	T4	T5	T1	T2	Т3	T4	T5
to SSS	tio of PSS	dB										
EPRE ra	tio of PBCH SSS	dB										
EPRE ra	tio of PBCH I DMRS	dB										
EPRE ra PDCCH SSS	tio of DMRS to	dB										
EPRE ra PDCCH DMRS	to PDCCH	dB			0					0		
SSS	DMRS to	dB			O					O		
DMRS	to PDSCH	dB										
DMRS to 1)	tio of OCNG o SSS(Note	dB										
to OCNO (Note 1)	tio of OCNG DMRS	dB										
SNR_C	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SI-RS	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
$N_{oc}$	Config 1	dBm/			[-98]					[-98]		
- oc	Config 2	15K			[-98]					[-98]		
	Config 3	Hz			[-98]					[-98]		
SS- RSRP		dBm /SC										
Note 3		S										
Ës/lot Ês/Noc		-						-				
lo	config 1, 2	dBm/						<del> </del>				
10	comig 1, 2	9.36 MHz										
	Config 3, 4	dBm/ 38.1 MHz										
Propaga condition	1			_	TDLC300	_			_	TDLC300	-	
Note 1:	OCNG shal							located a	nd a cons	stant tota	l transmit	ted

power spectral density is achieved for all OFDM symbols. Note 2:

SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q1.

No later than time point F occurring no later than D1 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set  $q_1$ .

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

#### 6.5.5.4 NR SA FR1 CSI-RS-based beam failure detection and link recovery in DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- Test requirements are between brackets.
- Some parameters are TBD

#### 6.5.5.4.1 Test purpose

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  $q_1$ .

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.

To partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in TS 38.133 [6] clause 8.5.

#### 6.5.5.4.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

#### 6.5.5.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.5.5.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.6.5.5.4.

#### 6.5.5.4.4 Test description

The test consists of two subtests with one NR serving cell configured. The difference between the two subtests is whether the measurement gap is configured on the NR serving Cell or not. Each subtest consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 6.5.5.4.4-1 shows the five different time durations and the corresponding variation of the downlink SNR in the active cell to emulate CSI-RS based beam failure.

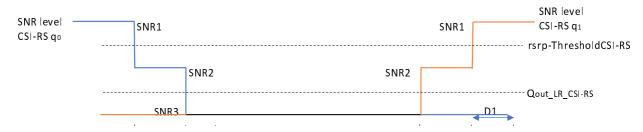


Figure 6.5.5.4.4-1: SNR variation CSI-RS for NR SA FR1 CSI-RS-based beam failure detection and link recovery in DRX

#### 6.5.5.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.5.5.4.4.1-1.

Table 6.5.5.4.4.1-1: Supported test configurations for NR SA FR1 CSI-RS-based beam failure detection and link recovery in DRX

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

Configure the test equipment and the DUT according to the parameters in Table 6.5.5.4.4.1-2.

Table 6.5.5.4.4.1-2: Initial conditions for NR SA FR1 CSI-RS-based beam failure detection and link recovery in DRX

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	I in Annex E, table E.4-1 and TS 38.	508-1 [14] clause 4.3.1 and 4.4.2.
Channel	As specified	by the test configuration selected fr	om Table 6.5.5.3.4.1-1.
bandwidth			
Propagation	AWGN		As specified in Annex C.2.2.
conditions			
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to	N/A		
connection			
diagram			

- 1. The general test parameter settings are set up according to Table 6.5.5.4.4.1-3. The measurement gap configuration for sub-test 2 is according to Table 6.5.5.4.4.1-4. The NZP-CSI-RS configuration for sub-test 1 and 2 is according to Table 6.5.5.4.4.1-5. The DRX configuration for subtest 1 and 2 is according to Table 6.5.5.4.4.1-6. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.
- 2. Message contents are defined in clause 6.5.5.4.4.3.
- 3. There is one NR carrier and one NR cells specified in the test. Cell 1 is the NR cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 6.5.5.4.4.1-3: General test parameters for NR SA FR1 CSI-RS-based beam failure detection and link recovery in DRX

Parameter		Uni	Val	ue	Comment
			Test 1	Test 2	
Active P	Cell		Cell 1	Cell 1	
	nnel Number		1	1	
Duplex mode	Config 1,		FDD	FDD	
	Config 2, 4		TDD	TDD	
TDD Configu	Config 1, r 3		Not Applicable	Not Applicable	
ation	Config 2	1 [	[TDDConf.1.1]	[TDDConf.1.1]	
	Config 4		[TDDConf.2.1]	[TDDConf.2.1]	
CORES	Config 1		[CR. 1.1 FDD]	[CR. 1.1 FDD]	A.3.1.2
ET	Config 2		[CR. 1.1 TDD]	[CR. 1.1 TDD]	
Referen			[CR. 2.1 FDD]	[CR. 2.1 FDD]	
e Channe	Config 4		[CR. 2.1 TDD]	[CR. 2.1 TDD]	
SSB	Config 1		SSB.1 FR1	SSB.1 FR1	A.3.10
Configu		1	SSB.1 FR1	SSB.1 FR1	A.3.10
ation	Config 3	1 -	SSB.2 FR1	SSB.2 FR1	A.3.11
	Config 4		SSB.2 FR1	SSB.2 FR1	71.0.11
SMTC	Config 1,		FR1 pattern 1	FR1 pattern 1	
Configu					
ation	Config 3, 4		FR1 pattern 2	FR1 pattern 2	
PDSCH/ PDCCH	J ,		15 KHz	15 KHz	
subcarri r spacin	3 - ,		30 KHz	30 KHz	
csi-RS-I			[0]	[0]	
assigned Failure F	d as Beam				
	parameters		TBD	TBD	A.3.2.1
CP leng			Normal	Normal	7.10.2.1
	ion Matrix and		[2x2 Low]	[2x2 Low]	
Antenna	ı				
Configu					
Beam	DCI format		1-0	1-0	
failure	Number of		2	2	
detect	Control				
ion	OFDM				
trans missio	symbols Aggregation	CC	8	8	
n	level	Е		-	
param eters	Ratio of hypothetical PDCCH RE	dB	0	0	
	energy to average				
	CSI-RS RE energy				
	Ratio of hypothetical PDCCH	dB	0	0	
	DMRS energy to average				
	CSI-RS RE energy				
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
DRX			640	640	
Gap pat	tern ID		[N.A.]	*[ <i>gp0</i> ]	

csi-RS-Inde			2	2	Number of SSB indexes used for beam failure detection	
rlmInSyncOutOfSync Threshold			absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).	
rsrp-Thresh	noldSSB		TBD	TBD	Threshold used for Qout_LR_SSB	
powerCont S	rolOffsetS		db0	db0	Used for deriving rsrp-ThresholdCSI-RS	
beamFailur MaxCount	elnstance		[n2]	[n2]	see TS 38.321 [7], section 5.17	
beamFailur Timer	eDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17	
NZP CSI-R configuration	NZP CSI-RS configuration		[Resourceld 1]	[Resourceld 0]		
ZP CSI-RS configuatio	ZP CSI-RS		TBD	TBD		
Periodic CS	SI reporting		PUCCH	PUCCH		
CSI reporting	Config 1, 2	slot	[5]	[5]		
periodicit y	periodicit Config 3		[10]	[10]		
T1		w	1	1	During this time the UE shall be fully synchronized to cell	
T2			0.4	0.4		
T3		S	[TBD]	[TBD]		
D1		S	[0.24]	[0.44]		
Note 1: UE-specific PDCCH is not transmitted after T1 starts.						

Table 6.5.5.4.4.1-4: Measurement gap configuration for NR SA FR1 CSI-RS-based beam failure detection and link recovery in DRX

Field	Test 2
Field	Value
gapOffset	[0]

Table 6.5.5.4.4.1-5: NZP-CSI-RS resource configuration for NR SA FR1 CSI-RS-based beam failure detection and link recovery in DRX

Field	Resourceld 0				
	Value	Value			
frequencyD omainAlloca tion <sup>Note 1</sup>	row1	row2			
startingRB	0	0			
nrofRBs	Note 2	Note 2			
Note 2: nro	e 1: TS 38.211 [6] table 7.4.1.5.3-1				

Table A.6.5.5.4.1-6: DRX-Configuration for NR SA FR1 CSI-RS-based beam failure detection and link recovery in DRX

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

#### 6.5.5.4.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to NR Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in subtest 2.

- 12. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 13. Set the parameters of NR Cell 1 according to T1 in Table 6.5.5.3.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 14. When T1 expires the SS shall change the SNR value to T2 as specified in Table 6.5.5.4.5-1. T2 starts.
- 15. When T2 expires the SS shall change the SNR value to T3 as specified in Table 6.5.5.4.5-1. T3 starts.
- 16. When T3 expires the SS shall change the SNR value to T4 as specified in Table 6.5.5.4.5-1. T4 starts.
- 17. When T4 expires the SS shall change the SNR value to T5 as specified in Table 6.5.5.4.5-1. T5 starts.
- 18. If the SS:
  - a) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1
     [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point B

and

b) does not detect any uplink power on NR carrier higher than OFF power defined in TS 38.521-1 [17] clause 6.3.2.5 from time point C until T3 expires

and

c) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point F (D1 after the start of T5) until T5 expires,

the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

- 19. When T5 expires the SS shall change the SNR value to T1 as specified in Table 6.5.5.4.5-1.
- 20. Wait [1s] for the UE to re-establish the connection or continue directly to step 10. If the UE re-establishes the connection within [1s] continue to step 11. Otherwise continue to step 10.
- 21. Switch the UE on and off. Ensure the UE is in RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.

22. Repeat steps 2-10 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

## 6.5.5.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.5.5.4.4.3-1: Common Exception messages for NR SA FR1 CSI-RS-based beam failure detection and link recovery in DRX

Default Message Contents					
Common contents of system information					
blocks exceptions					
Default RRC messages and information	FSS				
elements contents exceptions					

# 6.5.5.4.5 Test requirement

Tables 6.5.5.4.4.1-3 and 6.5.5.4.5-1 define the primary level settings including test tolerances for NR SA FR1 CSI-RS-based beam failure detection and link recovery in DRX.

Table 6.5.5.4.5-1: NR Cell specific test parameters for NR SA FR1 CSI-RS-based beam failure detection and link recovery in DRX

Parameter Uni					1 and To					1 and To		
			CSI-RS of set q₀					RS of se				
			T1	T2	T3	T4	T5	T1	T2	Т3	T4	T5
to SSS	tio of PSS	dB										
EPRE ra	tio of PBCH SSS	dB										
EPRE ra to PBCH	tio of PBCH DMRS	dB										
EPRE ra PDCCH SSS	tio of	dB										
EPRE ra PDCCH : DMRS	tio of to PDCCH	dB			0					0		
EPRE ra PDSCH I SSS	tio of DMRS to	dB										
EPRE ra PDSCH t DMRS	tio of to PDSCH	dB										
	tio of OCNG SSS <sup>(Note 1)</sup>	dB										
	tio of OCNG DMRS (Note	dB										
SNR_C	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SI-RS	Config 2 Config 3		TBD TBD	TBD TBD	TBD TBD	TBD TBD	TBD TBD	TBD TBD	TBD TBD	TBD TBD	TBD TBD	TBD TBD
3.7	Config 1	dBm/	ושט	ופט	[-98]	IDD	IBD	IDD	IBD	[-98]	IBD	ופט
$N_{oc}$	Config 2	15K			[-98]					[-98]		
	Config 3	Hz			[-98]					[-98]		
SS- RSRP <sup>N</sup> ote 3		dBm /SC S			•							
Ês/Iot												
Ês/Noc												
lo	config 1, 2	dBm/ 9.36 MHz										
	Config 3, 4	dBm/ 38.1 MHz										
Propagat condition	l .				TDLC300					TDLC300		
Note 1:	OCNG shal power spec							located a	nd a cons	stant total	transmit	ted

Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Settable parameters triemserves.

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set  $q_1$ .

No later than time point F occurring no later than D1 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set  $q_1$ .

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

# 6.5.6 Active BWP switch delay

# 6.5.6.1 DCI-based and time-based active BWP switch

## 6.5.6.1.0 Minimum conformance requirements

**FFS** 

#### 6.5.6.1.1 NR SA FR1 DCI-based DL active BWP switch in non-DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD
- Test procedure is TBD
- Test applicability needs to be added to TS 38.522

6.5.6.1.1	.1	Test	purpose

**FFS** 

6.5.6.1.1.2 Test applicability

**FFS** 

6.5.6.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.5.6.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.5.6.1.1.

6.5.6.1.1.4	Test description
6.5.6.1.1.4.1	Initial conditions

**FFS** 

6.5.6.1.1.4.2 Test procedure

**FFS** 

6.5.6.1.1.4.3 Message contents

FFS

6.5.6.1.1.5 Test requirements

**FFS** 

## 6.5.6.2 RRC-based active BWP switch

## 6.5.6.2.0 Minimum conformance requirements

**FFS** 

#### 6.5.6.2.1 NR SA FR1 RRC-based DL active BWP switch in non-DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD
- Test procedure is TBD
- Test applicability needs to be added to TS 38.522

6.5.6.2.1.1 Test purpose

**FFS** 

6.5.6.2.1.2 Test applicability

**FFS** 

6.5.6.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.5.6.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.5.6.2.1.

6.5.6.2.1.4 Test description

6.5.6.2.1.4.1 Initial conditions

**FFS** 

6.5.6.2.1.4.2 Test procedure

**FFS** 

6.5.6.2.1.4.3 Message contents

FFS

6.5.6.2.1.5 Test requirements

**FFS** 

# 6.6 Measurement procedures

# 6.6.1 Intra-frequency measurements

## 6.6.1.0 Minimum conformance requirements

# 6.6.1.0.1 Minimum conformance requirements for event-triggered measurement without gap

[TS 38.133, clause 9.2.5.1 and 9.2.5.2]

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). 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.

#### Where:

 $T_{PSS/SSS\_sync\_intra}$ : it is the time period used in PSS/SSS detection given in table 6.6.1.0.1-1.

T SSB\_measurement\_period\_intra: equal to a measurement period of SSB based measurement given in table 6.6.1.0.1-2.

 $CSSF_{intra}$ : it is a carrier specific scaling factor and is determined according to  $CSSF_{outside\_gap,i}$  in TS 38.133 [6] clause 9.1.5.1 for measurement conducted outside measurement gaps.

When intra-frequency SMTC is fully non overlapping with measurement gaps or intrafrequency SMTC is fully overlapping with MGs, Kp=1.

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

Table 6.6.1.0.1-1: 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 6.6.1.0.1-2: Measurement period for intra-frequency measurements without gaps (Frequency Range 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	·

[TS 38.133, clause 9.2.4.3]

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in TS 38.133 [6] clause 10.1.2.1, 10.1.7.1 and 10.1.12.1, 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 less than T  $_{identify\ intra\ without\ index}$  defined in TS 38.133 [6] clause 9.2.5.1. When L3 filtering is used an additional delay can be expected.

If a cell which has been detectable at least for the time period than  $T_{identify\ intra\ without\ index}$  defined in TS 38.133 [6] clause 9.2.5.1 becomes undetectable for a period and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than  $T_{measurement,\ Intra}$  provided the timing to that cell has not changed more than  $\pm$  3200 Tc while the measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used, an additional delay can be expected.

[TS 38.133, clause 9.2.2]

The requirements given above 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 TS 38.133 [6] sections 10.1.2 are fulfilled for a corresponding Band,
- SS-RSRQ related side conditions given in TS 38.133 [6] sections 10.1.7 are fulfilled for a corresponding Band,
- SS-SINR related side conditions given in TS 38.133 [6] sections 10.1.12 are fulfilled for a corresponding Band,
- SSB\_RP and SSB Ês/Iot according to TS 38.133 [6] Annex B.2.2 for a corresponding Band.

References: The conformance requirements covered in the current TC are specified in: TS 38.133 [6], clauses 9.2.2, 9.2.4.3, 9.2.5.1 and 9.2.5.2.

# 6.6.1.0.2 Minimum conformance requirements for event-triggered measurement with gap

[TS 38.133 [6], clause 9.2.6.2, 9.2.6.3]

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). It is assumed that *deriveSSB-IndexFromCell* is always enabled for FR1 TDD and FR2.

 $T_{identify\_intra\_without\_index} = T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra} \ ms$ 

Where:

T<sub>PSS/SSS</sub> <sub>sync intra</sub>: it is the time period used in PSS/SSS detection given in table 6.6.1.0.2-1.

 $T_{SSB\_measurement\_period\_intra} : equal \ to \ a \ measurement \ period \ of \ SSB \ based \ measurement \ given \ in \ table \ 6.6.1.0.2-2.$ 

 $CSSF_{intra}$ : it is a carrier specific scaling factor and is determined according to  $CSSF_{within\_gap,i}$  in TS 38.133 [6] section 9.1.5.2.2 for measurement within outside measurement gaps.

Table 6.6.1.0.2-1: Time period for PSS/SSS detection (Frequency range FR1)

DRX cycle	TPSS/SSS_sync_intra
No DRX	max( 600ms, 5 x max(MGRP, SMTC period)) x
	CSSF <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 6.6.1.0.2-2: Measurement period for intra-frequency measurements with gaps (Frequency Range FR1)

DRX cycle	T SSB_measurement_period_intra
No DRX	max( 200ms, 5 x max(MGRP, SMTC period)) x
	CSSF <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>

[TS 38.133 [6], clause 9.2.2]

The requirements given above 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 TS 38.133 [6] sections 10.1.2 are fulfilled for a corresponding Band,
- SS-RSRQ related side conditions given in TS 38.133 [6] sections 10.1.7 are fulfilled for a corresponding Band,
- SS-SINR related side conditions given in TS 38.133 [6] Sections 10.1.12 are fulfilled for a corresponding Band,
- SSB RP and SSB Ês/Iot according to TS 38.133 [6] Annex B.2.2 for a corresponding Band.

[TS 38.133 [6], clause 9.2.4.2]

The RSRP measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] clauses 10.1.2.1.1 and 10.1.2.1.2, the RSRQ measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] clauses 10.1.7.1.1, and the SINR measurement accuracy for all measured cells shall be as specified in the TS 38.133 [6] clause 10.1.12.1.1.

Reported RSRP, RSRQ and SINR measurements contained in event triggered measurement reports shall meet the requirements in TS 38.133 [6] clauses 10.1.2.1.1, 10.1.2.1.2, 10.1.7.1.1 and 10.1.12.1.1, 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 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 a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than  $T_{identify\_intra\_without\_index}$  defined in TS 38.133 [6] section 9.2.6.2. When L3 filtering is used an additional delay can be expected.

The normative reference for this requirement is TS 38.133 [6] clauses 9.2.2, 9.2.4.2, 9.2.6.2 and 9.2.6.3.

6.6.1.0.3 Minimum conformance requirements for event-triggered measurement without gap with SSB index reading

[TS 38.133 [6], clause 9.2.5.1, 9.2.5.2]

UE shall be able to identify a new detectable intra frequency cell within T<sub>identify\_intra\_with\_index</sub>.

 $T_{identify\_intra\_with\_index} = T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra} + T_{SSB\_time\_index\_intra} \ ms$ 

#### Where:

T<sub>PSS/SSS</sub> <sub>sync intra</sub>: it is the time period used in PSS/SSS detection given in table 6.6.1.0.3-1.

T<sub>SSB time index intra</sub>: it is the time period used to acquire the index of the SSB being measured given in table 6.6.1.0.3-2.

T<sub>SSB\_measurement\_period\_intra</sub>: equal to a measurement period of SSB based measurement given in table 6.6.1.0.3-3.

CSSF<sub>intra</sub>: it is a carrier specific scaling factor and is determined according to CSSF<sub>outside\_gap,i</sub> in TS 38.133 [6] section 9.1.5.1 for measurement conducted outside measurement gaps

When intrafrequency SMTC is fully non overlapping with measurement gaps or intrafrequency SMTC is fully overlapping with MGs,  $K_p=1$ 

When intrafrequency SMTC is partially overlapping with measurent gaps,  $K_p = 1/(1 - (SMTC \text{ period }/MGRP))$ , where SMTC period < MGRP

Table 6.6.1.0.3-1: 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
	CSSFintra
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 6.6.1.0.3-2: Time period for time index detection (Frequency range FR1)

DRX cycle	$T_{SSB\_time\_index\_intra}$
No DRX	max(120ms, ceil( 3 x K <sub>p</sub> ) x SMTC period) <sup>Note 1</sup> x
	CSSF <sub>intra</sub>
DRX cycle≤ 320ms	max(120ms, ceil (1.5 x 3 x K <sub>p</sub> ) x max(SMTC
	period,DRX cycle)] x CSSFintra
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	j

Table 6.6.1.0.3-3: Measurement period for intra-frequency measurements with gaps (Frequency Range 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 CSSFintra
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 identifie	d

[TS 38.133 [6], clause 9.2.2]

The requirements given above 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 TS 38.133 [6] sections 10.1.2 are fulfilled for a corresponding Band,

- SS-RSRQ related side conditions given in TS 38.133 [6] sections 10.1.7 are fulfilled for a corresponding Band,
- SS-SINR related side conditions given in TS 38.133 [6] Sections 10.1.12 are fulfilled for a corresponding Band,
- SSB RP and SSB Ês/Iot according to TS 38.133 [6] Annex B.2.2 for a corresponding Band.

[TS 38.133 [6], clause 9.2.4.2]

The RSRP measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] clauses 10.1.2.1.1 and 10.1.2.1.2, the RSRQ measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] clauses 10.1.7.1.1, and the SINR measurement accuracy for all measured cells shall be as specified in the TS 38.133 [6] clause 10.1.12.1.1.

Reported RSRP, RSRQ and SINR measurements contained in event triggered measurement reports shall meet the requirements in TS 38.133 [6] clauses 10.1.2.1.1, 10.1.2.1.2, 10.1.7.1.1 and 10.1.12.1.1, 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 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 a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than  $T_{identify\_intra\_with\_index}$  defined in TS 38.133 [6] section 9.2.5.1. When L3 filtering is used an additional delay can be expected.

The normative reference for this requirement is TS 38.133 [6] clauses 9.2.2, 9.2.4.2, 9.2.5.1 and 9.2.5.2.

# 6.6.1.0.4 Minimum conformance requirements for event-triggered measurement with gap with SSB index reading

[TS 38.133 [6], clause 9.2.6.2, 9.2.6.3]

UE shall be able to identify a new detectable intra frequency cell within T<sub>identify\_intra\_with\_index</sub>.

 $T_{identify\_intra\_with\_index} = T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra} + T_{SSB\_time\_index\_intra} \ ms$ 

#### Where:

T<sub>PSS/SSS\_sync\_intra</sub>: it is the time period used in PSS/SSS detection given in table 6.6.1.0.4-1.

T<sub>SSB\_time\_index\_intra</sub>: it is the time period used to acquire the index of the SSB being measured given in table 6.6.1.0.4-2.

 $T_{SSB\_measurement\_period\_intra}$ : equal to a measurement period of SSB based measurement given in table 6.6.1.0.4-3.

CSSF<sub>intra</sub>: it is a carrier specific scaling factor and is determined according to CSSF<sub>within\_gap, i</sub> in TS 38.133 section 9.1.5.2.2 for measurement conducted within measurement gaps.

When intrafrequency SMTC is fully non overlapping with measurement gaps or intrafrequency SMTC is fully overlapping with MGs,  $K_p=1$ 

When intrafrequency SMTC is partially overlapping with measurent gaps,  $K_p = 1/(1 - (SMTC \text{ period }/MGRP))$ , where SMTC period < MGRP.

Table 6.6.1.0.4-1: Time period for PSS/SSS detection (Frequency range FR1)

DRX cycle	TPSS/SSS_sync_intra
No DRX	max( 600ms, 5 x max(MGRP, SMTC period)) x
	CSSF <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 6.6.1.0.4-2: Time period for time index detection (Frequency range 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
	CSSF <sub>intra</sub>
DRX cycle≤ 320ms	max(120ms, ceil (1.5 x 3 x K <sub>p</sub> ) x max(SMTC
	period,DRX cycle)) x CSSFintra
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	d '

Table 6.6.1.0.4-3: Measurement period for intra-frequency measurements with gaps (Frequency Range FR1)

DRX cycle	T SSB_measurement_period_intra
No DRX	max( 200ms, 5 x max(MGRP, SMTC period)) x
	CSSFintra
DRX cycle≤ 320ms	max( 200ms, ceil(1.5x 5) x max(MGRP, SMTC
	period,DRX cycle)) x CSSF <sub>intra</sub>
DRX cycle>320ms	5 x max(MGRP, DRX cycle) x CSSF <sub>intra</sub>

[TS 38.133 [6], clause 9.2.2]

The requirements given above 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 TS 38.133 [6] sections 10.1.2 are fulfilled for a corresponding Band,
- SS-RSRQ related side conditions given in TS 38.133 [6] sections 10.1.7 are fulfilled for a corresponding Band,
- SS-SINR related side conditions given in TS 38.133 [6] sections 10.1.12 are fulfilled for a corresponding Band,
- SSB\_RP and SSB Ês/Iot according to TS 38.133 [6] Annex B.2.2 for a corresponding Band.

[TS 38.133 [6], clause 9.2.4.2]

The RSRP measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] clauses 10.1.2.1.1 and 10.1.2.1.2, the RSRQ measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] clauses 10.1.7.1.1, and the SINR measurement accuracy for all measured cells shall be as specified in the TS 38.133 [6] clause 10.1.12.1.1.

Reported RSRP, RSRQ and SINR measurements contained in event triggered measurement reports shall meet the requirements in TS 38.133 [6] clauses 10.1.2.1.1, 10.1.2.1.2, 10.1.7.1.1 and 10.1.12.1.1, 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 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 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 Tidentify\_intra\_with\_index defined in TS 38.133 [6] section 9.2.6.2. When L3 filtering is used an additional delay can be expected.

The normative reference for this requirement is TS 38.133 [6] clauses 9.2.2, 9.2.4.2, 9.2.6.2 and 9.2.6.3.

# 6.6.1.1 NR SA FR1 event-triggered reporting without gap in non-DRX

# 6.6.1.1.1 Test purpose

To verify the UE's ability to make a correct reporting of an event within intra-frequency cell search without gap under non-DRX.

## 6.6.1.1.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

## 6.6.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.6.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.6.1.1.

# 6.6.1.1.4 Test description

#### 6.6.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.6.1.1.4.1-1.

Table 6.6.1.1.4.1-1: Supported test configurations for NR SA FR1 event-triggered reporting without gap in non-DRX

Test Case ID	Description		
6.6.1.1-1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
6.6.1.1-2	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
6.6.1.1-3 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations.			

Configure the test equirement and the DUT according to the parameters in Table 6.6.1.1.4.1-2.

Table 6.6.1.1.4.1-2: Initial conditions for NR SA FR1 event-triggered reporting without gap in non-DRX

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, Table E.4-1 and TS 38	.508-1 [14] clause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 6.6.1.1.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	- Without LTE link - For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE part.		

- 1. The test parameters for PCell and neighbour cell are given in Table 6.6.1.1.4.1-3 below.
- 2. Message contents are defined in clause 6.6.1.1.4.3.
- 3. There is one carrier and two cells specified in the test. NR Cell 1 is the cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 6.6.1.1.4.1-3: General test parameters for SA intra-frequency event triggered reporting tests without gap for FR1 under non-DRX

Parameter	Unit	Test	Value	Comment
		configur ation		
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
_		2	SMTC.1	
		3	SMTC.1	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3		OFF
Time offset between PCell and PSCell		1, 2, 3	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	5	

#### 6.6.1.1.4.2 Test procedure

Two cells are deployed in the test, which are FR1 PCell (NR Cell 1) and a FR1 neighbour cell (NR Cell 2) on the same frequency as the PCell. The general and cell specific test parameters for PCell and neighbour cell are given in Table 6.6.1.1.4.1-3 and Table 6.6.1.1.5-1, respectively. 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 NR Cell 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.6.1.1.5-1. T1 starts.
- 3. SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit *RRCReconfigurationComplete* message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.6.1.1.5-1. T2 starts.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than 802 ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set NR Cell 2 physical cell identity = ((current NR cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.

- 9. After the RRC connection release, the SS:
  - transmits in NR Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5), or
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 6.6.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.6.1.1.4.3-1: Common Exception messages SA intra frequency event triggered reporting tests without gap under non-DRX

	Default Message Contents					
Common contents of system information blocks exceptions						
Default RRC messages and information elements contents exceptions	Table H.3.1-1					
·	Table H.3.1-2 with Condition INTRA-FREQ					
	Table H.3.1-3 with Condition INTRA-FREQ MO, SSB.1 FR1, SMTC.2 and Asynchronous cells for configuration 6.6.1.1-1 Table H.3.1-3 with Condition INTRA-FREQ MO, SSB.1 FR1, SMTC.1 and synchronous cells for configuration 6.6.1.1-2 Table H.3.1-3 with Condition INTRA-FREQ MO, SSB.2 FR1, SMTC.1 and synchronous cells for configuration 6.6.1.1-3					
	Table H.3.1-4 with A3-offset = -4.5dB					
	Table H.3.1-5 with Condition INTRA-FREQ					
	Table H.3.1-7 with Condition INTRA-FREQ					

## 6.6.1.1.5 Test requirement

Table 6.6.1.1.4.1-3 and Table 6.6.1.1.5-1 define the primary level settings including test tolerances for NR SA event triggered reporting test without gap under non-DRX.

Table 6.6.1.1.5-1: NR Cell specific test parameters for SA intra-frequency event triggered reporting tests without gap under non-DRX

Parameter	Unit	Test	Cell 1		Се	II 2	
		configuration	T1	T2	T1	T2	
TDD configuration		1	N/A			N/A	
		2	TDDConf.1.1		TDDConf.1.1		
		3	TDDConf.2		TDDConf.2		
PDSCH RMC		1	SR.1.	1 FDD	N.	/A	
configuration		2	SR.1.	1 TDD			
		3	SR.2.	1 TDD			
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD	
configuration		3	CR.2.	1 TDD	CR.2.	1 TDD	
Dedicated		1		.1 FDD	CCR.1	.1 FDD	
CORESET RMC		2	CCR.1	.1 TDD	CCR.1	.1 TDD	
configuration		3		.1 TDD		.1 TDD	
OCNG Patterns		1, 2, 3	OF		OF		
Initial BWP		1, 2, 3	DLBW		DLBW		
configuration		, ,	ULBW	/P.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		
$N_{oc}$ Note 2	dBm/SCS	1	-98				
- voc		2			-98		
		3			-95		
$N_{oc}$ Note 2	dBm/15 KHz	1	-98				
1 oc		2					
		3					
$\hat{E}_{s}/I_{ot}$	dB	1	4	-1.46	-Infinity	-1.46	
S / Tot		2					
		3					
$\hat{E}_{s}/N_{oc}$	dB	1	4	4	-Infinity	4	
-s/r oc		2	1				
		3					
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94	
		2	-94	-94	-Infinity	-94	
	ID (0.00 M):	3	-91	-91	-Infinity	-91	
lo	dBm/9.36 MHz	1	-64.60	-62.25	Specified		
	dBm/9.36 MHz	2	-64.60	-62.25	colu	mns	
	dBm/38.16 MHz	3	-58.50	-56.16			
Propagation Condition		1, 2, 3	AWGN				

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over

subcarriers and time and shall be modelled as AWGN of appropriate power for  $\,N_{oc}\,$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

The overall delays measured is defined as the time from the beginning of time period T2, to the moment the UE send one Event A3 triggered measurement report to NR Cell 2.

The overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

The overall delays measured test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

 $Measurement \ reporting \ delay = T_{identify\_intra\_without\_index}$ 

 $T_{identify\_intra\_without\_index} = (T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}) ms$ 

 $T_{PSS/SSS\_sync\_intr} = max [600 \text{ ms, ceil } (5 \times K_p) \times SMTC \text{ period }] \times CSSF_{intra} = 600 \text{ ms}$ 

 $T_{SSB\ measurement\ period\ intra}=max\ [\ 200\ ms,\ ceil(\ 5\times K_p)\times SMTC\ period\ ]\times CSSF_{intra}=200\ ms$ 

TTI insertion uncertainty = 2 ms

The overall delays measured shall be less than a total of 802 ms in this test case (note: this gives a total of 800 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

# 6.6.1.2 NR SA FR1 event-triggered reporting without gap in DRX

## 6.6.1.2.1 Test purpose

To verify the UE's ability to make a correct reporting of an event within intra-frequency cell search without gap under DRX.

## 6.6.1.2.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

#### 6.6.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.6.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.6.6.1.2.

## 6.6.1.2.4 Test description

# 6.6.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.6.1.2.4.1-1.

Table 6.6.1.2.4.1-1: Supported test configurations for NR SA FR1 event-triggered reporting without gap in DRX

Test Case ID	Description		
6.6.1.2-1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
6.6.1.2-2	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
6.6.1.2-3	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
Note: The UE is only required to be tested in one of the supported test configurations.			

Configure the test equipment and the DUT according to the parameters in Table 6.6.1.2.4.1-2.

Table 6.6.1.2.4.1-2: Initial conditions for NR SA FR1 event-triggered reporting without gap in DRX

Parameter	Value		Comment	
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.	
Test frequencies	As specified	in Annex E, table E.4-1 and TS 38.	508-1 [14] clause 4.3.1.	
Channel bandwidth	As specified	As specified by the test configuration selected from Table 6.6.1.2.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.	
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.	
Diagram	DUT Part	A.3.2.3.4		
Exceptions to connection diagram	- Without LTE link - For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE part.			

- 1. The test parameters for PCell and neighbour cell are given in Table 6.6.1.2.4.1-3 below.
- 2. Message contents are defined in clause 6.6.1.2.4.3.
- 3. There is one carrier and two cells specified in the test. NR Cell 1 is the cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 6.6.1.2.4.1-3: General test parameters for SA intra-frequency event triggered reporting tests without gap for FR1 under DRX

Parameter	Unit	Test configur	Value		Comment
		ation	Test 1	Test 2	
Active cell		1, 2, 3	Cell 1		
Neighbour cell		1, 2, 3	Cell 2		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and	Cell 2	
SSB configuration		1	SSB.1 FR1		
		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC.2		
		2	SMTC.1		
		3	SMTC.1		
A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	S	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX	ms	1, 2, 3	DRX.1	DRX.2	
Time offset between PCell and PSCell		1, 2, 3	3 us		Synchronous EN-DC
Time offset between serving		1	3 us		Synchronous cells
and neighbour cells		2	3 ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		3	3 us		Synchronous cells
T1	S	1, 2, 3	5		
T2	S	1, 2, 3	5	10	

#### 6.6.1.2.4.2 Test procedure

Two cells are deployed in the test, which are FR1 PCell (NR Cell 1) and a FR1 neighbour cell (NR Cell 2) on the same frequency as the PCell. The general and cell specific test parameters for PCell and neighbour cell are given in Table 6.6.1.2.4.1-3 and Table 6.6.1.2.5-1, respectively. 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 NR Cell 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.6.1.2.5-1. T1 starts.
- 3. SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.6.1.2.5-1. T2 starts.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than 922 ms for Test 1 or less than 6402 ms for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.

- 7. After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set NR Cell 2 physical cell identity = ((current NR cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in NR Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5),
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 6.6.1.2.4.1-1 as appropriate.

# 6.6.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.6.1.2.4.3-1: Common Exception messages for SA intra frequency event triggered reporting tests without gap under DRX

	Default Message Contents
Common contents of system information blocks exceptions	
Default RRC messages and information elements contents exceptions	Table H.3.1-1
	Table H.3.1-2 with Condition INTRA-FREQ
	Table H.3.1-3 with Condition INTRA-FREQ MO SSB.1 FR1, SMTC.2 and Asynchronous cells for configuration 6.6.1.2-1
	Table H.3.1-3 with Condition INTRA-FREQ MO SSB.1 FR1, SMTC.1 and synchronous cells for configuration 6.6.1.2-2
	Table H.3.1-3 with Condition INTRA-FREQ MO SSB.2 FR1, SMTC .1 and synchronous cells for configuration 6.6.1.2-3
	Table H.3.1-4 with A3-offset = -4.5dB
	Table H.3.1-5 with Condition INTRA-FREQ
	Table H.3.1-7 with Condition INTRA-FREQ
	Table H.3.7-1 with Condition DRX.1 for test 1
	Table H.3.7-1 with Condition DRX.2 for test 2

# 6.6.1.2.5 Test requirement

Table 6.6.1.2.4.1-3 and Table 6.6.1.2.5-1 define the primary level settings including test tolerances for NR event triggered reporting in synchronous cells when DRX is used test.

Table 6.6.1.2.5-1: NR Cell specific test parameters for SA intra-frequency event triggered reporting tests without gap under DRX

Parameter	Unit	Test	Се	Cell 1		II 2	
		configuration	T1	T2	T1	T2	
TDD configuration		1	N/A		N,	N/A	
		2	TDDConf.1.1			TDDConf.1.1	
		3	TDDConf.2.1			TDDConf.2.1	
PDSCH RMC		1	SR.1.	1 FDD	N.	/A	
configuration		2	SR.1.	1 TDD			
		3	SR.2.	1 TDD	1		
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD	
configuration		3	CR.2.	1 TDD	CR.2.	1 TDD	
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC		2	CCR.1	.1 TDD	CCR.1	.1 TDD	
configuration		3	CCR.2	.1 TDD	CCR.2	.1 TDD	
OCNG Patterns		1, 2, 3	OF	P.1	OF	P.1	
Initial BWP		1, 2, 3	DLBV	/P.0.1	DLBW	/P.0.1	
configuration				/P.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		
$N_{oc}$ Note 2	dBm/SCS	1	-98				
		2			.98		
		3	-95				
$N_{oc}$ Note 2	dBm/15 KHz	1	-98				
ОС		2					
		3		1	1		
$\hat{E}_{s}/I_{ot}$	dB	1	4	-1.46	-Infinity	-1.46	
-s/-ot		2					
		3					
$\hat{E}_{s}/N_{oc}$	dB	1	4	4	-Infinity	4	
87 00		2	_				
OO DODD Note 2	ID (000 I/II	3		0.4			
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94	
		2	-94	-94	-Infinity	-94	
lo	dBm/9.36 MHz	3 1	-91	-91	-Infinity	-91	
lo		2	-64.60	-62.25	Specified colu		
	dBm/9.36 MHz		-64.60	-62.25	Colu	111115	
Propagation	dBm/38.16 MHz	3 1, 2, 3	-58.50	-56.16	VCN		
Condition		1, 2, 3	AWGN				

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over

subcarriers and time and shall be modelled as AWGN of appropriate power for  $\,N_{oc}\,$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

In Test 1 when DRX cycle length = 40 ms, the overall delay measured is defined as the time from the beginning of time period T2 to the moment the UE send one Event A3 triggered measurement report on PUSCH.

In Test 2 when DRX cycle length = 640 ms, the overall delay measured is defined as the time from the beginning of time period T2 to the moment the UE starts to send preambles on the PRACH for Scheduling Request (SR) to obtain allocation to send the measurement report to NR Cell 2 on PUSCH.

#### For both tests:

The overall delays measured is defined as the time from the beginning of time period T2 to the moment the UE send one Event A3 triggered measurement report to NR Cell 2.

The overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

The overall delay measured when DRX cycle length is 40 ms test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

Measurement reporting delay = T<sub>identify intra without index</sub>

 $T_{identify intra without index} = (T_{PSS/SSS sync intra} + T_{SSB measurement period intra}) ms$ 

 $T_{PSS/SSS\_sync\_intra} = max[600ms, ceil(1.5 \times 5 \text{ x K}_p) \times max(SMTC period, DRX cycle)] \times CSSF_{intra} = 600ms$ 

 $T_{SSB\_measurement\_period\_intra} = max[200ms, ceil(1.5 \times 5 \times K_p) \ x \ max(SMTC \ period,DRX \ cycle)] \times CSSF_{intra} = 320ms$ 

TTI insertion uncertainty = 2 ms

The overall delay measured when DRX cycle length is 40 ms shall be less than a total of 922 ms.

The overall delay measured when DRX cycle length is 640 ms test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

Measurement reporting delay = T<sub>identify intra without index</sub>

$$T_{identify\_intra\_without\_index} = (T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}) ms$$

$$T_{PSS/SSS\_sync\_intra} = ceil(5 \times K_p) \times DRX \ cycle \times CSSF_{intra} = 3200ms$$

$$T_{SSB\_measurement\_period\_intra} = ceil(5 \times K_p) \times DRX \ cycle \times CSSF_{intra} = 3200ms$$

TTI insertion uncertainty = 2 ms

The overall delay measured when DRX cycle length is 640 ms shall be less than a total of 6402 ms.

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

# 6.6.1.3 NR SA FR1 event-triggered reporting with gap in non-DRX

# 6.6.1.3.1 Test purpose

The purpose of this test is to verify UE's ability to make a correct reporting of an event with gaps under non-DRX within intra-frequency cell search with gaps requirements.

## 6.6.1.3.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

# 6.6.1.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.6.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.6.1.3.

## 6.6.1.3.4 Test description

#### 6.6.1.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.6.1.3.4.1-1.

Table 6.6.1.3.4.1-1: Supported test configurations for NR SA FR1 event-triggered reporting with gap in non-DRX

Test Case ID	Description		
6.6.1.3-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
6.6.1.3-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
6.6.1.3-3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
Note 1: The UE	Note 1: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 6.6.1.3.4.1-2.

Table 6.6.1.3.4.1-2: Initial conditions for NR SA FR1 event-triggered reporting with gap in non-DRX

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, table E.4-1 and TS 38.	508-1 [14] clause 4.3.1 and 4.4.2.
Channel bandwidth	As specified	by the test configuration selected fr	rom Table 6.6.1.3.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	- Without LTE link - For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE part.		

- 1. The general test parameter settings are set up according to Table 6.6.1.3.4.1-3.
- 2. Message contents are defined in clause 6.6.1.3.4.3.
- 3. There is one NR carrier and two cells specified in the test. Cell 1 is the cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 6.6.1.3.4.1-3: General test parameters for NR SA FR1 event-triggered reporting with gap in non-DRX

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
Measurement gap type		1, 2, 3	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2, 3	40	
Measurement gap length	ms	1, 2, 3	6	
Measurement gap offset	ms	1, 2, 3	39	
SSB configuration		1	SSB.1 FR1	
-		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
-		2	SMTC.1	
		3	SMTC.1	
CSI-RS parameters		1	CSI-RS.1.2 FDD	
		2	CSI-RS.1.2 TDD	
		3	CSI-RS.2.2 TDD	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX	ms	1, 2, 3		OFF
Time offset between PCell and PSCell		1, 2, 3	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	5	

#### 6.6.1.3.4.2 Test procedure

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 general and cell specific test parameters for PCell and neighbour cell are given in Table 6.6.1.3.4.1-3 and Table 6.6.1.3.5-1, respectively. 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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.6.1.3.5-1. T1 starts.
- 3. SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.6.1.3.5-1.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than 802 ms then the number of successful tests is increased by one. If the

UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.

- 7. After the SS receive the MeasurementReport message in step 6) or when T2 expires, the SS shall transmit RRCRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5), or
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

# 6.6.1.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.6.1.3.4.3-1: Common Exception messages for NR SA FR1 event-triggered reporting with gap in non-DRX

	Default Message Contents
Common contents of system information blocks exceptions	
Default RRC messages and information elements contents exceptions	Table H.3.1-1
'	Table H.3.1-2 with Condition INTRA-FREQ and GAP NEEDED
	Table H.3.1-3 with Condition INTRA-FREQ MO, SSB.1 FR1, SMTC.2 and Asynchronous cells for Configuration 6.6.1.3-1
	Table H.3.1-3 with Condition INTRA-FREQ MO, SSB.1 FR1, SMTC.1 and Synchronous cells for Configuration 6.6.1.3-2
	Table H.3.1-3 with ConditionINTRA-FREQ MO, SSB.2 FR1, SMTC.1 and Synchronous cells for Configuration 6.6.1.3-3
	Table H.3.1-4 with A3-offset = -4.5dB
	Table H.3.1-5 with Condition INTRA-FREQ
	Table H.3.1-6 with Condition Pattern #0
	Table H.3.1-7 with Condition INTRA-FREQ

#### 6.6.1.3.5 Test requirement

Table 6.6.1.3.4.1-3 and Table 6.6.1.3.5-1 define the primary level settings including test tolerances for NR SA FR1 event-triggered reporting with gap in non-DRX test.

Table 6.6.1.3.5-1: NR Cell specific test parameters for NR SA FR1 event-triggered reporting with gap in non-DRX

Parameter	Unit	Test	Cell 1		Cell 2		
		configuration	T1	T1 T2		T2	
TDD configuration		1	N/A		N/	Ά	
· ·		2	TDDConf.1.1 TDDConf.		onf.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	CR.1.	1 FDD	
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD	
configuration		3	CR.2.	1 TDD	CR.2.	1 TDD	
Dedicated		1	CCR.1	.1 FDD	CCR.1.	1 FDD	
CORESET RMC		2	CCR.1	.1 TDD	CCR.1.	1 TDD	
configuration		3	CCR.2	.1 TDD	CCR.2	1 TDD	
OCNG Patterns		1, 2, 3		P.1	OF		
Initial BWP		1, 2, 3		/P.0.1	DLBW		
configuration		, , -		/P.0.1	ULBWP.0.1		
Active DL BWP		1, 2, 3		DLBWP.1.2		DLBWP.1.1	
configuration							
Active UL BWP		1, 2, 3	ULBWP.1.1		ULBWP.1.1		
configuration							
RLM-RS		1, 2, 3	CSI-RS		SS	SB	
$N_{oc}^{$	dBm/SCS	1	-98				
oc		2	-98				
		3	-95				
$N_{oc}^{}$ Note 2	dBm/15 KHz	11	-98				
- · oc		2	_				
		3					
${ m \hat{E}}_{ m s}/{ m I}_{ m ot}$	dB	1	4	-1.46	-Infinity	-1.46	
s / Tot		2					
		3					
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4	
s / Oc	ļ	2	_				
OO DODD Note 3	ID (000 KI)	3	0.4	0.4	1 6 1	0.4	
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94	
		2 3	-94 -91	-94	-Infinity	-94	
lo	dBm/9.36 MHz	<u> </u>		-91	-Infinity	-91	
IU	dBm/9.36 MHz	2	-64.60 -62.25 Specified in C				
	dBm/38.16 MHz	3	-64.60 -58.50	-62.25 -56.16	Colu	111113	
Propagation	UDITI/30.10 IVITZ	1, 2, 3	-36.30		l VGN		
Condition		1, 4, 5		Av	VGIN		
Condition			4 115				

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be
constant over subcarriers and time and shall be modelled as AWGN of appropriate power for

 $N_{\it oc}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

The overall delays measured is defined as the time from the beginning of time period T2, to the moment the UE send one Event A3 triggered measurement report.

The overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

The overall delays measured test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

Measurement reporting delay =  $T_{identify\_intra\_without\_index}$ 

 $T_{identify\_intra\_without\_index} = T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}$ 

 $T_{PSS/SSS \text{ sync intra}} = 600 \text{ ms}$ 

 $T_{SSB\_measurement\_period\_intra} = 200 \text{ ms}$ 

TTI insertion uncertainty = 2 ms

The overall delays measured shall be less than a total of 802 ms in this test case (note: this gives a total of 800 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

# 6.6.1.4 NR SA FR1 event-triggered reporting with gap in DRX

# 6.6.1.4.1 Test purpose

The purpose of this test is to verify UE's ability to make a correct reporting of an event with gaps under DRX within intra-frequency cell search with gaps requirements.

#### 6.6.1.4.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

## 6.6.1.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.6.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.6.6.1.4.

6.6.1.4.4 Test description

#### 6.6.1.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.6.1.4.4.1-1.

Table 6.6.1.4.4.1-1: Supported test configurations for NR SA FR1 event-triggered reporting with gap in DRX

Test Case ID	Description			
6.6.1.4-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode			
6.6.1.4-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode			
6.6.1.4-3 NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
Note 1: The UE	Note 1: The UE is only required to be tested in one of the supported test configurations			

Configure the test equipment and the DUT according to the parameters in Table 6.6.1.4.4.1-2.

Table 6.6.1.4.4.1-2: Initial conditions for NR SA FR1 event-triggered reporting with gap in DRX

Parameter		Value	Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified	in Annex E, table E.4-1 and TS 38.	508-1 [14] clause 4.3.1 and 4.4.2.		
Channel bandwidth	As specified by the test configuration selected from Table 6.6.1.4.4.1-1.				
Propagation conditions	AWGN		As specified in Annex C.2.2.		
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.2.3.4			
Exceptions to connection diagram		apable UEs without any 2Rx RF A.3.2.5.2 for DUT part and			

- 1. The general test parameter settings are set up according to Table 6.6.1.4.4.1-3.
- 2. Message contents are defined in clause 6.6.1.4.4.3.
- 3. There is one NR carrier and two cells specified in the test. Cell 1 is the cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 6.6.1.4.4.1-3: General test parameters for NR SA FR1 event-triggered reporting with gap in DRX

Parameter	Unit	Test configur	Value		Comment
		ation	Test 1	Test 2	
Active cell		1, 2, 3	Cell 1		
Neighbour cell		1, 2, 3	Cell 2		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and	Cell 2	
Measurement gap type		1, 2, 3	Per-UE gaps		
Measurement gap repitition periodicity	ms	1, 2, 3	40		
Measurement gap length	ms	1, 2, 3	6		
Measurement gap offset	ms	1, 2, 3	39		
SSB configuration		1	SSB.1 FR1		
		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC.2		
		2	SMTC.1		
		3	SMTC.1		
CSI-RS parameters		1	CSI-RS.1.2 F		
		2	CSI-RS.1.2 T		
		3	CSI-RS.2.2 T	DD	
A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	S	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX	ms	1, 2, 3	DRX.1	DRX.2	
Time offset between PCell and PSCell		1, 2, 3	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs		Synchronous cells
		3	3 μs		Synchronous cells
T1	s	1, 2, 3	5		
T2	S	1, 2, 3	5	10	

#### 6.6.1.4.4.2 Test procedure

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 general and cell specific test parameters for PCell and neighbour cell are given in Table 6.6.1.4.4.1-3 and Table 6.6.1.4.4.2-1, respectively. 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.

In Test 1 when DRX cycle = 40 ms is used, UE needs to be provided at least once every 500 ms with new Timing Advance Command MAC control element to restart the Timer Alignment Timer to keep the UE uplink time alignment. Furthermore, the UE is allocated with PUSCH resource at every DRX cycle. In Test 2 when DRX = 640 ms is used, the uplink time alignment is not maintained and the UE needs to use RACH to obtain uplink allocation for measurement reporting.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.6.1.4.5-1. T1 starts.
- 3. SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.6.1.4.5-1.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than 922 ms for Test 1 or less than 6402 ms for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5),
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 6.6.1.4.4.1-3 as appropriate.

## 6.6.1.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.6.1.4.4.3-1: Common Exception messages for NR SA FR1 event-triggered reporting with gap in DRX

	Default Message Contents
Common contents of system information blocks exceptions	
Default RRC messages and information elements contents exceptions	Table H.3.1-1
	Table H.3.1-2 with Condition INTRA-FREQ and GAP NEEDED
	Table H.3.1-3 with Condition INTRA-FREQ MO, SSB.1 FR1, SMTC.2 and Asynchronous cells for configuration 6.6.1.4-1
	Table H.3.1-3 with Condition INTRA-FREQ MO, SSB.1 FR1, SMTC.1
	and Asynchronous cells for configuration 2 Table H.3.1-3 with Condition INTRA-FREQ MO, SSB.2 FR1, SMTC.1
	and Asynchronous cells for configuration 6.6.1.4-3
	Table H.3.1-4 with A3-offset = -4.5dB
	Table H.3.1-5 with Condition INTRA-FREQ
	Table H.3.1-6 with Condition Pattern #0
	Table H.3.1-7 with Condition INTRA-FREQ
	Table H.3.7-1 with Condition DRX.1 for test 1
	Table H.3.7-1 with Condition DRX.1 for test 2

# 6.6.1.4.5 Test requirement

Table 6.6.1.4.4.1-3 and Table 6.6.1.4.5-1 define the primary level settings including test tolerances for NR SA FR1 event-triggered reporting with gap in DRX test.

Table 6.6.1.4.5-1: NR Cell specific test parameters for NR SA FR1 event-triggered reporting with gap in DRX

Parameter	Unit	Test	Cell 1		Cell 2	
		configuration	T1	T1 T2		T2
TDD configuration		1	N/A		N/	Ά
-		2	TDDConf.1.1 TDDConf.1		onf.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	CR.1.	1 FDD
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD
configuration		3	CR.2.	1 TDD	CR.2.	1 TDD
Dedicated		1	CCR.1	.1 FDD	CCR.1.	1 FDD
CORESET RMC		2	CCR.1	.1 TDD	CCR.1.	.1 TDD
configuration		3	CCR.2	.1 TDD	CCR.2	
OCNG Patterns		1, 2, 3		P.1	OF	
Initial BWP		1, 2, 3		/P.0.1	DLBW	
configuration		-, _, -		/P.0.1	ULBWP.0.1	
Active DL BWP		1, 2, 3		/P.1.2	DLBWP.1.1	
configuration						
Active UL BWP		1, 2, 3	ULBWP.1.1		ULBWP.1.1	
configuration						
RLM-RS		1, 2, 3	CSI-RS		SS	SB
$N_{oc}^{$	dBm/SCS	1	-98			
- · oc		2			·98	
		3	-95			
$N_{oc}$ Note 2	dBm/15 KHz	1	-98			
oc		2				
		3				
${ m \hat{E}}_{ m s}/{ m I}_{ m ot}$	dB	1	4	-1.46	-Infinity	-1.46
≥s/ Fot		2				
		3				
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4
s / Oc	,	2	_			
OO DODD Note 2	ID (000 I/II	3	0.4	0.4	1.6.1	
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
lo.	dPm/0.26 MU=	3	-91	-91 -62.25	-Infinity	-91
lo	dBm/9.36 MHz	1	-64.60		Specified colu	
	dBm/9.36 MHz dBm/38.16 MHz	<u>2</u> 3	-64.60 -58.50	-62.25 -56.16	Colu	111115
Propagation	UDIII/30.16 IVIMZ	1, 2, 3	-56.50		VGN	
Condition		1, ∠, 3		AV	VOIN	
Condition			4 115			

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.

In Test 1 when DRX cycle length = 40 ms is used, the overall delay measured is defined as the time from the beginning of time period T2, to the moment the UE send one Event A3 triggered measurement report on PUSCH.

In Test 2 when DRX cycle length = 640 ms is used, the overall delay measured is defined as the time from the beginning of time period T2, to the moment the UE starts to send preambles on the PRACH for Scheduling Request (SR) to obtain allocation to send the measurement report on PUSCH.

#### For both tests:

The overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

- NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.
- NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

The overall delays measured test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

 $Measurement \ reporting \ delay = T_{identify\_intra\_without\_index}$ 

 $T_{identify\_intra\_without\_index} = T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}$ 

 $T_{PSS/SSS\_sync\_intra} = 600$  ms for Test 1, and  $T_{PSS/SSS\_sync\_intra} = 3200$  ms for Test 2

T<sub>SSB\_measurement\_period\_intra</sub> = 320 ms for Test 1, and T<sub>SSB\_measurement\_period\_intra</sub> = 3200 ms for Test 2

TTI insertion uncertainty = 2 ms

For Test 1, the overall delays measured shall be less than a total of 922 ms (note: this gives a total of 920 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

For Test 2, the overall delays measured shall be less than a total of 6402 ms (note: this gives a total of 6400 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

# 6.6.1.5 NR SA FR1 event-triggered reporting without gap in non-DRX with SSB index reading

#### 6.6.1.5.1 Test purpose

The purpose of this test is to verify UE's ability to make a correct reporting of an event within intra-frequency cell search without gaps requirements.

# 6.6.1.5.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

## 6.6.1.5.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.6.1.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.6.6.1.5.

## 6.6.1.5.4 Test description

## 6.6.1.5.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.6.1.5.4.1-1.

Table 6.6.1.5.4.1-1: Supported test configurations for NR SA FR1 event-triggered reporting without gap in non-DRX with SSB index reading

Configurat	Description	
6.6.1.5-1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	
Note: The UE	only required to be tested in one of the supported test configurations.	

Configure the test equipment and the DUT according to the parameters in Table 6.6.1.5.4.1-2.

Table 6.6.1.5.4.1-2: Initial conditions for NR SA FR1 event-triggered reporting without gap in non-DRX with SSB index reading

Parameter		Value	Comment	
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.	
Test frequencies	As specified	in Annex E, table E.4-1 and TS 38.	508-1 [14] clause 4.3.1 and 4.4.2.	
Channel bandwidth	As specified by the test configuration selected from Table 6.6.1.5.4.1-1.			
Propagation conditions	AWGN		As specified in Annex C.2.2.	
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.	
Diagram	DUT Part	A.3.2.3.4	1	
Exceptions to connection diagram	- Without LTE link - For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE part.			

- 1. The general test parameter settings are set up according to Table 6.6.1.5.4.1-3.
- 2. Message contents are defined in clause 6.6.1.5.4.3.
- 3. There is one NR carrier and two cells specified in the test. Cell 1 is the cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 6.6.1.5.4.1-3: General test parameters for NR SA FR1 event-triggered reporting without gap in non-DRX with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	Cell 1	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between PCell		1	3 μs	Synchronous EN-DC
and PSCell Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
T1	S	1	5	
T2	S	1	5	

# 6.6.1.5.4.2 Test procedure

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 general and cell specific test parameters for PCell and neighbour cell are given in Table 6.6.1.5.4.1-3 and Table 6.6.1.5.5-1, respectively. 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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.6.1.5.5-1. T1 starts.

- 3. SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit *RRCReconfigurationComplete* message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.6.1.5.5-1.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than 922 ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall transmit RRCRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5),
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 6.6.1.5.4.3 Message contents

Message contents are according to TS 38.508-1 clause 4.6 with the following exceptions:

Table 6.6.1.5.4.3-1: Common Exception messages for NR SA FR1 event-triggered reporting without gap in non-DRX with SSB index reading

	Default Message Contents
Common contents of system information blocks exceptions	
Default RRC messages and information elements contents exceptions	Table H.3.1-1
• 	Table H.3.1-2 with Condition INTRA-FREQ
	Table H.3.1-3 with Condition INTRA-FREQ MO, SSB.1 FR1, SMTC.2 and Asynchronous cells for Configuration 6.6.1.5-1
	Table H.3.1-4 with A3-offset = -4.5 dB
	Table H.3.1-5 with Condition INTRA-FREQ
	Table H.3.1-7 with Condition INTRA-FREQ

## 6.6.1.5.5 Test requirement

Table 6.6.1.5.4.1-3 and Table 6.6.1.5.5-1 define the primary level settings including test tolerances for SA event triggered reporting without gap under non-DRX with SSB index reading test.

Table 6.6.1.5.5-1: NR Cell specific test parameters for NR SA FR1 event-triggered reporting without gap in non-DRX with SSB index reading

Parameter	Unit	Test	Се	Cell 1 T1 T2		II 2
		configuration	T1			T2
TDD configuration		1	N/A		N/A	
PDSCH RMC		1	SR.1.	1 FDD	N.	/A
configuration						
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD
RMC						
configuration						
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD
CORESET RMC						
configuration						
OCNG Patterns		1		P.1	OF	
Initial BWP		1		VP.0.1	DLBWP.0.1	
configuration				ULBWP.0.1		/P.0.1
Active DL BWP		1	DLBV	VP.1.1	DLBWP.1.1	
configuration						
Active UL BWP		1	ULBV	VP.1.1	ULBWP.1.1	
configuration					000	
RLM-RS		1	S	SB		SB
$N_{oc}^{$	dBm/SCS	1		-	-98	
$N_{oc}$ Note 2	dBm/15 KHz	1		-	-98	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	4 -1.46		-1.46
$\hat{E}_s/N_{oc}$	dB	1	4 4		-Infinity	4
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94 -94		-94
lo	dBm/9.36 MHz	1	-94 -94 -Infinity -94 -64.60 -62.25 Specified in Ce		l in Cell 1	
			columns			
Propagation Condition		1	AWGN			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

The overall delays measured is defined as the time from the beginning of time period T2, to the moment the UE send one Event A3 triggered measurement report.

The overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

The overall delays measured test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

 $Measurement\ reporting\ delay = T_{identify\_intra\_with\_index}$ 

 $T_{identify\_intra\_with\_index} = T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra} + T_{SSB\_time\_index\_intra}$ 

 $T_{PSS/SSS\_sync\_intra} = 600 \text{ ms}$ 

 $T_{SSB\_time\_index\_intra} = 120 \ ms$ 

 $T_{SSB\_measurement\_period\_intra} = 200 \text{ ms}$ 

TTI insertion uncertainty = 2 ms

The overall delays measured shall be less than a total of 922 ms in this test case (note: this gives a total of 920 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

# 6.6.1.6 NR SA FR1 event-triggered reporting with gap in non-DRX with SSB index reading

## 6.6.1.6.1 Test purpose

The purpose of this test is to verify UE's ability to make a correct reporting of an event within intra-frequency cell search with gaps requirements.

## 6.6.1.6.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

#### 6.6.1.6.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.6.1.0.4.

The normative reference for this requirement is TS 38.133 [6] clause A.6.6.1.6.

## 6.6.1.6.4 Test description

## 6.6.1.6.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.6.1.6.4.1-1.

Table 6.6.1.6.4.1-1: Supported test configurations for NR SA FR1 event-triggered reporting with gap in non-DRX with SSB index reading

Cor	nfiguration	Description
6.6.1.6-1		15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
Note:	The UE is only red	quired to be tested in one of the supported test configurations.

Configure the test equipment and the DUT according to the parameters in Table 6.6.1.3.4.1-2.

Table 6.6.1.6.4.1-2: Initial conditions for NR SA FR1 event-triggered reporting with gap in non-DRX with SSB index reading

Parameter		Value	Comment			
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	in Annex E, table E.4-1 and TS 38.	508-1 [14] clause 4.3.1 and 4.4.2.			
Channel bandwidth	As specified	As specified by the test configuration selected from Table 6.6.1.6.4.1-1.				
Propagation conditions	AWGN		As specified in Annex C.2.2.			
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	A.3.2.3.4	1			
Exceptions to connection diagram	- Without LTE link - For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.2 for DUT part and A.3.1.8.4 for TE part.					

- 1. The general test parameter settings are set up according to Table 6.6.1.6.4.1-3.
- 2. Message contents are defined in clause 6.6.1.6.4.3.

3. There is one NR carrier and two cells specified in the test. Cell 1 is the cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 6.6.1.6.4.1-3: General test parameters for NR SA FR1 event-triggered reporting with gap in non-DRX with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	Cell 1	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	
Measurement gap type		1	Per-UE gaps	
Measurement gap repitition periodicity	ms	1	40	
Measurement gap length	ms	1	6	
Measurement gap offset	ms	1	39	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
CSI-RS parameters		1	CSI-RS.1.2 FDD	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between PCell and PSCell		1	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
T1	S	1	5	
T2	S	1	5	

#### 6.6.1.6.4.2 Test procedure

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 general and cell specific test parameters for PCell and neighbour cell are given in Table 6.6.1.6.4.1-3 and Table 6.6.1.6.5-1, respectively. 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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.6.1.6.5-1. T1 starts.
- 3. SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.6.1.3.5-1.
- 6. UE shall transmit a MeasurementReport message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than 922 ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.

- 7. After the SS receive the MeasurementReport message in step 6) or when T2 expires, the SS shall transmit RRCRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5),
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 6.6.1.6.4.3 Message contents

Message contents are according to TS 38.508-1 clause 4.6 with the following exceptions:

Table 6.6.1.6.4.3-1: Common Exception messages for NR SA FR1 event-triggered reporting with gap in non-DRX with SSB index reading

	Default Message Contents
Common contents of system information blocks exceptions	
Default RRC messages and information elements contents exceptions	Table H.3.1-1
·	Table H.3.1-2 with Condition INTRA-FREQ and GAP NEEDED
	Table H.3.1-3 with Condition INTRA-FREQ MO, SSB.1 FR1, SMTC.2 and Asynchronous cells for Configuration 6.6.1.6-1
	Table H.3.1-4 with A3-offset = -4.5dB
	Table H.3.1-5 with Condition INTRA-FREQ
	Table H.3.1-6 with Condition Pattern #0
	Table H.3.1-7 with Condition INTRA-FREQ

# 6.6.1.6.5 Test requirement

Table 6.6.1.6.4.1-3 and Table 6.6.1.6.5-1 define the primary level settings including test tolerances for SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading test.

Table 6.6.1.6.5-1: NR Cell specific test parameters for NR SA FR1 event-triggered reporting with gap in non-DRX with SSB index reading

Parameter	Unit	Test	Се	Cell 1 T1 T2		II 2	
		configuration	T1			T2	
TDD configuration		1	N/A		N/A		
PDSCH RMC		1	SR.1.	SR.1.1 FDD		/A	
configuration							
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC							
configuration							
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC							
configuration							
OCNG Patterns		1		P.1	OF		
Initial BWP		1		VP.0.1	DLBWP.0.1		
configuration		4		VP.0.1	ULBWP.0.1		
Active DL BWP		1	DLBV	VP.1.2	DLBWP.1.1		
configuration Active UL BWP		1	LII DV	/D 4 4	ULBWP.1.1		
		1	ULBV	VP.1.1	ULBW	ULBWP.1.1	
configuration RLM-RS		1	CSI	-RS	SSB		
	dBm/SCS	1	CSI		·98	<u> </u>	
$N_{oc}^{$	ubiii/3C3	'		•	.90		
Note 2	dBm/15 KHz	1		-	-98		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	4 -1.46		-1.46	
$\hat{E}_s/N_{oc}$	dB	1	4 4		-Infinity	4	
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94 -94		-94	
lo	dBm/9.36 MHz	1	-64.60 -62.25 Specified in Ce		l in Cell 1		
			columns				
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.

The overall delays measured is defined as the time from the beginning of time period T2, to the moment the UE send one Event A3 triggered measurement report.

The overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

The overall delays measured test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

 $Measurement \ reporting \ delay = T_{identify\_intra\_with\_index}$ 

 $T_{identify\_intra\_with\_index} = T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra} + T_{SSB\_time\_index\_intra}$ 

 $T_{PSS/SSS\_sync\_intra} = 600 \text{ ms}$ 

 $T_{SSB\_time\_index\_intra} = 120 \text{ ms}$ 

 $T_{SSB\_measurement\_period\_intra} = 200 \text{ ms}$ 

TTI insertion uncertainty = 2 ms

The overall delays measured shall be less than a total of 922 ms in this test case (note: this gives a total of 920 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

# 6.6.2 Inter-frequency measurements

# 6.6.2.0 Minimum conformance requirements for Inter-frequency measurements

Same as clause 4.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause 9.3.2, 9.3.4, 9.3.5, 9.3.6.3.

# 6.6.2.1 NR SA FR1-FR1 event-triggered reporting in non-DRX

# 6.6.2.1.1 Test purpose

To verify that the UE makes correct reporting of an event in non-DRX within inter-frequency NR cell search requirements without SSB time index detection in TS 38.133 [6] clause 9.3.4.

## 6.6.2.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 6.6.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.6.6.2.1.

# 6.6.2.1.4 Test description

# 6.6.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.6.2.1.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 6.6.2.1.4.1-2. Test environment parameters are given in Table 6.6.2.1.4.1-3.

Table 6.6.2.1.4.1-1: SA FR1-FR1 event triggered reporting tests in non-DRX supported test configurations

Test Case ID	Description				
6.6.2.1-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode				
6.6.2.1-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
6.6.2.1-3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
Note 1: The UE is only required to be tested in one of the supported test configurations					
Note 2: target N	R cell has the same SCS, BW and duplex mode as NR serving cell				

Table 6.6.2.1.4.1-2: SA FR1-FR1 general test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection in non DRX

Parameter	Unit	Test	Va	lue	Comment		
		configurati on	Test 1	Test 2			
NR RF Channel Number		Config 1,2,3	1, 2		Two FR1 NR carrier frequencies is used.		
Active cell		Config 1,2,3	NR cell 1 (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 TS 38.133 clause 9.1.2-1.		
Measurement gap offset		Config 1,2,3	39	19			
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3		
		Config 2	SSB.1 FR1		As specified in clause A.3		
		Config 3	SSB.2 FR1		As specified in clause A.3		
A3-Offset	dB	Config 1,2,3	-6				
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Normal				
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0		L3 filtering is not used		
DRX		Config 1,2,3	OFF		DRX is not used		
Time offset between serving and neighbour cells		Config 1	3ms		3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs		Synchronous cells.		
T1	s	Config 1,2,3	5				
T2	S	Config 1,2,3	1	1			

Table 6.6.2.1.4-3: Test Environment parameters for SA inter-frequency event triggered reporting without SSB time index detection in non-DRX

Parameter	Value		Comment			
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	in Annex E, Table E.2-1 and TS 38	3.508-1 [14] clause 4.3.1 and 4.4.2.			
Channel bandwidth	As specified by the test configuration selected from Table 4.6.2.1.4.1-1.					
Propagation conditions	AWGN		As specified in Annex C.2.2.			
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	A.3.2.3.4	7			
Exceptions to connection diagram	- Without LTE link - For 4Rx capable UEs without any 2Rx RF bands use A.3.2.5.1 for DUT part and A.3.1.8.4 for TE part.					

<sup>1.</sup> Message contents are defined in clause 6.6.2.1.4.3.

<sup>2.</sup> There are two NR cells on two carriers specified in the test. Cell 1 is the cell used for connection setup and Cell 2 is a target cell on a different carrier than Cell 1. The power levels and settings for Cell 2 are set according to Annex C.1.2.

#### 6.6.2.1.4.2 Test procedure

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.

In test 1 measurement gap pattern configuration # 0 as defined in Table 6.6.2.1.4-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table 6.6.2.1.4-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.6.2.1.4-2. T1 starts.
- 3. The SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.6.2.1.4-2. T2 Starts.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than 920 ms for Test 1 and 760 ms for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a *Paging* message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.),
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 6.6.2.1.4-2 as appropriate.

#### 6.6.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.6.2.1.4.3-1: Common Exception messages SA inter frequency event triggered reporting without SSB time index detection in non-DRX

D	Default Message Contents					
Common contents of system information blocks exceptions						
Default RRC messages and information elements contents exceptions	Table H.3.1-1 Table H.3.1-2 with Conditions GAP NEEDED and INTER-FREQ Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC pattern 2 and Asynchronous cells for configuration 6.6.2.1-1 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC pattern 1 and synchronous cells for configuration 6.6.2.1-2 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.2 FR1, SMTC pattern 1 and synchronous cells for configuration 6.6.2.1-3 Table H.3.1-4 with A3-offset = -6dB Table H.3.1-5 with Condition INTER-FREQ Table H.3.1-6 with Condition Pattern #0 for Test 1 Table H.3.1-6 with Condition Pattern #4 for Test 2 Table H.3.1-7 with Condition INTER-FREQ					

6.6.2.1.5 Test requirement

Table 6.6.2.1.5-1 defines the primary level settings including test tolerances for all tests.

Table 6.6.2.1.5-1: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection in non-DRX

Pa	Parameter		Unit Test		II 1	Cell 2		
			configuratio n	T1	T2	T1	T2	
NR RF Chai	nnel Number		Config 1,2,3	-			2	
Duplex mod	е		Config 1	FDD				
			Config 2,3		TDD			
TDD configu	ıratıon		Config 1 Config 2	Not Applicable TDDConf.1.1				
			Config 3			Conf.2.1		
BWchannel		MHz	Config 1,2			RB,c = 52		
			Config 3			RB,c = 106		
BWP BW		MHz	Config 1,2 Config 3		10: N	RB,c = 52 RB,c = 106		
BWP configurati	Initial DL BWP		Corning 3	DLBW		RB,C = 100	NA	
on	Initial UL BWP		Config 1, 2,	ULBW	/P.0.1		NA	
	Dedicated DL BWP		3	DLBW	/P.1.1		NA	
	Dedicated UL BWP			ULBW	/P.1.1		NA	
TRS configu	uration		Config 1	TRS.1.	1 FDD		NA	
			Config 2	TRS.1.	1 TDD		NA	
			Config 3	TRS.1.2 TDD		NA		
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1		
	PDSCH Reference measurement channel		Config 1	SR.1.			-	
measureme	ili Channei		Config 2	SR.1.1 TDD				
CORESET I	Deference		Config 3 Config 1	SR2.1				
Channel	Kelerence		Config 2	CR.1.1 FDD CR.1.1 TDD CR2.1 TDD		- 		
0.10.1.10.			Config 3					
	guration defined and A.3.11. 2		Config 1	SMTC.2				
			Config 2, 3	SMTC.1				
	CCH subcarrier	kHz	Config 1,2 Config 3	15				
spacing EPRE ratio	of PSS to SSS		Coning 3			30		
EPRE ratio	of PBCH DMRS							
	of PBCH to PBCH							
to SSS	of PDCCH DMRS							
PDCCH DM			Config 1,2,3	(	)		0	
to SSS	of PDSCH to							
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 /45					00	
Note2		dBm/15 kHz		-98		-98		
N oc Note2		dBm/S CS	Config 1,2 Config 3	<u>-9</u>			<u>-98</u> -95	
SS-RSRP No	ote 3	dBm/S CS	Config 1,2	-94	-94	-Infinity	-91	
			Config 3	-91	-91	-Infinity	-88	

$\hat{E}_{s}/I_{ot}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
$\hat{E}_{s}/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io <sup>Note3</sup>	dBm/9.3 6MHz	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 both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the 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 Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

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%. with a confidence level of 95%

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 760 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

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.

# 6.6.2.2 NR SA FR1-FR1 event-triggered reporting in DRX

## 6.6.2.2.1 Test purpose

To verify that the UE makes correct reporting of an event in DRX within inter-frequency NR cell search requirements without SSB time index detection in TS 38.133 [6] clause 9.3.4.

## 6.6.2.2.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

## 6.6.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.6.6.2.2.

#### 6.6.2.2.4 Test description

#### 6.6.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.6.2.2.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 6.6.2.2.4.1-2. Test environment parameters are given in Table 6.6.2.2.4.1-3.

Table 6.6.2.2.4.1-1: SA FR1-FR1 event triggered reporting tests in DRX supported test configurations

Test Case ID	Description		
6.6.2.2-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
6.6.2.2-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
6.6.2.2-3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		
Note 1: The UE is only required to be tested in one of the supported test configurations			
Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell			

Table 6.6.2.2.4-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection in DRX

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		2		As specified in TS 38.133 clause 9.1.2-1
Measurement gap offset		Config 1,2,3	39		39		
SMTC-SSB parameters		Config 1	SSB.1 FR1				As specified in clause A.3
		Config 2	SSB.1	FR1			As specified in clause A.3
		Config 3	SSB.2	FR1			As specified in clause A.3
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	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.5
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	1.1	1.1	1.1	

Table 6.6.2.2.4-3: Test Environment parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection in DRX

Parameter		Value	Comment				
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.				
Test frequencies	As specified in Annex E, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.						
Channel bandwidth	As specified by the test configuration selected from Table 4.6.2.1.4.1-1.						
Propagation conditions	AWGN		As specified in Annex C.2.2.				
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.				
Diagram	DUT Part	A.3.2.3.4					
Exceptions to connection diagram		pable UEs without any 2Rx RF .3.2.5.1 for DUT part and					

- 1. Message contents are defined in clause 6.6.2.2.4.3.
- 2. There are two NR cells on two carriers specified in the test. Cell 1 is the cell used for connection setup and Cell 2 is a target cell on a different carrier than Cell 1. The power levels and settings for Cell 2 are set according to Annex C.1.2.

#### 6.6.2.2.4.2 Test procedure

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.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 6.6.2.2.4-2 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 6.6.2.2.4-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.6.2.2.4-2. T1 starts.
- 3. The SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit *RRCReconfigurationComplete* message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.6.2.2.4-2. T2 Starts.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than 1080 ms for Test 1, 10240 ms for Test 2, 1080 ms for Test 3 and 10240 ms for Test 4 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:

- transmits in Cell 1 a *Paging* message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.), or:
- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 6.6.2.2.4-2 as appropriate.

## 6.6.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.6.2.2.4.3-1: Common Exception messages SA inter frequency event triggered reporting without SSB time index detection in non-DRX

Default Message Contents					
Common contents of system information blocks exceptions					
Default RRC messages and information elements contents exceptions	Table H.3.1-1 Table H.3.1-2 with Conditions GAP NEEDED and INTER-FREQ Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.2 and Asynchronous cells for configuration 6.6.2.2 -1 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.1 and Synchronous cells for configuration 6.6.2.2 -2 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.2 FR1, SMTC.1 and Synchronous cells for configuration 6.6.2.2 -3 Table H.3.1-4 with A3-offset = -6dB Table H.3.1-5 with Condition INTER-FREQ Table H.3.1-6 with Condition Pattern #0 for Test 1 Table H.3.1-6 with Condition Pattern #4 for Test 2 Table H.3.1-7 with Condition INTER-FREQ Table H.3.7-1 with Condition DRX.1 for Test 1 and Test 3 Table H.3.7-1 with Condition DRX.2 for Test 2 and Test 4				

#### 6.6.2.2.5 Test requirement

Table 6.6.2.2.5-1 defines the primary level settings including test tolerances for all tests.

Table 6.6.2.2.5-1: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter		Unit	Test	Cell 1 Cell 2				
			configuratio n	T1	T2	T1	T2	
NR RF Chann	nel Number		Config 1,2,3	,			2	
Duplex mode			Config 1		F	DD		
·			Config 2,3		TDD			
TDD configuration			Config 1		Not Applicable			
			Config 2 Config 3			Conf.1.1 Conf.2.1		
BW <sub>channel</sub>		MHz	Config 1,2			RB,c = 52		
DVVCname		1711 12	Config 3			RB,c = 32		
BWP BW		MHz	Config 1,2		10: N	RB,c = 52		
	1		Config 3			RB,c = 106		
BWP configuratio	Initial DL BWP		Config 1, 2, 3	DLBW			NA	
n	Initial UL BWP			ULBW	/P.0.1		NA	
	Dedicated DL BWP			DLBW	/P.1.1		NA	
	Dedicated UL BWP			ULBW	/P.1.1		NA	
TRS configura	ation		Config 1	TRS.1.	1 FDD		NA	
			Config 2	TRS.1.	1 TDD		NA	
			Config 3	TRS.1.	2 TDD		NA	
			Config 1	TRS.1.	1 FDD		NA	
OCNG Pattern	ns defined in		Config 1,2,3	OF			)P.1	
A.3.2.1.1 (OP			<b>G</b> , ,					
PDSCH Refer			Config 1	SR.1.	SR.1.1 FDD		-	
measurement	channel		Config 2	SR.1.				
			Config 3	SR2.1				
CORESET Re	eference		Config 1	CR.1.1		-		
Channel			Config 2 Config 3	CR.1.1 CR2.1				
	SMTC configuration defined in A.3.11.1 and A.3.11. 2		Config 1	OI(Z.		ITC.2		
			Config 2, 3		SMTC.1			
PDSCH/PDC0	CH subcarrier	kHz	Config 1,2		15			
spacing			Config 3	30				
EPRE ratio of	PSS to SSS							
EPRE ratio of to SSS	EPRE ratio of PBCH DMRS							
	PBCH to PBCH							
	PDCCH DMRS							
EPRE ratio of PDCCH DMR			Config 1,2,3	(	)		0	
	PDSCH DMRS							
EPRE ratio of	PDSCH to							
PDSCH EPRE ratio of OCNG DMRS								
to SSS(Note 1)								
EPRE ratio of OCNG to OCNG DMRS (Note 1)								
N Note2	,	dBm/15 kHz	Config 1,2,3	-98+TT -98		-98		
Note2		dBm/S	Config 1,2	-98-			-98	
SS-RSRP Note	3	CS dPm/S	Config 1 2	-95-			-95 01	
33-K3KP 11016	•	dBm/S CS	Config 1,2 Config 3	-94 -91	-94 -91	-Infinity -Infinity	-91 -88	
î î		dB	Config	4	4	-Infinity	7	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$			1,2,3,4,5,6			,		

$\hat{\mathcal{E}}_{s}/N_{oc}$	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	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AW	'GN	A۱	VGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

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% with a confidence level of 95%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

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% with a confidence level of 95%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

6.6.2.3 Void

6.6.2.4 Void

6.6.2.5 NR SA FR1-FR1 event-triggered reporting in non-DRX with SSB time index detection

# 6.6.2.5.1 Test purpose

To verify that the UE makes correct reporting of an event in non-DRX within inter-frequency NR cell search requirements with SSB time index detection in TS 38.133 [6] clause 9.3.4.

#### 6.6.2.5.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

# 6.6.2.5.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A. 6.6.2.5.

6.6.2.5.4 Test description

6.6.2.5.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.6.2.3.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 6.6.2.3.4.1-2. Test environment parameters are given in Table 6.6.2.3.4.1-3.

Table 6.6.2.5.4.1-1: SA FR1-FR1 event triggered reporting tests in non-DRX with SSB time index detection supported test configurations

Test Case ID	Description			
6.6.2.5-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode			
6.6.2.5-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode			
6.6.2.5-3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
Note 1: The UE is only required to be tested in one of the supported test configurations				
Note 2: target N	Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell			

Table 6.6.2.5.4-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection in non-DRX

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		Two FR1 NR carrier frequencies is used
Active cell		Config 1,2,3	NR cell 1 (Pcell)		NR Cell 1 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	2	As specified in TS 38.133 clause 9.1.2-1
Measurement gap offset		Config 1,2,3	39	39	
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.
		Config 2	SSB.1 FR1		As specified in clause A.3
		Config 3	SSB.2 FR1		As specified in TS 38.133 clause A.3
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 6.6.2.5.4-3: Environment test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection in non-DRX

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, Table E.2-1 and TS 38	.508-1 [14] clause 4.3.1 and 4.4.2.
Channel bandwidth	As specified	by the test configuration selected fr	rom Table 4.6.2.1.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		pable UEs without any 2Rx RF .3.2.5.1 for DUT part and	

- 1. Message contents are defined in clause 6.6.2.5.4.3.
- 2. There are two NR cells on two carriers specified in the test. Cell 1 is the cell used for connection setup and Cell 2 is a target cell on a different carrier than Cell 1. The power levels and settings for Cell 2 are set according to Annex C.1.2.

# 6.6.2.5.4.2 Test procedure

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.

In test 1 measurement gap pattern configuration # 0 as defined in Table 6.6.2.5.4-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table 6.6.2.5.4-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.6.2.4.4-2. T1 starts.
- 3. The SS shall transmit an *RRCReconfiguration* message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.6.2.4.4-2. T2 Starts.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than 1040 ms for Test 1 and 880 ms for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a *Paging* message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without

release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.), or:

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 6.6.2.1.4-2 as appropriate.

# 6.6.2.5.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.6.2.5.4.3-1: Common Exception messages SA inter frequency event triggered reporting without SSB time index detection in non-DRX

	Default Message Contents
Common contents of system information blocks exceptions	
Default RRC messages and information elements contents exceptions	Table H.3.1-1 Table H.3.1-2 with Conditions GAP NEEDED and INTER-FREQ Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.2 and Asynchronous cells for configuration 6.6.2.5-1 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.1 and Synchronous cells for configuration 6.6.2.5-2 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.2 FR1, SMTC.1 and Synchronous cells for configuration 6.6.2.3-3 Table H.3.1-4 with A3-offset = -6dB and Condition SSB Index Table H.3.1-5 with Condition INTER-FREQ Table H.3.1-6 with Condition Pattern #0 for Test 1 and Test 2 Table H.3.1-6 with Condition Pattern #2 for Test 3 and Test 4 Table H.3.1-7 with Conditions INTER-FREQ and SSB Index

# 6.6.2.5.5 Test requirement

Table 6.6.2.4.5-1 defines the primary level settings including test tolerances for all tests.

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		II 1	Cell 2		
			configuratio n	T1	T2	T1	T2	
NR RF Channe	el Number		Config 1,2,3	1	1		2	
Duplex mode	Duplex mode		Config 1	FDD				
TDD	4:		Config 2,3	TDD				
TDD configura	TDD configuration		Config 1 Config 2		Not Applicable TDDConf.1.1			
			Config 3			Conf.2.1		
BW <sub>channel</sub>		MHz	Config 1,2			I <sub>RB,c</sub> = 52		
			Config 3		40: N	RB,c = 106		
BWP BW		MHz	Config 1,2			I <sub>RB,c</sub> = 52		
BWP	Initial DL		Config 3	DLBW		RB,c = 106	NA	
configuration	BWP							
	Initial UL BWP		Config 1, 2,	ULBW	/P.0.1		NA	
	Dedicated DL		3	DLBW	/P.1.1		NA	
	BWP Dedicated UL			ULBW	/P 1 1		NA	
	BWP							
TRS configura	tion		Config 1		.1 FDD		NA NA	
			Config 2 Config 3		.1 TDD .2 TDD		NA NA	
OCNG Pattern	s defined in		Config 1,2,3	OF			)P.1	
A.3.2.1.1 (OP.	1)		-					
PDSCH Reference			Config 1		1 FDD		-	
measurement	Chamei		Config 2		SR.1.1 TDD			
CODECET Day	· · · · · · · · · · · · · · · · · · ·		Config 3		SR2.1 TDD CR.1.1 FDD -			
CORESET Reference Channel			Config 1 Config 2		1 TDD	1	-	
Onamici	Citatillei		Config 3	CR2.1 TDD				
	SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1			MTC.2		
			Config 2, 3	SMTC.1				
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15				
spacing			Config 3	30				
EPRE ratio of PSS to SSS								
EPRE ratio of PBCH DMRS to SSS								
	PBCH to PBCH							
	PDCCH DMRS							
to SSS	DD0011:							
EPRE ratio of I			Config 1,2,3	(	)		0	
EPRE ratio of l	PDSCH DMRS		1					
to SSS EPRE ratio of I	PDSCH to							
PDSCH			]					
EPRE ratio of OCNG DMRS								
to SSS(Note 1) EPRE ratio of OCNG to								
OCNG DMRS (Note 1)								
N Note2		dBm/15 kHz		-98		-98		
Note2		dBm/S	Config 1,2		98		-98	
		CS (C)	Config 3		95		-95	
SS-RSRP Note 3	•	dBm/S CS	Config 1,2 Config 3	-94 -91	-94 -91	-Infinity -Infinity	-91 -88	
î î		dB	Config 1,2,3	4	4	-Infinity	7	
$\hat{\mathbf{E}}_{\!\scriptscriptstyle s}/\mathbf{I}_{\!\scriptscriptstyle ot}$			<b>J</b>					

Note 3:

$\hat{E}_{s}/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
IO <sup>Note3</sup>	dBm/9.3 6MHz	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 spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be

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.

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% with a confidence level of 95%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 880 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# 6.6.2.6 NR SA FR1-FR1 event-triggered reporting in DRX with SSB time index detection

# 6.6.2.6.1 Test purpose

To verify that the UE makes correct reporting of an event in DRX within inter-frequency NR cell search requirements with SSB time index detection in TS 38.133 [6] clause 9.3.4.

# 6.6.2.6.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

# 6.6.2.6.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.6.6.2.6.

# 6.6.2.6.4 Test description

#### 6.6.2.6.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.6.2.6.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 6.6.2.6.4.1-2. Test environment parameters are given in Table 6.6.2.6.4.1-3.

Table 6.6.2.6.4.1-1: SA FR1-FR1 event triggered reporting tests in DRX with SSB time index detection supported test configurations

Test Case ID	Description			
6.6.2.6-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode			
6.6.2.64-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode			
6.6.2.6-3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
Note 1: The UE is only required to be tested in one of the supported test configurations				
Note 2: target N	Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell			

Table 6.6.2.6.4-2: 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 ce	II 1 (Pce	ell)		NR Cell 1 is on NR RF channel number 1
Neighbour cell		Config 1,2,3	NR ce	II2			NR cell 2 is on NR RF channel number 2
Gap Pattern Id		Config 1,2,3	0		2		As specified in TS 38.133 clause 9.1.2-1
Measurement gap offset		Config 1,2,3	39		39		
SMTC-SSB parameters		Config 1	SSB.1	FR1			As specified in clause A.3
		Config 2	SSB.1	FR1			As specified in clause A.3
		Config 3	SSB.2	FR1			As specified in clause A.3
A3-Offset	dB	Config 1,2,3	-6				
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Norma	al			
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.5
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	1.3	13.5	1.3	13.5	

Table 6.6.2.6.4-3: Test Environment parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection in DRX

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, Table E.2-1 and TS 38	3.508-1 [14] clause 4.3.1 and 4.4.2.
Channel bandwidth	As specified	by the test configuration selected f	rom Table 4.6.2.1.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.8.2	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	1
Exceptions to connection diagram		apable UEs without any 2Rx RF A.3.2.5.1 for DUT part and	

- 1. Message contents are defined in clause 6.6.2.6.4.3.
- 2. There are two NR cells on two carriers specified in the test. Cell 1 is the cell used for connection setup and Cell 2 is a target cell on a different carrier than Cell 1. The power levels and settings for Cell 2 are set according to Table Annex C.1.2.

# 6.6.2.6.4.2 Test procedure

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.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.6.4-2 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. 6.6.2.6.4-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.6.2.6.4-2. T1 starts.
- 3. The SS shall transmit an *RRCReconfiguration* message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.6.2.6.4-2. T2 Starts.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than 1280 ms for Test 1, 13440 ms for Test 2, 1280 ms for Test 3 and 13440 ms for Test 4, then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 3 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a *Paging* message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures

the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.), or:

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 6.6.2.1.4-2 as appropriate.

# 6.6.2.6.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.6.2.6.4.3-1: Common Exception messages SA inter frequency event triggered reporting without SSB time index detection in non-DRX

С	Default Message Contents
Common contents of system information blocks exceptions	
Default RRC messages and information elements contents exceptions	Table H.3.1-1 Table H.3.1-2 with Conditions GAP NEEDED and INTER-FREQ Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.2 and Asynchronous cells for configuration 6.6.2.6-1 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.1 FR1, SMTC.1 and synchronous cells for configuration 6.6.2.6-2 Table H.3.1-3 with Conditions INTER-FREQ MO and SSB.2 FR1, SMTC.1 and synchronous cells for configuration 6.6.2.6-3 Table H.3.1-4 with A3-offset = -6dB and Condition SSB Index Table H.3.1-5 with Condition INTER-FREQ Table H.3.1-6 with Condition Pattern #0 for Test 1 and Test 2 Table H.3.1-7 with Conditions INTER-FREQ and SSB Index Table H.3.7-1 with Condition DRX.1 for Test 1 and Test 3 Table H.3.7-1 with Condition DRX.2 for Test 2 and Test 4

# 6.6.2.6.5 Test requirement

Table 6.6.2.6.5-1 defines the primary level settings including test tolerances for all tests.

Table 6.6.2.6.5-1 : Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Pa	rameter	Unit	Test	Ce	II 1	C	ell 2
			configuratio n	T1	T2	T1	T2
NR RF Channel Number			Config 1,2,3	,	1		2
Duplex mode			Config 1		FDD		
-			Config 2,3		TDD		
TDD configu	ıration		Config 1		Not Applicable		
			Config 2			Conf.1.1	
BW <sub>channel</sub>		MHz	Config 3 Config 1,2		TDDConf.2.1 10: N <sub>RB,c</sub> = 52		
DVV channel		IVIIIZ	Config 1,2			$\frac{IRB,c = 52}{RB,c = 106}$	
BWP BW		MHz	Config 1,2			RB,c = 100 $RB,c = 52$	
5001 500		1411 12	Config 3	40: N <sub>RB,c</sub> = 32			
BWP	Initial DL BWP			DLBW			NA
configurati	Initial UL BWP			ULBW			NA
on	Dedicated DL BWP		Config 1, 2, 3	DLBW	/P.1.1		NA
	Dedicated UL BWP			ULBW	/P.1.1		NA
TRS configu	ıration		Config 1		.1 FDD		1.1 TDD
			Config 2		.1 TDD		1.2 TDD
00110 5 #			Config 3		.2 TDD		WP.0.1
A.3.2.1.1 (O			Config 1,2,3	OF	P.1		OP.1
PDSCH Ref			Config 1	SR.1.	1 FDD		-
measureme	nt channel		Config 2	SR.1.	1 TDD	1	
			Config 3	SR2.1	1 TDD	1	
CORESET	Reference		Config 1	CR.1.			-
Channel			Config 2		1 TDD	]	
			Config 3	CR2.	1 TDD		
	SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1		SMTC.2		
			Config 2, 3		SN	MTC.1	
PDSCH/PDCCH subcarrier		kHz	Config 1,2			15	
spacing	-4 DOO 4- DOO		Config 3			30	
	of PSS to SSS						
EPRE ratio to SSS	of PBCH DMRS						
EPRE ratio	of PBCH to PBCH						
EPRE ratio of PDCCH DMRS to SSS							
	of PDCCH to		Config 1,2,3	(	)		0
	of PDSCH DMRS		-				
EPRE ratio	of PDSCH to						
EPRE ratio	PDSCH EPRE ratio of OCNG DMRS						
to SSS(Note							
OCNG DMR							
Note2		dBm/15		-6	98		-98
		kHz				<u> </u>	
N Note2		dBm/S CS	Config 1,2 Config 3		98 95		-98 -95
SS-RSRP No	ote 3	dBm/S	Config 1,2	-94	-94	-Infinity	-93 -91
		CS	Config 3	-9 <del>4</del> -91	-91	-Infinity	-88
$\hat{E}_{s}/I_{ot}$		dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
$\hat{E}_{s}/N_{oc}$		dB	Config 1,2,3	4	4	-Infinity	7
$L_{s}/L_{oc}$							

Io <sup>Note3</sup>	dBm/9.3 6MHz	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	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  $_{N}$  \_ \_ \_ to be
- SS-RSRP and lo levels have been derived from other parameters for information purposes. They Note 3: are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

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% with a confidence level of 95%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

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.

- 6.6.2.7 Void
- 6.6.2.8 Void

#### 6.6.3 Inter-RAT Measurements

- 6.6.3.0 Minimum conformance requirements
- 6.6.3.0.1 Minimum conformance requirements for inter-RAT event triggered reporting to E-**UTRAN FDD**

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 TS 38.133 [6] Section 10.2.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [23],

- RSRQ related conditions in the accuracy requirements in TS 38.133 [6] Section 10.2.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [23],
- RS-SINR related conditions in the accuracy requirements in TS 38.133 [6] Section 10.2.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.19 of TS 36.133 [23].

# 6.6.3.0.1.1 Requirements when no DRX is used

When the UE requires measurement gaps to identify and measure inter-RAT cells and an appropriate measurement gap pattern is scheduled, the UE shall be able to identify a new detectable FDD cell within T<sub>Identify, E-UTRAN FDD</sub> according to the following expression:

$$T_{Identify,E-UTRAN\;FDD} = T_{BasicIdentify} * \frac{480}{T_{Inter1}} * CSSF_{interRAT} \quad ms,$$

where:

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

 $T_{Inter1}$  is defined in TS 38.133 [6] section 9.4.1,

 $CSSF_{interRAT} = CSSF_{within\_gap\_i\_}$  is the scaling factor for the measured inter-RAT E-UTRA carrier i which is calculated as specified in TS 38.133 [6] section 9.1.5.2.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of  $T_{\text{Measure, E-UTRAN FDD}}$  defined in Table 6.6.3.0.1.1-1.

Table 6.6.3.0.1.1-1: Measurement period and measurement bandwidth

Configuration	Physical Layer Measurement period:  TMeasure, E-UTRAN FDD [ms]	Measurement bandwidth [RB]
0	480 x CSSF <sub>interRAT</sub>	6
1 (note 1)	240 x CSSF <sub>interRAT</sub>	50
NOTE 1: This co	nfiguration is optional.	

The UE shall be capable of identifying and performing NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements of at least 4 E-UTRAN FDD cells per E-UTRA FDD carrier frequency layer for up to 7 E-UTRA FDD carrier frequency layers.

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN FDD RSRP measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] section 10.2.2. The NR – E-UTRAN FDD RSRQ measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] section 10.2.3. The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] section 10.2.5.

# 6.6.3.0.1.2 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<sub>Identify, E-UTRAN FDD</sub> specified in Table 6.6.3.0.1.2-1.

Table 6.6.3.0.1.2-1: Requirement to identify a newly detectable E-UTRAN FDD cell

DRX cycle length (s)	Tidentify, E-UTRAN FDD (S) (DRX cycles)			
	Gap period = 40 ms, 20 ms	Gap period = 80 ms		
≤0.16	Non-DRX requirements in	Non-DRX requirements in		
	Section 6.6.3.0.1.1 apply	Section 6.6.3.0.1.1 apply		
0.256	5.12*K (20*CSSFinterRAT)	7.68*K (30*CSSFinterRAT)		
0.32	6.4*K (20*CSSFinterRAT)	7.68*K (24*CSSFinterRAT)		
0.32< DRX-cycle	Note1 (20*CSSFinterRAT)	Note1 (20*CSSFinterRAT)		
≤10.24				
NOTE 1: The time depends on the DRX cycle length.				
NOTE 2: CSSF <sub>interRAT</sub> is as defined in Section 6.6.3.0.1.1.				

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 6.6.3.0.1.2-2.

Table 6.6.3.0.1.2-2: 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 Section 6.6.3.0.1.1 apply		
0< DRX-cycle ≤10.24	Note1 (5* CSSFinterRAT)		
NOTE 1: The time depends on the DRX cycle length.			
NOTE 2: CSSF <sub>interRAT</sub> is as defined in Section 6.6.3.0.1.1.			

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 TS 38.133 [6] Section 10.2.2. The NR – E-UTRAN FDD RSRQ measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] Section 10.2.3. The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] Section 10.2.5.

#### 6.6.3.0.1.3 Measurement reporting requirements for 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 TS 38.133 [6] sections 10.2.2, 10.2.3, and 10.2.5, respectively.

The UE shall not send any event-triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTI<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 sections 6.6.3.0.1.1 and 6.6.3.0.1.2 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 [13], the event triggered measurement reporting delay shall be less than  $T_{Measure,\,E-UTRAN\,FDD}$  provided the timing to that cell has not changed more than  $\pm$  50 Ts while measurement gap has not been available and the L3 filter has not been used.

The normative reference for this requirement is TS 38.133 [6] clause 9.4.2.

# 6.6.3.0.2 Minimum conformance requirements for inter-RAT event triggered reporting to E-UTRAN TDD

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 TS 38.133 [6] Section 10.2.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [23],
- RSRQ related conditions in the accuracy requirements in TS 38.133 [6] Section 10.2.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [23],
- RS-SINR related conditions in the accuracy requirements in TS 38.133 [6] Section 10.2.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.19 of TS 36.133 [23].

# 6.6.3.0.2.1 Requirements when no DRX is used

When the UE requires measurement gaps to identify and measure inter-RAT cells and an appropriate measurement gap pattern is scheduled, the UE shall be able to identify a new detectable TDD cell within T<sub>Identify, E-UTRAN TDD</sub> according to the following expression:

- When configuration 0 or configuration 1 in Table 6.6.3.0.2-1 is applied,

$$T_{Identify,E-UTRAN\,TDD} = T_{BasicIdentify} * \frac{480}{T_{Inter1}} * CSSF_{interRAT} ms$$
,

- When configuration 2 or configuration 3 in Table 6.6.3.0.2-1 is applied,

$$T_{Identify,E-UTRAN\ TDD} = (T_{BasicIdentify} * \frac{480}{T_{Inter1}} + 240) * CSSF_{interRAT} ms,$$

where:

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

 $T_{Inter1}$  is defined in TS 38.133 [6] section 9.4.1,

 $CSSF_{interRAT} = CSSF_{within\_gap\_i\_}$  is the scaling factor for the measured inter-RAT E-UTRA carrier i which is calculated as specified in TS 38.133 [6] section 9.1.5.2.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of  $T_{\text{Measure, E-UTRAN TDD}}$  defined in Table 6.6.3.0.2.1-1.

Table 6.6.3.0.2.1-1: T<sub>Measure, E-UTRAN TDD</sub> for different configurations

Configuration	Measurement bandwidth	Number of UL/DL sub- frames per half frame (5 ms)		DwPTS		T <sub>Measure, E-UTRAN</sub> TDD [ms]
	[RB]	DL	UL	Normal CP	Extende d CP	
0	6	2	2	$19760 \cdot T_{\rm s}$	$20480 \cdot T_{\rm s}$	480 x CSSF <sub>interRAT</sub>
1 (note 1)	50	2	2	$19760 \cdot T_{\rm s}$	$20480 \cdot T_{\rm s}$	240 x CSSF <sub>interRAT</sub>
NOTE 1: This configuration is optional.						

The UE shall be capable of identifying and performing NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements of at least 4 E-UTRAN TDD cells per E-UTRA TDD carrier frequency layer for up to 7 E-UTRA TDD carrier frequency layers.

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN TDD RSRP measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] section 10.2.2. The NR - E-UTRAN TDD RSRQ measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] section 10.2.3. The NR – E-UTRAN TDD RS-SINR measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] section 10.2.5.

#### Requirements when DRX is used 6.6.3.0.2.1

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<sub>Identify, E-UTRAN TDD</sub> specified in Table 6.6.3.0.2.1-1.

Table 6.6.3.0.2.1-1: 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 ms	Gap period = 80 ms		
≤0.16	Non-DRX requirements in	Non-DRX requirements in		
	Section 6.6.3.0.2.1 apply	Section 6.6.3.0.2.1 apply		
0.256	5.12*K (20*CSSFinterRAT)	7.68*K (30*CSSFinterRAT)		
0.32	6.4*K (20*CSSFinterRAT)	7.68*K (24*CSSFinterRAT)		
0.32< DRX-cycle ≤10.24	Note1 (20*CSSF <sub>interRAT</sub> )	Note1 (20*CSSF <sub>interRAT</sub> )		
NOTE 1: The time depends on the DRX cycle length.				

NOTE 2: CSSFinterRAT IS as defined in Section 6.6.3.0.2.1.

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<sub>measure, E-UTRAN TDD</sub> specified in Table 6.6.3.0.2.1-2.

Table 6.6.3.0.2.1-2: Requirement to measure E-UTRAN TDD cells

DRX cycle length (s)	Tmeasure, E-UTRAN TDD (s) (DRX cycles)	
≤0.08	Non-DRX Requirements in Section 6.6.3.0.2.1	
	apply	
0.128	For configuration 2, non-DRX requirements in	
	section 6.6.3.0.2.1 apply,	
	Otherwise: Note1 (5*CSSF <sub>interRAT</sub> )	
0.128 <drx-cycle≤10.24< td=""><td>Note1 (5*CSSFinterRAT)</td></drx-cycle≤10.24<>	Note1 (5*CSSFinterRAT)	
NOTE 1: The time depends on the DRX cycle length.		
NOTE 2: CSSF <sub>interRAT</sub> is	as defined in Section 6.6.3.0.2.1.	

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 TS 38.133 [6] Section 10.2.2. The NR - E-UTRAN TDD RSRQ measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] Section 10.2.3. The NR - E-UTRAN TDD RS-SINR measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] Section 10.2.5.

#### 6.6.3.0.2.3 Measurement reporting requirements for 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 TS 38.133 [6] sections 10.2.2, 10.2.3, and 10.2.5, respectively.

The UE shall not send any event-triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTI<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 <sub>Identify, E-UTRAN TDD</sub> defined in sections 6.6.3.0.2.1 and 6.6.3.0.2.2 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 [13], the event triggered measurement reporting delay shall be less than  $T_{Measure,\,E-UTRAN\,TDD}$  provided the timing to that cell has not changed more than  $\pm$  50 Ts while measurement gap has not been available and the L3 filter has not been used.

The normative reference for this requirement is TS 38.133 [6] clause 9.4.3.

# 6.6.3.1 NR SA FR1 – E-UTRAN event-triggered reporting in non-DRX

Editor's notes: This test case is incomplete. The following aspects are either missing or TBD.

Test tolerance analysis is missing.

# 6.6.3.1.1 Test purpose

This test 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 under the cell search and measurement requirements.

#### 6.6.3.1.2 Test applicability

This test applies to all types of NR UE supporting SA FR1 from Release 15 onwards.

# 6.6.3.1.3 Minimum conformance requirements

The normative reference for this requirement is TS 38.133 [6] clause A.6.6.3.1.

# 6.6.3.1.3.1 NR – E-UTRAN FDD requirement

The minimum conformance requirements are specified in clause 6.6.3.0.1.

# 6.6.3.1.3.2 NR – E-UTRAN TDD requirement

The minimum conformance requirements are specified in clause 6.6.3.0.2.

# 6.6.3.1.4 Test description

# 6.6.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.6.3.1.4.1-1.

Table 6.6.3.1.4.1-1: supported test configurations

Test Case ID	Description		
6.6.3.1-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode, LTE FDD		
6.6.3.1-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE FDD		
6.6.3.1-3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE FDD		
6.6.3.1-4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode, LTE TDD		
6.6.3.1-5	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE TDD		
6.6.3.1-6	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE TDD		
NOTE: The	NOTE: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 6.6.3.1.4.1-2 and Table 6.6.3.1.4.1-3.

Table 6.6.3.1.4.1-2: Initial conditions for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	l in Annex E, Table E.1-1 and TS 38	.508-1 [14] sclause 4.3.1.
Channel bandwidth	As specified	by the test configuration selected fr	rom Table 6.6.3.1.5-1 and Table 6.6.3.1.5-2
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.1.7.1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.1	
Exceptions to connection diagram	N/A		

Table 6.6.3.1.4.1-3: 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		
		6.6.3.1.5-1 and		
		6.6.3.1.5-2.		
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 TS 38.133 [6] Table	
			9.1.2-1. Per-UE gap pattern.	
NR measurement quantity		SS-RSRP	Measurement quantity for Cell 1	
Inter-RAT E-UTRAN		RSRP	Measurement quantity for Cell 2	
measurement quantity				
b2-Threshold1	dBm	Note 1	SS-RSRP threshold for SS-RSRP	
			measurement on cell1 for event B2	
b2-Threshold2EUTRA	dBm	-95	E-UTRAN RSRP threshold for SS-RSRP	
			measurement on cell1 for event B2	
Hysteresis	dB	0		
TimeToTrigger	S	0		
Filter coefficient		0	L3 filtering is not used	
DRX		OFF	OFF	
T1	S	5		
T2	S	5		
NOTE 1: Values are defined in Table 6.6.3.1.5-1				

- 1. Message contents are defined in clause 6.6.3.1.4.3.
- 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. The connection setup is done according to the settings in Annex C.1.1 and C.1.2.

# 6.6.3.1.4.2 Test procedure

The test consists of two successive time periods, with time durations of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. Gap pattern configuration is configured before T2 begins to enable inter-frequency monitoring.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.6.3.1.5-1 and 6.6.3.1.5-2. Propagation conditions are set according to Annex C clause C.2.2.T1 starts.
- 3. SS shall transmit an RRCReconfiguration message.

- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 6.6.3.1.5-1 and 6.6.3.1.5-2.
- 6. UE shall transmit a MeasurementReport message triggered by Event B2. If the measurement reporting delay from the beginning of time period T2 is less than 3842ms the number of successful tests is increased by one. If the UE fails to report the event within the measurement reporting delay requirement then the number of failure tests is increased by one.
- 7. After the SS receive the MeasurementReport message in step 6 or when T2 expires, the SS shall transmit a *RRCConnectionRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED according to TS 38.508-1 [14] clause 4.5.4 (if the paging fails, switches off and on the UE and ensures the UE is in the state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5, or
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10.Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

# 6.6.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 6.6.3.1.4.3-1: Common Exception messages NR SA FR1 – E-UTRAN event-triggered reporting in non-DRX

Default Message Contents				
Common contents of system information blocks exceptions				
Default RRC messages and information	Table H.3.1-1			
elements contents exceptions	Table H.3.1-2 with Conditions GAP NEEDED and INTER-RAT			
	Table H.3.1-3 with Condition SSB.1 FR1, SMTC pattern 1 and			
	Asynchronous cells cells for configuration 6.6.3.1-1, 6.6.3.1-2, 6.6.3.1-			
	4, 6.6.3.1-5			
	Table H.3.1-3 with Condition SSB.1 FR2, SMTC pattern 1 and			
	Asynchronous cells cells for configuration 6.6.2.1-3, 6.6.3.1-6			
	Table H.3.1-3A			
	Table H.3.1-4A			
	Table H.3.1-5 with Condition INTER-RAT			
	Table H.3.1-6 with Condition Pattern #0			
	Table H.3.1-7 with Condition INTER-RAT			

# 6.6.3.1.5 Test requirement

Table 6.6.3.1.5-1 and Table 6.6.3.1.5-2 defines the primary level settings including test tolerances for all tests.

Table 6.6.3.1.5-1: 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	er		1, 2, 3, 4, 5, 6		1	
Duplex mode			1, 2, 3		FDD	
.,			4, 5, 6		TDD	
TDD Configuration	SCS=15 KHz		2, 5		Conf.1.1	
J	SCS=30 KHz		3, 6		Conf.2.1	
BW <sub>channel</sub>	<b>'</b>	MHz	1, 4		c = 52 (FDD)	
			2, 5		c = 52 (TDD)	
			3, 6		= 106 (TDD)	
PDSCH reference	measurement		1, 4		1.1 FDD	
channel			2, 5		1.1 TDD	
			3, 6		2.1 TDD	
CORSET reference	e channel		1, 4		1.1 FDD	
			2, 5	CR.	1.1 TDD	
			3, 6		2.1 TDD	
BWP	Initial DL BWP		1, 2, 3, 4, 5, 6		3WP.0.1	
configurations	Dedicated DL BWP		1, 2, 3, 4, 5, 6		BWP.1.1	
<u>~</u>	Initial UL BWP		1, 2, 3, 4, 5, 6		BWP.0.1	
	UL BWP		1, 2, 3, 4, 5, 6		BWP.1.1	
OCNG pattern note1			1, 2, 3, 4, 5, 6		OP.1	
SMTC configuratio	n		1, 2, 3, 4, 5, 6	SMTC.1		
SSB configuration			1, 2, 4, 5	SSB.1 FR1		
Ü			3, 6	SS	B.2 FR1	
b2-Threshold1		-ID	1, 2, 4, 5	-96 -93		
		dBm	3, 6			
EPRE ratio of PSS	to SSS		1, 2, 3, 4, 5, 6			
EPRE ratio of PBC	H_DMRS to SSS					
EPRE ratio of PBC	H to PBCH_DMRS					
EPRE ratio of PDC	CH_DMRS to SSS					
EPRE ratio of PDC	CH to					
PDCCH_DMRS		dB		0		
EPRE ratio of PDS	CH_DMRS to SSS					
EPRE ratio of PDS	CH to					
PDSCH_DMRS						
EPRE ratio of OCN						
	IG to OCNG DMRS					
Noc note2		dBm/15 KHz	1, 2, 3, 4, 5, 6		04+TT	
Noc note2		dBm/SCS	1, 2, 4, 5	-1	04+TT	
			3, 6		01+TT	
Ê <sub>s</sub> /N <sub>oc</sub>		dB	1, 2, 3, 4, 5, 6	16+TT	0+TT	
Ê <sub>s</sub> /I <sub>ot</sub> note3		dB	1, 2, 3, 4, 5, 6	16+TT	0+TT	
SS-RSRP note3		dBm/SCS	1, 2, 4, 5	-88+TT	-104+TT	
			3, 6	-85+TT	-101+TT	
SSB_RP note3		dBm/SCS	1, 2, 4, 5	-88+TT	-104+TT	
			3, 6	-85+TT	-101+TT	
		dBm/9.36	1, 2, 4, 5	-59.94+TT	-73.04+TT	
lo note3		MHz				
		dBm/38.16	3, 6	-53.84+TT	-66.93+TT	
_		MHz				
Propagation condit			1, 2, 3, 4, 5, 6		DLA30	
	tion and Correlation		1, 2, 3, 4, 5, 6	1>	κ2 Low	
Matrix						

NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

NOTE 3: 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 6.6.3.1.5-2: 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	on Cell 2		
			T1	T2	
RF channel number		1, 2, 3, 4, 5, 6	2		
Duplex mode		1, 2, 3	FDD		
·		4, 5, 6	TDD		
TDD special subframe		4, 5, 6	6		
configuration note1  TDD uplink-downlink configuration		4, 5, 6	1		
note1		4, 3, 0	I		
BW <sub>channel</sub>	MHz	1, 2, 3, 4, 5, 6	5MHz: N <sub>RB,0</sub>		
			10MHz: N <sub>RB</sub>		
			20MHz: N <sub>RB</sub> ,		
PDSCH parameters:		1, 2, 3	5MHz: R.7		
DL Reference Measurement			10MHz: R.3		
Channel note2		4.5.0	20MHz: R.6		
		4, 5, 6	5MHz: R.4		
			10MHz: R.0		
DOELGH/DDGGH/DHIGH		4.0.0	20MHz: R.3 TDD		
PCFICH/PDCCH/PHICH 1, 2, 3 5MHz: R.11 FDD parameters: 1, 2, 3 10MHz: R.6 FDD					
parameters: DL Reference Measurement					
Channel note2		4, 5, 6	20MHz: R.10 FDD 5MHz: R.11 TDD		
Channe		4, 5, 6	10MHz: R.6 TDD		
			20MHz: R.10 TDD		
OCNG Patterns note2		1, 2, 3	5MHz: OP.20 FDD		
CONC Fallonio		1, 2, 0	10MHz: OP.10 FDD		
			20MHz: OP.1		
		4, 5, 6	5MHz: OP.9 TDD		
		., 0, 0	10MHz: OP.1 TDD		
			20MHz: OP.7 TDD		
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB		0		
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA note3					
OCNG_RB note3					
$N_{\rm oc}$ $^{\rm note4}$ dBm/15kHz		1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6	-104+TT		
Ês/Noc			-Infinity 17+TT		
È <sub>s</sub> /I <sub>ot</sub> note5	dB	1, 2, 3, 4, 5, 6	-Infinity	17+TT	
RSRP note5	dBm/15kHz	1, 2, 3, 4, 5, 6			
SCH_RP note5	dBm/15kHz	1, 2, 3, 4, 5, 6			
lo <sup>note5</sup>	dBm/9MHz	1, 2, 3, 4, 5, 6			
Propagation Condition not 6		1, 2, 3, 4, 5, 6	ETU70		
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Lov	v	
Correlation Matrix note6					

NOTE 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [24].

NOTE 6: Propagation condition and correlation matrix are defined in section B.2 in TS 36.101 [27]. Editor's note: spec is not listed!

NOTE 2: DL RMCs and OCNG patterns are specified in sections A 3.1 and A 3.2 of TS 36.133 [23] 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.

The UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3842ms 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 overall delays measured test requirement is expressed as:

```
\begin{split} T_{identify,E\text{-}UTRAN\,FDD} &= T_{BasicIdentify} * 480 \ / \ T_{Inter1} * CSSF_{interRAT} \ ms \end{split} Which: T_{BasicIdentify} &= 480, T_{Inter1} &= 60, CSSF_{interRAT} &= 1
```

TTI insertion uncertainty =  $TTI_{DCCH} = 1$  ms;  $2xTTI_{DCCH} = 2$  ms

The overall delays measured shall be less than a total of 3842 ms in this test case (note: this gives a total of 3840 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty).

The rate of correct events observed during repeated tests shall be at least 90% with confidence level of 95%.

# 6.6.3.2 NR SA FR1 – E-UTRAN event-triggered reporting in DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.

Test Tolerance is TBD

- Connection diagram is TBD.

# 6.6.3.2.1 Test purpose

This test 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 under the cell search and measurement requirements.

# 6.6.3.2.2 Test applicability

This test applies to all types of NR UE supporting SA FR1 from Release 15 onwards.

# 6.6.3.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clauses 6.6.3.0.3 and 6.6.3.0.4.

The normative reference for this requirement is TS 38.133 [6] clause A.6.6.3.2.

# 6.6.3.2.4 Test description

# 6.6.3.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.6.3.2.4.1-1.

Table 6.6.3.2.4.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Test Case ID	Description
6.6.3.2-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode, LTE FDD
6.6.3.2-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE FDD
6.6.3.2-3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE FDD
6.6.3.2-4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode, LTE TDD
6.6.3.2-5	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE TDD
6.6.3.2-6	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE TDD
NOTE: The U	JE is only required to be tested in one of the supported test configurations

Configure the test equipment and the DUT according to the parameters in Table 6.6.3.2.4.1-2 and Table 6.6.3.2.4.1-3.

Table 6.6.3.2.4.1-2: Initial conditions for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, Table E.1-1 and TS 38	.508-1 [14] sclause 4.3.1.
Channel bandwidth	As specified	by the test configuration selected fr	rom Table 6.6.3.2.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	TBD	
Exceptions to connection diagram	N/A		

Table 6.6.3.2.4.1-3: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Parameter	Unit	V	'alue	Comment
NR RF Channel Number		1		1 NR carrier frequency is used in the test
LTE RF Channel Number		2		1 LTE carrier frequency is used in the test
Channel Bandwidth	MHz	As specifie	ed in Tables	
		6.6.3.2.5-1	land	
		6.6.3.2.5-2	<u>2</u> .	
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 TS 38.133 [6] Table
				9.1.2-1. Per-UE gap pattern.
NR measurement quantity		SS-RSRP		Measurement quantity for Cell 1
Inter-RAT E-UTRAN		RSRP		Measurement quantity for Cell 2
measurement quantity				
b2-Threshold1	dBm	note 1		SS-RSRP threshold for SS-RSRP
				measurement on cell1 for event B2
b2-Threshold2EUTRA	dBm	-95		E-UTRAN RSRP threshold for SS-RSRP
				measurement on cell1 for event B2
Hysteresis	dB	0		
TimeToTrigger	S	0		
Filter coefficient		0		L3 filtering is not used
DRX		DRX.1	DRX.2	DRX cycle configurations DRX.1 and
				DRX.2 are defined in Table A.3.3.1-1 and
				Table A.3.3.2-1 respectively.
T1	S	5		
T2	S	5	15	
NOTE 1: Values are define	ed in Table 6	.6.3.2.5-1		

1. Message contents are defined in clause 6.6.3.2.4.3.

2. 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. Cell 1 is configured according to Annex C.1.1 and C.1.2, Cell 2 is configured according to TS 36.521-3 [26] Annex C.1.0 and C.1.1.

# 6.6.3.2.4.2 Test procedure

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

In each test the UE shall be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore the UE shall be allocated with PUSCH resource at every DRX cycle.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 6.6.3.2.5-1 and 6.6.3.2.5-2. T1 starts.
- 3. SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Tables 6.6.3.2.5-1 and 6.6.3.2.5-2. T2 starts.
- 6. UE shall transmit a MeasurementReport message triggered by Event B2. If the overall delays measured from the beginning of time period T2 is less than 3.48 s for Test 1 or less than 12.8 s for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receive the MeasurementReport message in step 6) or when T2 expires, the SS shall transmit RRCRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. The SS shall set Cell 2 primary scrambling code = ((current cell 2 primary scrambling code 50) mod 200 + 100) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with ue-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5),
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

6.6.3.2.4.3 Message contents

FFS

6.6.3.2.5 Test requirement

Table 6.6.3.2.5-1 and Table 6.6.3.2.5-2 defines the primary level settings including test tolerances for all tests.

Table 6.6.3.2.5-1: 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	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	, 6 40: N <sub>RB,c</sub> = 106 (TDD)			
PDSCH reference m	neasurement		1, 4	SR.1.1 FDD SR.1.1 TDD SR.2.1 TDD			
channel			2, 5				
			3, 6				
CORSET reference	channel		1, 4	CR.1.1 FDD CR.1.1 TDD			
			2, 5				
			3, 6		.2.1 TDD		
	Initial DL BWP		1, 2, 3, 4, 5, 6		DLBWP.0.1 DLBWP.1.1		
configurations	Dedicated DL BWP		1, 2, 3, 4, 5, 6	DLE	ULBWP.0.1		
	Initial UL BWP		1, 2, 3, 4, 5, 6	ULE	BWP.0.1		
	Dedicated UL BWP		1, 2, 3, 4, 5, 6	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			
b2-Threshold1		dBm	1, 2, 4, 5	-96			
			3, 6	-93			
EPRE ratio of PSS t	o SSS		1, 2, 3, 4, 5, 6				
EPRE ratio of PBCH	I_DMRS to SSS						
EPRE ratio of PBCH	I to PBCH_DMRS						
EPRE ratio of PDCC	CH_DMRS to SSS						
EPRE ratio of PDCC	CH to						
PDCCH_DMRS		dB			0		
EPRE ratio of PDSC							
EPRE ratio of PDSC	CH to						
PDSCH_DMRS							
EPRE ratio of OCNO							
EPRE ratio of OCNO	G to OCNG DMRS						
Voc <sup>Note2</sup>		dBm/15 KHz	1, 2, 3, 4, 5, 6		04+TT		
N <sub>oc</sub> Note2		dBm/SCS	1, 2, 4, 5		04+TT		
			3, 6	-1	01+TT		
Ês/Noc		dB	1, 2, 3, 4, 5, 6	16+TT	0+TT		
Ês/Iot <sup>Note3</sup>		dB	1, 2, 3, 4, 5, 6	16+TT	0+TT		
SS-RSRP <sup>Note3</sup>		dBm/SCS	1, 2, 4, 5	-88+TT	-104+TT		
			3, 6	-85+TT	-101+TT		
SSB_RP <sup>Note3</sup>		dBm/SCS	1, 2, 4, 5	-88+TT	-104+TT		
			3, 6	-85+TT	-101+TT		
		dBm/9.36	1, 2, 4, 5	-59.94+TT	-73.04+TT		
O <sup>Note3</sup>		MHz					
		dBm/38.16	3, 6	-53.84+TT	-66.93+TT		
		MHz					
Propagation condition			1, 2, 3, 4, 5, 6		DLA30		
Antenna Configurati	on and Correlation		1, 2, 3, 4, 5, 6	1)	x2 Low		
Matrix							

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{ac}$  to be fulfilled.

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 6.6.3.2.5-2: 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		4, 5, 6	6			
configuration <sup>Note1</sup>						
TDD uplink-downlink		4, 5, 6	1			
configuration <sup>Note1</sup>						
BW <sub>channel</sub>	MHz	1, 2, 3, 4, 5, 6	5MHz: N <sub>RB</sub> ,			
			10MHz: N <sub>RB</sub>	* -		
DDCCII - a ra ma ata ra :		4.0.0	20MHz: N <sub>RB</sub> ,			
PDSCH parameters:		1, 2, 3	5MHz: R.7			
DL Reference Measurement Channel <sup>Note2</sup>			10MHz: R.3 20MHz: R.6			
Charmer		4, 5, 6	5MHz: R.4			
		4, 5, 6	10MHz: R.4			
			20MHz: R.3			
PCFICH/PDCCH/PHICH		1, 2, 3				
parameters: 10MHz: R.6 FDD						
DL Reference Measurement			20MHz: R.10 FDD			
Channel <sup>Note2</sup>		4, 5, 6	5MHz: R.11 TDD			
	10MHz: R.6 TDD			S TDD		
			20MHz: R.10 TDD			
OCNG Patterns <sup>Note2</sup>		1, 2, 3	5MHz: OP.20 FDD			
			10MHz: OP.10 FDD			
			20MHz: OP.17 FDD			
		4, 5, 6	5MHz: OP.9 TDD 10MHz: OP.1 TDD			
DDOLL DA		4 0 0 4 5 0	20MHz: OP.	7 וטט		
PBCH_RA		1, 2, 3, 4, 5, 6				
PBCH_RB						
PSS_RA						
SSS_RA						
PCFICH_RB						
PHICH_RA PHICH_RB	dB		0			
PDCCH_RA	ub ub		0			
PDCCH_RB						
PDSCH_RA						
PDSCH_RB						
OCNG_RA <sup>Note3</sup>						
OCNG_RB <sup>Note3</sup>	<del></del>					
N <sub>oc</sub> Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104+T	T		
Ê <sub>s</sub> /N <sub>oc</sub>	dBill/13ki12	1, 2, 3, 4, 5, 6	-Infinity	18.55+TT		
Ê <sub>s</sub> /l <sub>ot</sub> Note5	dB	1, 2, 3, 4, 5, 6	-Infinity	18.55+TT		
RSRP <sup>Note5</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-85.45+TT		
SCH_RP <sup>Note5</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-85.45+TT		
Io <sup>Note5</sup>	dBm/9MHz	1, 2, 3, 4, 5, 6	-73.21+10log (N <sub>RB,c</sub> /50)	-54.6+10log (N <sub>RB</sub>		
Propagation Condition Note6		1 2 2 4 5 6	<u>+TT</u> ETU7(	/50) +TT		
Propagation Condition Note6  Antenna Configuration and		1, 2, 3, 4, 5, 6				
Antenna Configuration and Correlation Matrix Note6		1, 2, 3, 4, 5, 6	1x2 Lo	vv		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.

Note 2: DL RMCs and OCNG patterns are specified in sections A 3.1 and A 3.2 of TS 36.133 respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: Ê<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 section B.2 in TS 36.101 [25].

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%.

# 6.7 Measurement performance requirements

# 6.7.1 SS-RSRP

# 6.7.1.0 Minimum conformance requirements

6.7.1.0.1 Intra-frequency absolute SS-RSRP measurement accuracy requirements

Same as in clause 4.7.1.0.1.

6.7.1.0.2 Intra-frequency relative SS-RSRP measurement accuracy requirements

Same as in clause 4.7.1.0.2.

6.7.1.0.3 Inter-frequency absolute SS-RSRP measurement accuracy requirements

Same as in clause 4.7.1.0.3.

6.7.1.0.4 Inter-frequency relative SS-RSRP measurement accuracy requirements

Same as in clause 4.7.1.0.4.

# 6.7.1.1 Intra-frequency measurements

# 6.7.1.1.1 NR SA FR1 SS-RSRP absolute measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

# 6.7.1.1.1 Test purpose

The purpose of this test is to verify that the intra-frequency SS-RSRP absolute measurement accuracy is within the specified limits for all bands.

# 6.7.1.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

# 6.7.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.7.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.7.1.1.

6.7.1.1.4 Test description

6.7.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.7.1.1.4.1-1.

Table 6.7.1.1.1.4.1-1: NR SA FR1 SS-RSRP measurement accuracy supported test configurations

Test Case ID	Description					
6.7.1.1.1-1	NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD					
6.7.1.1.1-2	NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD					
6.7.1.1.1-3	NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD					
Note	Note: The UE is only required to be tested in one of the supported test configurations					

Configure the test equipment and the DUT according to the parameters in Table 6.7.1.1.1.4.1-2.

Table 6.7.1.1.4.1-2: Initial conditions for SS-RSRP intra frequency absolute accuracy in FR1

Parameter		Value	Comment		
Test environment	NC, T	L/VL, TL/VH, TH/VL, TH/VH	As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	P	As specified in Annex E, Table E.1-	1 and TS 38.508-1 [14] sclause 4.3.1.		
Channel bandwidth	P	As specified by the test configuration	n selected from Table 6.7.1.1.1.4.1-1.		
Propagation conditions	AWGN		As specified in Annex C.2.2.		
Connection Diagram	TE Part	A.3.1.8.2 with n = 2 and $\phi_1$ = 5	As specified in TS 38.508-1 [14] Annex A.		
	DUT Part	A.3.2.3.4			
Exceptions to connection diagram	N/A				

- 1. Message contents are defined in clause 6.7.1.1.4.3.
- 2. Cell 1 is the NR FR1 serving cell (PCell) and Cell 2 is the NR neighbour in the same frequency and the target cell for SS-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1 and C.1.2.

# 6.7.1.1.4.2 Test procedure

- 1. Ensure the UE is in state RRC\_CONNECTED CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On*, according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to Table 6.7.1.1.5-1 as appropriate.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit an RRCConnectionReconfigurationComplete message.
- 5. The UE shall transmit periodically MeasurementReport messages.
- 6. After 10s wait from Step 3, the SS shall check the SS-RSRP reported values in the periodic MeasurementReport. The SS-RSRP value of Cell 2 reported by the UE is compared to the expected SS-RSRP. If the value is outside the limits in Table 6.7.1.1.1.5-2 or the UE fails to report the measurement value for Cell 2, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.
- 7. The SS shall continue checking the MeasurementReport messages transmitted by the UE until the confidence level according to Table G.2.3-1 in Annex G is achieved.
- 8. Repeat steps 1-7 for each sub-test in Table 6.7.1.1.5-1 as appropriate.

# 6.7.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

TBD

# 6.7.1.1.5 Test requirement

Table 6.7.1.1.5-1 defines the primary level settings including test tolerances for all tests.

Each SS-RSRP measurement report for each of the tests in Table 6.7.1.1.1.5-1 shall meet the corresponding absolute accuracy requirements in Table 6.7.1.1.1.5-2.

Table 6.7.1.1.5-1: NR SA FR1 SS-RSRP measurement accuracy test parameters

Para	meter	Unit	Tes			Test 2		Test 3		
SSB ARFCN			Cell 2	Cell 3	Cell 2 Cell 3 freq1		Cell 2 Cell 3 freq1			
	Config 1		fre	q1	FE		ire	q'i		
Duplex mode	Config 2,3				TC					
	Config 1		Not Applicable							
TDD configuration	Config 2				TDDC	onf.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>RE</sub>	$_{3,c} = 52$				
	Config 3				40: N <sub>RB</sub>	,c = 106				
	Config 1				10: N <sub>RE</sub>	s,c = 52				
BWP BW	Config 2				10: N <sub>RE</sub>	s,c = 52				
	Config 3				40: N <sub>RB</sub>	$_{,c} = 106$				
Downlink initial BWP of	onfiguration				DLB\	VP.0				
Downlink dedicated B\	VP configuration		DLBWP.1							
Uplink dedicated BWP	configuration				ULB\	VP.1				
DRx Cycle		ms	ms Not Applicable							
	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	-		
Chamo	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD			
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD			
	Config 2		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-		
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD			
	Config 1		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD			
Control Channel RMC	Config 2		CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-		
	Config 3		CR2.1 TDD		CCR2. 1 TDD		CCR2.1 TDD			
	Config 1		SSB 1.FR1		SSB 1.FR1		SSB 1.FR1			
SSB configuration	Config 2		SSB 1.FR1	-	SSB 1.FR1	-	SSB 1.FR1	-		
	Config 3		SSB 2.FR1		SSB 2.FR1		SSB 2.FR1			
SMTC configuration		SMTC 1								
OCNG Patterns  PDSCH/PDCCH Config 1,2					OF	P.1				
PDSCH/PDCCH subcarrier spacing	kHz			15 I 30k	kHz kHz					
EPRE ratio of PSS to SSS					]					
EPRE ratio of PBCH DMRS to SSS										
EPRE ratio of PBCH to P EPRE ratio of PDCCH DI		-								
EPRE ratio of PDCCH to		dB	0	0	0	0	0	0		
EPRE ratio of PDSCH DI	MRS to SSS									
EPRE ratio of PDSCH to EPRE ratio of OCNG DM		4								
EPRE ratio of OCNG DIV		†								

M Note2	Config 1,2	Depending on band group	dBm/15Kh	-106±TT		-88±TT		-116 ±TT + Δ <sub>BG_offset</sub>	
$N_{oc}^{$	Config 3	Depending on band group	Z -113±TT		-94±TT		116 ±TT + Δ <sub>BG_offset</sub>		
$N_{oc}^{$	Config 1,2		dBm/SCS	-106	-106±TT		±TT	Same as Noc/15kHz	
IV oc	Config 3	Depending on band group	ubili/SCS	-110	±TT	-91	±TT	-113±TT + Δ <sub>BG_offset</sub>	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$			dB	2.5±TT	-6±TT	2.5±T T	-6±TT	0.46± TT	- 5.76± TT
$\hat{E}_s/N_{oc}$			dB	6±TT	1±TT	6±TT	1±TT	3±TT	-1±TT
SS-	Config 1,2	Depending on band group	dD /000	- 100±T T	- 105±T T	- 82±TT	- 87±TT	- 113±T T + Δ <sub>BG_off</sub> set	$\begin{array}{c} \text{-} \\ \text{117} \pm \text{T} \\ \text{T +} \\ \Delta_{\text{BG\_offs}} \\ \text{et} \end{array}$
RSRP <sup>Not</sup> e3	Config 3	Depending on band group	dBm/SCS	- 106±T T	- 109±T T	- 85±TT	- 90±TT	- 110±T T+ Δ <sub>BG_off</sub> set	- 114±T T+ Δ <sub>BG_offs</sub> et
IoNote3	Config 1,2	Depending on band group	dBm/ 9.36MHz	-70.09	9±TT	-52.0	9±TT		±TT + _offset
	Config 3	Depending on band group	dBm/ 38.16MHz	-70.99±11 -51.99±11			S±TT + _offset		
	Propagation condition					AW			
	onfiguration	h		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:  $\Delta_{BG\_offset}$  is defined in clause 3A.4, Table 3A.4.1-2.

Table 6.7.1.1.1.5-2: SS-RSRP Intra frequency absolute accuracy requirements for the reported values

Normal Conditions	Test 1 All bands	Test 2 All bands	Test 3	
	All bands	All bands	Bands FDD A	TBD
			Bands FDD_B1, FDD_B2	TBD
			Bands FDD_B1, FDD_B2	TBD
Lowest reported value (Cell 2)	TBD	TBD	Bands FDD_C	TBD
Lowest reported value (Gell 2)	100	100	Bands FDD_B	TBD
			Bands FDD_G	TBD
			Bands FDD_H	TBD
	TBD	TBD	Bands FDD A	TBD
	100	.55	Bands FDD B1, FDD B2	TBD
			Bands FDD_C	TBD
Highest reported value (Cell 2)			Bands FDD_D	TBD
,			Bands FDD_E, FDD_F	TBD
			Bands FDD G	TBD
			Bands FDD_D	TBD
Extreme Conditions	Test 1	Test 2	Test 3	
	All bands	All bands		
	TBD	TBD	Bands FDD_A	TBD
			Bands FDD_B1, FDD_B2	TBD
			Bands FDD_C	TBD
Lowest reported value (Cell 2)			Bands FDD_C Bands FDD_D	TBD
Lowest reported value (Cell 2)			Bands FDD_C Bands FDD_D Bands FDD_E, FDD_F	TBD TBD
Lowest reported value (Cell 2)			Bands FDD_C Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G	TBD TBD TBD
Lowest reported value (Cell 2)	TOD	TDD	Bands FDD_C Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H	TBD TBD TBD TBD
Lowest reported value (Cell 2)	TBD	TBD	Bands FDD_C Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H Bands FDD_A	TBD TBD TBD TBD TBD
Lowest reported value (Cell 2)	TBD	TBD	Bands FDD_C Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H Bands FDD_A Bands FDD_B1, FDD_B2	TBD TBD TBD TBD TBD TBD TBD
	TBD	TBD	Bands FDD_C Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H Bands FDD_A Bands FDD_B1, FDD_B2 Bands FDD_C	TBD TBD TBD TBD TBD TBD TBD TBD TBD
Lowest reported value (Cell 2)  Highest reported value (Cell 2)	TBD	TBD	Bands FDD_C Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H Bands FDD_A Bands FDD_B1, FDD_B2 Bands FDD_C Bands FDD_D	TBD
	TBD	TBD	Bands FDD_C Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H Bands FDD_A Bands FDD_B1, FDD_B2 Bands FDD_C Bands FDD_D Bands FDD_D Bands FDD_D	TBD
	TBD	TBD	Bands FDD_C Bands FDD_D Bands FDD_E, FDD_F Bands FDD_G Bands FDD_H Bands FDD_A Bands FDD_B1, FDD_B2 Bands FDD_C Bands FDD_D	TBD

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

# 6.7.1.1.2 NR SA FR1 SS-RSRP relative measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

# 6.7.1.1.2.1 Test purpose

The purpose of this test is to verify that the intra-frequency SS-RSRP relative measurement accuracy is within the specified limits for all bands.

# 6.7.1.1.2.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

# 6.7.1.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.7.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.6.7.1.1.

# 6.7.1.1.2.4 Test description

# 6.7.1.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.7.1.1.2.4.1-1.

Table 6.7.1.1.2.4.1-1: NR SA FR1 SS-RSRP measurement accuracy supported test configurations

Test Case ID	Description	
6.7.1.1.2-1	NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD	
6.7.1.1.2-2	NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD	
6.7.1.1.2-3	NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD	
Note: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 6.7.1.1.2.4.1-2.

Table 6.7.1.1.2.4.1-2: Initial conditions for SS-RSRP intra frequency relative accuracy in FR1

Parameter	Value		Comment
Test environment	NC, TL/VL, TL/VH, TH/VL, TH/VH		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	P	s specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth	A	s specified by the test configuration	n selected from Table 6.7.1.1.2.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part	A.3.1.8.2 with n = 2 and $\phi_1$ = 5 Hz	As specified in TS 38.508-1 [14] Annex A.
	DUT Part	A.3.2.3.4	
Exceptions to connection diagram		N/A	

- 1. Message contents are defined in clause 6.7.1.1.2.4.3.
- 2. Cell 1 is the NR FR1 serving cell (PCell) and Cell 2 is the NR neighbour in the same frequency and the target cell for SS-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1 and C.1.2.

### 6.7.1.1.2.4.2 Test procedure

- 1. Ensure the UE is in state RRC\_CONNECTED CONNECTED with generic procedure parameters Connectivity *NR* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to Table 6.7.1.1.2.5-1 as appropriate.
- 3. The SS shall transmit an RRCConnectionReconfiguration message on Cell 1.
- 4. The UE shall transmit an RRCConnectionReconfigurationComplete message.
- 5. The UE shall transmit periodically MeasurementReport messages.
- 6. After 10s wait from Step 3, the SS shall check the SS-RSRP reported values of Cell 1 and Cell 2 in the periodic MeasurementReport. The SS-RSRP value of Cell 3 reported by the UE is compared to the reported SS-RSRP of Cell 2. If the resulting value is outside the limits in Table 6.7.1.1.2.5-2 or the UE fails to report the measurement value for Cell 2 or Cell 3, the number of failed iterations is increased by one. Otherwise, the number of passed iterations is increased by one.
- 7. The SS shall continue checking the MeasurementReport messages transmitted by the UE until the confidence level according to Table G.2.3-1 in Annex G is achieved.
- 8. Repeat steps 1-7 for each sub-test in Table 6.7.1.1.2.5-1 as appropriate.

# 6.7.1.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

# 6.7.1.1.2.5 Test requirement

Table 6.7.1.1.2.5-1 defines the primary level settings including test tolerances for all tests.

Each SS-RSRP measurement report for each of the tests in Table 6.7.1.1.2.5-1 shall meet the corresponding absolute accuracy requirements in Table 6.7.1.1.2.5-2.

Table 6.7.1.1.2.5-1: Same as Table 6.7.1.1.1.5-1

Table 6.7.1.1.2.5-2: SS-RSRP Intra frequency relative accuracy requirements for the reported values

	Test 1	Test 2	Test 3	
	All bands	All bands	All bands	
Normal Conditions				
Lowest reported value (Cell 2)	RSRP_x - TBD	RSRP_x - TBD	RSRP_x - TBD	
Highest reported value (Cell 2)	RSRP_x + TBD	RSRP_x + TBD	RSRP_x + TBD	
Extreme Conditions				
Lowest reported value (Cell 2)	RSRP_x - TBD	RSRP_x - TBD	RSRP_x - TBD	
Highest reported value (Cell 2)	RSRP_x + TBD	RSRP_x + TBD	RSRP_x + TBD	
RSRP_x is the reported value of Cell 1				

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

# 6.7.1.2 Inter-frequency measurements

# 6.7.1.2.1 NR SA FR1-FR1 SS-RSRP absolute measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

#### 6.7.1.2.1.1 Test purpose

The purpose of this test is to verify that the inter-frequency SS-RSRP absolute measurement accuracy is within the specified limits for all bands.

# 6.7.1.2.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 6.7.1.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.7.1.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.6.7.1.2.

6.7.1.2.1.4 Test description

6.7.1.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.7.1.2.1.4.1-1.

Table 6.7.1.2.1.4.1-1: NR SA FR1-FR1 SS-RSRP measurement accuracy supported test configurations

Test Case ID	Description	
6.7.1.2.1-1	NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD	
6.7.1.2.1-2	NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD	
6.7.1.2.1-3	NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD	
Note: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 6.7.1.2.1.4.1-2.

Table 6.7.1.2.1.4.1-2: Initial conditions for SS-RSRP inter frequency absolute accuracy in FR1

Parameter		Value	Comment
Test environment	NC, TL/VL, TL/VH, TH/VL, TH/VH		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	P	s specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth	A	s specified by the test configuration	n selected from Table 6.7.1.2.1.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part	A.3.1.8.2 with n = 2 and $\phi_1$ = 5 Hz	As specified in TS 38.508-1 [14] Annex A.
	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

- 1. Message contents are defined in clause 6.7.1.2.1.4.3.
- 2. Cell 1 is the NR FR1 serving cell (PCell) and Cell 2 is the NR neighbour in a different FR1 frequency and the target cell for SS-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1 and C.1.2.

# 6.7.1.2.1.4.2 Test procedure

Same as in clause 6.7.1.1.1.4.2 but replacing Table 6.7.1.1.1.5-1 and 6.7.1.1.1.5-2 with 6.7.1.2.1.5-1 and 6.7.1.2.1.5-2, respectively.

#### 6.7.1.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

TBD

6.7.1.2.1.5 Test requirement

TBD

# 6.7.1.2.2 NR SA FR1-FR1 SS-RSRP relative measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

# 6.7.1.2.2.1 Test purpose

The purpose of this test is to verify that the inter-frequency SS-RSRP absolute measurement accuracy is within the specified limits for all bands.

# 6.7.1.2.2.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 6.7.1.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.7.1.0.4.

The normative reference for this requirement is TS 38.133 [6] clause A.6.7.1.2.

### 6.7.1.2.2.4 Test description

#### 6.7.1.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.7.1.2.2.4.1-1.

Table 6.7.1.2.2.4.1-1: NR SA FR1-FR1 SS-RSRP relative measurement accuracy supported test configurations

Test Case ID	Description	
6.7.1.2.2-1	NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD	
6.7.1.2.2-2	NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD	
6.7.1.2.2-3	NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD	
Note: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 6.7.1.2.2.4.1-2.

Table 6.7.1.2.2.4.1-2: Initial conditions for SS-RSRP inter frequency relative accuracy in FR1

Parameter	Value		Comment
Test environment	NC, TL/VL, TL/VH, TH/VL, TH/VH		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	A	as specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth	A	as specified by the test configuration	n selected from Table 6.7.1.2.2.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part	A.3. 1.8.2 with n = 2 and $\phi_1$ = 5	As specified in TS 38.508-1 [14] Annex A.
	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

- 1. Message contents are defined in clause 6.7.1.2.2.4.3.
- 2. Cell 1 is the NR FR1 serving cell (PCell) and Cell 2 is the NR neighbour in a different FR1 frequency and the target cell for SS-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1 and C.1.2.

# 6.7.1.2.2.4.2 Test procedure

Same as in clause 6.7.1.1.2.4.2 but replacing Table 6.7.1.1.2.5-1 and 6.7.1.1.2.5-2 with 6.7.1.2.2.5-1 and 6.7.1.2.2.5-2, respectively.

# 6.7.1.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

6.7.1.2.2.5 Test requirement

**TBD** 

# 6.7.2 SS-RSRQ

# 6.7.2.0 Minimum conformance requirements

# 6.7.2.0.1 Intra-frequency SS-RSRQ measurement accuracy requirements

Same as in clause 4.7.2.0.1.

# 6.7.2.0.2 Inter-frequency SS-RSRQ measurement accuracy requirements

Same as in clause 4.7.2.0.2.

# 6.7.2.1 NR SA FR1 SS-RSRQ measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.
- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

# 6.7.2.1.1 Test purpose

The purpose of this test is to verify that the intra-frequency SS-RSRQ measurement accuracy is within the specified limits for all bands.

# 6.7.2.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

# 6.7.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.7.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.7.2.1.

# 6.7.2.1.4 Test description

# 6.7.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.7.2.1.4.1-1.

Table 6.7.2.1.4.1-1: NR SA FR1 SS-RSRQ measurement accuracy supported test configurations

Test Case ID	Description		
6.7.2.1-1	NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD		
6.7.2.1-2	NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD		
6.7.2.1-3	NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD		
Note	Note: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 6.7.2.1.4.1-2.

Table 6.7.2.1.4.1-2: Initial conditions for SS-RSRQ intra frequency accuracy in FR1

Parameter		Value	Comment
Test environment	NC, TI	L/VL, TL/VH, TH/VL, TH/VH	As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	A	s specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth		As specified by the test configuration	on selected from Table 6.7.2.1.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part	A.3.1.8.2 with n = 2 and $\phi_1$ = 5	As specified in TS 38.508-1 [14] Annex A.
	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

- 1. Message contents are defined in clause 6.7.2.1.4.3.
- 2. Cell 1 is the NR serving cell (PCell). The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 is an NR FR1 cell in the same frequency as Cell 1. Cell 2 is the target cell for SS-RSRQ measurements. The connection setup is done according to the settings in Annex C.1.1.

# 6.7.2.1.4.2 Test procedure

**TBD** 

#### 6.7.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

TBD

6.7.2.1.5 Test requirement

**TBD** 

# 6.7.2.2 NR SA FR1-FR1 SS-RSRQ measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.
- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

# 6.7.2.2.1 Test purpose

The purpose of this test is to verify that the inter-frequency SS-RSRQ measurement accuracy is within the specified limits for all bands.

# 6.7.2.2.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

### 6.7.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.7.2.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.6.7.2.2.

# 6.7.2.2.4 Test description

# 6.7.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.7.2.2.4.1-1.

Table 6.7.2.2.4.1-1: NR SA FR1-FR1 SS-RSRQ measurement accuracy supported test configurations

Test Case ID	Description	
6.7.2.2-1	NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD	
6.7.2.2-2	NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD	
6.7.2.2-3	NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD	
Note: The UE is only required to be tested in one of the supported test configurations		

Configure the test equipment and the DUT according to the parameters in Table 6.7.2.2.4.1-2.

Table 6.7.2.2.4.1-2: Initial conditions for SS-RSRQ inter frequency accuracy in FR1

Parameter		Value	Comment
Test environment	NC, TI	L/VL, TL/VH, TH/VL, TH/VH	As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	A	as specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth		As specified by the test configuration	n selected from Table 6.7.2.1.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part	A.3.1.8.2 with n = 2 and $\phi_1$ = 5 Hz	As specified in TS 38.508-1 [14] Annex A.
	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

- 1. Message contents are defined in clause 6.7.2.2.4.3.
- 2. Cell 1 is the NR serving cell (PCell). The power levels and settings for Cell 1 are set according to Annex A.6. Cell 2 is an NR FR1 cell in the same frequency as Cell 1. Cell 2 is the target cell for SS-RSRQ measurements. The connection setup is done according to the settings in Annex C.1.1.

# 6.7.2.2.4.2 Test procedure

**TBD** 

# 6.7.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

TBD

#### 6.7.2.2.5 Test requirement

**TBD** 

# 6.7.3 SS-SINR

# 6.7.4 L1-RSRP

# 6.7.4.0 Minimum conformance requirements

6.7.4.0.1 SSB based absolute L1-RSRP measurement accuracy requirements

Same as 4.7.4.0.1.

6.7.4.0.2 SSB based relative L1-RSRP measurement accuracy requirements

Same as 4.7.4.0.2.

6.7.4.0.3 CSI-RS based absolute L1-RSRP measurement accuracy requirements

Same as 4.7.4.0.3.

6.7.4.0.4 CSI-RS based relative L1-RSRP measurement accuracy requirements

Same as 4.7.4.0.4.

# 6.7.4.1 SSB based L1-RSRP measurements

# 6.7.4.1.1 NR SA FR1 SSB based L1-RSRP absolute measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.
- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

# 6.7.4.1.1.1 Test purpose

The purpose of this test is to verify that the SSB based L1-RSRP absolute measurement accuracy is within the specified limits for all bands.

# 6.7.4.1.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 6.7.4.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.7.4.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.6.7.4.1.

# 6.7.4.1.1.4 Test description

#### 6.7.4.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.7.4.1.1.4.1-1.

Table 6.7.4.1.1.4.1-1: NR SA FR1 SSB based L1-RSRP absolute measurement accuracy supported test configurations

Test Case ID	Description		
6.7.4.1.1-1	NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD		
6.7.4.1.1-2	NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD		
6.7.4.1.1-3	NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD		
Note: The UE is only required to be tested in one of the supported test configurations			

Configure the test equipment and the DUT according to the parameters in Table 6.7.4.1.1.4.1-2.

Table 6.7.4.1.1.4.1-2: Initial conditions for SSB based L1-RSRP absolute accuracy in FR1

Parameter		Value	Comment
Test environment	NC, TI	_/VL, TL/VH, TH/VL, TH/VH	As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	Д	s specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth	Δ	s specified by the test configuration	n selected from Table 6.7.4.1.1.4.1-1.
Propagation conditions		AWGN	As specified in Annex C.2.2.
Connection	TE Part	A.3.1.8.2 with n = 1	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

- 1. Message contents are defined in clause 6.7.4.1.1.4.3.
- 2. Cell 1 is the NR FR1 cell. Cell 1 is the target for SSB based L1-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1.

### 6.7.4.1.1.4.2 Test procedure

**TBD** 

# 6.7.4.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

TBD

6.7.4.1.1.5 Test requirement

TBD

# 6.7.4.1.2 NR SA FR1 SSB based L1-RSRP relative measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.
- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

# 6.7.4.1.2.1 Test purpose

The purpose of this test is to verify that the SSB based L1-RSRP relative measurement accuracy is within the specified limits for all bands.

# 6.7.4.1.2.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

### 6.7.4.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.7.4.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.6.7.4.1.

# 6.7.4.1.2.4 Test description

# 6.7.4.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.7.4.1.2.4.1-1.

Table 6.7.4.1.2.4.1-1: NR SA FR1 SSB based L1-RSRP relative measurement accuracy supported test configurations

Test Case ID	Description			
6.7.4.1.2-1	NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD			
6.7.4.1.2-2	NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD			
6.7.4.1.2-3	NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD			
Note: The UE is only required to be tested in one of the supported test configurations				

Configure the test equipment and the DUT according to the parameters in Table 6.7.4.1.2.4.1-2.

Table 6.7.4.1.2.4.1-2: Initial conditions for SSB based L1-RSRP relative accuracy in FR1

Parameter		Value	Comment	
Test environment	NC, TI	L/VL, TL/VH, TH/VL, TH/VH	As specified in TS 38.508-1 [14] clause 4.1.	
Test frequencies	Д	as specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.	
Channel bandwidth	As specified by the test configuration selected from Table 6.7.4.1.2.4.1-1.			
Propagation conditions		AWGN	As specified in Annex C.2.2.	
Connection	TE Part	A.3.1.8.2 with n = 1	As specified in TS 38.508-1 [14] Annex A.	
Diagram	DUT Part	A.3.2.3.4		
Exceptions to connection diagram	N/A			

- 1. Message contents are defined in clause 6.7.4.1.2.4.3.
- 2. Cell 1 is the NR FR1 cell. Cell 1 is the target for SSB base L1-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1.

# 6.7.4.1.2.4.2 Test procedure

**TBD** 

# 6.7.4.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

# 6.7.4.1.2.5 Test requirement

**TBD** 

# 6.7.4.2 CSI-RS based L1-RSRP measurements

# 6.7.4.2.1 NR SA FR1 CSI-RS based L1-RSRP absolute measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.
- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

# 6.7.4.2.1.1 Test purpose

The purpose of this test is to verify that the CSI-RS based L1-RSRP absolute measurement accuracy is within the specified limits for all bands.

### 6.7.4.2.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

# 6.7.4.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.7.4.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.6.7.4.2.

# 6.7.4.2.1.4 Test description

#### 6.7.4.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.7.4.2.1.4.1-1.

Table 6.7.4.2.1.4.1-1: NR SA FR1 CSI-RS based L1-RSRP absolute measurement accuracy supported test configurations

Test Case ID	Description		
6.7.4.2.1-1	NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD		
6.7.4.2.1-2	NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD		
6.7.4.2.1-3	NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD		
Note: The UE is only required to be tested in one of the supported test configurations			

Configure the test equipment and the DUT according to the parameters in Table 6.7.4.2.1.4.1-2.

Table 6.7.4.2.1.4.1-2: Initial conditions for CSI-RS based L1-RSRP absolute accuracy in FR1

Parameter		Value	Comment
Test environment	NC, TI	_/VL, TL/VH, TH/VL, TH/VH	As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	Δ	s specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth	Δ	n selected from Table 6.7.4.2.1.4.1-1.	
Propagation conditions		AWGN	As specified in Annex C.2.2.
Connection	TE Part A.3.1.8.2 with n = 1		As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

- 1. Message contents are defined in clause 6.7.4.2.1.4.3.
- 2. Cell 1 is the NR FR1 cell. Cell 1 is the target for CSI-RS based L1-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1.

# 6.7.4.2.1.4.2 Test procedure

**TBD** 

### 6.7.4.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

6.7.4.2.1.5 Test requirement

**TBD** 

# 6.7.4.2.2 NR SA FR1 CSI-RS based L1-RSRP relative measurement accuracy

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- The core requirements in TS 38.133 are between [.] or TBD.
- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD

# 6.7.4.2.2.1 Test purpose

The purpose of this test is to verify that the CSI-RS based L1-RSRP relative measurement accuracy is within the specified limits for all bands.

# 6.7.4.2.2.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

# 6.7.4.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.7.4.0.4.

The normative reference for this requirement is TS 38.133 [6] clause A.6.7.4.2.

# 6.7.4.2.2.4 Test description

#### 6.7.4.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 6.7.4.2.2.4.1-1.

Table 6.7.4.2.2.4.1-1: NR SA FR1 CSI-RS based L1-RSRP relative measurement accuracy supported test configurations

Test Case ID	Description		
6.7.4.2.2-1	NR: 15 kHz SSB SCS, 10MHz bandwidth, FDD		
6.7.4.2.2-2	NR: 15 kHz SSB SCS, 10MHz bandwidth, TDD		
6.7.4.2.2-3	NR: 30 kHz SSB SCS, 40MHz bandwidth, TDD		
Note: The UE is only required to be tested in one of the supported test configurations			

Configure the test equipment and the DUT according to the parameters in Table 6.7.4.2.2.4.1-2.

Table 6.7.4.2.2.4.1-2: Initial conditions for CSI-RS based L1-RSRP relative accuracy in FR1

Parameter		Value	Comment
Test environment	NC, TL	_/VL, TL/VH, TH/VL, TH/VH	As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	Α	s specified in Annex E, Table E.1-1	and TS 38.508-1 [14] sclause 4.3.1.
Channel bandwidth	As specified by the test configuration selected from Table 6.7.4.2.2.4.1-1.		
Propagation conditions		AWGN	As specified in Annex C.2.2.
Connection	TE Part	A.3.1.8.2 with $n = 1$	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.2.3.4	
Exceptions to connection diagram	N/A		

- 1. Message contents are defined in clause 6.7.4.2.2.4.3.
- 2. Cell 1 is the NR FR1 cell. Cell 1 is the target for CSI-RS based L1-RSRP measurements. The connection setup is done according to the settings in Annex C.1.1.

6.7.4.2.2.4.2 Test procedure

**TBD** 

6.7.4.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

TBD

6.7.4.2.2.5 Test requirement

**TBD** 

# 7 NR standalone with at least one NR cell in FR2

This section contains test scenarios for NR standalone. This configuration is also known as SA Option 2. At least one NR cell is in Frequency Range 2.

For conformance testing involving FR2 test cases in this specification, the UE under test shall disable UL Tx diversity schemes.

- 7.1 RRC\_IDLE state mobility
- 7.2 RRC\_INACTIVE state mobility
- 7.3 RRC\_CONNECTED state mobility
- 7.3.1 Handover
- 7.3.2 RRC connection mobility control
- 7.3.2.1 RRC re-establishment
- 7.3.2.1.0 Minimum conformance requirements

[TS 38.133, clause 6.2.1.2]

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

$$T_{re-establish\_delay} = T_{UE\_re-establish\_delay} + T_{UL\_grant}$$

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

The UE re-establishment delay ( $T_{UE\_re-establish\_delay}$ ) is 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:

$$T_{UB\_re-establish\_delay} = 50 + T_{identify\_intra\_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

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

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

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

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

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

T<sub>identify\_inter\_NR,i</sub>: It is the time to identify the target inter-frequency NR cell on inter-frequency carrier *i* configured for RRC re-establishment and it depends on whether the target NR cell is known cell or unknown cell and on the frequency range (FR) of the target NR cell. T<sub>identify\_inter\_NR,i</sub> 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] signalling 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.

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

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

 $N_{\text{freq}}$ : 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	Frequency range	Tidentify_intra_NR [ms]			
SSB Ês/lot (dB)	(FR) of target NR	Known NR cell	Unknown NR cell		
	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	Frequency range	Tidentify_inter_NR, i [ms]		
Ês/lot (dB)	(FR) of target NR	Known NR cell	Unknown NR cell	
	cell			
≥ [-8]	FR1	MAX (200 ms, [6] x T <sub>SMTC, i</sub> )	MAX (800 ms, [13] x T <sub>SMTC, i</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>	
Note 1: The UE is not required to successfully identify a cell on any NR frequency layer when T <sub>SMTC,i</sub> > 20 ms and serving cell SSB Ês/lot < [-8] dB.				

The normative reference for this requirement is TS 38.133 [6] clause 6.2.1.

### 7.3.2.1.1 NR SA FR2 RRC re-establishment

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The test tolerances and test system uncertainties applicable to this test are undefined.
- Cell Configuration table in Annex A is undefined.
- Antenna diagram is TBD
- Message content is TBD
- Minimum conformance requirements contain square brackets [RAN4 dependant]
- Test procedure is TBD
- Test requirement contains square brackets
- Initial conditions is FFS

# 7.3.2.1.1.1 Test purpose

The purpose of this test is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits.

# 7.3.2.1.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 7.3.2.1.1.3 Minimum conformance requirement

The minimum conformance requirements are specified in clause 7.3.2.1.0

The normative reference for this requirement is TS 38.133 [6] clause A.7.3.2.1.1

# 7.3.2.1.1.4 Test description

# 7.3.2.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.3.2.1.1.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 7.3.2.1.1.4.1-2. Test environment parameters are given in Table 7.3.2.1.1.4.1-3.

Table 7.3.2.1.1.4.1-1: Intra-frequency RRC re-establishment in FR2 supported test configurations

Config Description		
1		NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations depending on UE capability

Table 7.3.2.1.1.4.1-2: General test parameters for Intra-frequency RRC re-establishment in FR2

Parameter		Unit	Test	Value	Comment
			configuration		
Initial	Active cell		1	Cell1	
condition	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Channe	el Number		1	1	
			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	T310		1	0	Radio link failure timer; T310 is disabled
T311	T311		1	5000	RRC re-establishment timer
Access Barring Information		-	1	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR2	
SMTC con	figuration		1	SMTC	
	· ·			pattern 1	
	DRX cycle length		1	OFF	
PRACH configuration index			1	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1		S	1	5	
T2		ms	1	1600	Time for the UE to detect RLF
T3		S	1	6	

Table 7.3.2.1.1.4.1-3: Test Environment Intra-frequency RRC re-establishment in FR2

Parameter		Value	Comment			
Test environment	FFS		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	in Annex E, Table FFS and TS 38.9	508-1 [14] clause FFS			
Channel bandwidth	As specified	As specified by the test configuration selected from Table FFS				
Propagation conditions	FFS		As specified in Annex FFS			
Connection	TE Part	FFS	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	FFS				
Exceptions to connection diagram		•				

- 1. Message contents are defined in clause 7.3.2.1.1.4.3.
- 2. There are two NR cells specified in the test.

**FFS** 

7.3.2.1.1.4.2 Test procedure

**FFS** 

7.3.2.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause FFS with the following exceptions:

Table 7.3.2.1.1.4.3-1: Common Exception messages for NR intra-frequency RRC re-establishment test case in FR2

Default Message Contents				
Common contents of system information	FFS			
blocks exceptions				
Default RRC messages and information	FFS			
elements contents exceptions				

7.3.2.1.1.5 Test requirement

Table 7.3.2.1.1.5-1 defines the primary level settings including test tolerances for all tests.

Table 7.3.2.1.1.5-1 : Cell specific test parameters for NR intra-frequency RRC re-establishment test case in FR2

Parameter	Unit	Test		Cell 1		Cell 2		
		configuration	T1	T2	T3	T1	T2	T3

TDD configuration		1	TI	DDConf.3.	1	Т	DDConf.3.	1
		1	SR.3.1 TDD			N/A		
RMSI CORESET		1	C	CR.3.1 FDD			CR.3.1 FDD	
RMC configuration								
Dedicated CORESET		1	C	CR.3.1 FDI	D	С	CR.3.1 FD	D
RMC configuration								
TRS configuration		1	TF	RS.2.1 TDI	)		N/A	
TCI state		1	CS	I-RS.Confi	g.0		N/A	
OCNG Pattern		1	OP.1 d	lefined in A	3.2.1	OP.1 (	defined in A	\.3.2.1
Initial DL BWP		1		DLBWP.0.1		[	DLBWP.0.	1
configuration								
Initial UL BWP		1	L	JLBWP.0.1		l	JLBWP.0.	1
configuration								
RLM-RS		1	SSB			SSB		
AoA setup		1	Setup 1 defined in A.3.15.1			Setup 1	defined in	A.3.15.1
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	1.81+TT	-infinity	-infinity	-	5+TT	5+TT
L <sub>s</sub> / L <sub>ot</sub>						3.64+T		
						Т		
$N_{oc}$ Note2	dBm/SCS	1			-98			
$N_{oc}$ Note2	dBm/15 kHz	1			-98			
$\hat{E}_s/N_{oc}$	dB	1	8+TT	-infinity	-infinity	5+TT	5+TT	5+TT
SS-RSRP Note3	dBm/SCS	1	-90+TT	-infinity	-infinity	-93+TT	-93+TT	_
33-N3NF	dBIII/3C3	ı	-90+11	-inininity	-ii iii ii ii iy	-93+11	-93+11	93+TT
lo	dBm/95.04 MHz	1	_	-infinity	-infinity	_	_	30+11
10	UDITI/33.04 WII 12	'	58.81+TT	-11111111111111111111111111111111111111	-11111111111111111111111111111111111111	58.81+	62.82+	62.82
			30.01111			TT	TT	+TT
Propagation		1			AWG			
Condition		•						
	be used such that both	cells are fully a	llocated and a	constant t	otal transm	itted powe	r spectral o	density
	or all OFDM symbols.						-	,

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.

SS-RSRP levels have been derived from other parameters for information purposes. They are not settable

Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

The RRC re-establishment delay to an unknown NR intra frequency cell shall be less than [6] s.

and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90% with a confidence level of 95%.

#### 7.3.2.1.2 NR SA FR2 - FR2 RRC re-establishment

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The test tolerances and test system uncertainties applicable to this test are undefined.
- Cell Configuration table in Annex A is undefined.
- Antenna diagram is TBD

parameters themselves.

Note 2:

Note 3:

- Message content is TBD
- Minimum conformance requirements contain square brackets [RAN4 dependant]
- Test procedure is TBD
- Test requirement contains square brackets

# - Initial conditions is FFS

# 7.3.2.1.2.1 Test purpose

The purpose of this test is to verify that the NR inter-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits.

# 7.3.2.1.2.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

# 7.3.2.1.2.3 Minimum conformance requirement

The minimum conformance requirements are specified in clause 7.3.2.1.0

The normative reference for this requirement is TS 38.133 [6] clause A.7.3.2.1.2

# 7.3.2.1.2.4 Test description

# 7.3.2.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.3.2.1.2.4.1-1. Configure the test equipment and the DUT according to the parameters in Table 7.3.2.1.2.4.1-2. Test environment parameters are given in Table 7.3.2.1.2.4.1-3.

Table 7.3.2.1.2.4.1-1: Inter-frequency RRC re-establishment in FR2 supported test configurations

	Config	Description
1		NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations depending on UE capability

Table 7.3.2.1.2.4.1-2: General test parameters for Inter-frequency RRC re-establishment in FR2

	Parameter		Test	Value	Comment
			configuration		
Initial	Active cell		1	Cell1	
condition	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Channe	el Number		1	1, 2	
			1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1	0	Radio link failure timer; T310 is disabled
T311		ms	1	5000	RRC re-establishment timer
Access Ba	rring Information	-	1	Not Sent	No additional delays in random access procedure.
SSB config	juration		1	SSB.1 FR2	
			1	SMTC pattern 1	
DRX cycle	length	S	1	OFF	
	nfiguration index		1	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1	·	S	1	5	
T2		ms	1	1600	Time for the UE to detect RLF
T3		S	1	6	

Table 7.3.2.1.2.4.1-3: Test Environment Inter-frequency RRC re-establishment in FR2

Parameter		Value	Comment			
Test environment	FFS		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	in Annex E, Table FFS and TS 38.9	508-1 [14] clause FFS			
Channel bandwidth	As specified	As specified by the test configuration selected from Table FFS				
Propagation conditions	FFS		As specified in Annex FFS			
Connection	TE Part	FFS	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	FFS				
Exceptions to connection diagram		•				

- 1. Message contents are defined in clause 7.3.2.1.2.4.3
- 2. There are two NR cells specified in the test.

**FFS** 

7.3.2.1.2.4.2 Test procedure

**FFS** 

7.3.2.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause FFS with the following exceptions:

Table 7.3.2.1.2.4.3-1: Common Exception messages for NR intra-frequency RRC re-establishment test case in FR2

	Default Message Contents
Common contents of system information	FFS
blocks exceptions	
Default RRC messages and information	FFS
elements contents exceptions	

**FFS** 

7.3.2.1.2.5 Test requirement

Table 7.3.2.1.2.5-1 defines the primary level settings including test tolerances for all tests.

Table 7.3.2.1.2.5-1: Cell specific test parameters for NR intra-frequency RRC re-establishment test case in FR2

Parameter	Unit	Test	Cell 1			Cell 2		
		configuration	T1	T2	T3	T1	T2	Т3

TDD configuration		1	TI	DDConf.3.	1	Т	DDConf.3.	1
		1	S	R.3.1 TDD		N/A		
RMSI CORESET		1	C	R.3.1 FDD	FDD CR.3.1 FDD		)	
RMC configuration								
Dedicated CORESET		1	C	CR.3.1 FD	D	С	CR.3.1 FD	D
RMC configuration								
TRS configuration		1		RS.2.1 TDI			N/A	
TCI state		1	CS	I-RS.Confi	g.0		N/A	
OCNG Pattern		1		lefined in A			defined in A	
Initial DL BWP		1		DLBWP.0.1			DLBWP.0.1	
configuration								
Initial UL BWP		1	L	JLBWP.0.1		l	JLBWP.0.1	
configuration								
RLM-RS		1		SSB		SSB		
AoA setup		1	Setup 1	defined in A	4.3.15.1	Setup 1 defined in A.3.15.1		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	5+TT	-infinity	-infinity	-infinity	-infinity	8+TT
$N_{oc}$ Note2	dBm/SCS	1	-98+TT					
$N_{oc}$ Note2	dBm/15 kHz	1			-98+7	П		
$\hat{E}_s/N_{oc}$	dB	1	5+TT	-infinity	-infinity	-infinity	-infinity	8+TT
SS-RSRP Note3	dBm/SCS	1	-93+TT	-infinity	-infinity	-infinity	-infinity	- 90+TT
lo	dBm/95.04 MHz	1	- 62.82+TT	-infinity	-infinity	-infinity	-infinity	- 60.37 +TT
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 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.

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% with a confidence level of 95%.

- 7.3.2.2 Random access
- 7.3.2.3 RRC connection release with redirection
- 7.4 Timing
- 7.4.1 UE transmit timing
- 7.4.2 UE timer accuracy
- 7.4.3 Timing advance
- 7.5 Signalling characteristics
- 7.5.1 Radio link monitoring
- 7.5.2 Interruption
- 7.5.3 SCell activation and deactivation delay
- 7.5.4 UE UL carrier RRC reconfiguration delay
- 7.5.5 Link recovery procedures
- 7.5.5.0 Minimum conformance requirements
- 7.5.5.0.1 Minimum conformance requirements for SSB-based BFD and link recovery procedures

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

The value of  $T_{Evaluate\_BFD\_SSB}$  is defined in Table 7.5.5.0.1-1 for FR2 with N=8

### For FR2,

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

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

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

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

 $\begin{tabular}{|c|c|c|c|c|} \hline \textbf{Configuration} & \textbf{T}_{\tt Evaluate\_BFD\_SSB} \ \textbf{(ms)} \\ \hline no \ DRX & max([50], \ ceil(5^*P^*N)^*T_{SSB}) \\ \hline DRX \ cycle \le 320 ms & max([50], \ ceil(7.5^*P^*N)^*max(T_{DRX},T_{SSB})) \\ \hline DRX \ cycle > 320 ms & ceil(5^*P^*N)^*T_{DRX} \\ \hline Note: & T_{SSB} \ is \ the \ periodicity \ of \ SSB \ in \ the \ set \ \overline{q}_0 \ . \ T_{DRX} \ is \ the \ DRX \ cycle \\ \hline \end{tabular}$ 

Table 7.5.5.0.1-1: Evaluation period T<sub>Evaluate\_BFD\_out</sub> for FR2

When the radio link quality on all the configured RS resources in set  $\overline{q}_0$  is worse than  $Q_{\text{out\_LR}}$ , Layer 1 of the UE shall send a beam failure instance indication to the higher layers. A Layer 3 filter may be applied to the beam failure instance indications as specified in TS 38.331 [13].

The beam failure instance evaluation for the configured RS resources in set  $\bar{q}_0$  shall be performed as specified in section 6 in TS 38.213 [8]. Two successive indications from Layer 1 shall be separated by at least  $T_{Indication\ interval\ BFD}$ .

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

When DRX is used,  $T_{Indication\_interval\_BFD}$  is max(1.5\*DRX\_cycle\_length, 1.5\* $T_{BFD-RS,M}$ ) if DRX cycle\_length is less than or equal to 320ms, and  $T_{Indication\_interval}$  is DRX\_cycle\_length if DRX cycle\_length is greater than 320ms.

UE shall be able to evaluate whether the L1-RSRP measured on the configured SSB resource in set  $\overline{q}_1$  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  $\hat{E}$ s/Iot are according to Annex Table B.2.4.1 for a corresponding band.

The value of T<sub>Evaluate CBD SSB</sub> is defined in Table 7.5.5.0.1-2 for FR2 with N=8.

length.

#### For FR2,

- $P=1/(1-T_{SSB}/T_{SMTCperiod})$ , when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ( $T_{SSB} < T_{SMTCperiod}$ ).
- P is 3, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC period ( $T_{SSB} = T_{SMTCperiod}$ ).
- P is  $1/(1-T_{SSB}/MGRP-T_{SSB}/T_{SMTCperiod})$ , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ( $T_{SSB} < T_{SMTCperiod}$ ) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$  or
- $T_{SMTCperiod} = MGRP \text{ and } T_{SSB} < 0.5*T_{SMTCperiod}$
- P is  $1/(1-T_{SSB}/MGRP)*3$ , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ( $T_{SSB} < T_{SMTCperiod}$ ) and SMTC occasion is not overlapped with measurement gap and  $T_{SMTCperiod} = MGRP$  and  $T_{SSB} = 0.5*T_{SMTCperiod}$
- P is 1/{1- T<sub>SSB</sub> /min (T<sub>SMTCperiod</sub> ,MGRP)}, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion (T<sub>SSB</sub> < T<sub>SMTCperiod</sub>) and SMTC occasion is partially or fully overlapped with measurement gap
- P is  $1/(1-T_{SSB}/MGRP)*3$ , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion ( $T_{SSB} = T_{SMTCperiod}$ ) and SMTC occasion is partially overlapped with measurement gap ( $T_{SMTCperiod} < MGRP$ )

In both FR1 and FR2, if different SCS is used for SSB and CSI-RS, and the UE does not support simultaneousRxDataSSB-DiffNumerology, it is assumed that the SSB configured for candidate beam detection and each CSI-RS resource shall be TDMed transmitted.

In FR2, it is assumed that the SSB configured for candidate beam detection and each CSI-RS resource shall be TDMed transmitted.

Table 7.5.5.0.1-2: Evaluation period T<sub>Evaluate\_CBD\_out</sub> for FR2

The normative reference for this requirement is TS 38.133 [6] clause 8.5.2.2, 8.5.4 and 8.5.5.2.

# 7.5.5.0.2 Minimum conformance requirements for CSI-RS-based BFD and link recovery procedures

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

The value of T<sub>Evaluate\_BFD\_CSI-RS</sub> is defined in Table 7.5.5.0.2-1 for FR2 with N=1

Editor's Note: It is FFS if a CSI-RS resource in the resource set with repetition "ON" can be configured as a BFD-RS. If CSI-RS for BFD can be in the resource set with repetition "ON", N=8 may apply.

Editor's Note: FFS if there are other conditions with N=8.

### For FR2,

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

- P is 1/(1- T<sub>CSI-RS</sub> /MGRP T<sub>CSI-RS</sub> /T<sub>SMTCperiod</sub>), when BFD-RS is partially overlapped with measurement gap and BFD-RS is partially overlapped with SMTC occasion (TCSI-RS < T<sub>SMTCperiod</sub>) and SMTC occasion is not overlapped with measurement gap and
- T<sub>SMTCperiod</sub> ≠ MGRP or
- T<sub>SMTCperiod</sub> = MGRP and T<sub>CSI-RS</sub> < 0.5\*T<sub>SMTCperiod</sub>
- P is  $1/(1-T_{CSI-RS}/MGRP)^*$   $P_{sharing\ factor}$ , when BFD-RS is partially overlapped with measurement gap and BFD-RS is partially overlapped with SMTC occasion ( $T_{CSI-RS} < T_{SMTCperiod}$ ) and SMTC occasion is not overlapped with measurement gap and  $T_{SMTCperiod} = MGRP$  and  $T_{CSI-RS} = 0.5*T_{SMTCperiod}$
- P is 1/{1-T<sub>CSI-RS</sub> /min (T<sub>SMTCperiod</sub> ,MGRP)}, when BFD-RS is partially overlapped with measurement gap (T<sub>CSI-RS</sub> < MGRP) and BFD-RS is partially overlapped with SMTC occasion (T<sub>CSI-RS</sub> < T<sub>SMTCperiod</sub>) and SMTC occasion is partially or fully overlapped with measurement gap.
- P is  $1/(1-T_{CSI-RS}/MGRP)$ \* P<sub>sharing factor</sub>, when BFD-RS is partially overlapped with measurement gap and BFD-RS is fully overlapped with SMTC occasion ( $T_{CSI-RS} = T_{SMTCperiod}$ ) and SMTC occasion is partially overlapped with measurement gap ( $T_{SMTCperiod} < MGRP$ )
- P<sub>sharing factor</sub> is 3.

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

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

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

The values of M<sub>BFD</sub> used in Table 7.5.5.0.2-1 is defined as

-  $M_{BFD} = 10$ , if the CSI-RS resource configured for BFD is transmitted with Density = 3.

Table 7.5.5.0.2-1: Evaluation period T<sub>Evaluate\_BFD\_CSI-RS</sub> for FR2

Configuration		T <sub>Evaluate_BFD_CSI-RS</sub> (ms)			
no DRX		max([50], [M <sub>BFD</sub> *P*N] * T <sub>CSI-RS</sub> )			
DRX cycle ≤ 320ms		max([50], [1.5×M <sub>BFD</sub> *P*N]*max(T <sub>DRX</sub> , T <sub>CSI-RS</sub> ))			
DRX cycle > 320ms		[M <sub>BFD</sub> *P*N] * T <sub>DRX</sub>			
Note:	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.					

When the radio link quality on all the configured RS resources in set  $\overline{q}_0$  is worse than  $Q_{\text{out\_LR}}$ , Layer 1 of the UE shall send a beam failure instance indication to the higher layers. A Layer 3 filter may be applied to the beam failure instance indications as specified in TS 38.331 [13].

The beam failure instance evaluation for the configured RS resources in set  $\overline{q}_0$  shall be performed as specified in section 6 in TS 38.213 [8]. Two successive indications from Layer 1 shall be separated by at least T<sub>Indication\_interval\_BFD</sub>.

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

When DRX is used,  $T_{Indication\_interval\_BFD}$  is max(1.5\*DRX\_cycle\_length, 1.5\* $T_{BFD-RS,M}$ ) if DRX cycle\_length is less than or equal to 320ms, and  $T_{Indication\_interval}$  is DRX\_cycle\_length if DRX cycle\_length is greater than 320ms.

UE shall be able to evaluate whether the L1-RSRP measured on the configured CSI-RS resource in set  $\overline{q}_1$  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 Ês/Iot is according to Annex Table B.2.4.2 for a corresponding band.

The value of  $T_{Evaluate\_CBD\_CSI-RS}$  is defined in Table 7.5.5.0.2-2 for FR2 with N=8.

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

#### For FR2,

- P=1, when candidate beam detection RS is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P=1/(1-T_{CSI-RS}/MGRP)$ , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is not overlapped with SMTC occasion ( $T_{CSI-RS} < MGRP$ )
- P=1/ $(1 T_{CSI-RS} / T_{SMTCperiod})$ , when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ( $T_{CSI-RS} < T_{SMTCperiod}$ ).
- P is 3, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion ( $T_{CSI-RS} = T_{SMTCperiod}$ ).
- P is 1/(1- T<sub>CSI-RS</sub> /MGRP T<sub>CSI-RS</sub> /T<sub>SMTCperiod</sub>), when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion (TCSI-RS < T<sub>SMTCperiod</sub>) and SMTC occasion is not overlapped with measurement gap and
- $T_{SMTCperiod} \neq MGRP$  or
- T<sub>SMTCperiod</sub> = MGRP and T<sub>CSI-RS</sub> < 0.5\*T<sub>SMTCperiod</sub>
- P is  $1/(1-T_{CSI-RS}/MGRP)^*$  3, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ( $T_{CSI-RS} < T_{SMTCperiod}$ ) and SMTC occasion is not overlapped with measurement gap and  $T_{SMTCperiod} = MGRP$  and  $T_{CSI-RS} = 0.5*T_{SMTCperiod}$
- P is  $1/\{1-T_{CSI-RS}/min(T_{SMTCperiod},MGRP)\}$ , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ( $T_{CSI-RS} < T_{SMTCperiod}$ ) and SMTC occasion is partially or fully overlapped with measurement gap
- P is 1/(1- T<sub>CSI-RS</sub> /MGRP)\* 3, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion (T<sub>CSI-RS</sub> = T<sub>SMTCperiod</sub>) and SMTC occasion is partially overlapped with measurement gap (T<sub>SMTCperiod</sub> < MGRP) [Longer evaluation period would be expected if the CSI-RS is on the same OFDM symbols with RLM/BFD/BM-RS, or other CBD-RS, according to the measurement restrictions defined in section TBD.]</li>

In both FR1 and FR2, if different SCS is used for SSB and CSI-RS, and the UE does not support *simultaneousRxDataSSB-DiffNumerology*, it iss assumed that the CSI-RS configured for candidate beam detection and each SSB shall be TDMed transmitted.

In FR2, It is assumed that the CSI-RS configured for candidate beam detection with N=1 shall be TDMed with any RS resources configured for RLM/BFD/CBD/L1-RSRP reporting which is not is QCL-Type D with this CSI-RS resource or under the conditions of N>1 as specified in TS 38.133 [6] section 8.1.2.2, 8.1.2.3, 8.5.2.2, 8.5.2.3, 8.5.2.5, 8.5.2.6, 9.5.4.1 and 9,5,4,2.

The values of M<sub>CBD</sub> used in Table 7.5.5.0.2-2 is defined as

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

Table 7.5.5.0.2-2: Evaluation period T<sub>Evaluate\_CBD\_CSI-RS</sub> for FR2

Configuration		T <sub>Evaluate_CBD_CSI-RS</sub> (ms)			
non-DRX		max([25], ceil(Mcbd *P*N) * Tcsi-Rs)			
DRX o	cycle ≤ 320ms	ceil(Mcbd *P*N*1.5) * max(Tdrx, Tcsl-rs)			
DRX c	cycle > 320ms	ceil(Mcbd *P*N) *Tdrx			
Note: T <sub>CSI-RS</sub> is the periodicity of CSI-RS resource in the set $\overline{q}_1$ . T <sub>DRX</sub> is the					
	DRX cycle ler	nath.			

The normative reference for this requirement is TS 38.133 [6] clause 8.5.3.2, 8.5.4 and 8.5.6.2.

# 7.5.5.1 NR SA FR2 SSB-based beam failure detection and link recovery in non-DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- Connection diagram is TBD.
- Test requirements are between brackets.
- Some parameters are TBD

# 7.5.5.1.1 Test purpose

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  $q_1$ .

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.

To partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in TS 38.133 [6] clause 8.5.

#### 7.5.5.1.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

#### 7.5.5.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.5.5.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.7.5.5.1.

# 7.5.5.1.4 Test description

The test consists of two subtests with one NR serving cell configured. The difference between the two subtests is whether the measurement gap is configured on the NR serving Cell or not. Each subtest consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 7.5.5.1.4-1 shows the five different time durations and the corresponding variation of the downlink SNR in the active cell to emulate SSB based beam failure.

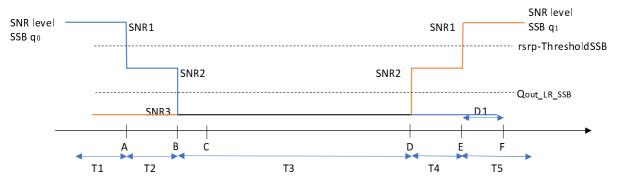


Figure 7.5.5.1.4-1: SNR variation SSB for NR SA FR2 SSB-based beam failure detection and link recovery in non-DRX

### 7.5.5.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.5.5.1.4.1-1.

Table 7.5.5.1.4.1-1: Supported test configurations for NR SA FR2 SSB-based beam failure detection and link recovery in non-DRX

Configuration		Description
1		TDD duplex mode, 120 kHz SSB SCS, 100MHz bandwidth
2		TDD duplex mode, 240 kHz SSB SCS, 100MHz bandwidth
Note: The UE is only r		equired to pass in one of the supported test configurations in FR2

Configure the test equipment and the DUT according to the parameters in Table 7.5.5.1.4.1-2.

Table 7.5.5.1.4.1-2: Initial conditions for NR SA FR2 SSB-based beam failure detection and link recovery in non-DRX

Parameter		Value	Comment			
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	I in Annex E, table E.5-1 and TS 38.	508-1 [14] clause 4.3.1 and 4.4.2.			
Channel	As specified by the test configuration selected from Table 7.5.5.1.4.1-1.					
bandwidth						
Propagation	AWGN		As specified in Annex C.2.2.			
conditions						
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	A.3.TBD				
Exceptions to	N/A					
connection						
diagram						

- 1. The general test parameter settings are set up according to Table 7.5.5.1.4.1-3. The measurement gap configuration for sub-test 2 is according to Table 7.5.5.1.4.1-4.
- 2. Message contents are defined in clause 7.5.5.1.4.3.
- 3. There is one NR carrier and one NR cells specified in the test. Cell 1 is the NR cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 7.5.5.1.4.1-3: General test parameters for NR SA FR2 SSB-based beam failure detection and link recovery in non-DRX

Parameter		Uni	Va	Comment	
		t	Test 1	Test 2	
Active F	Cell		Cell 1	Cell 1	
	nnel Number		1	1	
Duplex			TDD	TDD	
mode	Config 2		TDD	TDD	
TDD	Config 1		[TDDConf.3.1]	[TDDConf.3.1]	
Configu ation	r Config 2		[TDDConf.3.1]	[TDDConf.3.1]	
CORES	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]	
ET	Config 2		[CR. 3.1 TDD]	[CR. 3.1 TDD]	
Referen					
е					
Channe			TDD (A)	TDD (N. )	
SSB	Config 1		TBD (Note:	TBD (Note:	
Configu ation	Config 2		periodicity is 20ms) TBD (Note:	periodicity is 20ms) TBD (Note:	
ation	Cornig 2		periodicity is 20ms)	periodicity is 20ms)	
SMTC	Config 1		TDD	TDD	
Configu			TDD	TDD	
ation	3				
PDSCH			120 KHz	120 KHz	
PDCCH subcarri			120 KHz	120 KHz	
r spacin					
csi-RS-I			[0]	[0]	
	d as RLM RS		[O]	[0]	
	parameters		TBD	TBD	
CP leng			Normal	Normal	
	ion Matrix and		[2x2 Low]	[2x2 Low]	
Antenna					
Configu					
	Beam DCI format		1-0	1-0	
	failure Number of detect Control		2	2	
ion	OFDM				
trans	symbols				
missio	Aggregation	CC	8	8	
n	level	Е			
param	Ratio of	dB	0	0	
eters	hypothetical				
	PDCCH RE				
	energy to average				
	CSI-RS RE				
	energy				
	Ratio of	dB	0	0	
	hypothetical				
	PDCCH DMRS				
	energy to				
	average				
	CSI-RS RE				
	energy				
	DMRS		REG bundle size	REG bundle size	
	precoder				
	granularity		6	6	
	REG bundle size		ъ	р	
DRX	SILU		OFF	OFF	
Gap pat	tern ID		[N.A.]	*[ <i>gp0</i> ]	
ssb-Inde			2	2	Number of SSB
					indexes used for
					beam failure
					detection

rlmInSync0 Threshold	OutOfSync		absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-Thresh	oldSSB		TBD	TBD	Threshold used for Qout_LR_SSB
powerConti S	rolOffsetS		NA	NA	Used for deriving rsrp- ThresholdCSI-RS
beamFailur MaxCount	elnstance		[n2]	[n2]	see TS 38.321 [7], section 5.17
beamFailur Timer	ilureDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17
	ZP CSI-RS configuation		TBD	TBD	
CSI-IM con	CSI-IM configuration		TBD	TBD	
Periodic CS	SI reporting		PUCCH	PUCCH	
CSI reporting	Config 1, 2	slot	[5]	[5]	
periodicit y			[10]	[10]	
T1		S	1	1	During this time the UE shall be fully synchronized to cell 1
T2		S	0.4	0.4	
T3		S	[0.6]	[0.6]	
D1		S	[0.24]	[0.44]	
Note 1: l	JE-specific I	PDCCH	is not transmitted after	Γ1 starts.	

Table 7.5.5.1.4.1-4: Measurement gap configuration for NR SA FR2 SSB-based beam failure detection and link recovery in non-DRX

Field	Test 2		
rieid	Value		
gapOffset	[0]		

# 7.5.5.1.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to NR Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in subtest 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of NR Cell 1 according to T1 in Table 7.5.5.1.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 7.5.5.1.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 7.5.5.1.5-1. T3 starts.
- 5. When T3 expires the SS shall change the SNR value to T4 as specified in Table 7.5.5.1.5-1. T4 starts.
- 6. When T4 expires the SS shall change the SNR value to T5 as specified in Table 7.5.5.1.5-1. T5 starts.

#### 7. If the SS:

a) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1
 [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point B

and

b) does not detect any uplink power on NR carrier higher than OFF power defined in TS 38.521-1 [17] clause 6.3.2.5 from time point C until T3 expires

and

c) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point F (D1 after the start of T5) until T5 expires,

the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

- 8. When T5 expires the SS shall change the SNR value to T1 as specified in Table 7.5.5.1.5-1.
- 9. Wait [1s] for the UE to re-establish the connection or continue directly to step 10. If the UE re-establishes the connection within [1s] continue to step 11. Otherwise continue to step 10.
- 10. Switch the UE on and off. Ensure the UE is in RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 11. Repeat steps 2-10 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

# 7.5.5.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 7.5.5.1.4.3-1: Common Exception messages for NR SA FR2 SSB-based beam failure detection and link recovery in non-DRX

Default Message Contents					
Common contents of system information					
blocks exceptions					
Default RRC messages and information	FFS				
elements contents exceptions					

# 7.5.5.1.5 Test requirement

Tables 7.5.5.1.4.1-3 and 7.5.5.1.5-1 define the primary level settings including test tolerances for NR SA FR2 SSB-based beam failure detection and link recovery in non-DRX.

Table 7.5.5.1.5-1: NR Cell specific test parameters for NR SA FR2 SSB-based beam failure detection and link recovery in non-DRX

Parameter		Unit	Test 1 and Test 2				Test 1 and Test 2						
				SSB of set q₀					SSB of set q <sub>1</sub>				
			T1	T2	T3	T4	T5	T1	T2	Т3	T4	T5	
PDCCH	_beta	dB			4					4			
PDCCH	_DMRS_bet	dB			4					4			
а													
PBCH_b	eta	dB											
PSS_be	ta	dB											
SSS_be	ta	dB		0					0				
PDSCH	_beta	dB											
OCNG_I	oeta	dB											
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
$N_{oc}$	0 " 1			[-98]				[-98]					
1 oc	Config 2	15K		[-98]					[-98]				
	Config 3	Hz			[-98]					[-98]			
Propagation condition				[TDL-0	C 300ns 1	100Hz]			[TDL-0	C 300ns 1	100Hz]		

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set  $q_1$ .

No later than time point F occurring no later than D1 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set  $q_1$ .

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

# 7.5.5.2 NR SA FR2 SSB-based beam failure detection and link recovery in DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- Connection diagram is TBD.
- Test requirements are between brackets.
- Some parameters are TBD

# 7.5.5.2.1 Test purpose

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  $q_1$ .

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.

To partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in TS 38.133 [6] clause 8.5.

# 7.5.5.2.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

# 7.5.5.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.5.5.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.7.5.5.2.

# 7.5.5.2.4 Test description

The test consists of two subtests with one NR serving cell configured. The difference between the two subtests is whether the measurement gap is configured on the NR serving Cell or not. Each subtest consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 7.5.5.2.4-1 shows the five different time durations and the corresponding variation of the downlink SNR in the active cell to emulate SSB based beam failure.

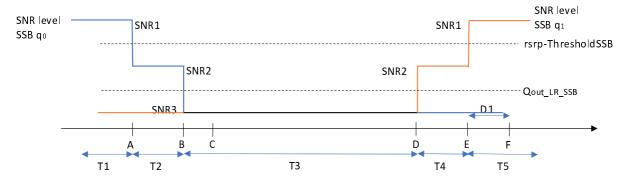


Figure 7.5.5.2.4-1: SNR variation SSB for NR SA FR2 SSB-based beam failure detection and link recovery in DRX

#### 7.5.5.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.5.5.2.4.1-1.

Table 7.5.5.2.4.1-1: Supported test configurations for NR SA FR2 SSB-based beam failure detection and link recovery in DRX

Configuration		Description				
1		TDD duplex mode, 120 kHz SSB SCS, 100MHz bandwidth				
2		TDD duplex mode, 240 kHz SSB SCS, 100MHz bandwidth				
Note: The UE is only required to pass in one of the supported test configurations in FR2						

Configure the test equipment and the DUT according to the parameters in Table 7.5.5.2.4.1-2.

Table 7.5.5.2.4.1-2: Initial conditions for NR SA FR2 SSB-based beam failure detection and link recovery in DRX

Parameter		Value	Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified in Annex E, table E.5-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.				
Channel bandwidth	As specified by the test configuration selected from Table 7.5.5.2.4.1-1.				
Propagation conditions	AWGN		As specified in Annex C.2.2.		
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.TBD			
Exceptions to connection diagram	N/A				

- 1. The general test parameter settings are set up according to Table 7.5.5.2.4.1-3. The measurement gap configuration for sub-test 2 is according to Table 7.5.5.2.4.1-4. The DRX configuration for subtest 1 and 2 is according to Table 7.5.5.2.4.1-5. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.
- 2. Message contents are defined in clause 7.5.5.2.4.3.
- 3. There is one NR carrier and one NR cells specified in the test. Cell 1 is the NR cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 7.5.5.2.4.1-3: General test parameters for NR SA FR2 SSB-based beam failure detection and link recovery in DRX

Pa	rameter	Uni	Value		Comment
		t	Test 1	Test 2	
Active F	Cell		Cell 1	Cell 1	
RF Cha	nnel Number		1	1	
Duplex	Config 1		TDD	TDD	
mode	Config 2		TDD	TDD	
TDD	Config 1		[TDDConf.3.1]	[TDDConf.3.1]	
Configu	r Config 2		[TDDConf.3.1]	[TDDConf.3.1]	
ation	0 " 1		100 o 4 TDD1	100 0 4 TDD1	
CORES			[CR. 3.1 TDD]	[CR. 3.1 TDD]	
ET Referen	Config 2		[CR. 3.1 TDD]	[CR. 3.1 TDD]	
e					
Channe	ı				
SSB	Config 1		TBD (Note:	TBD (Note:	
Configu			periodicity is 20ms)	periodicity is 20ms)	
ation	Config 2		TBD (Note:	TBD (Note:	
			periodicity is 20ms)	periodicity is 20ms)	
SMTC	Config 1		TDD	TDD	
Configu	r Config 2		TDD	TDD	
ation	/ 0 " 1		400 1011	400.1711	
PDSCH		]	120 KHz	120 KHz	
PDCCH subcarri			120 KHz	120 KHz	
r spacin					
csi-RS-I			[0]	[0]	
	d as RLM RS		[O]	[0]	
	parameters		TBD	TBD	
CP leng			Normal	Normal	
	ion Matrix and		[2x2 Low]	[2x2 Low]	
Antenna			-		
Configu					
Beam	DCI format		1-0	1-0	
failure	Number of		2	2	
detect ion	Control OFDM				
trans	symbols				
missio	Aggregation	CC	8	8	
n	level	E	· ·	· ·	
param	Ratio of	dB	0	0	
eters	hypothetical				
	PDCCH RE				
	energy to				
	average				
	CSI-RS RE				
	energy Ratio of	dB	0	0	
	hypothetical	ab	U	O	
	PDCCH				
	DMRS				
	energy to				
	average				
	CSI-RS RE				
	energy		DEO h " '	DEO by " '	
	DMRS		REG bundle size	REG bundle size	
	precoder granularity				
	REG bundle		6	6	
	size		U		
DRX			640	640	
Gap pat	tern ID		[N.A.]	*[ <i>gp0</i> ]	
ssb-Inde			2	2	Number of SSB
					indexes used for
					beam failure
					detection

rlmInSyncOutOfSync Threshold			absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-Thresh	oldSSB		TBD	TBD	Threshold used for Qout_LR_SSB
powerConti S	rolOffsetS		NA	NA	Used for deriving rsrp- ThresholdCSI-RS
beamFailur MaxCount	elnstance		[n2]	[n2]	see TS 38.321 [7], section 5.17
beamFailur Timer	beamFailureDetection Timer		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17
	ZP CSI-RS configuation		TBD	TBD	
CSI-IM con	CSI-IM configuration		TBD	TBD	
Periodic CS	SI reporting		PUCCH	PUCCH	
CSI reporting	Config 1, 2	slot	[5]	[5]	
periodicit y	Config 3		[10]	[10]	
T1		S	1	1	During this time the UE shall be fully synchronized to cell 1
T2		S	0.4	0.4	
T3		S	[0.6]	[0.6]	
D1		S	[0.24]	[0.44]	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.					

Table 7.5.5.2.4.1-4: Measurement gap configuration for NR SA FR2 SSB-based beam failure detection and link recovery in DRX

Field	Test 2
rieid	Value
gapOffset	[0]

Table 7.5.5.2.4.1-5: DRX-Configuration for NR SA FR2 SSB-based beam failure detection and link recovery in DRX

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

#### 7.5.5.2.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to NR Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in subtest 2.

1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

- 2. Set the parameters of NR Cell 1 according to T1 in Table 7.5.5.2.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 7.5.5.2.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 7.5.5.2.5-1. T3 starts.
- 5. When T3 expires the SS shall change the SNR value to T4 as specified in Table 7.5.5.2.5-1. T4 starts.
- 6. When T4 expires the SS shall change the SNR value to T5 as specified in Table 7.5.5.2.5-1. T5 starts.
- 7. If the SS:
  - a) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1
     [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point B

and

b) does not detect any uplink power on NR carrier higher than OFF power defined in TS 38.521-1 [17] clause 6.3.2.5 from time point C until T3 expires

and

c) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point F (D1 after the start of T5) until T5 expires,

the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

- 8. When T5 expires the SS shall change the SNR value to T1 as specified in Table 7.5.5.2.5-1.
- 9. Wait [1s] for the UE to re-establish the connection or continue directly to step 10. If the UE re-establishes the connection within [1s] continue to step 11. Otherwise continue to step 10.
- 10. Switch the UE on and off. Ensure the UE is in RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 11. Repeat steps 2-10 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

## 7.5.5.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 7.5.5.2.4.3-1: Common Exception messages for NR SA FR2 SSB-based beam failure detection and link recovery in DRX

Default Message Contents					
Common contents of system information					
blocks exceptions					
Default RRC messages and information	FFS				
elements contents exceptions					

#### 7.5.5.2.5 Test requirement

Tables 7.5.5.2.4.1-3 and 7.5.5.2.5-1 define the primary level settings including test tolerances for NR SA FR2 SSB-based beam failure detection and link recovery in DRX.

Table 7.5.5.2.5-1: NR Cell specific test parameters for NR SA FR2 SSB-based beam failure detection and link recovery in DRX

Parameter Unit		Unit		Test	1 and To	est 2		Test 1 and Test 2				
				SSB of set q <sub>0</sub>			SSB of set q <sub>1</sub>					
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
PDCCH	_beta	dB			4					4		
PDCCH	_DMRS_bet	dB			4					4		
а												
PBCH_b	eta	dB										
PSS_be	ta	dB										
SSS_be	ta	dB			0					0		
PDSCH	_beta	dB										
OCNG_I	oeta	dB										
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
$N_{oc}$	Config 1	dBm/			[-98]					[-98]		
1 voc	Config 2	15K			[-98]					[-98]		
	Config 3	Hz			[-98]					[-98]		
Propaga condition	tion			[TDL-0	C 300ns 1	100Hz]			[TDL-0	C 300ns 1	100Hz]	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.2.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set  $q_1$ .

No later than time point F occurring no later than D1 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set  $q_1$ .

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

# 7.5.5.3 NR SA FR2 CSI-RS-based beam failure detection and link recovery in non-DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- Connection diagram is TBD.
- Test requirements are between brackets.
- Some parameters are TBD

#### 7.5.5.3.1 Test purpose

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 candidate set  $q_1$ .

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.

To partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in TS 38.133 [6] clause 8.5.

#### 7.5.5.3.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

#### 7.5.5.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.5.5.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.7.5.5.3.

## 7.5.5.3.4 Test description

The test consists of two subtests with one NR serving cell configured. The difference between the two subtests is whether the measurement gap is configured on the NR serving Cell or not. Each subtest consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 7.5.5.3.4-1 shows the five different time durations and the corresponding variation of the downlink SNR in the active cell to emulate CSI-RS based beam failure.

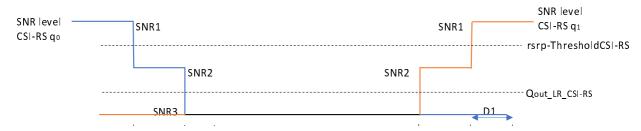


Figure 7.5.5.3.4-1: SNR variation CSI-RS for NR SA FR2 CSI-RS-based beam failure detection and link recovery in non-DRX

#### 7.5.5.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.5.5.3.4.1-1.

Table 7.5.5.3.4.1-1: Supported test configurations for NR SA FR2 CSI-RS-based beam failure detection and link recovery in non-DRX

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100MHz bandwidth

Configure the test equipment and the DUT according to the parameters in Table 7.5.5.3.4.1-2.

Table 7.5.5.3.4.1-2: Initial conditions for NR SA FR2 CSI-RS-based beam failure detection and link recovery in non-DRX

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	I in Annex E, table E.5-1 and TS 38.	508-1 [14] clause 4.3.1 and 4.4.2.
Channel bandwidth	As specified	I by the test configuration selected fr	rom Table 7.5.5.3.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.TBD	
Exceptions to connection diagram	N/A		

- 1. The general test parameter settings are set up according to Table 7.5.5.3.4.1-3. The measurement gap configuration for sub-test 2 is according to Table 7.5.5.3.4.1-4. The NZP-CSI-RS configuration for sub-test 1 and 2 is according to Table 7.5.5.3.4.1-5.
- 2. Message contents are defined in clause 7.5.5.3.4.3.
- 3. There is one NR carrier and one NR cells specified in the test. Cell 1 is the NR cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 7.5.5.3.4.1-3: General test parameters for NR SA FR2 CSI-RS-based beam failure detection and link recovery in non-DRX

Pa	Parameter Uni Value		Comment		
		t	Test 1	Test 2	
Active F	Cell		Cell 1	Cell 1	
	nnel Number		1	1	
Duplex mode	Config 1		TDD	TDD	
TDD Configu ration	Config 1		[TDDConf.3.1]	[TDDConf.3.1]	
CORES ET Referen ce Channe			[CR. 3.1 TDD]	[CR. 3.1 TDD]	A.3.1.2
SSB Configu ration	Config 1		SSB.1 FR2	SSB.1 FR2	A.3.10
SMTC Configu ration	Config 1		SMTC.1	SMTC.1	A.3.11
PDSCH /PDCC H subcarri er spacing	i		120KHz	120KHz	
csi-RS-l assigne	ndex d as beam		[0]	[0]	
failure F	oarameters		TBD	TBD	A.3.2.1
CP leng			Normal	Normal	A.J.Z. I
	tion Matrix and		[2x2 Low]	[2x2 Low]	
Beam	DCI format		1-0	1-0	
failure detect ion trans	Number of Control OFDM symbols		2	2	
missio n	Aggregation level	CC E	8	8	
param eters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
DRX			OFF	OFF	
Gap pat	tern ID		[N.A.]	*[ <i>gp0</i> ]	

csi-RS-Index		2	2	Number of SSB	
				indexes used for	
				beam failure	
				detection	
rlmInSyncOutOfSync		absent	absent	When the field is	
Threshold				absent, the UE	
				applies the value	
				0. (Table 8.1.1-1).	
rsrp-ThresholdSSB		TBD	TBD	Threshold used	
				for Q <sub>out_LR_SSB</sub>	
powerControlOffsetS		NA	NA	Used for deriving	
S				rsrp-	
				ThresholdCSI-RS	
beamFailureInstance		[n2]	[n2]	see TS 38.321 [7],	
MaxCount				section 5.17	
beamFailureDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7],	
Timer				section 5.17	
ZP CSI-RS		TBD	TBD		
configuation					
CSI-IM configuration		TBD	TBD		
Periodic CSI reporting		PUCCH	PUCCH		
CSI Config 1, 2	slot	[5]	[5]		
reportin Config 3		[10]	[10]		
g					
periodic					
ity					
T1	S	1	1	During this time	
				the UE shall be	
				fully synchronized	
				to cell 1	
T2	S	0.4	0.4		
T3	S	[TBD]	[TBD]		
D1	S	[0.24]	[0.44]		
Note 1: UE-specific PDCCH is not transmitted after T1 starts.					

Table 7.5.5.3.4.1-4: Measurement gap configuration for NR SA FR2 CSI-RS-based beam failure detection and link recovery in non-DRX

Field	Test 2
rieid	Value
gapOffset	[0]

Table 7.5.5.3.4.1-5: NZP-CSI-RS resource configuration for NR SA FR2 CSI-RS-based beam failure detection and link recovery in non-DRX

Field	Resourceld 0	Resourceld 1
	Value	Value
frequencyD omainAlloca tion <sup>Note 1</sup>	row1	row2
startingRB	0	0
nrofRBs	Note 2	Note 2
Note 2: nr	S 38.211 [6] table of RBs is derived on figuration in TS able A.4.5.1.7.1-	based on the 38.133 [6]

#### 7.5.5.3.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to NR Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in subtest 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of NR Cell 1 according to T1 in Table 7.5.5.3.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 7.5.5.3.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 7.5.5.3.5-1. T3 starts.
- 5. When T3 expires the SS shall change the SNR value to T4 as specified in Table 7.5.5.3.5-1. T4 starts.
- 6. When T4 expires the SS shall change the SNR value to T5 as specified in Table 7.5.5.3.5-1. T5 starts.
- 7. If the SS:
  - a) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1
     [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point B

and

b) does not detect any uplink power on NR carrier higher than OFF power defined in TS 38.521-1 [17] clause 6.3.2.5 from time point C until T3 expires

and

c) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point F (D1 after the start of T5) until T5 expires,

the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

- 8. When T5 expires the SS shall change the SNR value to T1 as specified in Table 7.5.5.3.5-1.
- 9. Wait [1s] for the UE to re-establish the connection or continue directly to step 10. If the UE re-establishes the connection within [1s] continue to step 11. Otherwise continue to step 10.
- 10. Switch the UE on and off. Ensure the UE is in RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 11. Repeat steps 2-10 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 7.5.5.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 7.5.5.3.4.3-1: Common Exception messages for NR SA FR2 CSI-RS-based beam failure detection and link recovery in non-DRX

Default Message Contents						
Common contents of system information						
blocks exceptions						
Default RRC messages and information	FFS					
elements contents exceptions						

#### 7.5.5.3.5 Test requirement

Tables 7.5.5.3.4.1-3 and 7.5.5.3.5-1 define the primary level settings including test tolerances for NR SA FR2 CSI-RS-based beam failure detection and link recovery in non-DRX.

Table 7.5.5.3.5-1: NR Cell specific test parameters for NR SA FR2 CSI-RS-based beam failure detection and link recovery in non-DRX

Para	ameter	Unit	Test 1 and Test 2		Test 1 and Test 2							
					-RS of s			CSI-RS of set q <sub>1</sub>				
EDDE	. ( 000	ID.	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
	tio of PSS	dB										
to SSS	tio of PBCH	dB										
DMRS to		uБ										
	tio of PBCH	dB										
to PBCH		u.b										
EPRE ra		dB										
PDCCH	DMRS to											
SSS												
EPRE ra		dB										
	to PDCCH				•					•		
DMRS	i:f	40			0					0		
EPRE ra		dB										
SSS	JIVIKS 10											
EPRE ra	tio of	dB										
	o PDSCH	<u></u>										
DMRS												
	tio of OCNG	dB										
	SSS <sup>(Note 1)</sup>											
	tio of OCNG	dB										
to OCNG	DMRS (Note											
SNR_C	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SI-RS	Config 2	uD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
00	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
<b>A</b> 7	Config 1	dBm/	טטו	100	[-98]	100	100	100	טטו	[-98]	טטו	טטו
$N_{oc}$	Config 2	15K			[-98]					[-98]		
	Config 3	Hz			[-98]					[-98]		
SS-	J -	dBm			L J							
RSRPN		/SC										
ote 3		S										
Ês/Iot												
Ês/Noc		15 (										
lo	config 1, 2	dBm/										
		9.36 MHz										
	Config 3,	dBm/										
	4	38.1										
		MHz										
Propagat	ion			[7	DLA30-7	75]			T]	DLA30-7	<b>7</b> 5]	
condition												
Note 1:	OCNG shal							located a	nd a cons	stant tota	I transmit	ted
Note O	power spec										Th a	
Note 2:	SS-RSRP a settable par				rived troi	n otner pa	arameters	s for infor	mation p	urposes.	rney are	TOIT
	seliable par	ameters	u lei i isel	ves.								

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set  $q_1$ .

No later than time point F occurring no later than D1 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set  $q_1$ .

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

## 7.5.5.4 NR SA FR2 CSI-RS-based beam failure detection and link recovery in DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are not complete.
- Connection diagram is TBD.
- Test requirements are between brackets.
- Some parameters are TBD

#### 7.5.5.4.1 Test purpose

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 candidate set  $q_1$ .

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.

To partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in TS 38.133 [6] clause 8.5.

## 7.5.5.4.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

#### 7.5.5.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.5.5.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.7.5.5.4.

# 7.5.5.4.4 Test description

The test consists of two subtests with one NR serving cell configured. The difference between the two subtests is whether the measurement gap is configured on the NR serving Cell or not. Each subtest consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure 7.5.5.4.4-1 shows the five different time durations and the corresponding variation of the downlink SNR in the active cell to emulate CSI-RS based beam failure.



Figure 7.5.5.4.4-1: SNR variation CSI-RS for NR SA FR2 CSI-RS-based beam failure detection and link recovery in DRX

#### 7.5.5.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.5.5.4.4.1-1.

Table 7.5.5.4.4.1-1: Supported test configurations for NR SA FR2 CSI-RS-based beam failure detection and link recovery in DRX

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100MHz bandwidth

Configure the test equipment and the DUT according to the parameters in Table 7.5.5.4.4.1-2.

Table 7.5.5.4.4.1-2: Initial conditions for NR SA FR2 CSI-RS-based beam failure detection and link recovery in DRX

Parameter		Value	Comment				
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.				
Test frequencies	As specified in Annex E, table E.5-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.						
Channel bandwidth	As specified by the test configuration selected from Table 6.5.5.3.4.1-1.						
Propagation conditions	AWGN		As specified in Annex C.2.2.				
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.				
Diagram	DUT Part	A.3.TBD					
Exceptions to connection diagram	N/A						

- 1. The general test parameter settings are set up according to Table 7.5.5.4.4.1-3. The measurement gap configuration for sub-test 2 is according to Table 7.5.5.4.4.1-4. The NZP-CSI-RS configuration for sub-test 1 and 2 is according to Table 7.5.5.4.4.1-5. The DRX configuration for subtest 1 and 2 is according to Table 7.5.5.4.4.1-6. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.
- 2. Message contents are defined in clause 7.5.5.4.4.3.
- 3. There is one NR carrier and one NR cells specified in the test. Cell 1 is the NR cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 7.5.5.4.4.1-3: General test parameters for NR SA FR2 CSI-RS-based beam failure detection and link recovery in DRX

Active PCell
RF Channel Number
Duplex mode
Mode   TDD
TDD
Configuration
Pation   CORES   Config 1   [CR. 3.1 TDD]   [CR. 3.1 TDD]   A.3.1.2
CORES ET Referen ce Channe I         Config 1         [CR. 3.1 TDD]         A.3.1.2           CCManne I         SSB         Config 1         SSB.1 FR2         SSB.1 FR2         A.3.10           Configuration         SMTC         Config 1         SMTC.1         SMTC.1         A.3.11           Configuration         PDSCH Config 1         120 KHz         120 KHz         120 KHz           PDSCH H Subcarrier         FRS-Index assigned as RLM RS         [0]         [0]         [0]           CSi-RS-Index assigned as RLM RS         TBD         TBD         A.3.2.1           CP length         Normal         Normal         Normal           Correlation Matrix and Antenna Configuration         [2x2 Low]         [2x2 Low]           Beam failure detect ion OFDM symbols         DCI format symbols         1-0         1-0
ET
Referen
Channe
SSB
Configuration
Configuration
Ration   SMTC   Config 1   SMTC.1   SMTC.1   SMTC.1   A.3.11
SMTC   Config 1   SMTC.1   SMTC.1   A.3.11
Configue
PDSCH
/PDCC       H       subcarri       er       spacing       csi-RS-Index       assigned as RLM RS       OCNG parameters       TBD       TBD       Normal       Normal       Correlation Matrix and Antenna       Configuration       Beam DCI format failure detect Control ion OFDM trans       trans       symbols    [0]  [0]  [0]  [0]  [0]  [0]  [1]  [0]  [1]  [1
H subcarri er spacing
subcarri er spacing
er spacing         [0]         [0]           csi-RS-Index assigned as RLM RS         [0]         [0]           OCNG parameters         TBD         TBD         A.3.2.1           CP length         Normal         Normal         Normal           Correlation Matrix and Antenna Configuration         [2x2 Low]         [2x2 Low]           Beam Indicated DCI format failure detect Control ion OFDM trans         1-0         1-0           1-0 Getect Control ion OFDM trans         2         2
spacing         [0]         [0]           csi-RS-Index assigned as RLM RS         [0]         [0]           OCNG parameters         TBD         TBD         A.3.2.1           CP length         Normal         Normal         Normal           Correlation Matrix and Antenna Configuration         [2x2 Low]         [2x2 Low]           Beam Indicate Configuration         DCI format Indicate Control ion OFDM Itrans         1-0         1-0           failure Indicate Control ion OFDM Itrans         Symbols         2         2
Csi-RS-Index assigned as RLM RS  OCNG parameters  TBD  TBD  TBD  A.3.2.1  CP length  Correlation Matrix and Antenna  Configuration  Beam DCI format 1-0 1-0 failure Number of detect Control ion OFDM trans symbols
assigned as RLM RS  OCNG parameters  TBD  TBD  A.3.2.1  CP length  Correlation Matrix and Antenna  Configuration  Beam DCI format 1-0 1-0 failure Number of detect Control ion OFDM trans symbols
OCNG parameters         TBD         TBD         A.3.2.1           CP length         Normal         Normal           Correlation Matrix and Antenna Configuration         [2x2 Low]         [2x2 Low]           Beam failure failure detect control ion OFDM trans         DCI format DCI format Symbols         1-0         1-0
CP length Normal Normal  Correlation Matrix and Antenna Configuration  Beam DCI format 1-0 1-0 failure Number of detect Control ion OFDM trans symbols
Antenna         Configuration           Beam failure         DCI format         1-0           failure detect         Number of control ion         2         2           ion OFDM trans         symbols
Configuration         Beam failure         DCI format         1-0         1-0           failure detect ion         OFDM trans         Symbols         Symbols
Beam DCI format 1-0 1-0 failure Number of 2 2 detect Control ion OFDM trans symbols
failure Number of 2 2 detect Control ion OFDM trans symbols
detect Control on OFDM trans symbols
ion OFDM trans symbols
trans symbols
missio   Aggregation   CC   8   8
n level E
param Ratio of dB 0 0
eters hypothetical
PDCCH RE
energy to average
CSI-RS RE
energy
Ratio of dB 0 0
hypothetical
PDCCH
DMRS
energy to average
CSI-RS RE
energy
DMRS REG bundle size REG bundle size
precoder
granularity
REG bundle 6 6
size
Gap pattern ID         [N.A.]         *[gp0]           csi-RS-Index         2         2         Number of SS
indexes used f
beam failure
detection

rlmInSynd Threshold	cOutOfSync I		absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-Thre	sholdSSB		TBD	TBD	Threshold used for Qout_LR_SSB
powerCor S	ntrolOffsetS		NA	NA	Used for deriving rsrp- ThresholdCSI-RS
beamFail MaxCoun	ureInstance t		[n2]	[n2]	see TS 38.321 [7], section 5.17
beamFail Timer	ureDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17
	ZP CSI-RS configuation		TBD	TBD	
CSI-IM configuration			TBD	TBD	
Periodic 0	Periodic CSI reporting		PUCCH	PUCCH	
CSI	Config 1, 2	slot	[5]	[5]	
reportin g periodic ity	Config 3		[10]	[10]	
T1		S	1	1	During this time the UE shall be fully synchronized to cell 1
T2	T2		0.4	0.4	
T3		S	[TBD]	[TBD]	
D1		S	[0.24]	[0.44]	
Note 1:	UE-specific F	PDCCH	is not transmitted after	T1 starts.	

Table 7.5.5.4.4.1-4: Measurement gap configuration for NR SA FR2 CSI-RS-based beam failure detection and link recovery in DRX

Field	Test 2
rielu	Value
gapOffset	[0]

Table 7.5.5.4.4.1-5: NZP-CSI-RS resource configuration for NR SA FR2 CSI-RS-based beam failure detection and link recovery in DRX

Field	Resourceld 0	Resourceld 1				
	Value	Value				
frequencyD omainAlloca tion <sup>Note 1</sup>	row1	row2				
startingRB	0	0				
nrofRBs	Note 2	Note 2				
Note 1: TS 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in TS 38.133 [6] Table A.4.5.1.7.1-1						

Table 7.5.5.4.4.1-6: DRX-Configuration for NR SA FR2 CSI-RS-based beam failure detection and link recovery in DRX

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

#### 7.5.5.4.4.2 Test procedure

Prior to the start of the time duration T1, the UE shall be fully synchronized to NR Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in subtest 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters of NR Cell 1 according to T1 in Table 7.5.5.4.5-1. Propagation conditions are set according to Annex C.2.3. T1 starts.
- 3. When T1 expires the SS shall change the SNR value to T2 as specified in Table 7.5.5.4.5-1. T2 starts.
- 4. When T2 expires the SS shall change the SNR value to T3 as specified in Table 7.5.5.4.5-1. T3 starts.
- 5. When T3 expires the SS shall change the SNR value to T4 as specified in Table 7.5.5.4.5-1. T4 starts.
- 6. When T4 expires the SS shall change the SNR value to T5 as specified in Table 7.5.5.4.5-1. T5 starts.
- 7. If the SS:
  - a) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point A to time point B

and

b) does not detect any uplink power on NR carrier higher than OFF power defined in TS 38.521-1 [17] clause 6.3.2.5 from time point C until T3 expires

and

c) detects uplink power on NR carrier equal to or higher than minimum output power defined in TS 38.521-1 [17] clause 6.3.1.5 in each slot configured for CQI transmission (according CQI reporting on PUCCH) during the period from time point F (D1 after the start of T5) until T5 expires,

the number of successful tests is increased by one.

Otherwise the number of failed tests is increased by one.

- 8. When T5 expires the SS shall change the SNR value to T1 as specified in Table 7.5.5.4.5-1.
- 9. Wait [1s] for the UE to re-establish the connection or continue directly to step 10. If the UE re-establishes the connection within [1s] continue to step 11. Otherwise continue to step 10.
- 10. Switch the UE on and off. Ensure the UE is in RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.

11. Repeat steps 2-10 for all subtests until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

# 7.5.5.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 7.5.5.4.4.3-1: Common Exception messages for NR SA FR2 CSI-RS-based beam failure detection and link recovery in DRX

Default Message Contents						
Common contents of system information blocks exceptions						
Default RRC messages and information elements contents exceptions	FFS					

# 7.5.5.4.5 Test requirement

Tables 7.5.5.4.4.1-3 and 7.5.5.4.5-1 define the primary level settings including test tolerances for NR SA FR2 CSI-RS-based beam failure detection and link recovery in DRX.

Table 7.5.5.4.5-1: NR Cell specific test parameters for NR SA FR2 CSI-RS-based beam failure detection and link recovery in DRX

Parameter U									Test	1 and T	est 2	
				CSI	-RS of se	et qo			CSI	-RS of se	et q <sub>1</sub>	
			T1	T2	Т3	T4	T5	T1	T2	Т3	T4	T5
	tio of PSS	dB			0					0		
to SSS	tio of PBCH	dB										
DMRS to	SSS											
EPRE ra to PBCH	tio of PBCH DMRS	dB										
EPRE ra		dB										
DMRS	to PDCCH	dB										
EPRE ra PDSCH SSS	tio of DMRS to	dB										
EPRE ra PDSCH DMRS	tio of to PDSCH	dB										
	tio of OCNG SSS <sup>(Note 1)</sup>	dB										
EPRE ra	tio of OCNG 5 DMRS (Note	dB										
SNR_C	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SI-RS	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
$N_{oc}$	Config 1	dBm/			[-98]					[-98]		
00	Config 2	15K			[-98]					[-98]		
	Config 3	Hz			[-98]					[-98]		
SS- RSRP <sup>N</sup> ote 3		dBm /SC S										
Ês/Iot												
Ês/Noc												
lo	config 1, 2	dBm/ 9.36 MHz										
	Config 3,	dBm/ 38.1 MHz										
Propaga condition	l .				DLA30-7	-				DLA30-7	_	
Note 1: Note 2:	OCNG shall power spec SS-RSRP a	tral dens	sity is ach	nieved for	all OFDI	M symbol	S.					

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

settable parameters themselves.

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set  $q_1$ .

No later than time point F occurring no later than D1 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set  $q_1$ .

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

# 7.5.6 Active BWP switch delay

# 7.5.6.1 DCI-based and time-based active BWP switch

## 7.5.6.1.0 Minimum conformance requirements

**FFS** 

## 7.5.6.1.1 NR SA FR2 DCI-based DL active BWP switch in non-DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD
- Test procedure is TBD
- Test applicability needs to be added to TS 38.522

7.5.6.1.1.1	Test	purpose
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**FFS** 

7.5.6.1.1.2 Test applicability

**FFS** 

7.5.6.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.5.6.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.7.5.6.1.1.

7.5.6.1.1.4	Test description
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7.5.6.1.1.4.1 Initial conditions

**FFS** 

7.5.6.1.1.4.2 Test procedure

**FFS** 

7.5.6.1.1.4.3 Message contents

FFS

7.5.6.1.1.5 Test requirements

FFS

## 7.5.6.1.2 NR SA FR1-FR2 DCI-based DL active BWP switch in non-DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD
- Test procedure is TBD
- Test applicability needs to be added to TS 38.522

7.5.6.1.2.1 Test purpose

**FFS** 

7.5.6.1.2.2 Test applicability

**FFS** 

7.5.6.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.5.6.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.7.5.6.1.2.

7.5.6.1.2.4 Test description

7.5.6.1.2.4.1 Initial conditions

**FFS** 

7.5.6.1.2.4.2 Test procedure

**FFS** 

7.5.6.1.2.4.3 Message contents

**FFS** 

7.5.6.1.2.5 Test requirements

**FFS** 

### 7.5.6.2 RRC-based active BWP switch

7.5.6.2.0 Minimum conformance requirements

**FFS** 

#### 7.5.6.2.1 NR SA FR2 RRC-based DL active BWP switch in non-DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Test tolerance analysis is missing
- Message contents are TBD
- Cell mapping is TBD
- Test procedure is TBD
- Test applicability needs to be added to TS 38.522

7.5.6.2.1.1 Test purpose

**FFS** 

7.5.6.2.1.2 Test applicability

**FFS** 

7.5.6.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.5.6.2.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.7.5.6.2.1.

7.5.6.2.1.4 Test description

7.5.6.2.1.4.1 Initial conditions

**FFS** 

7.5.6.2.1.4.2 Test procedure

**FFS** 

7.5.6.2.1.4.3 Message contents

**FFS** 

7.5.6.2.1.5 Test requirements

FFS

# 7.6 Measurement procedures

# 7.6.1 Intra-frequency measurements

# 7.6.1.0 Minimum conformance requirements

7.6.1.0.1 Minimum conformance requirements for event-triggered measurement without gap

[TS 38.133, clause 9.2.5.1 and 9.2.5.2]

The UE shall be able to identify a new detectable intra frequency cell within Tidentify\_intra\_without\_index if UE is not indicated to report SSB based RRM measurement result with the associated SSB index(reportQuantityRsIndexes or maxNrofRSIndexesToReport is not configured), or the UE has been indicated that the neighbour cell is synchronous with the serving cell (deriveSSB-IndexFromCell is enabled). The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within Tidentify\_intra\_without\_index. It is assumed that deriveSSB-IndexFromCell is always enabled for FR1 TDD and FR2.

 $T_{identify\_intra\_without\_index} = (T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}) \ ms$ 

#### Where:

T<sub>PSS/SSS\_sync\_intr</sub>: it is the time period used in PSS/SSS detection given in table 7.6.1.0.1-1.

T<sub>SSB\_measurement\_period\_intra</sub>: equal to a measurement period of SSB based measurement given in table 7.6.1.0.1-2.

CSSF<sub>intra</sub>: it is a carrier specific scaling factor and is determined according to CSSF<sub>outside\_gap,i</sub> in TS 38.133 [6] clause 9.1.5.1 for measurement conducted outside measurement gaps.

- $M_{pss/sss\_sync\_w/o\_gaps}$ : For a UE supporting FR2 power class 1,  $M_{pss/sss\_sync\_w/o\_gaps} = 40$ . For a UE supporting power class 2,  $M_{pss/sss\_sync\_w/o\_gaps} = 24$ . For a UE supporting FR2 power class 3,  $M_{pss/sss\_sync\_w/o\_gaps} = 24$ . For a UE supporting FR2 power class 4,  $M_{pss/sss\_sync\_w/o\_gaps} = 24$
- $M_{meas\_period\_w/o\_gaps}: For \ a \ UE \ supporting \ power \ class \ 1, \ M_{meas\_period\_w/o\_gaps} = 40. \ For \ a \ UE \ supporting \ FR2 \ power \ class \ 2, \ M_{meas\_period\_w/o\_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 3, \ M_{meas\_period\_w/o\_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{meas\_period\_w/o\_gaps} = 24.$
- When intrafrequency SMTC is fully non-overlapping with measurement gaps or intrafrequency SMTC is fully overlapping with MGs, Kp=1.
- When intrafrequency SMTC is partially overlapping with measurement gaps, Kp = 1/(1 (SMTC period / MGRP)), where SMTC period < MGRP
- For FR2 when any of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap is fully overlapping with intra-frequency SMTC,  $K_{layer1\_measurement} = 1.5$ , otherwise  $K_{layer1\_measurement} = 1.5$

Table 7.6.1.0.1-1: Time period for PSS/SSS detection (Frequency range FR2)

DRX cycle	TPSS/SSS_sync_intra	
No DRX	max(600ms, ceil(M <sub>pss/sss_sync_w/o_gaps</sub> x K <sub>p</sub> x	
	Klayer1_measurement) x SMTC period)Note 1 x CSSFintra	
DRX cycle≤ 320ms	max(600ms, ceil(1.5 x M <sub>pss/sss_sync_w/o_gaps</sub> x K <sub>p</sub> x	
	K <sub>layer1_measurement</sub> ) x max(SMTC period,DRX cycle)) x	
	CSSF <sub>intra</sub>	
DRX cycle>320ms	ceil(Mpss/sss_sync_w/o_gaps x Kp x Klayer1_measurement) 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 identifie	ad	

Table 7.6.1.0.1-2: Measurement period for intra-frequency measurements without gaps (Frequency 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	
	Klayer1_measurement) x SMTC period)Note 1 x CSSFintra	
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	
	CSSF <sub>intra</sub>	
DRX cycle>320ms	ceil(Mmeas_period_w/o_gaps xKp x Klayer1_measurement ) 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		

[TS 38.133, clause 9.2.4.3]

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in TS 38.133 [6] clause 10.1.2.1, 10.1.7.1 and 10.1.12.1, 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 less than T identify intra without index defined in TS 38.133 [6] clause 9.2.5.1. When L3 filtering is used an additional delay can be expected.

If a cell which has been detectable at least for the time period than  $T_{identify\ intra\ without\ index}$  defined in TS 38.133 [6] clause 9.2.5.1 becomes undetectable for a period and then the cell becomes detectable again and triggers an event, the event

triggered measurement reporting delay shall be less than  $T_{Measurement\_Period, Intra}$  provided the timing to that cell has not changed more than  $\pm$  3200 Tc while the measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used, an additional delay can be expected.

[TS 38.133, clause 9.2.2]

The requirements given above 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 TS 38.133 [6] sections 10.1.2 are fulfilled for a corresponding Band,
- SS-RSRQ related side conditions given in TS 38.133 [6] sections 10.1.7 are fulfilled for a corresponding Band,
- SS-SINR related side conditions given in TS 38.133 [6] sections 10.1.12 are fulfilled for a corresponding Band,
- SSB\_RP and SSB Ês/Iot according to TS 38.133 [6] Annex B.2.2 for a corresponding Band.

References: The conformance requirements covered in the current TC are specified in: TS 38.133 [6], clauses 9.2.2, 9.2.4.3, 9.2.5.1 and 9.2.5.2.

## 7.6.1.0.2 Minimum conformance requirements for event-triggered measurement with gap

[TS 38.133 [6], clause 9.2.6.2, 9.2.6.3]

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). It is assumed that *deriveSSB-IndexFromCell* is always enabled for FR1 TDD and FR2.

$$T_{identify\_intra\_without\_index} = T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra} \quad ms$$

#### Where:

T<sub>PSS/SSS\_sync\_intra</sub>: it is the time period used in PSS/SSS detection given in table 7.6.1.0.2-1.

T<sub>SSB</sub> measurement period intra: equal to a measurement period of SSB based measurement given in table 7.6.1.0.2-2.

CSSF<sub>intra</sub>: it is a carrier specific scaling factor and is determined according to CSSF<sub>within\_gap,i</sub> in TS 38.133 [6] section 9.1.5.2.2 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

 $M_{meas\_period\_with\_gaps} : For a \ UE \ supporting \ power \ class \ 1, \ M_{meas\_period\_with\_gaps} = 40. \ For a \ UE \ supporting \ power \ class \ 2, \\ M_{meas\_period\_with\_gaps} = 24. \ For a \ UE \ supporting \ power \ class \ 3, \ M_{meas\_period\_with\_gaps} = 24. \ For a \ UE \ supporting \ power \ class \ 4, \ M_{meas\_period\_with\_gaps} = 24.$ 

Table 7.6.1.0.2-1: Time period for PSS/SSS detection (Frequency range FR2)

DRX cycle	T <sub>PSS</sub> /SSS_sync_intra
No DRX	max(600ms, Mpss/sss_sync_with_gaps 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	Mpss/sss_sync_with_gaps x max(MGRP, DRX cycle) x
·	CSSF <sub>intra</sub>

Table 7.6.1.0.2-2: Measurement period for intra-frequency measurements with gaps (Frequency Range 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
	CSSFintra
DRX cycle>320ms	M <sub>meas_period with_gaps</sub> x max(MGRP, DRX cycle) x CSSF <sub>intra</sub>

[TS 38.133 [6], clause 9.2.2]

The requirements given above 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 TS 38.133 [6] sections 10.1.2 are fulfilled for a corresponding Band,
- SS-RSRQ related side conditions given in TS 38.133 [6] sections 10.1.7 are fulfilled for a corresponding Band,
- SS-SINR related side conditions given in TS 38.133 [6] Sections 10.1.12 are fulfilled for a corresponding Band,
- SSB\_RP and SSB £s/Iot according to TS 38.133 [6] Annex B.2.2 for a corresponding Band.

[TS 38.133 [6], clause 9.2.4.2]

The RSRP measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] clauses 10.1.2.1.1 and 10.1.2.1.2, the RSRQ measurement accuracy for all measured cells shall be as specified in TS 38.133 [6] clauses 10.1.7.1.1, and the SINR measurement accuracy for all measured cells shall be as specified in the TS 38.133 [6] clause 10.1.12.1.1.

Reported RSRP, RSRQ and SINR measurements contained in event triggered measurement reports shall meet the requirements in TS 38.133 [6] clauses 10.1.2.1.1, 10.1.2.1.2, 10.1.7.1.1 and 10.1.12.1.1, 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 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 a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than  $T_{identify\_intra\_without\_index}$  defined in TS 38.133 [6] section 9.2.6.2. When L3 filtering is used an additional delay can be expected.

The normative reference for this requirement is TS 38.133 [6] clauses 9.2.2, 9.2.4.2, 9.2.6.2 and 9.2.6.3.

## 7.6.1.1 NR SA FR2 event-triggered reporting without gap in non-DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are missing.
- -Connection diagrams are missing.
- Some parameters are TBD
- Test tolerance is missing.

## 7.6.1.1.1 Test purpose

To verify the UE's ability to make a correct reporting of an event within intra-frequency cell search without gap under non-DRX.

#### 7.6.1.1.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

#### 7.6.1.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.6.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.7.6.1.1.

#### 7.6.1.1.4 Test description

#### 7.6.1.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.6.1.1.4.1-1.

Table 7.6.1.1.4.1-1: Supported test configurations for NR SA FR2 event-triggered reporting without gap in non-DRX

Test Case ID	Description	
7.6.1.1-1	120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode	
7.6.1.1-2	240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode	
Note: The UE is only required to be tested in one of the supported test configurations.		

Configure the test requirement and the DUT according to the parameters in Table 7.6.1.1.4.1-2.

Table 7.6.1.1.4.1-2: Initial conditions for NR SA FR2 event-triggered reporting without gap in non-DRX

Parameter		Value	Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified	I in Annex E, Table E.5-1 and TS 38	5.508-1 [14] clause 4.3.1.		
Channel bandwidth	As specified by the test configuration selected from Table 6.6.1.1.4.1-1.				
Propagation conditions	AWGN		As specified in Annex C.2.2		
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.TBD			
Exceptions to connection diagram	N/A				

- 1. The test parameters for PCell and neighbour cell are given in Table 7.6.1.1.4.1-3 below.
- 2. Message contents are defined in clause 7.6.1.1.4.3.
- 3. There is one carrier and two cells specified in the test. NR Cell 1 is the cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 7.6.1.1.4.1-3: General test parameters for NR SA FR2 event-triggered reporting without gap in non-DRX

Parameter	Unit	Config	Value	Comment
Active cell		1, 2	PCell (Cell 1)	
Neighbour cell		1, 2	Cell 2	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2	One TDD carrier frequency is used for the NR cells.
SMTC configuration		1, 2	SMTC.1	
A3-Offset	dB	1, 2	-6	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	OFF	
Time offset between Cell 1 and Cell 2		1, 2	3 μs	Synchronous cells
Time offset between Cell 2 and Cell 3		1, 2	3 μs	Synchronous cells
T1	S	1, 2	5	
T2	S	1, 2	5	

#### 7.6.1.1.4.2 Test procedure

Two cells are deployed in the test, which are FR2 PCell (NR Cell 1) and a FR2 neighbour cell (NR Cell 2) on the same frequency as the PCell. The general and cell specific test parameters for PCell and neighbour cell are given in Table 7.6.1.1.4.1-3 and Table 7.6.1.1.5-1, respectively. 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 NR Cell 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 7.6.1.1.5-1. T1 starts.
- 3. SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 7.6.1.1.5-1. T2 starts.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than X ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one. Where X is
  - 2402 ms for UE supporting power class 1,
  - 1442 ms for UE supporting power class 2 or 3,
  - [1442] ms for UE supporting power class 4
- 7. After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set NR Cell 2 physical cell identity = ((current NR cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in NR Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures

the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5), or

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

## 7.6.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 7.6.1.1.4.3-1: Common Exception messages for NR SA FR2 event-triggered reporting without gap in non-DRX

Default Message Contents		
FFS		

#### 7.6.1.1.5 Test requirement

Table 7.6.1.1.4.1-3, Table 7.6.1.1.5-1 and Table 7.6.1.1.5-2 define the primary level settings including test tolerances for NR SA FR2 event-triggered reporting without gap in non-DRX.

Table 7.6.1.1.5-1: NR Cell specific test parameters for NR SA FR2 event-triggered reporting without gap in non-DRX

Parameter	Unit	Config	Cell 1	Cell 2
			T1 T2	T1 T2
TDD configuration		1, 2	TDDConf.3.1	TDDConf.3.1
Initial BWP		1, 2	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1, 2	DLBWP.1.1	DLBWP.1.1
configuration				
Active UL BWP		1, 2	ULBWP.1.1	ULBWP.1.1
configuration				
RLM-RS		1, 2	SSB	SSB
PDSCH RMC		1, 2	SR.3.1 TDD	N/A
configuration				
RMSI CORESET		1, 2	CR.3.1 TDD	CR.3.1 TDD
RMC				
configuration				
Dedicated		1, 2	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC				
configuration				
TRS configuration		1, 2	TRS.2.1 TDD N/A	
TCI state		1, 2	CSI-RS.Config.0 N/A	
OCNG Patterns	·	1, 2	OP.1	OP.1
SSB		1	SSB.1 FR2 SSB.1 FR2	
		2	SSB.2 FR2	SSB.2 FR2
Propagation		1, 2	A\	WGN
Condition				

Table 7.6.1.1.5-2: NR OTA Cell specific test parameters for NR SA FR2 event-triggered reporting without gap in non-DRX

Parameter	Unit	Config	Cell 2 Cell 3		II 3	
			T1	T2	T1	T2
AoA setup		1, 2		A.	3.8.x	
$\mathbf{\hat{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$	dB	1, 2	TBD	TBD	TBD	TBD
$N_{oc}$ Note 2	dBm/15 KHz	1, 2		T	BD	
Note 2	dBm/SCS	1		T	BD	
1 voc		2	TBD			
SS-RSRP	dBm/SCS	1	TBD	TBD	TBD	TBD
		<u>2</u>	TBD	TBD	TBD	TBD
$\hat{E}_s/N_{oc}$	dB	1, 2	TBD	TBD	TBD	TBD
Io	dBm/95.04MHz	1, 2	TE	3D	TE	3D

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{\rm ac}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

The overall delays measured is defined as the time from the beginning of time period T2, to the moment the UE send one Event A3 triggered measurement report to NR Cell 2.

The overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

The overall delays measured test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

 $Measurement \ reporting \ delay = T_{identify\_intra\_without\_index}$ 

Tidentify intra without index = (TPSS/SSS sync intra + TSSB measurement period intra) ms

For UE supporting power class 1, T<sub>PSS/SSS\_sync\_intr</sub> = 1200 ms, T<sub>SSB\_measurement\_period\_intra</sub>= 1200 ms,

For UE supporting power class 2 or 3, T<sub>PSS/SSS\_sync\_intr</sub> = 720 ms, T<sub>SSB\_measurement\_period\_intra</sub> = 720 ms

For IE supporting power class 4, T<sub>PSS/SSS\_sync\_intr</sub> = [720] ms, T<sub>SSB\_measurement\_period\_intra</sub>= [720] ms

TTI insertion uncertainty = 2 ms

The overall delays measured shall be less than a total of X+2 ms in this test case (note: this gives a total of X ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty), where

X = 2400 for UE supporting power class 1,

X = 1440 for UE supporting power class 2 or 3,

X = [1400] for UE supporting power class 4

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

# 7.6.1.2 NR SA FR2 event-triggered reporting without gap in DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are missing.

- -Connection diagrams are missing.
- Some parameters are TBD
- Test tolerance is missing.

#### 7.6.1.2.1 Test purpose

To verify the UE's ability to make a correct reporting of an event within intra-frequency cell search without gap under DRX.

## 7.6.1.2.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

#### 7.6.1.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.6.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.7.6.1.2.

#### 7.6.1.2.4 Test description

#### 7.6.1.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.6.1.2.4.1-1.

Table 7.6.1.2.4.1-1: Supported test configurations for NR SA FR2 event-triggered reporting without gap in DRX

Test Case ID	Description	
7.6.1.2-1	120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode	
7.6.1.2-2	240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode	
Note: The UE is only required to be tested in one of the supported test configurations.		

Configure the test equipment and the DUT according to the parameters in Table 7.6.1.2.4.1-2.

Table 7.6.1.2.4.1-2: Initial conditions for NR SA FR2 event-triggered reporting without gap in DRX

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, table E.5-1 and TS 38.	508-1 [14] clause 4.3.1.
Channel bandwidth	As specified	by the test configuration selected fr	rom Table 7.6.1.2.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	A.3.TBD	
Exceptions to connection diagram	N/A		

- 1. The test parameters for PCell and neighbour cell are given in Table 7.6.1.2.4.1-3 below.
- 2. Message contents are defined in clause 7.6.1.2.4.3.
- 3. There is one carrier and two cells specified in the test. NR Cell 1 is the cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 7.6.1.2.4.1-3: General test parameters for NR SA FR2 event-triggered reporting without gap in 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 Cell 2		One TDD carrier frequency is used for the NR cells.
SMTC configuration		1, 2	SMTC.1		
A3-Offset	dB	1, 2	-6		
CP length		1, 2	Normal		
Hysteresis	dB	1, 2	0		
Time To Trigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	DRX.1	DRX.2	DRX related parameters are defined in Table A.7.6.1.2.1-5
Time offset between Cell 1 and Cell 2		1, 2	3 μs		Synchronous EN-DC
Time offset between Cell 2 and Cell 3		1, 2	3 μs		Synchronous cells
T1	S	1, 2	5		
T2	S	1, 2	10	TBD	

#### 7.6.1.2.4.2 Test procedure

Two cells are deployed in the test, which are FR2 PCell (NR Cell 1) and a FR2 neighbour cell (NR Cell 2) on the same frequency as the PCell. The general and cell specific test parameters for PCell and neighbour cell are given in Table 7.6.1.2.4.1-3, Table 7.6.1.2.5-1 and Table 7.6.1.2.5-2, respectively. 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 NR Cell 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 7.6.1.2.5-1 and Table 7.6.1.2.5-2. T1 starts.
- 3. SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 7.6.1.2.5-1 and Table 7.6.1.2.5-2. T2 starts.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than X ms for Test 1 or less than Y ms for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one. Where X is
  - 7202 for UE supporting power class 1,
  - 4322 for UE supporting power class 2 or 3,
  - [4322] for UE supporting power class 4,

#### and Y is

- 51202 for UE supporting power class 1,
- 30722 for UE supporting power class 2 or 3,
- [30722] for UE supporting power class 4.

- 7. After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set NR Cell 2 physical cell identity = ((current NR cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in NR Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in State state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5),
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 7.6.1.2.4.1-1 as appropriate.

## 7.6.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 7.6.1.2.4.3-1: Common Exception messages for NR SA FR2 event-triggered reporting without gap in DRX

Default Message Contents				
Common contents of system information				
blocks exceptions				
Default RRC messages and information	FFS			
elements contents exceptions				

#### 7.6.1.2.5 Test requirement

Table 7.6.1.2.4.1-3, Table 7.6.1.2.5-1 and Table 7.6.1.2.5-2 define the primary level settings including test tolerances for NR event triggered reporting in synchronous cells when DRX is used test.

Table 7.6.1.2.5-1: NR Cell specific test parameters for NR SA FR2 event-triggered reporting without gap in DRX

Parameter	Unit	Config	Ce	II 1	Ce	II 2
			T1	T2	T1	T2

TDD configuration	1, 2	TDDConf.3.1	TDDConf.3.1
Initial BWP	1, 2	DLBWP.0.1	DLBWP.0.1
configuration		ULBWP.0.1	ULBWP.0.1
Active DL BWP	1, 2	DLBWP.1.1	DLBWP.1.1
configuration			
Active UL BWP	1, 2	ULBWP.1.1	ULBWP.1.1
configuration			
RLM-RS	1, 2	SSB	SSB
PDSCH RMC	1, 2	SR.3.1 TDD	N/A
configuration			
RMSI CORESET	1, 2	CR.3.1 TDD	CR.3.1 TDD
RMC			
configuration			
Dedicated	1, 2	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC			
configuration			
TRS configuration	1, 2	TRS.2.1 TDD	N/A
TCI state	1, 2	CSI-RS.Config.0	N/A
OCNG Patterns	1, 2	OP.1	OP.1
SSB	1	SSB.1 FR2	SSB.1 FR2
	2	SSB.2 FR2	SSB.2 FR2
Propagation	1, 2	AV	VGN
Condition			

Table 7.6.1.2.5-2: NR OTA Cell specific test parameters for NR SA FR2 event-triggered reporting without gap in DRX

Parameter	Unit	Config	Ce	Cell 2		Cell 3	
			T1	T2	T1	T2	
AoA setup		A.3.8.x					
$\mathbf{\hat{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB	1, 2	TBD	TBD	TBD	TBD	
$N_{oc}$ Note 2	dBm/15 KHz	1, 2		TBD			
Note 2	dBm/SCS	1		TBD			
r v oc		2		TBD			
SS-RSRP	dBm/SCS	1	TBD	TBD	TBD	TBD	
		<u>2</u>	TBD	TBD	TBD	TBD	
$\hat{E}_s/N_{oc}$	dB	1, 2	TBD	TBD	TBD	TBD	
Io	<i>Io</i> dBm/95.04MHz		TI	TBD TBD			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

In Test 1 when DRX cycle length = 40 ms, the overall delay measured is defined as the time from the beginning of time period T2 to the moment the UE send one Event A3 triggered measurement report on PUSCH.

In Test 2 when DRX cycle length = 640 ms, the overall delay measured is defined as the time from the beginning of time period T2 to the moment the UE starts to send preambles on the PRACH for Scheduling Request (SR) to obtain allocation to send the measurement report to NR Cell 2 on PUSCH.

## For both tests:

The overall delays measured is defined as the time from the beginning of time period T2 to the moment the UE send one Event A3 triggered measurement report to NR Cell 2.

The overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

The overall delay measured when DRX cycle length is 40 ms test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

 $Measurement \ reporting \ delay = T_{identify\_intra\_without\_index}$ 

```
T_{identify\_intra\_without\_index} = (T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}) ms
```

For UE supporting power class 1,  $T_{PSS/SSS\_sync\_intra} = 3600$  ms,  $T_{SSB\_measurement\_period\_intra} = 3600$  ms,

For UE supporting power class 2 or 3, Tpss/sss\_sync\_intra = 2160 ms, Tpss\_measurement\_period\_intra = 2160 ms

For UE supporting power class 4, Tpss/sss\_sync\_intra = [2160] ms, T sss\_measurement\_period\_intra = [2160] ms

TTI insertion uncertainty = 2 ms

The overall delay measured when DRX cycle length is 40 ms shall be less than a total of X ms, where X is

- X = 7202 for UE supporting power class 1,
- X = 4322 for UE supporting power class 2 or 3,
- X = [4322] for UE supporting power class 4,

The overall delay measured when DRX cycle length is 640 ms test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

Measurement reporting delay =  $T_{identify\_intra\_without\_index}$ 

```
T_{identify\_intra\_without\_index} = (T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}) ms
```

For UE supporting power class 1, Tpss/sss\_sync\_intra = 25600 ms, T ssb\_measurement\_period\_intra = 25600 ms,

For UE supporting power class 2 or 3, T<sub>PSS/SSS\_sync\_intra</sub> = 15360 ms, T<sub>SSB\_measurement\_period\_intra</sub> = 15360 ms

For UE supporting power class 4, Tpss/sss\_sync\_intra = [15360] ms, Tssb\_measurement\_period\_intra = [15360] ms

TTI insertion uncertainty = 2 ms

The overall delay measured when DRX cycle length is 640 ms shall be less than a total of X ms, where

- X = 51202 for UE supporting power class 1,
- X = 30722 for UE supporting power class 2 or 3,
- X = [30722] for UE supporting power class 4,

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

## 7.6.1.3 NR SA FR2 event-triggered reporting with gap in non-DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are missing.
- -Connection diagrams are missing.
- Some parameters are TBD
- Test tolerance is missing.

## 7.6.1.3.1 Test purpose

The purpose of this test is to verify UE's ability to make a correct reporting of an event with gaps under non-DRX within intra-frequency cell search with gaps requirements.

## 7.6.1.3.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

#### 7.6.1.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.6.1.0.1.

The normative reference for this requirement is TS 38.133 [6] clause A.7.6.1.3.

## 7.6.1.3.4 Test description

#### 7.6.1.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.6.1.3.4.1-1.

Table 7.6.1.3.4.1-1: Supported test configurations for NR SA FR2 event-triggered reporting with gap in non-DRX

Test Case ID	Description			
7.6.1.3-1	120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode			
7.6.1.3-2	240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode			
Note: The	UE is only required to be tested in one of the supported test configurations.			

Configure the test equipment and the DUT according to the parameters in Table 7.6.1.3.4.1-2.

Table 7.6.1.3.4.1-2: Initial conditions for NR SA FR2 event-triggered reporting with gap in non-DRX

Parameter		Value	Comment			
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	As specified in Annex E, table E.5-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.				
Channel	As specified	by the test configuration selected fr	rom Table 6.6.1.3.4.1-1.			
bandwidth						
Propagation	AWGN		As specified in Annex C.2.2.			
conditions						
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	A.3.TBD				
Exceptions to	N/A					
connection						
diagram						

- 1. The general test parameter settings are set up according to Table 7.6.1.3.4.1-3.
- 2. Message contents are defined in clause 7.6.1.3.4.3.
- 3. There is one NR carrier and two cells specified in the test. Cell 1 is the cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 7.6.1.3.4.1-3: General test parameters for NR SA FR2 event-triggered reporting with gap in non-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.
Gap type		1, 2	Per-UE gaps	
Measurement gap repitition	ms	1, 2	40	
periodicity		1, 2		
Measurement gap length	ms	1, 2	6	
Measurement gap offset	ms	1, 2	39	
SMTC configuration		1, 2	SMTC.1	
CSI-RS parameters		1, 2	CSI-RS.3.2 TDD	
A3-Offset	dB	1, 2	-6	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	OFF	
Time offset between Cell 1 and		1, 2	3 μs	Synchronous EN-DC
Cell 2		1, 2		
Time offset between Cell 2 and		1, 2	3 μs	Synchronous cells
Cell 3		1, 4		
T1	S	1, 2	5	
T2	S	1, 2	5	

#### 7.6.1.3.4.2 Test procedure

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 general and cell specific test parameters for PCell and neighbour cell are given in Table 7.6.1.3.4.1-3, Table 7.6.1.3.5-1 and Tavke 7.6.1.3.5-2, respectively. 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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 7.6.1.3.5-1 and Table 7.6.1.3.5-2. T1 starts.
- 3. SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 7.6.1.3.5-1 and Table 7.6.1.3.5-2.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than X ms then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one. Where X is
  - X = 3202 for UE supporting power class 1,
  - X = 1922 ms for UE supporting power class 2 or 3,
  - X = [1922] ms for UE supporting power class 4,

-

- 7. After the SS receive the MeasurementReport message in step 6) or when T2 expires, the SS shall transmit RRCRelease message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5),
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.

#### 7.6.1.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 7.6.1.3.4.3-1: Common Exception messages for NR SA FR1 event-triggered reporting with gap in non-DRX

Default Message Contents					
Common contents of system information blocks exceptions					
Default RRC messages and information elements contents exceptions	FFS				

#### 7.6.1.3.5 Test requirement

Table 7.6.1.3.4.1-3 and Table 7.6.1.3.5-1 define the primary level settings including test tolerances for NR SA FR1 event-triggered reporting with gap in non-DRX test.

Table 7.6.1.3.5-1: NR Cell specific test parameters for NR SA FR1 event-triggered reporting with gap in non-DRX

Parameter	Unit	Config	Cell 1	Cell 2	
			T1 T2	T1 T2	
TDD configuration		1, 2	TDDConf.3.1	TDDConf.3.1	
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					
RLM-RS		1, 2	CSI-RS	CSI-RS	
PDSCH RMC		1, 2	SR.3.1 TDD	N/A	
configuration					
RMSI CORESET		1, 2	CR.3.1 TDD	CR.3.1 TDD	
RMC					
configuration					
Dedicated		1, 2	CCR.3.1 TDD	CCR.3.1 TDD	
CORESET RMC					
configuration					
TRS configuration		1, 2	TRS.2.1 TDD	N/A	
TCI state		1, 2	CSI-RS.Config.0	N/A	
OCNG Patterns		1, 2	OP.1 OP.1		
SSB		1	SSB.1 FR2 SSB.1 FR2		
		2	SSB.2 FR2	SSB.2 FR2	
Propagation	•	1, 2	AWGN		
Condition					

7.6.1.3.5-1: 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 2		Cell 3	
			T1	T2	T1	T2	
AoA setup		1, 2		A.	3.8.x		
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1, 2	1, 2 TBD TBD TBD				
$N_{oc}$ Note 2	dBm/15 KHz	1, 2	TBD				
Note 2	dBm/SCS	SCS 1		T	TBD		
1 voc		2	TBD				
SS-RSRP	dBm/SCS	1	TBD TBD TBD		TBD		
		<u>2</u>	TBD	TBD	TBD	TBD	
$\hat{E}_s/N_{oc}$	dB	1, 2	TBD	TBD	TBD	TBD	
Io	dBm/95.04MHz	1, 2	TI	TBD TBD			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

The overall delays measured is defined as the time from the beginning of time period T2, to the moment the UE send one Event A3 triggered measurement report.

The overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

The overall delays measured test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

Measurement reporting delay =  $T_{identify\_intra\_without\_index}$ 

 $T_{identify\_intra\_without\_index} = T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}$ 

For UE supporting power class 1, Tpss/sss\_sync\_intr = 1600 ms, Tssb\_measurement\_period\_intra = 1600 ms,

For UE supporting power class 2 or 3, Tpss/sss\_sync\_intr = 960 ms, Tssb\_measurement\_period\_intra = 960 ms

For IE supporting power class 4, T<sub>PSS/SSS</sub> sync intr = [960] ms, T<sub>SSB</sub> measurement period intra= [960] ms

TTI insertion uncertainty = 2 ms

The overall delays measured shall be less than a total of X+2 ms in this test case (note: this gives a total of 800 ms for measurement reporting delay plus 2 ms for TTI insertion uncertainty), where

X = 3200 for UE supporting power class 1,

X = 1920 for UE supporting power class 2 or 3,

X = [1920] for UE supporting power class 4

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

## 7.6.1.4 NR SA FR2 event-triggered reporting with gap in DRX

Editor's note: This test case is incomplete. The following aspects are either missing or TBD

- Message contents are missing.
- -Connection diagrams are missing.
- Some parameters are TBD
- Test tolerance is missing.

## 7.6.1.4.1 Test purpose

The purpose of this test is to verify UE's ability to make a correct reporting of an event with gaps under DRX within intra-frequency cell search with gaps requirements.

#### 7.6.1.4.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

## 7.6.1.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.6.1.0.2.

The normative reference for this requirement is TS 38.133 [6] clause A.7.6.1.4.

#### 7.6.1.4.4 Test description

#### 7.6.1.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.6.1.4.4.1-1.

Table 7.6.1.4.4.1-1: Supported test configurations for NR SA FR2 event-triggered reporting with gap in DRX

Test Case ID	Description			
7.6.1.4-1	120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode			
7.6.1.4-2	240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode			
Note: The U	JE is only required to be tested in one of the supported test configurations.			

Configure the test equipment and the DUT according to the parameters in Table 7.6.1.4.4.1-2.

Table 7.6.1.4.4.1-2: Initial conditions for NR SA FR2 event-triggered reporting with gap in DRX

Parameter		Value	Comment		
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified	in Annex E, table E.5-1 and TS 38.5	508-1 [14] clause 4.3.1 and 4.4.2.		
Channel	As specified	by the test configuration selected fr	om Table 7.6.1.4.4.1-1.		
bandwidth					
Propagation	AWGN		As specified in Annex C.2.2.		
conditions					
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.TBD			
Exceptions to	N/A				
connection					
diagram					

- 1. The general test parameter settings are set up according to Table 7.6.1.4.4.1-3.
- 2. Message contents are defined in clause 7.6.1.4.4.3.
- 3. There is one NR carrier and two cells specified in the test. Cell 1 is the cell used for connection setup with the power level set according to Annex C.1.1 and C.1.2 for this test.

Table 7.6.1.4.4.1-3: General test parameters for NR SA FR2 event-triggered reporting with gap in DRX

Parameter	Unit	Config	Value		Comment
		_	Test 1	Test 2	
Active cell		1, 2	PCell (Ce	ll 1)	
Neighbour cell		1, 2	Cell 2		Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2		One TDD carrier frequency is used for the NR cells.
Gap type		1, 2	Per-UE ga	aps	
Measurement gap repitition periodicity	ms	1, 2	40		
Measurement gap length	ms	1, 2	6		
Measurement gap offset	ms	1, 2	39		
SMTC configuration		1, 2	SMTC.1		
CSI-RS parameters		1, 2	CSI-RS.3	.2 TDD	
A3-Offset	dB	1, 2	-6		
CP length		1, 2	Normal		
Hysteresis	dB	1, 2	0		
Time To Trigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	ODRX.1	DRX.2	DRX related parameters are defined in Table A.7.6.1.2.1-5
Time offset between Cell 1 and Cell 2		1, 2	3 μs		Synchronous EN-DC
Time offset between Cell 2 and Cell 3		1, 2	3 μs		Synchronous cells
T1	S	1, 2	5		
T2	S	1, 2	10	TBD	

#### 7.6.1.4.4.2 Test procedure

Two cells are deployed in the test, which are FR2 PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The general and cell specific test parameters for PCell and neighbour cell are given in Table 7.6.1.4.4.1-3 and Table 7.6.1.4.4.2-1, respectively. 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.

In Test 1 when DRX cycle = 40 ms is used, UE needs to be provided at least once every 500 ms with new Timing Advance Command MAC control element to restart the Timer Alignment Timer to keep the UE uplink time alignment. Furthermore, the UE is allocated with PUSCH resource at every DRX cycle. In Test 2 when DRX = 640 ms is used, the uplink time alignment is not maintained and the UE needs to use RACH to obtain uplink allocation for measurement reporting.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 7.6.1.4.5-1 and Table 7.6.1.4.5-2. T1 starts.
- 3. SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 7.6.1.4.5-1 and Table 7.6.1.4.5-2.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than X ms for Test 1 or less than Y ms for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one. Where X and Y is
  - X = 7202, Y = 51202 for UE supporting power class 1,
  - X = 4322, Y = 30722 for UE supporting power class 2 and 3,
  - X = TBD, Y = [30722] for UE supporting power class 4,
- 7. After the SS receive the *MeasurementReport* message in step 6) or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a Paging message (including PagingRecord with UE-Identity) for the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5 (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5),
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR, Connected without release On according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 7.6.1.4.4.1-3 as appropriate.

#### 7.6.1.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 7.6.1.4.4.3-1: Common Exception messages for NR SA FR2 event-triggered reporting with gap in DRX

Default Message Contents					
Common contents of system information					
blocks exceptions					
Default RRC messages and information	FFS				
elements contents exceptions					

## 7.6.1.4.5 Test requirement

Table 7.6.1.4.4.1-3, Table 7.6.1.4.5-1 and Table 7.6.1.4.5-2 define the primary level settings including test tolerances for NR SA FR1 event-triggered reporting with gap in DRX test.

Table 7.6.1.4.5-1: NR Cell specific test parameters for NR SA FR2 event-triggered reporting with gap in DRX

Parameter	Unit	Config	Cell 1	Cell 2	
			T1 T2	T1 T2	
TDD configuration		1, 2	TDDConf.3.1	TDDConf.3.1	
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					
RLM-RS		1, 2	SCSI-RS	SSB	
PDSCH RMC		1, 2	SR.3.1 TDD	N/A	
configuration					
RMSI CORESET		1, 2	CR.3.1 TDD	CR.3.1 TDD	
RMC					
configuration					
Dedicated		1, 2	CCR.3.1 TDD	CCR.3.1 TDD	
CORESET RMC					
configuration					
TRS configuration		1, 2	TRS.2.1 TDD	N/A	
TCI state		1, 2	CSI-RS.Config.0 N/A		
OCNG Patterns		1, 2	OP.1 OP.1		
SSB		1	SSB.1 FR2 SSB.1 FR2		
		2	SSB.2 FR2	SSB.2 FR2	
Propagation		1, 2	AWGN		
Condition					

Table 7.6.1.4.5-2: NR OTA Cell specific test parameters for NR SA FR2 event-triggered reporting with gap in DRX

Parameter	Unit	Config	Cell 2		Се	II 3	
			T1	T2	T1	T2	
AoA setup		1, 2		A.	3.8.x		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2 TBD		TBD	TBD	TBD	
N <sub>oc Note 2</sub>	dBm/15 KHz	1, 2	TBD				
N dBm/SCS		1		TBD			
oc Note 2		2	TBD				
SS-RSRP	dBm/SCS	1	TBD TBD TBD TI		TBD		
		<u>2</u>	TBD	TBD	TBD	TBD	
$\hat{E}_s/N_{oc}$	dB	1, 2	TBD	TBD	TBD	TBD	
Io	dBm/95.04MHz	1, 2	TBD TBD			3D	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

In Test 1 when DRX cycle length = 40 ms is used, the overall delay measured is defined as the time from the beginning of time period T2, to the moment the UE send one Event A3 triggered measurement report on PUSCH.

In Test 2 when DRX cycle length = 640 ms is used, the overall delay measured is defined as the time from the beginning of time period T2, to the moment the UE starts to send preambles on the PRACH for Scheduling Request (SR) to obtain allocation to send the measurement report on PUSCH.

#### For both tests:

The overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays because of TTI insertion uncertainty of the measurement report in DCCH.

- NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.
- NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

The overall delay measured when DRX cycle length is 40 ms test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

 $Measurement\ reporting\ delay = T_{identify\_intra\_without\_index}$ 

 $T_{identify\_intra\_without\_index} = (T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}) \ ms$ 

For UE supporting power class 1, T<sub>PSS/SSS\_sync\_intra</sub> = 7200ms, T<sub>SSB\_measurement\_period\_intra</sub> = 7200 ms,

For UE supporting power class 2 or 3, T<sub>PSS/SSS\_sync\_intra</sub> = 2160 ms, T<sub>SSB\_measurement\_period\_intra</sub> = 2160 ms

For UE supporting power class 4, Tpss/sss\_sync\_intra = TBD ms, Tssb\_measurement\_period\_intra = TBD ms

TTI insertion uncertainty = 2 ms

The overall delay measured when DRX cycle length is 40 ms shall be less than a total of X ms, where X is

- X = 7202 for UE supporting power class 1,
- X = 4322 for UE supporting power class 2 or 3,

- X = TBD for UE supporting power class 4,

The overall delay measured when DRX cycle length is 640 ms test requirement is expressed as:

Overall delays measured = measurement reporting delay + TTI insertion uncertainty

 $Measurement \ reporting \ delay = T_{identify\_intra\_without\_index}$ 

```
T_{identify\_intra\_without\_index} = (T_{PSS/SSS\_sync\_intra} + T_{SSB\_measurement\_period\_intra}) ms
```

For UE supporting power class 1, Tpss/sss\_sync\_intra = 25600 ms, T ssb\_measurement\_period\_intra = 25600 ms,

For UE supporting power class 2 or 3, T<sub>PSS/SSS\_sync\_intra</sub> = 15360 ms, T<sub>SSB\_measurement\_period\_intra</sub> = 15360 ms

For UE supporting power class 4,  $T_{PSS/SSS\_sync\_intra} = [15360]$  ms,  $T_{SSB\_measurement\_period\_intra} = [15360]$  ms

TTI insertion uncertainty = 2 ms

The overall delay measured when DRX cycle length is 640 ms shall be less than a total of X ms, where

- X = 51202 for UE supporting power class 1,
- X = 30722 for UE supporting power class 2 or 3,
- X = [30722] for UE supporting power class 4,

For the test to pass, the total number of successful tests shall be more than 90% of the cases with a confidence level of 95%.

## 7.6.2 Inter-frequency measurements

## 7.6.2.0 Minimum conformance requirements for Inter-frequency measurements

Same as clause 5.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause 9.3.2, 9.3.4, 9.3.5, 9.3.6.3.

## 7.6.2.1 NR SA FR2-FR2 event-triggered reporting in non-DRX

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.
- Cell Configuration table in Annex A is undefined.
- Antenna diagram is TBD
- Message content is TBD
- Test procedure contains TBDs
- Minimum conformance requirements contain [] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)
- T2 is TBD (RAN4 Pending)

#### 7.6.2.1.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements.

## 7.6.2.1.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 7.6.2.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.7.6.2.1.

## 7.6.2.1.4 Test description

#### 7.6.2.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.6.2.1.4.1-1.

Table 7.6.2.1.4.1-1: NR FR2-FR2 event triggered reporting tests in non-DRX supported test configurations

Test Case ID	Description				
7.6.2.1-1	120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
Note 1: target NR cell has the same SCS, BW and duplex mode as NR serving cell					

Table 7.6.2.1.4.1-1: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Va	lue	Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	0	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	39	
SMTC-SSB parameters		Config 1	SSB.3 FR2		As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-15		
Hysteresis	dB	Config 1	0		
CP length		Config 1	Normal		
TimeToTrigger	S	Config 1	0		
Filter coefficient		Config 1	0		L3 filtering is not used
DRX		Config 1	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3μs		Synchronous cells.
T1	S	Config 1	5		
T2	s	Config 1	TBD	TBD	

Table 7.6.2.1.4-3: Test Environment parameters for SA inter-frequency event triggered reporting without SSB time index detection in non-DRX

Parameter	Value	Comment

Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.				
Test frequencies	As specified	As specified in Annex E, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.					
Channel bandwidth	As specified	As specified by the test configuration selected from Table 7.6.2.1.4.1-1.					
Propagation conditions	AWGN		As specified in Annex C.2.2.				
Connection Diagram	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.				
Diagram	DUT Part	TBD					
Exceptions to connection diagram	TBD						

- 1. Message contents are defined in clause 7.6.2.1.4.3.
- 2. There are two NR cells on two carriers specified in the test. Cell 1 is the cell used for connection setup and Cell 2 is a target cell on a different carrier than Cell 1. The power levels and settings for Cell 2 are set according to Annex C.1.2.

#### 7.6.2.1.4.2 Test procedure

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 TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

In test 1 measurement gap pattern configuration # 0 as defined in Table 7.6.2.1.4.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table 7.6.2.1.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 7.6.2.1.4.1-2. T1 starts.
- 3. The SS shall transmit an RRCReconfiguration message.
- ${\it 4. The UE shall transmit \it RRCReconfiguration Complete \it message.}$
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 7.6.2.1.4.1-2.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than TBD for Test 1 and TBD for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a *Paging* message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures

the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.), or:

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 7.6.2.1.4.1-2 as appropriate.

#### 7.6.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 7.6.2.1.4.3-1: Common Exception messages SA inter frequency event triggered reporting without SSB time index detection in non-DRX

Default Message Contents				
Common contents of system information				
blocks exceptions				
Default RRC messages and information	TBD			
elements contents exceptions				

#### 7.6.2.1.5 Test requirement

Table 7.6.2.1.5-1 defines the primary level settings including test tolerances for all tests.

Table 7.6.2.1.5-1: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter		Unit	Test	Ce	II 1	С	ell 1	
			configuratio n	T1	T2	T1	T2	
NR RF Channel Number			Config 1	,	<u>                                     </u>		2	
Duplex mode			Config 1	TE	TDD		TDD	
TDD configuration			Config 1	TDDConf.3.1		TDDConf.3.1		
BW <sub>channel</sub>		MHz	Config 1	100: N <sub>F</sub>	RB,c = 66	100: N <sub>RB,c</sub> = 66		
BWP BW	T	MHz	Config 1		RB,c = 66		$N_{RB,c} = 66$	
BWP configuration	Initial DL BWP				VP.0.1		N/A	
	Dedicated DL BWP		Config 1	DLBW	VP.1.1		N/A	
00110.5	Dedicated UL BWP			ULBW	VP.1.1	1	N/A	
OCNG Pattern A.3.2.1.1 (OP.	1)		Config 1	OF		C	)P.1	
PDSCH Refere measurement	channel		Config 1	SR.3.	1 TDD		-	
CORESET Re			Config 1	CR.3.	1 TDD		-	
SMTC configure in A.3.11.1 and	ration defined d A.3.11.2		Config 1	SM	ΓC.1	SN	/ITC.1	
PDSCH/PDCC spacing	H subcarrier	kHz	Config 1	12	20		120	
EPRE ratio of								
EPRE ratio of I to SSS								
DMRS	PBCH to PBCH							
to SSS	PDCCH DMRS							
EPRE ratio of PDCCH to PDCCH DMRS			Config 1	0		0		
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio of PDSCH to PDSCH								
EPRE ratio of to SSS(Note 1)	)							
	EPRE ratio of OCNG to OCNG DMRS (Note 1)							
UE orientation Angles of Arriv		degrees	Config 1	Within spherical coverage directions		Rx Beam Peak direction		
Relative difference arrival of cell 3	ence in angle of relative to cell	degrees	Config 1	N	IA	NA	{30, 60, 90, 120, 150}	
$N_{oc}^{ m Note2}$				-97.4		-111		
$N_{oc}^{ m Note2}$		Note5 dBm/S CS Note4	Config 1	-88.4		-102		
SS-RSRP Note 3	1	dBm/S CS Note5	Config 1	-87.7	-87.7	-Infinity	-88	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	Config 1	0.74	0.74	-Infinity	14	
$\hat{E}_s/N_{oc}$		dB	Config 1	0.74	0.74	-Infinity	14	
Io <sup>Note3</sup>		dBm/95 .04 MHz Note5	Config 1	-56.04	-56.04	-73.01	-58.84	
Propagation C	ondition	140160	Config 1		A	WGN	I	

Note 1: Note 2:	OCNG 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
	over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be
Note 3:	fulfilled. SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 6:	As observed with 0dBi gain antenna at the centre of the quiet zone

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90% with a confidence level of 95%.

In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## 7.6.2.2 NR SA FR2-FR2 event-triggered reporting in DRX

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.
- Cell Configuration table in Annex A is undefined.
- Antenna diagram is TBD
- Message content is TBD
- Minimum conformance requirements contain [] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)
- T2 is TBD (RAN4 Pending)

#### 7.6.2.2.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements.

#### 7.6.2.2.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 7.6.2.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.7.6.2.2.

7.6.2.2.4 Test description

7.6.2.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.6.2.2.4.1-1.

Table 7.6.2.2.4.1-1: NR FR2-FR2 event triggered reporting tests in DRX supported test configurations

Test Case ID	Description			
7.6.2.2-1	120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode			
Note 1: target NR cell has the same SCS, BW and duplex mode as NR serving cell				

Table 7.6.2.2.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Value				Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel Number		Config 1	1, 2			Two FR1 NR carrier frequencies is used.	
Active cell		Config 1	NR cell 1 (Pcell)			NR Cell 1 is on NR RF channel number 1.	
Neighbour cell		Config 1	NR ce	II 2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39 39				
SMTC-SSB parameters		Config 1	SSB.3	FR2			As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6				
Hysteresis	dB	Config 1	0				
CP length		Config 1	Norma	al			
TimeToTrigger	S	Config 1	0				
Filter coefficient		Config 1	0				L3 filtering is not used
DRX		Config 1	DRX .1	DRX .2	DRX .1	DRX .2	DRX is used
Time offset between serving and neighbour cells		Config 1	3µs			Synchronous cells.	
T1	S	Config 1	5				
T2	S	Config 1	TBD	TBD	TBD	TBD	

Table 7.6.2.2.4-3: Test Environment parameters for SA inter-frequency event triggered reporting without SSB time index detection in non-DRX

Parameter	Value		Comment			
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified in Annex E, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.					
Channel bandwidth	As specified by the test configuration selected from Table 7.6.2.2.4.1-1.					
Propagation conditions	AWGN		As specified in Annex C.2.2.			
	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.			

Connection Diagram	DUT Part	TBD	
Exceptions to connection diagram	TBD		

- 1. Message contents are defined in clause 7.6.2.2.4.3.
- 2. There are two NR cells on two carriers specified in the test. Cell 1 is the cell used for connection setup and Cell 2 is a target cell on a different carrier than Cell 1. The power levels and settings for Cell 2 are set according to Annex C.1.2.

## 7.6.2.2.4.2 Test procedure

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 TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 7.6.2.2.4.1-2 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 7.6.2.2.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 7.6.2.2.4.1-2. T1 starts.
- 3. The SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 7.6.2.2.4.1-2.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than TBD for Test 1 and TBD for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a *Paging* message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.), or:
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 7.6.2.2.4.1-2 as appropriate.

## 7.6.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 7.6.2.2.4.3-1: Common Exception messages SA inter frequency event triggered reporting without SSB time index detection in non-DRX

Default Message Contents				
Common contents of system information blocks exceptions				
Default RRC messages and information elements contents exceptions	TBD			

## 7.6.2.2.5 Test requirement

Table 7.6.2.2.5-1 defines the primary level settings including test tolerances for all tests.

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	Cell 1		Cell 2		
			configuratio n	T1	T2	T1	T2	
NR RF Channe	NR RF Channel Number		Config 1		1		2	
TDD configuration			Config 1	TDDC	TDDConf.3.1		TDDConf.3.1	
Duplex mode			Config 1		TDD		TDD	
BWchannel		MHz	Config 1	100: N <sub>RB,c</sub> = 66		100: N <sub>RB,c</sub> = 66		
BWP BW	T	MHz	Config 1	100: $N_{RB,c} = 66$		100: N <sub>RB,c</sub> = 66		
BWP configuration	Initial DL BWP				VP.0.1		I/A	
	Dedicated DL BWP		Config 1	DLBV	VP.1.1	N	I/A	
OCNIC Dattarra	Dedicated UL BWP		Config.4	ULBV	VP.1.1	N	I/A	
OCNG Pattern A.3.2.1.1 (OP.	1)		Config 1		P.1	0	P.1	
PDSCH Refere			Config 1	SR.3.	1 TDD		-	
CORESET Ref			Config 1	CR.3.	1 TDD		-	
SMTC configur in A.3.11.1 and			Config 1	SM	TC.1	SM	TC.1	
PDSCH/PDCC spacing	H subcarrier	kHz	Config 1	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 PDCCH to PDCCH DMRS  EPRE ratio of PDSCH DMRS to SSS			Config 1	0		0		
EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)								
UE orientation axis and TBD a		degrees	Config 1	NA		TBD		
arrival of cell 3	ence in angle of relative to cell	degrees	Config 1		IA	NA	TBD	
$N_{oc}^{ m Note2}$				-98		-98		
$N_{oc}^{}$ Note2		dBm/S CS Note4	Config 1	-89		-89		
SS-RSRP Note 3		dBm/S CS Note5	Config 1	-85	-85	-Infinity	-82	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	Config 1	4	4	-Infinity	7	
$\hat{E}_s/N_{oc}$		dB	Config 1	4	4	-Infinity	7	
Io <sup>Note3</sup>		dBm/95 .04 MHz Note5	Config 1	-57.55	-57.55	-Infinity	-56.00	
Propagation Co	ondition		Config 1		A	WGN		

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant
	over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be
	fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 6:	As observed with 0dBi gain antenna at the centre of the quiet zone

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# 7.6.2.3 NR SA FR2-FR2 event-triggered reporting in non-DRX with SSB time index detection

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.
- Cell Configuration table in Annex A is undefined.
- Antenna diagram is TBD
- Message content is TBD
- Minimum conformance requirements contain [ ] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)
- T2 is TBD (RAN4 Pending)

## 7.6.2.3.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements.

## 7.6.2.3.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

## 7.6.2.3.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.7.6.2.3.

## 7.6.2.3.4 Test description

#### 7.6.2.3.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.6.2.3.4.1-1.

Table 7.6.2.3.4.1-1: NR FR2-FR2 event triggered reporting tests in non-DRX with SSB time index detection supported test configurations

Test Case ID	Description
7.6.2.3-1	120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note 1: target N	R cell has the same SCS, BW and duplex mode as NR serving cell

Table 7.6.2.3.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Va	lue	Comment						
		configurati on	Test 1	Test 2							
NR RF Channel Number		Config 1	1, 2		1, 2		1, 2		1, 2		Two FR1 NR carrier frequencies is used
Active cell		Config 1	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.						
Neighbour cell		Config 1	NR cell 2		NR cell 2 is on NR RF channel number 2.						
Gap Pattern Id		Config 1	0 13		As specified in clause 9.1.2-1						
Measurement gap offset		Config 1	39	39							
SMTC-SSB parameters		Config 1	SSB.3 FR2		As specified in clause A.3.10.2						
A3-Offset	dB	Config 1	-6								
Hysteresis	dB	Config 1	0								
CP length		Config 1	Normal								
TimeToTrigger	S	Config 1	0								
Filter coefficient		Config 1	0		L3 filtering is not used						
DRX		Config 1	OFF		DRX is not used						
Time offset between serving and neighbour cells		Config 1	3μs		Synchronous cells						
T1	S	Config 1	5								
T2	S	Config 1	TBD	TBD							

Table 7.6.2.3.4-3: Test Environment parameters for SA inter-frequency event triggered reporting with SSB time index detection in non-DRX

Parameter	Value		Comment			
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	in Annex E, Table E.2-1 and TS 38	3.508-1 [14] clause 4.3.1 and 4.4.2.			
Channel bandwidth	As specified	by the test configuration selected f	from Table 7.6.2.3.4.1-1.			
Propagation conditions	AWGN		As specified in Annex C.2.2.			
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part TBD		1			
Exceptions to connection diagram	TBD	,				

- 1. Message contents are defined in clause 7.6.2.3.4.3.
- 2. There are two NR cells on two carriers specified in the test. Cell 1 is the cell used for connection setup and Cell 2 is a target cell on a different carrier than Cell 1. The power levels and settings for Cell 2 are set according to Annex C.1.2.

#### 7.6.2.3.4.2 Test procedure

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 TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

In test 1 measurement gap pattern configuration # 0 as defined in Table 7.6.2.3.4.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table 7.6.2.3.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 7.6.2.3.4.1-2. T1 starts.
- 3. The SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit *RRCReconfigurationComplete* message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 7.6.2.3.4.1-2.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than TBD for Test 1 and TBD for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a *Paging* message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without

release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.), or:

- switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 7.6.2.3.4.1-2 as appropriate.

## TBD7.6.2.3.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 7.6.2.3.4.3-1: Common Exception messages SA inter frequency event triggered reporting with SSB time index detection in non-DRX

Default Message Contents						
Common contents of system information blocks exceptions						
Default RRC messages and information elements contents exceptions	TBD					

#### 7.6.2.3.5 Test requirement

Table 7.6.2.3.5-1 defines the primary level settings including test tolerances for all tests.

Table 7.6.2.3.5-1: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter		Unit	Test	Cell 1 Cell 2			ell 2
			configuratio n	T1	T2	T1	T2
NR RF Channel Number			Config 1		1	2	
Duplex mode			Config 1	TE	DD	TDD	
TDD configura	tion		Config 1		TDDConf.3.1		onf.3.1
BW <sub>channel</sub>		MHz	Config 1		RB,c = 66		RB,c = 66
BWP BW		MHz	Config 1		RB,c = 66		<sub>RB,c</sub> = 66
BWP configuration	Initial DL BWP			DLBWP.0.1			I/A
	Dedicated DL BWP		Config 1	DLBW	/P.1.1	N	I/A
	Dedicated UL BWP				/P.1.1		I/A
OCNG Pattern A.3.2.1.1 (OP.	1)		Config 1	OF	P.1 	O	P.1
PDSCH Refere measurement	channel		Config 1	SR.3.	1 TDD		-
CORESET Ref Channel			Config 1	CR.3.	1 TDD		-
SMTC configur in A.3.11.1 and			Config 1	SM	ΓC.1	SM	TC.1
PDSCH/PDCC spacing		kHz	Config 1	12	20	1	20
EPRE ratio of I	PSS to SSS						
EPRE ratio of I	PBCH DMRS		-				
	EPRE ratio of PBCH to PBCH						
	EPRE ratio of PDCCH DMRS						
EPRE ratio of I	3		Config 1	(	)	0	
EPRE ratio of I to SSS							
EPRE ratio of I PDSCH							
EPRE ratio of 0 to SSS(Note 1)	)						
EPRE ratio of 0	(Note 1)						
UE orientation axis and TBD a	axis	degrees	Config 1		IA		BD
Relative differe arrival of cell 3 2	ence in angle of relative to cell	degrees	Config 1	N	IA	NA	TBD
$N_{oc}^{Note2}$		dBm/15 kHz Note5		-9	98	-98	
$N_{oc}^{ m Note2}$	$N_{oc}$ Note2		Config 1	-89		-89	
SS-RSRP Note 3	1	CS Note4 dBm/S	Config 1	05 05		-Infinity	-82
00-NORF 1910 0		CS Note5	Config 1	-85	-85	-inilility	-02
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		Config 1	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$		dB	Config 1	4	4	-Infinity	7
Io <sup>Note3</sup>		dBm/95 .04 MHz Note5	Config 1	-57.55	-57.55	-Infinity	-56.00
Propagation Co	ondition	140163	Config 1		ıA	WGN	
,				AVVGN			

Note 1:	OCNG 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
	over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be
	fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 6:	As observed with 0dBi gain antenna at the centre of the quiet zone

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# 7.6.2.4 NR SA FR2-FR2 event-triggered reporting in DRX with SSB time index detection

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.
- Cell Configuration table in Annex A is undefined.
- Antenna diagram is TBD
- Message content is TBD
- Minimum conformance requirements contain [ ] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)
- T2 is TBD (RAN4 Pending)

#### 7.6.2.4.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements.

#### 7.6.2.4.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 7.6.2.4.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.7.6.2.4.

7.6.2.4.4 Test description

7.6.2.4.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.6.2.4.4.1-1.

Table 7.6.2.4.4.1-1: NR FR2-FR2 event triggered reporting tests in DRX with SSB time index detection supported test configurations

Test Case ID Description						
7.6.2.4-1	120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode					
Note 1: target NR cell has the same SCS, BW and duplex mode as NR serving cell						

Table 7.6.2.4.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test		Va	lue		Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel Number		Config 1	1, 2				Two FR1 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)				NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR ce	II 2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39		39		
SMTC-SSB parameters		Config 1	SSB.3	FR2			As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6				
Hysteresis	dB	Config 1	0				
CP length		Config 1	Norma	ıl			
TimeToTrigger	S	Config 1	0				
Filter coefficient		Config 1	0	0			L3 filtering is not used
DRX		Config 1	DRX         DRX         DRX         DRX           .1         .2         .1         .2				DRX is used
Time offset between serving and neighbour cells		Config 1	3µs			Synchronous cells.	
T1	S	Config 1	5				
T2	S	Config 1	TBD	TBD	TBD	TBD	

Table 7.6.2.4.4-3: Test Environment parameters for SA inter-frequency event triggered reporting with SSB time index detection in non-DRX

Parameter	Value		Comment						
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.						
Test frequencies	As specifie	As specified in Annex E, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.							
Channel bandwidth	As specifie	As specified by the test configuration selected from Table 7.6.2.4.4.1-1.							
Propagation conditions	AWGN		As specified in Annex C.2.2.						
	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.						

Connection Diagram	DUT Part	TBD	
Exceptions to	TBD		
connection			
diagram			

- 1. Message contents are defined in clause 7.6.2.4.4.3.
- 2. There are two NR cells on two carriers specified in the test. Cell 1 is the cell used for connection setup and Cell 2 is a target cell on a different carrier than Cell 1. The power levels and settings for Cell 2 are set according to Annex C.1.2.

#### 7.6.2.4.4.2 Test procedure

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 TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 7.6.2.4.4.1-2 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 7.6.2.4.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 7.6.2.4.4.1-2. T1 starts.
- 3. The SS shall transmit an *RRCReconfiguration* message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 7.6.2.4.4.1-2.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than TBD for Test 1 and TBD for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a *Paging* message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.), or:
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.

- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 7.6.2.4.4.1-2 as appropriate.

## TBD7.6.2.4.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause 4.6 with the following exceptions:

Table 7.6.2.4.4.3-1: Common Exception messages SA inter frequency event triggered reporting with SSB time index detection in non-DRX

Default Message Contents					
Common contents of system information blocks exceptions					
Default RRC messages and information elements contents exceptions	TBD				

## 7.6.2.4.5 Test requirement

Table 7.6.2.4.5-1 defines the primary level settings including test tolerances for all tests.

Table 7.6.2.4.5-1: Cell specific test parameters for CA inter-frequency event triggered reporting with SSB time index detection

Parameter		Unit Test		Cell 1		Cell 2	
			configuratio n	T1	T2	T1	T2
NR RF Channel Number			Config 1		1	2	
Duplex mode			Config 1	TDD		TDD	
TDD configuration			Config 1		TDDConf.3.1		onf.3.1
BWchannel		MHz	Config 1		RB,c = 66	100: N <sub>RB,c</sub> = 66	
BWP BW BWP	Initial DL	MHz	Config 1		100: N <sub>RB,c</sub> = 66 DLBWP.0.1		<sub>RB,c</sub> = 66 I/A
configuration	BWP		DLBWP.0.1			I/A I/A	
	Dedicated DL BWP Dedicated UL		Config 1	DLBV	VP.1.1	IN IN	I/A
OONO Dattam	BWP		Operfor 4		VP.1.1		I/A
OCNG Pattern A.3.2.1.1 (OP.	1)		Config 1	Oi	P.1	O	P.1
PDSCH Refere measurement	channel		Config 1	SR.3.	1 TDD		-
CORESET Re			Config 1	CR.3.	1 TDD		-
SMTC configured in A.3.11.1 and	d A.3.11.2		Config 1	SM	ΓC.1	SM	TC.1
PDSCH/PDCC spacing		kHz	Config 1	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)  UE orientation around TBD axis and TBD axis  Relative difference in angle of		degrees	Config 1  Config 1  Config 1	N	D IA	0 TBD NA TBD	
arrival of cell 3 $\frac{2}{N_{oc}}$ Note2		dBm/15 kHz Note5	Confin 4	-98		-98	
$N_{oc}^{}$ Note2		dBm/S CS Note4	Config 1		39	-89	
SS-RSRP Note 3	3	dBm/S CS Note5	Config 1	-85	-85	-Infinity	-82
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	Config 1	4	4	-Infinity	7
$\hat{E}_s/N_{oc}$		dB	Config 1	4	4	-Infinity	7
Io <sup>Note3</sup>		dBm/95 .04 MHz Note5	Config 1	-57.55	-57.55	-Infinity	-56.00
Propagation C	ondition		Config 1		A	WGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant
	over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be
	fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 6:	As observed with OdRi gain antenna at the centre of the guiet zone

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## 7.6.2.5 NR SA FR1-FR2 event-triggered reporting in non-DRX

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.
- Cell Configuration table in Annex A is undefined.
- Antenna diagram is TBD
- Message content is TBD
- Minimum conformance requirements contain [ ] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)
- T2 is TBD (RAN4 Pending)

#### 7.6.2.5.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements.

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7.6.2.5.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

7.6.2.5.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.7.6.2.5.

7.6.2.5.4 Test description

7.6.2.5.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.6.2.5.4.1-1.

Table 7.6.2.5.4.1-1: SA FR1-FR2 event triggered reporting tests in non-DRX supported test configurations

Test Case ID	Description of serving cell	Description of target cell			
7.6.2.5-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	120 kHz SSB			
7.6.2.5-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	SCS, 100MHz			
7.6.2.5-3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	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 7.6.2.5.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	nit Test		alue	Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1	, 2	Two NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1
Neighbour cell		Config 1,2,3	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39	39	
SMTC-SSB parameters on NR RF Channel 1		Config 1	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6		
Hysteresis	dB	Config 1,2,3	0		
a4-Threshold	dBm	Config 1,2,3	TBD		
CP length		Config 1,2,3	Normal		
TimeToTrigger	S	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs		Synchronous cells.
T1	s	Config 1,2,3	5		
T2	s	Config 1,2,3	TBD	TBD	

Table 7.6.2.5.4-3: Test Environment parameters for SA inter-frequency event triggered reporting with SSB time index detection in non-DRX

Parameter		Value	Comment	
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.	
Test frequencies	As specified in Annex E, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.			
Channel	As specified by the test configuration selected from Table 7.6.2.5.4.1-1.			
bandwidth				
Propagation	AWGN		As specified in Annex C.2.2.	
conditions				
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.	
Diagram	DUT Part	TBD		
Exceptions to	TBD			
connection				
diagram				

<sup>1.</sup> Message contents are defined in clause 7.6.2.5.4.3.

<sup>2.</sup> There are two NR cells on two carriers specified in the test. Cell 1 is the cell used for connection setup and Cell 2 is a target cell on a different carrier than Cell 1. The power levels and settings for Cell 2 are set according to Annex C.1.2.

#### 7.6.2.5.4.2 Test procedure

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 TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

In test 1 measurement gap pattern configuration # 0 as defined in Table 7.6.2.5.4.1-2 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 7.6.2.5.4.1-2 is provided for UE that support per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 7.6.2.5.4.1-2. T1 starts.
- 3. The SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 7.6.2.5.4.1-2.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than TBD for Test 1 and TBD for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a *Paging* message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.), or:
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 7.6.2.5.4.1-2 as appropriate.

#### TBD7.6.2.5.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 7.6.2.5.4.3-1: Common Exception messages SA inter frequency event triggered reporting without SSB time index detection in non-DRX

Default Message Contents			
Common contents of system information			
blocks exceptions			
Default RRC messages and information	TBD		
elements contents exceptions			

7.6.2.5.5 Test requirement

Table 7.6.2.5.5-1 defines the primary level settings including test tolerances for all tests.

Table 7.6.2.5.5-1: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter		Unit	Test	Cell 1	Cell 2	
			configuratio n	T1 T2	T1 T2	
NR RF Channel Number			Config 1,2,3	1	2	
Duplex mode			Config 1	FDD	TDD	
			Config 2,3	TDD	TDD	
TDD configura	tion		Config 1	Not Applicable	TDDConf.3.1	
			Config 2	TDDConf.1.1 TDDConf.2.1	TDDConf.3.1 TDDConf.3.1	
BW <sub>channel</sub>		MHz	Config 3 Config 1	10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66	
DVV channel		141112	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 BW		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	
DIMB	L w to		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	
	Dedicated DL BWP		Config 1,2,3	DLBWP.1.1	N/A	
	Dedicated UL BWP			ULBWP.1.1	N/A	
OCNG Pattern A.3.2.1.1 (OP.	1)		Config 1,2,3	OP.1	OP.1	
PDSCH Refere			Config 1	SR.1.1 FDD		
measurement	cnannei		Config 2	SR.1.1 TDD	<u> </u>	
			Config 3	SR2.1 TDD		
CORESET Ref	ference		Config 1	CR.1.1 FDD		
Channel			Config 2 Config 3	CR.1.1 TDD CR2.1 TDD	_	
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.2	SMTC.2	
			Config 2,3	SMTC.1	SMTC.1	
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15	120	
spacing			Config 3	30	120	
EPRE ratio of	PSS to SSS					
EPRE ratio of	PBCH DMRS					
to SSS	DDOLLA DDOLL					
DMRS	PBCH to PBCH					
	PDCCH DMRS					
EPRE ratio of I			Config 1,2,3	0	0	
EPRE ratio of I	PDSCH DMRS		, cog .,_,c	· ·	, and the second	
to SSS EPRE ratio of I	PDSCH to					
PDSCH EPRE ratio of OCNG DMRS						
	EPRE ratio of OCNG to					
	OCNG DMRS (Note 1) UE orientation around TBD		Canti -: 4 0 0	N I A	TDD	
axis and TBD axis		degrees	Config 1,2,3	NA	TBD	
Relative differe arrival of cell 3	ence in angle of	degrees	Config 1,2,3	NA	NA TBD	
2 dPm/15		dBm/15		NA	TBD	
$N_{oc}^{ m Note2}$		kHz Note5		INA	טטו	
$N_{oc}^{ m Note2}$		dBm/S	Config 1,2	NA	NA	
		CS Note4	Config 3	NA	NA	
SS-RSRP Note 3	}		Config 1,2	NA NA	TBD TBD	

	dBm/S CS Note5	Config 3	NA	NA	TBD	TBD
$\hat{E}_{s}/I_{ot}$	dB	Config 1,2,3	NA	NA	TBD	TBD
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	NA	NA	TBD	TBD
Io <sup>Note3</sup>	dBm/9. 36MHz	Config 1,2	NA	NA	-	-
	dBm/38 .16MHz	Config 3	NA	NA	ı	-
	dBm/95 .04 MHz Note5	Config 1,2,3	-	-	TBD	TBD
Propagation Condition		Config 1,2,3		A۱	WGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### 7.6.2.6 NR SA FR1-FR2 event-triggered reporting in DRX

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.
- Cell Configuration table in Annex A is undefined.
- Antenna diagram is TBD
- Message content is TBD
- Minimum conformance requirements contain [] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)
- T2 is TBD (RAN4 Pending)

#### 7.6.2.6.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements.

#### 7.6.2.6.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 7.6.2.6.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.7.6.2.6.

#### 7.6.2.6.4 Test description

#### 7.6.2.6.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.6.2.6.4.1-1.

Table 7.6.2.6.4.1-1: SA FR1-FR2 event triggered reporting tests in DRX supported test configurations

Test Case ID	Description of serving cell	Description of target cell			
7.6.2.6-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	120 kHz SSB SCS, 100MHz			
7.6.2.6-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	bandwidth, TDD duplex mode			
7.6.2.6-3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
Note 1: The UE is only required to be tested in one of the supported test configurations					
Note 2: target N	R cell has the same SCS, BW and duplex mode as NR serving cell				

Table 7.6.2.6.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection in DRX

Parameter	Unit	Test	Value			Comment	
		configurati	Test	Test Test Test Test			
		on	1	2	3	4	
NR RF Channel Number		Config 1,2,3		1,	, 2		Two NR carrier frequencies is used.
Active cell		Config 1,2,3	NR ce	II 1 (Pce	ell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR ce	II 2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39		39		
SMTC-SSB parameters on NR RF Channel 1		Config 1	SSB.1	FR1			As specified in clause A.3.10.1
		Config 2	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3	SSB.2	FR1			As specified in clause A.3.10.1
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3	FR2			As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6				
Hysteresis	dB	Config 1,2,3	0				
a4-Threshold	dBm	Config 1,2,3	TBD				
CP length		Config 1,2,3	Norma	al			
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX .1	DRX .2	DRX .1	DRX .2	DRX is used
Time offset between serving and neighbour cells		Config 1	3ms			Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.	
		Config 2,3	3µs				Synchronous cells.
T1	s	Config 1,2,3	5				
T2	S	Config 1,2,3	TBD		TBD		

Table 7.6.2.6.4-3: Test Environment parameters for SA inter-frequency event triggered reporting without SSB time index detection in DRX

Parameter	Value		Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, Table E.2-1 and TS 38	.508-1 [14] clause 4.3.1 and 4.4.2.
Channel bandwidth	As specified	by the test configuration selected fr	rom Table 7.6.2.6.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection Diagram	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.
3 3	DUT Part	TBD	
Exceptions to connection diagram	TBD		

- 1. Message contents are defined in clause 7.6.2.6.4.3.
- 2. There are two NR cells on two carriers specified in the test. Cell 1 is the cell used for connection setup and Cell 2 is a target cell on a different carrier than Cell 1. The power levels and settings for Cell 2 are set according to Annex C.1.2.

#### 7.6.2.6.4.2 Test procedure

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 TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 7.6.2.6.4.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table 7.6.2.6.4.1-2 is provided for UE that support per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

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.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 7.6.2.6.4.1-2. T1 starts.
- 3. The SS shall transmit an *RRCReconfiguration* message.
- 4. The UE shall transmit *RRCReconfigurationComplete* message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 7.6.2.6.4.1-2.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than TBD for Test 1 and TBD for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a *Paging* message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.), or:
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 7.6.2.6.4.1-2 as appropriate.

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#### TBD7.6.2.6.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 7.6.2.6.4.3-1: Common Exception messages SA inter frequency event triggered reporting without SSB time index detection in DRX

D	efault Message Contents
Common contents of system information	
blocks exceptions	
Default RRC messages and information	TBD
elements contents exceptions	

#### 7.6.2.6.5 Test requirement

Table 7.6.2.6.5-1 defines the primary level settings including test tolerances for all tests.

Table 7.6.2.6.5-1: 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		T2	T1	T2	
NR RF Channe	NR RF Channel Number		Config 1,2,3	1		2		
Duplex mode			Config 1	FD	D	TDD		
.,			Config 2,3	TD		TDD		
TDD configura	tion		Config 1	Not App	olicable	TDDConf.3.1		
			Config 2	TDDC		TDDConf.3.1		
			Config 3	TDDC			Conf.3.1	
BW <sub>channel</sub>		MHz	Config 1	10: N <sub>RE</sub>			I <sub>RB,c</sub> = 66	
			Config 2	10: N <sub>RE</sub>			I <sub>RB,c</sub> = 66	
BWP BW		MHz	Config 3 Config 1	40: N <sub>RB</sub> 10: N <sub>RE</sub>			I <sub>RB,c</sub> = 66 I <sub>RB,c</sub> = 66	
DVVI DVV		IVII IZ	Config 2	10: NR	8c = 52		$I_{RB,c} = 66$	
			Config 3	40: N <sub>RB</sub>	$_{c} = 106$		$I_{RB,c} = 66$	
BWP configuration	Initial DL BWP		3	DLBW			N/A	
Comiguration	Dedicated DL BWP		Config 1,2,3	DLBW	/P.1.1	ı	N/A	
	Dedicated UL BWP			ULBW	/P.1.1	ı	N/A	
OCNG Pattern A.3.2.1.1 (OP.	s defined in		Config 1,2,3	OF	P.1	С	P.1	
PDSCH Refere			Config 1	SR.1.	I FDD		-	
measurement	channel		Config 2	SR.1.1	I TDD			
			Config 3	SR2.1	TDD			
CORESET Re	ference		Config 1	CR.1.1 FDD		-		
Channel			Config 2		CR.1.1 TDD			
			Config 3	CR2.1	TDD			
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMT	C.2	SM	ITC.2	
			Config 2,3	SMT	C.1	SM	ITC.1	
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	1			120	
spacing	2001.000		Config 3	3	0		120	
EPRE ratio of								
EPRE ratio of I to SSS								
EPRE ratio of I	PBCH to PBCH							
EPRE ratio of I to SSS	PDCCH DMRS							
EPRE ratio of I				-			0	
PDCCH DMRS			Config 1,2,3	(	)		0	
	PDSCH DMRS							
to SSS EPRE ratio of I	PDSCH to							
PDSCH	DOONTO							
EPRE ratio of (	OCNG DMRS							
to SSS(Note 1)	to SSS(Note 1)							
EPRE ratio of								
OCNG DMRS (Note 1)			0		Δ.	_	'DD	
UE orientation around TBD axis and TBD axis		degrees	Config 1,2,3	N	A	1	BD	
	Relative difference in angle of		Config 1,2,3	N	A	NA	TBD	
arrival of cell 3		degrees	001mg 1,2,0	,3 NA		147	100	
$N_{oc}$ Note2		dBm/15 kHz		N	A	T	BD	
		Note5	0 " 1 -		Δ.	_		
$N_{oc}^{ m Note2}$		dBm/S	Config 1,2	N			BD	
		CS Note4	Config 3	N	A		BD	
SS-RSRP Note 3	-		Config 1,2	NA	NA	TBD	TBD	

	dBm/S CS Note5	Config 3	NA	NA	TBD	TBD
$\hat{E}_{s}/I_{ot}$	dB	Config 1,2,3	NA	NA	TBD	TBD
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	NA	NA	TBD	TBD
Io <sup>Note3</sup>	dBm/9. 36MHz	Config 1,2	NA	NA	-	-
	dBm/38 .16MHz	Config 3	NA	NA	ı	-
	dBm/95 .04 MHz Note5	Config 1,2,3	-	-	TBD	TBD
Propagation Condition		Config 1,2,3		A۱	WGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the guiet zone

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# 7.6.2.7 NR SA FR1-FR2 event-triggered reporting in non-DRX with SSB time index detection

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.
- Cell Configuration table in Annex A is undefined.
- Antenna diagram is TBD

- Message content is TBD
- Minimum conformance requirements contain [] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)
- T2 is TBD (RAN4 Pending)

#### 7.6.2.7.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements.

#### 7.6.2.7.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 7.6.2.7.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.7.6.2.7.

#### 7.6.2.7.4 Test description

#### 7.6.2.7.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.6.2.7.4.1-1.

Table 7.6.2.7.4.1-1: SA FR1-FR2 event triggered reporting tests in non-DRX with SSB time index detection supported test configurations

Test Case ID	Description of serving cell	Description of target cell				
7.6.2.7-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	120 kHz SSB				
7.6.2.7-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	SCS, 100MHz				
7.6.2.7-3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	bandwidth, TDD				
		duplex mode				
Note 1: The UE is only required to be tested in one of the supported test configurations						
Note 2: target NI	R cell has the same SCS. BW and duplex mode as NR serving cell	ļ				

Table 7.6.2.7.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection in non-DRX

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1	, 2	Two NR carrier frequencies is used
Active cell		Config 1,2,3	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	13	As specified in clause 9.1.2-1
Measurement gap offset		Config 1,2,3	39	39	
SMTC-SSB parameters on NR RF Channel 1		Config 1	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6		
Hysteresis	dB	Config 1,2,3	0		
a4-Threshold	dBm	Config 1,2,3,4,5,6	TBD		
CP length		Config 1,2,3	Normal		
TimeToTrigger	S	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs		Synchronous cells
T1	S	Config 1,2,3	5		
T2	s	Config 1,2,3	TBD	TBD	

Table 7.6.2.6.4-3: Test Environment parameters for SA inter-frequency event triggered reporting with SSB time index detection in non-DRX

Parameter		Value	Comment
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.
Test frequencies	As specified	in Annex E, Table E.2-1 and TS 38	.508-1 [14] clause 4.3.1 and 4.4.2.
Channel bandwidth	As specified	by the test configuration selected fr	rom Table 7.6.2.7.4.1-1.
Propagation conditions	AWGN		As specified in Annex C.2.2.
Connection	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.
Diagram	DUT Part	TBD	
Exceptions to connection diagram	TBD	,	

1. Message contents are defined in clause 7.6.2.7.4.3.

2. There are two NR cells on two carriers specified in the test. Cell 1 is the cell used for connection setup and Cell 2 is a target cell on a different carrier than Cell 1. The power levels and settings for Cell 2 are set according to Annex C.1.2.

#### 7.6.2.7.4.2 Test procedure

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 TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

In test 1 measurement gap pattern configuration # 0 as defined in Table 7.6.2.7.4.1-2 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 7.6.2.7.4.1-2 is provided for UE that support per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 7.6.2.7.4.1-2. T1 starts.
- 3. The SS shall transmit an *RRCReconfiguration* message.
- 4. The UE shall transmit *RRCReconfigurationComplete* message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 7.6.2.7.4.1-2.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than TBD for Test 1 and TBD for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a *Paging* message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.), or:
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 7.6.2.7.4.1-2 as appropriate.

#### 7.6.2.7.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 7.6.2.7.4.3-1: Common Exception messages SA inter frequency event triggered reporting with SSB time index detection in non-DRX

Default Message Contents				
Common contents of system information blocks exceptions				
Default RRC messages and information elements contents exceptions	TBD			

#### 7.6.2.7.5 Test requirement

Table 7.6.2.7.5-1 defines the primary level settings including test tolerances for all tests.

Table 7.6.2.7.5-1: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Para	Parameter		Test	Cell 1	Cell 2
			configuratio n	T1 T2	T1 T2
NR RF Channe	el Number		Config 1,2,3	1	2
Duplex mode			Config 1	FDD	TDD
			Config 2,3	TDD	TDD
TDD configura	tion		Config 1	Not Applicable	TDDConf.3.1
			Config 2	TDDConf.1.1	TDDConf.3.1
BW <sub>channel</sub>		MHz	Config 3 Config 1	TDDConf.2.1 10: N <sub>RB,c</sub> = 52	TDDConf.3.1 100: N <sub>RB,c</sub> = 66
D v v cnannei		IVII IZ	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 BW		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
	T		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
	Dedicated DL BWP		Config 1,2,3	DLBWP.1.1	N/A
	Dedicated UL BWP			ULBWP.1.1	N/A
OCNG Pattern A.3.2.1.1 (OP.	1)		Config 1,2,3	OP.1	OP.1
PDSCH Refere			Config 1	SR.1.1 FDD	-
measurement	channel		Config 2	SR.1.1 TDD	
			Config 3	SR2.1 TDD	
CORESET Re	ference		Config 1	CR.1.1 FDD	
Channel			Config 2	CR.1.1 TDD	
CMTC configur	nation defined		Config 3	CR2.1 TDD	
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.2	SMTC.2
			Config 2,3	SMTC.1	SMTC.1
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15	120
spacing EPRE ratio of	DSS to SSS		Config 3	30	120
EPRE ratio of to SSS	PBCH DMRS				
	PBCH to PBCH				
DMRS	I BOIT TO I BOIT				
	PDCCH DMRS				
EPRE ratio of PDCCH DMRS			Config 1,2,3	0	0
	PDSCH DMRS				
EPRE ratio of PDSCH	PDSCH to				
EPRE ratio of to SSS(Note 1					
EPRE ratio of	OCNG to				
OCNG DMRS	· /		Config 1,2,3	NA	TBD
UE orientation around TBD axis and TBD axis		Joining 1,2,3	1 1/7		
Relative difference in angle of arrival of cell 3 relative to cell degrees		degrees	Config 1,2,3	NA	NA TBD
2				1 11	
$N_{oc}^{}$ Note2		dBm/15 kHz		NA	NA
A7 Note2		Note5 dBm/S	Config 1,2	NA	NA
$N_{oc}^{$		CS Note4	Config 3	NA NA	NA NA
SS-RSRP Note 3	3	110104	Config 1,2	NA NA	TBD TBD
- •			-,- ي	1	

	dBm/S CS Note5	Config 3	NA	NA	TBD	TBD
$\hat{E}_s/I_{ot}$	dB	Config 1,2,3	NA	NA	TBD	TBD
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	NA	NA	TBD	TBD
Io <sup>Note3</sup>	dBm/9. 36MHz	Config 1,2	NA	NA	-	-
	dBm/38 .16MHz	Config 3	NA	NA	ı	-
	dBm/95 .04 MHz Note5	Config 1,2,3	-	-	TBD	TBD
Propagation Condition		Config 1,2,3		A\	WGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# 7.6.2.8 NR SA FR1-FR2 event-triggered reporting in DRX with SSB time index detection

Editor's note: This test case is incomplete. The following aspects are either missing or not yet determined:

- The Test tolerances and Test system uncertainties applicable to this test are undefined.
- Cell Configuration table in Annex A is undefined.
- Antenna diagram is TBD
- Message content is TBD
- Minimum conformance requirements contain [] and TBDs (RAN4 Pending)
- Test requirement contains TBDs (RAN4 Pending)
- Initial conditions contain TBDs (RAN4 Pending)
- T2 is TBD (RAN4 Pending)

#### 7.6.2.8.1 Test purpose

The purpose of this test is to verify that the UE makes correct reporting of an event within inter-frequency cell search requirements.

#### 7.6.2.8.2 Test applicability

This test applies to all types of NR UE from Release 15 onwards.

#### 7.6.2.8.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 7.6.2.0.

The normative reference for this requirement is TS 38.133 [6] clause A.7.6.2.8.

#### 7.6.2.8.4 Test description

#### 7.6.2.8.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.6.2.8.4.1-1.

Table 7.6.2.8.4.1-1: SA FR1-FR2 event triggered reporting tests in DRX with SSB time index detection supported test configurations

Test Case ID	Description of serving cell	Description of target cell
7.6.2.8-1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	120 kHz SSB
7.6.2.8-2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	SCS, 100MHz
7.6.2.8-3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	bandwidth, TDD duplex mode
Note 1: The UE Note 2: target N		

Table 7.6.2.8.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection in DRX

Parameter	Unit	Test		Va	lue		Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel Number		Config 1,2,3		1,	, 2		Two NR carrier frequencies is used.
Active cell		Config 1,2,3	NR ce	II 1 (Pce	ell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR ce	II 2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39		39		
SMTC-SSB parameters on NR RF Channel 1		Config 1	SSB.1	FR1			As specified in clause A.3.10.1
		Config 2	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3	SSB.2	FR1			As specified in clause A.3.10.1
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3	FR2			As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6				
Hysteresis	dB	Config 1,2,3	0				
a4-Threshold	dBm	Config 1,2,3	TBD				
CP length		Config 1,2,3	Norma	al			
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX .1	DRX .2	DRX .1	DRX .2	DRX is used
Time offset between serving and neighbour cells		Config 1	3ms			Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.	
		Config 2,3	3µs				Synchronous cells.
T1	S	Config 1,2,3	5				
T2	S	Config 1,2,3	TBD		TBD		

Table 7.6.2.8.4-3: Test Environment parameters for SA inter-frequency event triggered reporting with SSB time index detection in DRX

Parameter	Value		Comment				
Test environment	NC		As specified in TS 38.508-1 [14] clause 4.1.				
Test frequencies	As specified in Annex E, Table E.2-1 and TS 38.508-1 [14] clause 4.3.1 and 4.4.2.						
Channel bandwidth	As specified by the test configuration selected from Table 7.6.2.8.4.1-1.						
Propagation conditions	AWGN		As specified in Annex C.2.2.				
Connection Diagram	TE Part	TBD	As specified in TS 38.508-1 [14] Annex A.				
	DUT Part	TBD					
Exceptions to connection diagram	TBD						

- 1. Message contents are defined in clause 7.6.2.8.4.3.
- 2. There are two NR cells on two carriers specified in the test. Cell 1 is the cell used for connection setup and Cell 2 is a target cell on a different carrier than Cell 1. The power levels and settings for Cell 2 are set according to Annex C.1.2.

#### 7.6.2.8.4.2 Test procedure

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. TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

In test 1&2 measurement gap pattern configuration # 0 as defined in Table 7.6.2.8.4.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table 7.6.2.8.4.1-2 is provided for UE that support per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

- 1. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 2. Set the parameters according to T1 in Table 7.6.2.8.4.1-2. T1 starts.
- 3. The SS shall transmit an RRCReconfiguration message.
- 4. The UE shall transmit RRCReconfigurationComplete message.
- 5. When T1 expires, the SS shall switch the power setting from T1 to T2 as specified in Table 7.6.2.8.4.1-2.
- 6. UE shall transmit a *MeasurementReport* message triggered by Event A3. If the overall delays measured from the beginning of time period T2 is less than TBD for Test 1 and TBD for Test 2 then the number of successful tests is increased by one. If the UE fails to report the event within the overall delays measured requirement then the number of failure tests is increased by one.
- 7. After the SS receives the *MeasurementReport* message in step 6 or when T2 expires, the SS shall transmit *RRCRelease* message to release the RRC connection which includes the release of the established radio bearers as well as all radio resources.
- 8. Set Cell 2 physical cell identity = ((current cell 2 physical cell identity + 1) mod 14 + 2) for next iteration of the test procedure loop.]
- 9. After the RRC connection release, the SS:
  - transmits in Cell 1 a *Paging* message (including PagingRecord with ue-Identity) for the UE and ensures the UE in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5. (if the paging fails, switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.),
  - switches off and on the UE and ensures the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NR SA, Connected without release *On* according to TS 38.508-1 [14] clause 4.5.
- 10. Repeat step 2-9 until the confidence level according to Tables G.2.3-1 in Annex G clause G.2 is achieved.
- 11. Repeat step 1-10 for each sub-test in Table 7.6.2.8.4.1-2 as appropriate.

#### TBD7.6.2.8.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

Table 7.6.2.8.4.3-1: Common Exception messages SA inter frequency event triggered reporting with SSB time index detection in DRX

Default Message Contents					
Common contents of system information					
blocks exceptions					
Default RRC messages and information elements contents exceptions	TBD				

#### 7.6.2.8.5 Test requirement

Table 7.6.2.8.5-1 defines the primary level settings including test tolerances for all tests.

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Table 7.6.2.8.5-1: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection in DRX

Para	Parameter		Test	Cell 1	Cell 2
			configuratio n	T1 T2	T1 T2
NR RF Channe	el Number		Config 1,2,3	1	2
Duplex mode			Config 1	FDD	TDD
			Config 2,3	TDD	TDD
TDD configura	tion		Config 1	Not Applicable	TDDConf.3.1
			Config 2	TDDConf.1.1	TDDConf.3.1
BW <sub>channel</sub>		MHz	Config 3 Config 1	TDDConf.2.1 10: N <sub>RB,c</sub> = 52	TDDConf.3.1 100: N <sub>RB,c</sub> = 66
D v v cnannei		IVII IZ	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 BW		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
	T		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
	Dedicated DL BWP		Config 1,2,3	DLBWP.1.1	N/A
	Dedicated UL BWP			ULBWP.1.1	N/A
OCNG Pattern A.3.2.1.1 (OP.	1)		Config 1,2,3	OP.1	OP.1
PDSCH Refere			Config 1	SR.1.1 FDD	-
measurement	channel		Config 2	SR.1.1 TDD	
			Config 3	SR2.1 TDD	
CORESET Re	ference		Config 1	CR.1.1 FDD	
Channel			Config 2	CR.1.1 TDD	
CMTC configur	nation defined		Config 3	CR2.1 TDD	
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.2	SMTC.2
			Config 2,3	SMTC.1	SMTC.1
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15	120
spacing EPRE ratio of	DSS to SSS		Config 3	30	120
EPRE ratio of to SSS	PBCH DMRS				
	PBCH to PBCH				
DMRS	I BOIT TO I BOIT				
	PDCCH DMRS				
EPRE ratio of PDCCH DMRS			Config 1,2,3	0	0
	PDSCH DMRS				
EPRE ratio of PDSCH	PDSCH to				
EPRE ratio of to SSS(Note 1					
EPRE ratio of	OCNG to				
OCNG DMRS	· /		Config 1,2,3	NA	TBD
UE orientation around TBD axis and TBD axis		Joining 1,2,3	1 1/7		
Relative difference in angle of arrival of cell 3 relative to cell degrees		degrees	Config 1,2,3	NA	NA TBD
2				1 11	
$N_{oc}^{}$ Note2		dBm/15 kHz		NA	NA
A7 Note2		Note5 dBm/S	Config 1,2	NA	NA
$N_{oc}^{$		CS Note4	Config 3	NA NA	NA NA
SS-RSRP Note 3	3	110104	Config 1,2	NA NA	TBD TBD
- •			-,- ي	1	

	dBm/S CS Note5	Config 3	NA	NA	TBD	TBD
$\hat{E}_{s}/I_{ot}$	dB	Config 1,2,3	NA	NA	TBD	TBD
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	NA	NA	TBD	TBD
Io <sup>Note3</sup>	dBm/9. 36MHz	Config 1,2	NA	NA	-	-
	dBm/38 .16MHz	Config 3	NA	NA	-	-
	dBm/95 .04 MHz Note5	Config 1,2,3	-	-	TBD	TBD
Propagation Condition		Config 1,2,3		A'	WGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# 7.7 Measurement performance requirements

#### 7.7.1 SS-RSRP

#### 7.7.1.1 Intra-frequency measurements

#### 7.7.1.2 Inter-frequency measurements

#### 7.7.1.3 Inter-frequency measurements between FR1 and FR2

#### 7.7.1.3.1 NR SA FR1-FR2 SS-RSRP absolute measurement accuracy

#### Editor's Note:

- Test tolerance analysis is missing.
- Message contents are TBD.
- Connection diagram is TBD.
- Cell mapping is TBD.
- Table 7.7.1.3.1.5-3 of reported value is FFS

#### 7.7.1.3.1.1 Test Purpose

The purpose of this test is to verify that the inter-frequency SS-RSRP absolute measurement accuracy with FR1 serving cell and FR2 target cell.

#### 7.7.1.3.1.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

#### 7.7.1.3.1.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.7.1.0.3.

The normative reference for this requirement is TS 38.133 [6] clause A.7.7.1.3.

#### 7.7.1.3.1.4 Test description

#### 7.7.1.3.1.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.7.1.3.1.4.1-1.

Table 7.7.1.3.1.4.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10MHz	
	bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10MHz	120 kHz SSB SCS, 100MHz
	bandwidth, TDD duplex mode	bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40MHz	
	bandwidth, TDD duplex mode	

Configure the test equipment and the DUT according to the parameters in Table 7.7.1.3.1.4.1-2.

Table 7.7.1.3.1.4.1-2: Initial conditions for NR SA FR1-FR2 SS-RSRP absolute measurement accuracy

Parameter		Value	Comment			
Test environment	NC, TL/VL,	TL/VH, TH/VL, TH/VH	As specified in TS 38.508-1 [14] clause 4.1.			
Test frequencies	As specified	in Annex E, table E.4-1 and TS 38.	508-1 [14] clause 4.3.1.			
Channel bandwidth	As specified by the test configuration selected from Table 7.7.1.3.1.4.1-1.					
Propagation conditions	AWGN		As specified in Annex C.2.2.			
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.			
Diagram	DUT Part	A.3.TBD				
Exceptions to connection diagram	N/A					

- 1. Message contents are defined in clause 7.7.1.3.1.4.3.
- 2. Cell 1 is the NR FR1 serving cell (PCell) and Cell 2 is the NR FR2 neighbour cell (the target cell for SS-RSRP measurements) on a different frequency than the PCell. The connection setup is done according to the settings in Annex C.1.1 and C.1.2.

#### 7.7.1.3.1.4.2 Test procedure

Same as in clause 6.7.1.2.1.4.2 but replacing Table 6.7.1.2.1.5-1 and 6.7.1.2.1.5-2 with 7.7.1.3.1.5-1 and 7.7.1.3.1.5-2, respectively.

#### 7.7.1.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

**TBD** 

#### 7.7.1.3.1.5 Test requirement

Table 7.7.1.3.1.5-1 and Table 7.7.1.3.1.5-2 define the primary level settings including test tolerances for all tests.

Each SS-RSRP measurement report for each of the tests in Table 7.7.1.3.1.5-1 and 7.7.1.3.1.5-2 shall meet the corresponding absolute accuracy requirements in Table 7.7.1.3.1.5-3.

Table 7.7.1.3.1.5-1: SS-RSRP inter-frequency test parameters

Parameter	Config	ig Unit	Tes	st 1	Test 2	
	Coming		Cell 1	Cell 2	Cell 1	Cell 2

SSB ARFCN	1~3		freq1	freq2	freq1	freq2	
	1		10:		10:		
			N <sub>RB,c</sub> = 52	100:	N <sub>RB,c</sub> = 52 10:	100:	
BWchannel	2	MHz	N <sub>RB,c</sub> = 52	$N_{RB,c} = 66$	N <sub>RB,c</sub> = 52	$N_{RB,c} = 66$	
	3						
			N <sub>RB,c</sub> = 106		N <sub>RB,c</sub> = 106		
Duplex mode	2		FDD TDD	TDD	FDD TDD	TDD	
Duplex mode	3		TDD	100	TDD	100	
	1		N/A		N/A		
	2		TDDConf.	TDDConf.	TDDConf.	TDDConf.	
TDD configuration			1.1	3.1	1.1	3.1	
	3		TDDConf. 2.1		TDDConf. 2.1		
	1		SR.1.1 FDD		SR.1.1 FDD		
PDSCH Reference	2		SR.1.1 TDD	-	SR.1.1 TDD	-	
measurement channel	3		SR.2.1 FDD		SR.2.1 FDD		
RMSI CORESET	1		CR.1.1 FDD	-	CR.1.1 FDD	-	
Reference Channel	2		CR.1.1 TDD	-	CR.1.1 TDD	-	
13.0101100 Offarillor	3		CR.2.1 FDD	-	CR.2.1 FDD	-	
Dedicated CORESET Reference Channel	2		CCR.1.1 FDD	-	CCR.1.1 FDD	-	
	3		CCR.1.1 TDD CCR.2.1 TDD	-	CCR.1.1 TDD CCR.2.1 TDD	-	
	3		SSB.1	-	SSB.1	-	
	1		FR1		FR1		
COD fiti			SSB.1	SSB.1	SSB.1	SSB.1	
SSB configuration	2		FR1	FR2	FR1	FR2	
	3		SSB.2		SSB.2		
	_		FR1		FR1		
OCNG Patterns	1~3			P.1	OF		
DL BWP	1~3 1~3			NP.1	DLB\		
UL BWP				WP.1	ULB\		
SMTC configuration	1~3		SMT	I C.1	SMT	C.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	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 condition	1~3	-		GN	AW		
Note 1: OCNG shall be	uood ouo	h that hath	a alla a na fullur	-1141		.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 7.7.1.3.1.5-2: SS-RSRP inter-frequency OTA related test parameters

Parameter		Config	Unit	Test 1		Test 2		
	Parameter Config		Onit	Cell 1	Cell 2	Cell 1	Cell 2	
$N_{oc}$	NR_FDD_FR1_A, NR_TDD_FR1_A	dBm/15		1Rm/15			TBD	
Note2	NR_FDD_FR1_B	1~3	kHz		Т	BD	TBD	TBD
	NR_TDD_FR1_C						TBD	

	NR_FDD_FR1_D, NR_TDD_FR1_D						TBD
	NR_FDD_FR1_E,						TBD
	NR_TDD_FR1_E NR_FDD_FR1_G						TBD
	NR_FDD_FR1_H						TBD
	NR_FDD_FR1_A,						TBD
	NR_TDD_FR1_A NR_FDD_FR1_B						TBD
	NR_TDD_FR1_C					TBD	TBD
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2,4,5		TBD			TBD
	NR_FDD_FR1_E,						TBD
	NR_TDD_FR1_E NR_FDD_FR1_G						TBD
$N_{oc}$	NR_FDD_FR1_H		dBm/SS				TBD
Note2	NR_FDD_FR1_A,		B SCS		TBD		TBD
	NR_TDD_FR1_A NR_FDD_FR1_B						TBD
	NR_TDD_FR1_C						TBD
	NR_FDD_FR1_D, NR_TDD_FR1_D	3		TBD		TBD	TBD
	NR_FDD_FR1_E,						TBD
	NR_TDD_FR1_E NR_FDD_FR1_G						
	NR_FDD_FR1_H						TBD TBD
		1~3	dB	TBD	TBD	TBD	TBD
	$\hat{E}_{s}/I_{ot}$	1~3	uБ	100	100	100	
	NR_TDD_FR1_A						TBD
	NR_FDD_FR1_B						TBD
	NR_TDD_FR1_C NR_FDD_FR1_D,	4045		TDD		TDD	TBD
	NR_TDD_FR1_D	1,2,4,5		TBD		TBD	TBD
SS-	NR_FDD_FR1_E, NR_TDD_FR1_E						TBD
	NR_FDD_FR1_G						TBD
RSR	NR_FDD_FR1_H NR_FDD_FR1_A,		dBm/SC S		TBD		TBD
P <sup>Note3</sup>	NR_TDD_FR1_A						TBD
	NR_FDD_FR1_B						TBD
	NR_TDD_FR1_C NR_FDD_FR1_D.			TDD		TBD	TBD
	NR_TDD_FR1_D	3		TBD			TBD
	NR_FDD_FR1_E, NR_TDD_FR1_E						TBD
	NR_FDD_FR1_G						TBD
	NR_FDD_FR1_H NR_FDD_FR1_A,						TBD
	NR_FDD_FR1_A, NR_TDD_FR1_A					TE	BD .
	NR_FDD_FR1_B						BD
	NR_TDD_FR1_C NR_FDD_FR1_D,		dBm/	N1/A			BD
	NR_TDD_FR1_D	1,2,4,5	9.36MH z	N/A		TBD	
	NR_FDD_FR1_E, NR_TDD_FR1_E					TE	BD
	NR_FDD_FR1_G					TE	
	NR_FDD_FR1_H NR_FDD_FR1_A.						BD
	NR_FDD_FR1_A, NR_TDD_FR1_A					TE	BD .
Io <sup>Note3</sup>	NR_FDD_FR1_B						3D
	NR_TDD_FR1_C NR_FDD_FR1_D,	_	dBm/				3D
	NR_TDD_FR1_D	3	38.16M Hz	N/A		TE	3D
	NR_FDD_FR1_E, NR_TDD_FR1_E		112			TE	3D
	NR_FDD_FR1_G	]					3D
	NR_FDD_FR1_H					TBD TBD	
	NR_TDD_FR2_A NR_TDD_FR2_B		dBm/			TE	
	NR_TDD_FR2_F	1~3	95.04M	N/A	TBD		
	NR_TDD_FR2_G	]	Hz			TBD TBD TBD	
	NR_TDD_FR2_T						

1	NR_TDD_FR2_Y					TE	3D
Ê	$\hat{Z}_s/N_{oc}$	1~3	dB	TBD	TBD	TBD	TBD
Note 1:	RSRP and lo le	evels have	been deriv	ed from other	parameters fo	r information	ourposes.
	They are not se	ettable par	ameters the	emselves.			
Note 2: RSRP minimum requirements are specified assuming independent interference and noise							
	at each receiver antenna port.						

#### Table 7.7.1.3.1.5-3: SS-RSRP inter-frequency absolute accuracy requirements for the reported values

FFS

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 7.7.1.3.2 NR SA FR1-FR2 SS-RSRP relative measurement accuracy

#### Editor's Note:

- Test tolerance analysis is missing.
- Message contents are TBD.
- Connection diagram is TBD.
- Cell mapping is TBD.
- Table 7.7.1.3.2.5-3 of reported value is FFS

#### 7.7.1.3.2.1 Test Purpose

The purpose of this test is to verify that the inter-frequency SS-RSRP relative measurement accuracy with FR1 serving cell and FR2 target cell.

#### 7.7.1.3.2.2 Test applicability

This test applies to all types of NR UE release 15 onwards.

#### 7.7.1.3.2.3 Minimum conformance requirements

The minimum conformance requirements are specified in clause 6.7.1.0.4

The normative reference for this requirement is TS 38.133 [6] clause A.7.7.1.3.

#### 7.7.1.3.2.4 Test description

#### 7.7.1.3.2.4.1 Initial conditions

This test shall be tested using any of the test configurations in Table 7.7.1.3.2.4.1-1.

Table 7.7.1.3.2.4.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10MHz	
	bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10MHz	120 kHz SSB SCS, 100MHz
	bandwidth, TDD duplex mode	bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40MHz	
	bandwidth, TDD duplex mode	

Configure the test equipment and the DUT according to the parameters in Table 7.7.1.3.2.4.1-2.

Table 7.7.1.3.2.4.1-2: Initial conditions for NR SA FR1-FR2 SS-RSRP relative measurement accuracy

Parameter		Value	Comment		
Test environment	NC, TL/VL,	TL/VH, TH/VL, TH/VH	As specified in TS 38.508-1 [14] clause 4.1.		
Test frequencies	As specified	I in Annex E, table E.4-1 and TS 38.	.508-1 [14] clause 4.3.1.		
Channel	As specified	I by the test configuration selected fr	om Table 7.7.1.3.2.4.1-1.		
bandwidth					
Propagation	AWGN		As specified in Annex C.2.2.		
conditions					
Connection	TE Part	A.3.TBD	As specified in TS 38.508-1 [14] Annex A.		
Diagram	DUT Part	A.3.TBD			
Exceptions to	N/A	•			
connection					
diagram					

- 1. Message contents are defined in clause 7.7.1.3.2.4.3.
- 2. Cell 1 is the NR FR1 serving cell (PCell) and Cell 2 is the NR FR2 neighbour cell (the target cell for SS-RSRP measurements) on a different frequency than the PCell. The connection setup is done according to the settings in Annex C.1.1 and C.1.2.

#### 7.7.1.3.2.4.2 Test procedure

Same as in clause 6.7.1.2.2.4.2 but replacing Table 6.7.1.2.2.5-1 and 6.7.1.2.2.5-2 with 7.7.1.3.2.5-1 and 7.7.1.3.2.5-2, respectively.

#### 7.7.1.3.2.4.3 Message contents

Message contents are according to TS 38.508-1 [14] clause TBD with the following exceptions:

TBD

#### 7.7.1.3.2.5 Test requirement

Table 7.7.1.3.2.5-1 and Table 7.7.1.3.2.5-2 define the primary level settings including test tolerances for all tests.

Each SS-RSRP measurement report for each of the tests in Table 7.7.1.3.2.5-1 and 7.7.1.3.2.5-2 shall meet the corresponding relative accuracy requirements in Table 7.7.1.3.2.5-3.

Table 7.7.1.3.2.5-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Linit	Tes	st 1	Tes	st 2
Parameter	Coming	Config Unit	Cell 1	Cell 2	Cell 1	Cell 2

SSB ARFCN	1~3		freq1	freq2	freq1	freq2
	1		10:	- 1	10:	- 1
	I		$N_{RB,c} = 52$		$N_{RB,c} = 52$	
BW <sub>channel</sub>	2	MHz	10:	100: N <sub>RB,c</sub> = 66	10:	100: N <sub>RB.c</sub> = 66
			N <sub>RB,c</sub> = 52 40:	N <sub>RB,c</sub> = 00	N <sub>RB,c</sub> = 52 40:	N <sub>RB,c</sub> = 00
	3		$N_{RB,c} = 106$		$N_{RB,c} = 106$	
	1		FDD		FDD	
Duplex mode	2		TDD	TDD	TDD	TDD
	3		TDD		TDD	
	1		N/A		N/A	
	2		TDDConf.	TDDConf.	TDDConf.	TDDConf.
TDD configuration			1.1	3.1	1.1	3.1
	3		TDDConf.	<b></b>	TDDConf.	<b>.</b>
			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	-
	3		SR.2.1 FDD		SR.2.1 FDD	
RMSI CORESET	2		CR.1.1 FDD	-	CR.1.1 FDD	-
Reference Channel	3		CR.1.1 TDD CR.2.1 FDD	-	CR.1.1 TDD CR.2.1 FDD	<u> </u>
			CR.2.1 FDD		CR.2.1 FDD CCR.1.1 FDD	
Dedicated CORESET	2		CCR.1.1 FDD	-	CCR.1.1 FDD	-
Reference Channel	3		CCR.2.1 TDD	_	CCR.2.1 TDD	<u>-</u>
	3		SSB.1	_	SSB.1	<u> </u>
	1		FR1		FR1	
			SSB.1	SSB.1	SSB.1	SSB.1
SSB configuration	2		FR1	FR2	FR1	FR2
	_		SSB.2		SSB.2	
	3		FR1		FR1	
OCNG Patterns	1~3		OF	P.1	OF	P.1
DL BWP	1~3		DLB\	NP.1	DLB\	VP.1
UL BWP	1~3		ULB\	NP.1	ULB\	WP.1
SMTC configuration	1~3		SMT	ΓC.1	SMT	C.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	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					ON
Propagation condition	1~3	-		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.

Table 7.7.1.3.2.5-2: SS-RSRP inter-frequency OTA related test parameters

Parameter		Config	Unit	Test 1		Test 2		
	rarameter	Coning	Onit	Cell 1	Cell 2	Cell 1	Cell 2	
Noc	NR_FDD_FR1_A, NR_TDD_FR1_A		dBm/15 kHz	1~3   1   1	·			TBD
Note2	NR_FDD_FR1_B	1~3			Т	BD	TBD	TBD
	NR_TDD_FR1_C	i					TBD	

	NR_FDD_FR1_D, NR_TDD_FR1_D						TBD
	NR_FDD_FR1_E,						TBD
	NR_TDD_FR1_E NR_FDD_FR1_G						TBD
	NR_FDD_FR1_H						TBD
	NR_FDD_FR1_A, NR_TDD_FR1_A						TBD
	NR_FDD_FR1_B						TBD
	NR_TDD_FR1_C					TBD	TBD
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2,4,5		TBD			TBD
	NR_FDD_FR1_E, NR_TDD_FR1_E						TBD
N/	NR_FDD_FR1_G						TBD
$N_{oc}$ Note2	NR_FDD_FR1_H		dBm/SS		TBD		TBD
	NR_FDD_FR1_A, NR_TDD_FR1_A		B SCS				TBD
	NR_FDD_FR1_B			TBD			TBD
	NR_TDD_FR1_C NR_FDD_FR1_D,					TDD	TBD
	NR_TDD_FR1_D	3				TBD	TBD
	NR_FDD_FR1_E, NR_TDD_FR1_E						TBD
	NR_FDD_FR1_G						TBD
	NR_FDD_FR1_H						TBD
	$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~3	dB	TBD	TBD	TBD	TBD
	NR_FDD_FR1_A, NR_TDD_FR1_A						TBD
	NR_FDD_FR1_B						TBD
	NR_TDD_FR1_C NR_FDD_FR1_D,	4045		TDD		TDD	TBD
	NR_TDD_FR1_D	1,2,4,5		TBD		TBD	TBD
	NR_FDD_FR1_E, NR_TDD_FR1_E						TBD
SS-	NR_FDD_FR1_G		ID (00				TBD
RSR	NR_FDD_FR1_H NR_FDD_FR1_A,		dBm/SC S		- TBD		TBD
P <sup>Note3</sup>	NR_TDD_FR1_A			TBD		TBD	TBD
	NR_FDD_FR1_B NR_TDD_FR1_C						TBD TBD
	NR_FDD_FR1_D,	3					TBD
	NR_TDD_FR1_D NR_FDD_FR1_E,	Ŭ					
	NR_TDD_FR1_E						TBD
	NR_FDD_FR1_G NR FDD FR1 H						TBD TBD
	NR_FDD_FR1_A,					TF	3D
	NR_TDD_FR1_A NR_FDD_FR1_B						3D
	NR_TDD_FR1_C		dBm/				3D
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2,4,5	9.36MH	N/A		TE	3D
	NR_FDD_FR1_E,		Z			TF	3D
	NR_TDD_FR1_E NR_FDD_FR1_G						3D
	NR_FDD_FR1_H						BD
	NR_FDD_FR1_A, NR_TDD_FR1_A					TE	3D
Io <sup>Note3</sup>	NR_FDD_FR1_B					TE	3D
10	NR_TDD_FR1_C		dBm/			TE	3D
	NR_FDD_FR1_D, NR_TDD_FR1_D	3	38.16M	N/A		TE	3D
	NR_FDD_FR1_E, NR_TDD_FR1_E		Hz			TE	3D
	NR_FDD_FR1_G						3D
	NR_FDD_FR1_H						3D
	NR_TDD_FR2_A NR_TDD_FR2_B		dBm/			TBD TBD	
	NR_TDD_FR2_F	1~3	95.04M	N/A	TBD		BD BD
	NR_TDD_FR2_G		Hz			TBD	
	NR_TDD_FR2_T					TE	3D

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NF	R_TDD_FR2_Y					TE	3D
$\hat{E}_s/N_{oc}$		1~3	dB	TBD	TBD	TBD	TBD
Note 1:	RSRP and lo le	vels have	been deriv	ed from other	parameters fo	r information p	ourposes.
-	They are not settable parameters themselves.						
Note 2: RSRP minimum requirements are specified assuming independent interference and noise							
	at each receiver antenna port						

Table 7.7.1.3.2.5-3: SS-RSRP inter-frequency relative accuracy requirements for the reported values

**FFS** 

For the test to pass, the ratio of successful reported values in each test shall be more than 90% with a confidence level of 95%.

#### 7.7.2 SS-RSRQ

## 7.7.3 SS-SINR

# Annex A (normative): RRM test configurations

# A.1 Reference measurement channels

This section contains the Reference Measurement Channels (RMC) to be used for the RRM test scenarios in Sections 4 to 7 of this document.

## A.1.1 PDSCH

## A.1.1.1 FDD

Table A.1.1.1-1: PDSCH Reference Measurement Channels for SCS = 15 kHz for FDD

	Parameter	Unit	Value			
Reference	ce channel		SR.1.1 FDD			
Channel	bandwidth	MHz	10			
	of transmitter antennas		1			
Allocated	d resource blocks for PDSCH Note 1		24			
Allocated	d slots per Radio Frame		10			
Radio f	rame containing SSB	slots	Note 5			
Radio f	rame not containing SSB	slots	[10]			
MCS ind	ex		4			
Modulati	on		QPSK			
Target C	oding Rate		1/3			
Number	of control symbols		2			
PDSCH	mapping type		Type A			
	on Bit Payload					
For slot	s with RMSI Note 2	Bits	[1864]			
Number	of Code Blocks per slot		1			
	hannel Bits Per slot					
For slot	s with RMSI Note 2, 4	Bits	[6048]			
Note 1:	Allocated outside the SMTC duration in time and in renot overlap with the resource blocks allocated for SS/					
Note 2:	PDSCH is scheduled on the slots with RMSI.					
Note 3:	If necessary, the information bit payload size can be a					
	test implementation. The payload sizes are defined in					
Note 4:	Derived based on the PDSCH DMRS assumption: dr					
	dmrs-Type=1, dmrs-AdditonalPositions=2, maxLengt					
	index: 1000, and Number of PDSCH DMRS CDM gro					
Note 5:	PDSCH is not scheduled in slots containing SSB acco					
configuration used in the test. SSB configurations are defined in section A.3.						

# A.1.1.2 TDD

Table A.1.1.2-1: PDSCH Reference Measurement Channels for SCS = 15 kHz for TDD

	Parameter	Unit	Value				
Referenc	e channel		SR.1.1 TDD				
Channel	bandwidth	MHz	10				
	of transmitter antennas		1				
Allocated	resource blocks for PDSCH Note 1		24				
Allocated	slots per Radio Frame						
Radio fr	ame containing SSB	slots	Note 5				
Radio fr	ame not containing SSB	slots	[4]				
MCS tabl	e		64QAM				
MCS inde	ex		4				
Modulation	on		QPSK				
Target Co	oding Rate		1/3				
Number of	of control symbols		2				
PDSCH r	mapping type		Type A				
	on Bit Payload						
	s with RMSI Note 2	Bits	[1864]				
Number of	of Code Blocks per slot		1				
	nannel Bits Per slot						
For slots	s with RMSI Note 2, 4	Bits	[6048]				
Note 1:	Allocated outside the SMTC duration in time and in re	esource b	locks which do				
	not overlap with the resource blocks allocated for SS	/PBCH bl	ock.				
Note 2:	PDSCH is scheduled on the slots with RMSI.						
Note 3:	If necessary, the information bit payload size can be						
	test implementation. The payload sizes are defined in						
Note 4:	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)						
Note 5:	PDSCH is not scheduled in slots containing SSB acc						
	configuration used in the test. SSB configurations are	e defined	in section				
	A.3.10.						

Table A.1.1.2-2: PDSCH Reference Measurement Channels for SCS = 30 kHz for TDD

	Parameter	Unit	Value			
Referenc	e channel		SR.2.1 TDD			
Channel	bandwidth	MHz	40			
	of transmitter antennas		1			
Allocated	resource blocks for PDSCH Note 1		24			
Allocated	Allocated slots per Radio Frame					
Radio fr	ame containing SSB	slots	Note 5			
Radio fr	ame not containing SSB	slots	[10]			
MCS tabl	е		64QAM			
MCS inde	ex		4			
Modulatio	on		QPSK			
Target Co	oding Rate		1/3			
Number of	of control symbols		2			
PDSCH r	napping type		Type A			
	on Bit Payload					
For slots	s with RMSI Note 2	Bits	[1864]			
Number of	of Code Blocks per slot		1			
	nannel Bits Per slot					
For slots with RMSI Note 2 Bits [6048						
Note 1:	Allocated outside the SMTC duration in time and in res	ource blo	ocks which do			
	not overlap with the resource blocks allocated for SS/P	BCH bloc	ck.			
Note 2:	PDSCH is scheduled on the slots with RMSI.					
Note 3:	If necessary, the information bit payload size can be ac					
	test implementation. The payload sizes are defined in 3GPP TS 38.213 [8].					
Note 4:						
	dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index:					
	1000, and Number of PDSCH DMRS CDM group(s) without data: 1.					
Note 5:						
	configuration used in the test. SSB configurations are of	defined in	section A.3.10.			

Table A.1.1.2-3: PDSCH Reference Measurement Channels for SCS = 120 kHz for TDD

	Parameter	Unit	Value		
Reference	Reference channel		SR.3.1 TDD		
Channel	Channel bandwidth		100		
	Number of transmitter antennas		1		
Allocated	resource blocks for PDSCH Note 1		24		
Allocated	I slots per Radio Frame		TBD		
Radio fr	ame containing SSB	slots	Note 5		
Radio fr	ame not containing SSB	slots	[48]		
MCS tab	le		64QAM		
MCS inde	ex		4		
Modulation	on		QPSK		
Target C	oding Rate		1/3		
Number	of control symbols		2		
PDSCH i	mapping type		Type A		
Informati	on Bit Payload				
	with RMSI Note 2	Bits	[1864]		
Number	of Code Blocks per slot		1		
Binary Channel Bits Per slot					
For slots with RMSI Note 2, 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:	Note 3: If necessary, the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in 3GPP TS 38.213 [8].				
Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.					
Note 5:	PDSCH is not scheduled in slots containing SSB according configuration used in the test. SSB configurations are de	ing to the			

#### CORESET for RMSI scheduling A.1.2

#### A.1.2.1 FDD

Table A.1.2.1-1: RMSI CORESET Reference Measurement Channels for SCS = 15 kHz for FDD

Parameter	Unit	Value		
Reference channel		CR.1.1 FDD		
Channel bandwidth	MHz	10		
Subcarrier spacing for RMSI CORESET	kHz	15		
Allocated resource blocks for RMSI CORESETNote 7		24		
Subcarrier spacing for SSB	kHz	15		
SSB and RMSI CORESET multiplexing configuration		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 CORESETNote 7	symb	2		
	ols			
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 [31].				
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 [8].
- Cell ID shall depend upon the test configuration. Note 5:
- Note 6: Payload size shall depend upon the test configuration.
- The configuration of set of resource blocks and slot symbols of control resource set Note 7: for Type0-PDCCH search space corresponds to index 0 in Table 13-1 in TS 38.213
- Other values can be used to align with GSCN as long as SSB does not overlap the Note 8: RMC

## A.1.2.2 TDD

Table A.1.2.2-1: RMSI CORESET Reference Measurement Channels for SCS = 15 kHz for TDD

	Parameter	Unit	Value		
Reference	Reference channel		CR.1.1 TDD		
Channel	bandwidth	MHz	10		
	er spacing for RMSI CORESET	kHz	15		
Allocated	resource blocks for RMSI CORESET Note 7		24		
Subcarrie	er spacing for SSB	kHz	15		
Index of	transmitted SSB within an SS-Burst		#0		
SSB and	RMSI CORESET multiplexing configuration		Pattern 1		
Offset be	etween SSB and RMSI CORESET Note 3, 7	RB	0 (Note 8)		
Configura	ation of PDCCH monitoring occasions for RMSI ET Note 4		Index 4		
	of transmitter antennas		1		
Duration	of RMSI CORESET Note 7	symb ols	2		
DCI Forn	nat Note 1		Note 2		
Aggregation level CCE 8					
DMRS p	DMRS precoder granularity 6				
REG bundle size 6					
Mapping from REG to CCE Distribut					
Cell ID			Note 5		
Payload	(without CRC)	Bits	Note 6		
Note 1: DCI formats are defined in TS 38.212 [31].  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 RI defined in Table 13-11 in TS 38.213 [8].	MSI COR	ESET is		
Note 5:	• •				
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 [8].					
Note 8:	• •				

overlap the RMC

Table A.1.2.2-2: RMSI CORESET Reference Measurement Channels for SCS = 30 kHz for TDD

	Parameter	Unit	Value		
Reference	e channel		CR.2.1 TDD		
Channel bandwidth MHz					
	er spacing for RMSI CORESET	kHz	30		
Allocated	resource blocks for RMSI CORESET Note 7		24		
Index of	transmitted SSB within an SS-Burst		#0		
	transmitted SSB within an SS-Burst		#0		
SSB and	RMSI CORESET multiplexing configuration		Pattern 1		
	tween SSB and RMSI CORESET Note 3, 7	RB	0 (Note 8)		
Configura CORESE	ation of PDCCH monitoring occasions for RMSI T Note 4		Index 4		
	of transmitter antennas		1		
Duration of RMSI CORESET Note 7 symb 2 ols					
DCI Forn	nat Note 1		Note 2		
Aggregation level CCE 8					
DMRS pi	ecoder granularity		6		
REG bur	ndle 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 [31].				
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 [8].					
Note 5:					
Note 6:	· · · · · · · · · · · · · · · · · · ·				
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 [8].					
Note 8: Other values can be used to align with GSCN as long as SSB does not					

Note 8:

overlap the RMC

Table A.1.2.2-3: RMSI CORESET Reference Measurement Channels for SCS = 120 kHz for TDD

	Parameter	Unit	Value		
Reference channel			CR.3.1 TDD		
	bandwidth	MHz	100		
Subcarrie	er spacing for RMSI CORESET	kHz	120		
Allocated	resource blocks for RMSI CORESET Note 7		24		
	er spacing for SSB	kHz	120		
	transmitted SSB within an SS-Burst		#0		
SSB and	RMSI CORESET multiplexing configuration		Pattern 1		
Offset be	tween SSB and RMSI CORESET Note 3, 7	RB	0 (Note 8)		
Configura CORESE	ation of PDCCH monitoring occasions for RMSI ET Note 4		Index 4		
	of transmitter antennas		1		
Duration	of RMSI CORESET Note 7	symb ols	2		
DCI Format Note 1 Note 2					
Aggregat	tion level	CCE	8		
DMRS precoder granularity 6					
REG bur			6		
Mapping	from REG to CCE		Distributed		
Cell ID			Note 5		
Payload	(without CRC)	Bits	Note 6		
Note 1: Note 2:	DCI formats are defined in TS 38.212 [31].	tion			
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 [8].					
Note 5: Note 6:	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 [8].					
Note O.	Other values can be used to align with CCCN or				

Other values can be used to align with GSCN as long as SSB does not

# A.1.3 CORESET for RMC scheduling

## A.1.3.1 FDD

Table A.1.3.1-1: Control Channel RMC for SCS = 15 kHz for FDD

Parameter	Unit	Value
Reference channel		[CCR.1.1]
		FDD
Channel bandwidth	MHz	10
Subcarrier spacing for RMSI CORESET	kHz	15
Allocated resource blocks for CORESET		24
Number of transmitter antenna		1
Duration of CORESET	symb	2
	ols	
REG bundle size		6
		Same as
DMRS precoder granularity		REG bundle
		size
CCE to REG mapping		Interleaved
Interleave n_shift		0
Interleave size		2
Beamforming Pre-Coder		N/A
Aggregation level	CCE	8
DCI formats		Note 1
Payload size (without CRC)	bits	Note 2
Note 1: DCI format shall depend upon the test configuration.		
Note 2: Payload size shall depend upon the test configuration		

## A.1.3.2 TDD

Table A.1.3.2-1: Control Channel RMC for SCS = 15 kHz for TDD

Parameter	Unit	Value
Reference channel		[CCR.1.1]
		TDD
Channel bandwidth	MHz	10
Subcarrier spacing for RMSI CORESET	kHz	15
Allocated resource blocks for CORESET		24
Number of transmitter antenna		1
Duration of CORESET	symb	2
	ols	
REG bundle size		6
		Same as
DMRS precoder granularity		REG bundle
		size
CCE to REG mapping		Interleaved
Interleave n_shift		0
Interleave size		2
Beamforming Pre-Coder		N/A
Aggregation level	CCE	8
DCI formats		Note 1
Payload size (without CRC)	bits	Note 2
Note 1: DCI format shall depend upon the test configura	ation.	
Note 2: Payload size shall depend upon the test configu	uration	

Table A.1.3.2-2: Control Channel RMC for SCS = 30 kHz for TDD

Parameter	Unit	Value
Reference channel		[CCR.2.1]
		TDD
Channel bandwidth	MHz	40
Subcarrier spacing for RMSI CORESET	kHz	30
Allocated resource blocks for CORESET		24
Number of transmitter antenna		1
Duration of CORESET	symb	2
	ols	
REG bundle size		6
		Same as
DMRS precoder granularity		REG bundle
		size
CCE to REG mapping		Interleaved
Interleave n_shift		0
Interleave size		2
Beamforming Pre-Coder		N/A
Aggregation level	CCE	8
DCI formats		Note 1
Payload size (without CRC)		Note 2
Note 1: DCI format shall depend upon the test configuration.		
Note 2: Payload size shall depend upon the test configuration		

Table A.1.3.2-3: Control Channel RMC for SCS = 120 kHz for TDD

Parameter	Unit	Value
Reference channel		[CCR.3.1]
		TDD
Channel bandwidth	MHz	100
Subcarrier spacing for RMSI CORESET	kHz	120
Allocated resource blocks for CORESET		24
Number of transmitter antenna		1
Duration of CORESET	symb	2
	ols	
REG bundle size		6
		Same as
DMRS precoder granularity		REG bundle
		size
CCE to REG mapping		Interleaved
Interleave n_shift		0
Interleave size		2
Beamforming Pre-Coder		N/A
Aggregation level	CCE	8
DCI formats		Note 1
Payload size (without CRC)	bits	Note 2
Note 1: DCI format shall depend upon the test configuration.		
Note 2: Payload size shall depend upon the test configuration		

# A.1.4 CSI-RS

# A.1.4.1 FDD

Table A.1.4.1-1: CSI-RS Reference Measurement Channels for SCS = 15 kHz for FDD

Parameter		Unit	Value			
Reference channel			CSI-RS.1.1	CSI-RS.1.2	CSI-RS.1.3	
			FDD	FDD	FDD	
Channel bandwidth		MHz	10	10	10	
Subcarrier spacin	g for RMSI CORESET	kHz	15	15	15	
	resourceType		periodic	periodic	periodic	
	Number of ports		2	1	1	
	CMD Type		FD-CDM2	noCDM	noCDM	
	Density		1	3	3	
NZP CSI-RS	firstOFDMSymbolInTimeDomain		5	5	5	
	frequencyDomainAllocation		000001	000001	000001	
	period	slot	TBD	TBD	TBD	
	offset	slot	TBD	TBD	TBD	
	EPRE ratio to SSS	dB	0	0	0	
	subcarrierLocation-p0		s0	N/A	N/A	
CSI-IM	symbolLocation-p0		6	N/A	N/A	
CSI-IIVI	period	slot	TBD	N/A	N/A	
	offset	slot	TBD	N/A	N/A	
ReportConfigType	9		periodic	periodic	periodic	
CQI-table			Table 1	N/A	N/A	
reportQuantity			TBD	csi-RSRP	csi-RSRP	
timeRestrictionFo	rInterferenceMeasurement		configured	N/A	N/A	
cqi-FormatIndicate	or		Wideband	N/A	N/A	
pmi-FormatIndica	tor		Wideband	N/A	N/A	
Codebook Type			Type1 single	N/A	N/A	
• •			panel			
Codebook Mode			1	N/A	N/A	
	el-2Tx-CodebookSubsetRestriction		111111	N/A	N/A	
Physical channel			PUCCH	PUCCH	PUCCH	
Reporting Interval		ms	10	TBD	TBD	
CQI/RI/PMI delay		ms	TBD	N/A	N/A	

# A.1.4.2 TDD

Table A.1.4.2-1: CSI-RS Reference Measurement Channels for SCS = 15 kHz for TDD

	Parameter	Unit		Value			
Reference channel			CSI-RS.1.1	CSI-RS.1.2	CSI-RS.1.3		
			TDD	TDD	TDD		
Channel	bandwidth	MHz	10	10	10		
Subcarrier spacing for RMSI CORESET		kHz	15	15	15		
	resourceType		periodic	periodic	periodic		
	Number of ports		2	1	1		
	CMD Type		FD-CDM2	noCDM	noCDM		
NZP	Density		1	3	3		
CSI-RS	firstOFDMSymbolInTimeDomain		5	5	5		
COI-ICO	frequencyDomainAllocation		000001	000001	000001		
	period	slot	TBD	TBD	TBD		
	offset	slot	TBD	TBD	TBD		
	EPRE ratio to SSS	dB	0	0	0		
	subcarrierLocation-p0		s0	N/A	N/A		
CSI-IM	symbolLocation-p0		6	N/A	N/A		
CSI-IIVI	period	slot	TBD	N/A	N/A		
	offset	slot	TBD	N/A	N/A		
ReportConfigType			periodic	periodic	periodic		
CQI-table	)		Table 1	N/A	N/A		
reportQua			TBD	csi-RSRP	csi-RSRP		
timeResti	rictionForInterferenceMeasurement		configured	N/A	N/A		
cqi-Forma	atIndicator		Wideband	N/A	N/A		
pmi-Form	natIndicator		Wideband	N/A	N/A		
Codeboo	k Type		Type1 single	N/A	N/A		
			panel				
Codebook Mode			1	N/A	N/A		
Type1-SinglePanel-2Tx-CodebookSubsetRestriction			111111	N/A	N/A		
Physical channel for CSI report			PUCCH	PUCCH	PUCCH		
Reporting		ms	10	TBD	TBD		
CQI/RI/P	MI delay	ms	TBD	N/A	N/A		

Table A.1.4.2-2: CSI-RS Reference Measurement Channels for SCS = 30 kHz for TDD

	Parameter	Unit	Value			
Referenc	e channel		CSI-RS.2.1	CSI-RS.2.2	CSI-RS.2.3	
			TDD	TDD	TDD	
Channel	bandwidth	MHz	40	40	40	
Subcarrie	er spacing for RMSI CORESET	kHz	30	30	30	
	resourceType		periodic	periodic	periodic	
	Number of ports		2	1	1	
	CMD Type		FD-CDM2	noCDM	noCDM	
NZP	Density		1	3	3	
CSI-RS	firstOFDMSymbolInTimeDomain		5	5	5	
001-100	frequencyDomainAllocation		000001	000001	000001	
	period	slot	TBD	TBD	TBD	
	offset	slot	TBD	TBD	TBD	
	EPRE ratio to SSS	dB	0	0	0	
	subcarrierLocation-p0		s0	N/A	N/A	
CSI-IM	symbolLocation-p0		6	N/A	N/A	
COI-IIVI	period	slot	TBD	N/A	N/A	
	offset	slot	TBD	N/A	N/A	
ReportCo	onfigType		periodic	periodic	periodic	
CQI-table			Table 1	N/A	N/A	
reportQu			TBD	csi-RSRP	csi-RSRP	
timeRest	rictionForInterferenceMeasurement		configured	N/A	N/A	
cqi-Forma	atIndicator		Wideband	N/A	N/A	
pmi-Form	natIndicator		Wideband	N/A	N/A	
Codeboo	Codebook Type		Type1 single	N/A	N/A	
			panel			
Codebook Mode			1	N/A	N/A	
	Type1-SinglePanel-2Tx-CodebookSubsetRestriction		111111	N/A	N/A	
	channel for CSI report		PUCCH	PUCCH	PUCCH	
Reporting		ms	10	TBD	TBD	
CQI/RI/P	MI delay	ms	TBD	N/A	N/A	

Table A.1.4.2-3: CSI-RS Reference Measurement Channels for SCS = 120 kHz for TDD

	Parameter	Unit	Value			
Reference channel			CSI-RS.3.1	CSI-RS.3.2	CSI-RS.3.2	
			TDD	TDD	TDD	
Channel	bandwidth	MHz	100	100	100	
Subcarrie	er spacing for RMSI CORESET	kHz	120	120	120	
	resourceType		periodic	periodic	periodic	
	Number of ports		2	1	1	
	CMD Type		FD-CDM2	noCDM	noCDM	
NZP	Density		1	3	3	
CSI-RS	firstOFDMSymbolInTimeDomain		5	5	5	
001-100	frequencyDomainAllocation		000001	000001	000001	
	period	slot	TBD	TBD	TBD	
	offset	slot	TBD	TBD	TBD	
	EPRE ratio to SSS	dB	0	0	0	
	subcarrierLocation-p0		s0	N/A	N/A	
CSI-IM	symbolLocation-p0		6	N/A	N/A	
COI-IIVI	period	slot	TBD	N/A	N/A	
	offset	slot	TBD	N/A	N/A	
ReportCo	onfigType		periodic	periodic	periodic	
CQI-table	9		Table 1	N/A	N/A	
reportQu			TBD	csi-RSRP	csi-RSRP	
timeRest	rictionForInterferenceMeasurement		configured	N/A	N/A	
cqi-Forma	atIndicator		Wideband	N/A	N/A	
pmi-Form	pmi-FormatIndicator		Wideband	N/A	N/A	
Codeboo	k Type		Type1 single	N/A	N/A	
			panel			
Codebook Mode			1	N/A	N/A	
	Type1-SinglePanel-2Tx-CodebookSubsetRestriction		111111	N/A	N/A	
	channel for CSI report		PUCCH	PUCCH	PUCCH	
Reporting		ms	10	TBD	TBD	
CQI/RI/P	MI delay	ms	TBD	N/A	N/A	

# A.1.5 TDD UL/DL configuration

Table A.1.5-1: TDD UL/DL configuration for SCS=15kHz

Parameter	Unit			
Reference channel		TDDConf.1.1		
referenceSubcarrierSpacing	kHz	15		
TDD UL/DL pattern 1 Note 2		'DSUU'		
		S='10DL:2GP:2UL'		
dl-UL-TransmissionPeriodicity	ms	4		
nrofDownlinkSlots		1		
nrofDownlinkSymbols		9		
nrofUplinkSlot		2		
nrofUplinkSymbols		2		
TDD UL/DL pattern 2 Note 2		'D'		
dl-UL-TransmissionPeriodicity	ms	1		
nrofDownlinkSlots		1		
nrofDownlinkSymbols		0		
nrofUplinkSlot		0		
nrofUplinkSymbols		0		
Note 1: As specified in TS 38.213	8] and TS 3	38.331 [13].		
Note 2: For information				

Table A.1.5-2: TDD UL/DL configuration for SCS=30kHz

Parameter	Unit	Value					
Reference channel		TDDConf.2.1					
referenceSubcarrierSpacing	kHz	30					
TDD UL/DL pattern 1 Note 2		'3D1S4U'					
		S='6DL:4GP:4UL'					
dl-UL-TransmissionPeriodicity	ms	4					
nrofDownlinkSlots		3					
nrofDownlinkSymbols		4					
nrofUplinkSlot		4					
nrofUplinkSymbols		4					
TDD UL/DL pattern 2 Note 2		'DD'					
dl-UL-TransmissionPeriodicity	ms	1					
nrofDownlinkSlots		2					
nrofDownlinkSymbols		0					
nrofUplinkSlot		0					
nrofUplinkSymbols		0					

Note 1: As specified in TS 38.213 [8] and TS 38.331 [13].

Note 2: For information

Table A.1.5-3: 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-TransmissionPeriodicity	ms	0.625					
nrofDownlinkSlots		3					
nrofDownlinkSymbols		9					
nrofUplinkSlot		1					
nrofUplinkSymbols		2					
TDD UL/DL pattern 2 Note 2		Not configured					
dl-UL-TransmissionPeriodicity	ms	Not configured					
nrofDownlinkSlots		Not configured					
nrofDownlinkSymbols		Not configured					
nrofUplinkSlot		Not configured					
nrofUplinkSymbols		Not configured					

Note 1: As specified in TS 38.213 [8] and TS 38.331 [13].

Note 2: For information

#### A.1.6 PUSCH

This rule applies to NR cell(s), which the UE is connected to. The UE is in RRC\_CONNECTED mode.

When signalling or data payloads are expected to be sent on the PUSCH, the UE may be provided in advance with PUSCH resources by the SS. For sake of simplicity, the PUSCH scheduling may also occur continuously over many consecutive subframes. These options shall not be used if:

1) stated otherwise in the test description, or

2) the transmission of PUSCH and UL scheduling information affects the test purpose (e.g. DRX, PUCCH reception etc.)

#### A.2 Reference OCGN configuration

# A.2.1 Generic OFDMA channel noise generator (OCGN)

The OCGN pattern is used in a test for modelling the allocation of unused resourced in the channel bandwidth to virtual UEs (UEs that are not under test). The OCNG pattern simulates both PDCCH and PDSCH transmissions to the virtual UEs.

Table A.2.1-1: 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

REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the Note 2: channel bandwidth of the cell.

#### A.3 Reference SSB configuration

#### SSB configuration for FR1 A.3.1

Table A.3.1-1: SSB allocation for FR1

SMTC Parameters	Unit	Value						
SSB Pattern		SSB.1 FR1	SSB.2 FR1	SSB	SSB.3 FR1		3.4 FR1	
Channel bandwidth	MHz	10	40		10		40	
SSB SCS	kHz	15	30		15 30		30	
SSB periodicity	ms	20	20	20		20 20		
Number of SSBs per SS-burst		1	1	2		2		
SS/PBCH block index		0	0	0	1	0	1	
Indices of symbols containing SSB		2-5	4-7	2-5	8-11	2-5	8-11	
Indices of slots containing SSB		0	0	-		-		
RB numbers containing SSB within		(RB <sub>J</sub> ,	(RB <sub>J</sub> ,	0-19		0-19		
channel BW		RB <sub>J+1</sub> ,,	RB <sub>J+1</sub> ,,					
		RB <sub>J+19</sub> )Note 1	RB <sub>J+19</sub> )Note 1					

RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the Note 1: allowed synchronization raster defined in TS 38.104 [xx]. Editor's note: spec is not listed!

# A.3.2 SSB configuration for FR2

Table A.3.2-1: SSB allocation for FR2

SMTC Parameters	Unit	Value						
SSB Pattern		SSB.	1 FR2	SSB.2 FR2		SSB.3 FR2	SSB.4 FR2	
Channel bandwidth	MHz	10	00	10	00	100	100	
SSB SCS	kHz	1:	20	2	40	120	240	
SSB periodicity	ms	2	20	2	20	20	20	
Number of SSBs per SS-burst		- :	2	2		1	1	
SS/PBCH block index		0	1	0	1	0	0	
Indices of symbols containing SSB		4-7	8-11	8-11	12-13, 0-1	4-7	8-11	
Indices of slots containing SSB		(	)		0	0	0	
RB numbers containing SSB within channel BW		(RBJ, RBJ+1,, RBJ+19) <sup>Note 1</sup>		(RBJ, RBJ+1,, RBJ+19) <sup>Note 1</sup>		(RB <sub>J</sub> , RB <sub>J+1</sub> ,, RB <sub>J+19</sub> ) <sup>Note 1</sup>	(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 [xx]. Editor's note: spec is not listed!

# A.4 Reference SMTC configuration

Table A.4-1: SMTC configurations

SSB Parameters	Unit	Value				
SMTC Pattern		SMTC.1	SMTC.2	SMTC.3		
SMTC periodicity	MHz	20	20	160		
SMTC offset	ms	0	0	0		
SMTC duration	ms	1	5	1		

# A.5 Reference DRX configurations

Table A.5-1: DRX configurations

Parameter	Unit		Value						
DRX Configuration		DRX.1	DRX.2	DRX.3	DRX.4	DRX.5	DRX.6	DRX.7	DRX.8
drx-onDurationTimer	ms	1	1	1	psf2	psf6	1	6	6
drx-InactivityTimer	ms	1	1	1	psf2	psf192	1	1	1
						0			
drx-RetransmissionTimerDL	slot	1	1	1	psf16	psf16	1	1	1
drx-RetransmissionTimerUL	slot	1	1	1			1	1	1
drx-LongCycleStartOffset	ms	40	640	40	sf160,	sf320.	640	640	320
					0	0			
shortDRX	-	disabled	disabled	disable	disable	disable	disable	disable	disable
				d	d	d	d	d	d
TimeAlignmentTimer	ms	500	500	Infinity	Infinity	Infinity	500	Infinity	Infinity

# A.6 EN-DC test setup

The purpose of this Annex is to specify the EN-DC configuration for the test cases in Chapters 4 and 5 of this test specification.

## A.6.1 E-UTRA serving cell parameters

This section defines the cell power levels and other specific cell parameters of the E-UTRA serving cell for EN-DC.

## A.6.1.1 E-UTRA serving cell parameters for EN-DC tests with NR FR1

Table A.6.1.1-1 defines the E-UTRA serving cell parameters for EN-DC tests with NR FR1 cell(s), defined in Chapter 4 of this test specification. Unless otherwise stated within the test, all measurements in Clauses 4 and 5 are performed only on the NR carrier. The E-UTRA PCell shall configured to not interfere with NR operation and the E-UTRA PCell signal power shall not be critical to the test purpose.

Table A.6.1.1-1: E-UTRAN cell specific test parameters for EN-DC tests with NR FR1

Parameter	Unit	E-UTRAN Cell1
E LITDA DE Channal Number		4
E-UTRA RF Channel Number		1 FDD or TDD
Duplex mode		
TDD special subframe configuration Note1		6
TDD uplink-downlink configuration <sup>Note1</sup>		1
BW <sub>channel</sub> Note 6		5MHz: N <sub>RB,c</sub> = 25
		10MHz: N <sub>RB,c</sub> = 50
PP 0011		20MHz: N <sub>RB,c</sub> = 100
PDSCH parameters:		5MHz: R.7 FDD
DL Reference Measurement Channel <sup>Note2,</sup> Note 6		10MHz: R.3 FDD
Note o		20MHz: R.6 FDD
		5MHz: R.4 TDD
		10MHz: R.0 TDD
DOTION/DD CON/DN HOLL		20MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5MHz: R.11 FDD
DL Reference Measurement Channel <sup>Note2</sup> , Note 6		10MHz: R.6 FDD
Note 6		20MHz: R.10 FDD
		5MHz: R.11 TDD
		10MHz: R.6 TDD
OONO B Note 2		20MHz: R.10 TDD
OCNG Patterns <sup>Note 2</sup>		5MHz: OP.20 FDD
		10MHz: OP.10 FDD
		20MHz: OP.17 FDD
		5MHz: OP.9 TDD
		10MHz: OP.1 TDD 20MHz: OP.7 TDD
PBCH_RA	dB	ZUIVINZ. OP.7 TDD
PBCH_RB	dB	
PSS_RA	dB	
SSS_RA	dB	
PCFICH_RB	dB	
PHICH_RA	dB	
PHICH_RB	dB	0
PDCCH_RA	dB	U
PDCCH_RB	dB	
	_	
PDSCH_RA	dB	
PDSCH_RB OCNG RA <sup>Note 3</sup>	dB	
OCNG_RANGES  OCNG_RBNote 3	dB	
NocNote 4	dB dBm/15 kHz	404
		-104
Ës/Noc	dB	17
Ês/lot	dB	17
RSRP Note 5	dBm/15 kHz	-87
SCH_RP Note 5	dBm/15 kHz	-87
Io Note 5	dBm/Ch BW	-59.13 + 10log(N <sub>RB,c</sub> /50)
Propagation Condition		AWGN
Antenna Configuration		1x2
Note 1: Special subframe and uplink-down	nlink configurations	s are specified in table 4.2-1 in TS 36.211 [24].

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [24].

Note 2: DL RMCs and OCNG patterns are specified in sections A.1, A.2 and D.1 of TS 36.521-3 [26].

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: Es/lot, RSRP, SCH\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: For E-UTRA anchor configuration, pick 5 MHz as default channel bandwidth setting in the tests as it is supported by all E-UTRA bands. If none of the UE supported EN-DC band combos support 5MHz E-UTRA carrier, pick 20 MHz channel BW or 10 MHz channel BW, in that order,

#### Table A.6.1.1-2: CQI-ReportConfig-DEFAULT: Additional E-UTRA Anchor Configuration

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-2 CQI-ReportConfig-DEFAULT							
Information Element	Value/remark	Comment	Condition				
CQI-ReportConfig-DEFAULT ::= SEQUENCE {							
cqi-ReportModeAperiodic	NOT PRESENT						
cqi-ReportPeriodic	NOT PRESENT						
}							

#### Table A.6.1.1-3: PhysicalConfigDedicated-DEFAULT: Additional E-UTRA Anchor Configuration

Derivation Path: TS 36.508 [7] clause 4.8.2, Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT					
Information Element	Value/remark	Comment	Condition		
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {					
soundingRS-UL-ConfigDedicated	Not present		RBC		
}					

#### Table A.6.1.1-4: MAC-MainConfig-RBC: Additional E-UTRA Anchor Configuration

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC				
Information Element Value/remark Comment Condition				
timeAlignmentTimerDedicated	Infinity			

## A.6.1.2 E-UTRA serving cell parameters for EN-DC tests with NR FR2

Table A.6.1.2-1 defines the E-UTRA serving cell parameters for EN-DC tests with NR FR2 cell(s), defined in Chapter 5 of this test specification. Unless otherwise stated within the test, all measurements in Clauses 6 and 7 are performed only on the NR carrier. The E-UTRA PCell shall configured to not interfere with NR operation and the E-UTRA PCell signal power shall not be critical to the test purpose.

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Table A.6.1.2-1: E-UTRAN cell specific test parameters for EN-DC tests with NR FR2

Parameter	Unit	E-UTRAN Cell1
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> Note 5	MHz	5MHz: N <sub>RB,c</sub> = 25
2 V Chairnes	2	10MHz: N <sub>RB,c</sub> = 50
		20MHz: N <sub>RB,c</sub> = 100
PDSCH parameters:		5MHz: R.7 FDD
DL Reference Measurement Channel Note2,		10MHz: R.3 FDD
Note 5		20MHz: R.6 FDD
		5MHz: R.4 TDD
		10MHz: R.0 TDD
		20MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5MHz: R.11 FDD
DL Reference Measurement Channel <sup>Note2,</sup>		10MHz: R.6 FDD
Note 5		20MHz: R.10 FDD
		5MHz: R.11 TDD
		10MHz: R.6 TDD
		20MHz: R.10 TDD
OCNG Patterns <sup>Note2, Note 5</sup>		5MHz: OP.20 FDD
		10MHz: OP.10 FDD
		20MHz: OP.17 FDD
		5MHz: OP.9 TDD
		10MHz: OP.1 TDD
DDOLL DA	-ID	20MHz: OP.7 TDD
PBCH_RA PBCH_RB	dB dB	
PSS_RA	dB	
SSS_RA	dB	
PCFICH_RB	dB	
PHICH_RA	dB	
PHICH_RB	dB	0
PDCCH_RA	dB	
PDCCH_RB	dB	
PDSCH_RA	dB	
PDSCH_RB	dB	1
OCNG_RA <sup>Note3</sup>	dB	
OCNG_RBNote3	dB	
		s are specified in table 4.2-1 in TS 36.211 [24].
		ons A 1, A.2 and D.1 of TS 36.521-3 [26].
·	•	cated and a constant total transmitted power
spectral density is achieved for all		,
		UTRA link to the DUT in the EN-DC operation.
The Test System shall provide a s	table and noise-fro	ee E-UTRA signal without need of precise
		ontrol. Further details of the E-UTRA signal
		ific test parameters, since the E-UTRA link is not
		to influence the NR FR2 requirement.
		as default channel bandwidth setting in the tests
		e UE supported EN-DC band combos support
5MHz E-UTRA carrier, pick 20 MH	iz channel BW or	10 MHz channel BW, in that order,

Table A.6.1.2-2: CQI-ReportConfig-DEFAULT: Additional E-UTRA Anchor Configuration

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-2 CQI-ReportConfig-DEFAULT					
Information Element	Value/remark	Comment	Condition		
CQI-ReportConfig-DEFAULT ::= SEQUENCE {					
cqi-ReportModeAperiodic	NOT PRESENT				
cqi-ReportPeriodic	NOT PRESENT				
}					

#### Table A.6.1.2-3: PhysicalConfigDedicated-DEFAULT: Additional E-UTRA Anchor Configuration

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Derivation Path: TS 36.508 [7] clause 4.8.2, Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT						
Information Element Value/remark Comment Condition						
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {						
soundingRS-UL-ConfigDedicated	Not present		RBC			
}						

#### Table A.6.1.2-4: MAC-MainConfig-RBC: Additional E-UTRA Anchor Configuration

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC				
Information Element	Comment	Condition		
timeAlignmentTimerDedicated	Infinity			

# A.7 Reference PRACH configurations

This section provides the typical PRACH configurations used for all RRM test cases defined in this test specification. Parameters not listed in this section can be derived from the configuration of each test.

# A.7.1 PRACH configurations for FR1

Table A.7.1-1 defines the PRACH configurations for FR1. Each of the PRACH configurations defined in Table A.7.1-1 have different applicabilities:

- PRACH.1 FR1 for SSB-based contention based random access in FR1.
- PRACH.2 FR1 for SSB-based non-contention based random access in FR1.
- PRACH.3 FR1 for CSI-RS based non-contention based random access in FR1.

Table A.7.1-1 Parameters for PRACH Configurations for FR1

Field		Value		Comment
PRACH Configuration	PRACH.1 FR1	PRACH.2 FR1	PRACH.3 FR1	
prach-ConfigurationIndex	87	87	87	160ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 in TS 38.211 [7].
msg1-SubcarrierSpacing	Same as UL carrier SCS	Same as UL carrier SCS	Same as UL carrier SCS	
totalNumberOfRA- Preambles	48	48	48	Total number of preambles used for contention based and contention free random acces
numberOfRA- PreamblesGroupA	48	48	48	No group B.
prach-RootSequenceIndex	0	0	0	Logic equence index = 0, resulting in root sequence = 1.
ssb-perRACH- OccasionAndCB- PreamblesPerSSB	oneFourth, n48	-	-	OneFourth: 1 SSB associated with 4 RACH occasions n48: 48 contention based preambles per SSB
ssb-perRACH-Occasion	-	oneFourth	oneFourth	OneFourth: 1 SSB associated with 4 RACH occasions
msg1-FDM	One	One	One	One PRACH transmission occasions FDMed in one time instance.
rsrp-ThresholdSSB	RSRP_51	RSRP_51	N/A	The actual value of the threshold is
rsrp-ThresholdCSI-RS	N/A	N/A	RSRP_51	-105dBm, as defined in TS 38.331 [13].
ra- ContentionResolutionTimer	sf48	-	-	48 sub-frames
powerRampingStep	dB2	dB2	dB2	
preambleReceivedTargetP ower	dBm-120	dBm-120	dBm-120	
preambleTransMax	n6	n6	n6	Max number of RA preamble transmission perfomed before declaring a failure is 6
ra-ResponseWindow	sl10	sl10	sl10	10 slots
zeroCorrelationZoneConfig	11	11	11	N-CS configuration, N <sub>CS</sub> = 23
Backoff Parameter Index	2	2	2	20ms, as defined in table 7.2-1 in TS 38.321 [12].
ssb-ResourceList	-	present	N/A	Assocated with SSB index 0
ra-PreambleIndex	-	50	N/A	Assocated with SSB index 0
csirs-ResourceList	N/A	N/A	present	Assocated with CSI-RS configured
ra-PreambleIndex	N/A	N/A	50	Assocated with CSI-RS configured
ra-OccasionList	-	-	1	RA occasions allowed corresponding to CSI-RS
ra-ssb-OccasionMaskIndex	-	1	N/A	PRACH occasion index 1 is allowed
Note: For further information	see Clause 6.3.2 in	TS 38.331 [13].		

# A.7.2 PRACH configurations for FR2

Table A.7.2-1 defines the PRACH configurations for FR2. Each of the PRACH configurations defined in Table A.7.2-1 have different applicabilities:

- PRACH.1 FR2 for SSB-based contention based random access in FR2.
- PRACH.2 FR2 for SSB-based non-contention based random access in FR2.
- PRACH.3 FR2 for CSI-RS based non-contention based random access in FR2.

Table A.7.2-1 Parameters for PRACH Configurations for FR2

Field		Value		Comment
PRACH Configuration	PRACH.1 FR2	PRACH.2 FR2	PRACH.3 FR2	
prach-ConfigurationIndex	236	236	236	160ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 in TS 38.211 [7].
msg1-SubcarrierSpacing	Same as UL carrier SCS	Same as UL carrier SCS	Same as UL carrier SCS	
totalNumberOfRA- Preambles	48	48	48	Total number of preambles used for contention based and contention free random acces
numberOfRA- PreamblesGroupA	48	48	48	No group B.
prach-RootSequenceIndex	0	0	0	Logic equence index = 0, resulting in root sequence = 1.
ssb-perRACH- OccasionAndCB- PreamblesPerSSB	oneFourth, n48	N/A	N/A	OneFourth: 1 SSB associated with 4 RACH occasions n48: 48 contention based preambles per SSB
ssb-perRACH-Occasion	N/A	oneFourth	oneFourth	OneFourth: 1 SSB associated with 4 RACH occasions
msg1-FDM	One	One	One	One PRACH transmission occasions FDMed in one time instance.
rsrp-ThresholdSSB	RSRP_51	RSRP_51	N/A	The actual value of the threshold is
rsrp-ThresholdCSI-RS	N/A	N/A	RSRP_51	-105dBm, as defined in TS 38.331 [13].
ra- ContentionResolutionTimer	sf48	N/A	N/A	48 sub-frames
powerRampingStep	dB2	dB2	dB2	
preambleReceivedTargetP ower	dBm-120	dBm-120	dBm-120	
preambleTransMax	n6	n6	n6	Max number of RA preamble transmission perfomed before declaring a failure is 6
ra-ResponseWindow	sl10	sl10	sl10	10 slots
zeroCorrelationZoneConfig	11	11	11	N-CS configuration, N <sub>CS</sub> = 23
Backoff Parameter Index	2	2	2	20ms, as defined in table 7.2-1 in TS 38.321 [12].
ssb-ResourceList	-	present	N/A	Assocated with SSB index 0
ra-PreambleIndex	=	50	N/A	Assocated with SSB index 0
csirs-ResourceList	N/A	N/A	present	Assocated with CSI-RS configured
ra-PreambleIndex	N/A	N/A	50	Assocated with CSI-RS configured
ra-OccasionList	-	-	1	RA occasions allowed corresponding to CSI-RS
ra-ssb-OccasionMaskIndex	-	1	N/A	PRACH occasion index 1 is allowed
Note: For further information	see Clause 6.3.2 in	TS 38.331 [13].		•

# A.8 Reference BWP configurations

This section provides the typical BWP configurations used for RRM test cases defined in this test specification. For downlink BWP, both initial BWP and dedicated BWP configurations are specified in section A.8.1 and for uplink BWP, dedicated BWP configurations are specified in section A.8.2. Parameters not listed in this section can be derived from the configuration of each test.

# A.8.1 Downlink BWP configurations

Table A.8.1-1 defines the different downlink initial BWP configurations. Table A.8.1-2 defines the different downlink dedicated BWP configurations.

Table A.8.1-1: Downlink initial BWP configurations

BWP Parameters	Unit	Values			
DL BWP		DLBWP.0.1	DLBWP.0.2		
Starting PRB index		0	RB <sub>a</sub> Note 1		
Bandwidth		Same as RF channel defined in each test	same as RMSI CORSET(CORSET #0) defined in each test		
Note 1: RB <sub>a</sub> is the lowest PRB index to guarantee the BWP including SSB PRB index (RBJ, RBJ+1,, RBJ+19) which is defined in Section A.3.					

Table A.8.1-2: Downlink dedicated BWP configurations

BWP Parameters	Unit	Values						
DL BWP		DLBWP.1.1		DLBWP.1	.2	DLBWP.1.3		
Starting PRB index		0	RB <sub>b</sub> Note	1		RB <sub>a</sub> Note	2	
SCS	KHz		15	30	120	15	30	120
Bandwidth	RB	Same as RF channel defined for the serving cell in each test	25	51	32	15	51	32
RBJ+1,, RB.	J+19) whicl st PRB ind	ex to guarantee the n is defined in Section ex to guarantee the n A.3.	n A.3.		•		•	

# A.8.2 Uplink BWP configurations

Table A.8.2-1 defines the uplink initial BWP configurations. Table A.8.2-2 defines the uplink dedicated BWP configurations.

Table A.8.2-1: Uplink BWP patterns for initial BWP configurations

BWP Parameters	Va	lues		
UL BWP	ULBWP.0.1	ULBWP.0.2		
Staring PRB index	0	RB <sub>a</sub> Note 1		
Bandwidth	Same as RF channel defined in each test	same as RMSI CORSET(CORSET #0) defined in each test		
Note 1: RBa is the lowest PRB index to guarantee the BWP including SSB PRB				
index (RBJ, RBJ+1	index (RBJ, RBJ+1,, RBJ+19) which is defined in Section A.3.			

Table A.8.2-2: Uplink BWP patterns for initial BWP configurations

BWP Parameters	Unit	Values						
UL BWP		ULBWP.1.1				ULBWP.1.3		
Staring PRB index		0	RB <sub>b</sub> <sup>N</sup>	lote 1		RB <sub>a</sub> Note 1		
SCS	KHz		15	30	120	15	30	120
Bandwidth	RB	Same as RF channel defined for the serving cell in each test	25	51	32	15	51	32
index (RBJ, RBJ Note 2: RB <sub>a</sub> is the lowes	Note 1: RB <sub>b</sub> is the lowest PRB index to guarantee the BWP not fully overlapped with SSB PRB index (RBJ, RBJ+1,, RBJ+19) which is defined in Section A.3.							

# 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 idle state mobility test cases in clauses 6.1 and 7.1,
- UE conditions which shall apply for UE inter-frequency idle state mobility test cases in clauses 6.1 and 7.1.

# B.1.2 Conditions for measurements on NR intra-frequency cells for cell re-selection

This section defines the following conditions for NR intra-frequency measurements performed based on SSBs for cell re-selection: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.1.2-1 for FR1 NR cells.

The conditions are defined in Table B.1.2-2 for FR2 NR cells.

Table B.1.2-1: Conditions for intra-frequency cell re-selection in FR1

Parameter		Minimum	SSB Ês/lot				
	NR operating band groups Note1	dBm /	dBm / SCS <sub>SSB</sub>				
		SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	dB			
	NR_FDD_FR1_A, NR_TDD_FR1_A	-124	-121				
	NR_FDD_FR1_B	-123.5	-120.5				
	NR_TDD_FR1_C	-123	-120				
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	≥ -4			
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119				
	NR_FDD_FR1_G	-121	-118				
	NR_FDD_FR1_H	-120.5	-117.5				
NOTE 1: NF	operating band groups are defined in Section	n 3.5.2.					

Table B.1.2-2: Conditions for intra-frequency cell re-selection in FR2

	Minimum	SSB_RP	SSB Ês/lot
NR operating band groups Note1	dBm / S	SCS <sub>SSB</sub>	dB
	SCS <sub>SSB</sub> = 120 kHz	SCS <sub>SSB</sub> = 240 kHz	uБ
NR_TDD_FR2_A	TBD	TBD	
NR_TDD_FR2_B	TBD	TBD	
NR_TDD_FR2_F	TBD	TBD	TBD
NR_TDD_FR2_G	TBD	TBD	
NR_TDD_FR2_T	TBD	TBD	
NR_TDD_FR2_Y	TBD	TBD	
	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_F NR_TDD_FR2_G NR_TDD_FR2_T	NR operating band groups Note1         dBm / S           SCS <sub>SSB</sub> = 120 kHz           NR_TDD_FR2_A         TBD           NR_TDD_FR2_B         TBD           NR_TDD_FR2_F         TBD           NR_TDD_FR2_G         TBD           NR_TDD_FR2_T         TBD	SCS <sub>SSB</sub> = 120 kHz         SCS <sub>SSB</sub> = 240 kHz           NR_TDD_FR2_A         TBD         TBD           NR_TDD_FR2_B         TBD         TBD           NR_TDD_FR2_F         TBD         TBD           NR_TDD_FR2_G         TBD         TBD           NR_TDD_FR2_T         TBD         TBD

# B.1.3 Conditions for measurements on NR inter-frequency cells for cell re-selection

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This section defines the following conditions for NR inter-frequency measurements performed based on SSBs for cell re-selection: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions defined in Table B.1.2-1 for FR1 NR intra-frequency cell re-selection shall also apply for FR1 NR inter-frequency cells in this section.

The conditions defined in Table B.1.2-2 for FR2 NR intra-frequency cell re-selection shall also apply for FR2 NR inter-frequency cells in this section.

# B.2 Conditions for NR RRC\_CONNECTED state

#### B.2.1 Introduction

In Annex B.2, the following conditions are specified:

- UE conditions which shall apply for UE intra-frequency measurement procedures and measurement performance tests in clauses 4.6, 4.7, 5.6, 5.7, 6.6, 6.7, 7.6 and 7.7,
  - UE conditions which shall apply for UE inter-frequency measurements procedures and requirements in Section 9,
- UE conditions which shall apply for UE intra-frequency measurements performance requirements in Section 10,
- UE conditions which shall apply for UE inter-frequency measurements performance requirements in Section 10.

# B.2.2 Conditions for NR intra-frequency measurements

This section defines the following conditions for NR intra-frequency measurements and corresponding procedures performed based on SSBs: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.2-2 for FR2 NR cells.

Table B.2.2-1: Conditions for intra-frequency measurements in FR1

Parameter		Minimum	SSB Ês/lot	
	NR operating band groups Note1	dBm /	SCS <sub>SSB</sub>	dB
		SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	uв
	NR_FDD_FR1_A, NR_TDD_FR1_A	-127	-124	
	NR_FDD_FR1_B	-126.5	-123.5	
	NR_TDD_FR1_C	-126	-123	
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 Section 3.5.2.

Table B.2.2-2: Conditions for intra-frequency measurements in FR2

		Minimum	Minimum SSB_RP				
Parameter	NR operating band groups Note1	dBm /	SCS <sub>SSB</sub>	-ID			
		SCS <sub>SSB</sub> = 120 kHz	SCS <sub>SSB</sub> = 240 kHz	dB			
	NR_TDD_FR2_A	TBD	TBD				
	NR_TDD_FR2_B	TBD	TBD				
Conditions	NR_TDD_FR2_F	TBD	TBD	TBD			
Conditions	NR_TDD_FR2_G	TBD	TBD				
	NR_TDD_FR2_T	TBD	TBD				
	NR_TDD_FR2_Y	TBD	TBD				

NOTE 1: NR operating band groups are defined in Section 3.5.3.

# B.2.3 Conditions for NR inter-frequency measurements

This section defines the following conditions for NR inter-frequency measurements and corresponding procedures performed based on SSBs: SSB\_RP and SSB  $\hat{E}s/Iot$ , 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 Ês/lot	
Parameter	NR operating band groups Note1	dBm /	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	operating band groups are defined in Section	n 3 5 2		

Table B.2.3-2: Conditions for inter-frequency measurements in FR2

		Minimum	SSB Ês/lot	
Parameter	NR operating band groups Note1	dBm/	SCS <sub>SSB</sub>	dB
		SCS <sub>SSB</sub> = 120 kHz	SCS <sub>SSB</sub> = 240 kHz	иь
	NR_TDD_FR2_A	TBD	TBD	•
	NR_TDD_FR2_B	TBD	TBD	
Conditions	NR_TDD_FR2_F	TBD	TBD	TBD
Conditions	NR_TDD_FR2_G	TBD	TBD	
	NR_TDD_FR2_T	TBD	TBD	
	NR_TDD_FR2_Y	TBD	TBD	
NOTE 1: NR	operating band groups are defined in Sect	ion 3.5.3		

# B.3 RRM requirement exceptions

## B.3.1 Introduction

Annex B.3 covers exceptions for the side conditions based on receiver sensitivity for CA, DC, and SUL.

## B.3.2 Receiver sensitivity relaxation for CA

### B.3.2.1 Receiver sensitivity relaxation for UE supporting CA in FR1

For a UE supporting inter-band carrier aggregation configuration with uplink in NR band, if there is a relaxation of receiver sensitivity  $\Delta R_{IB,c}>0$  dB as defined in TS 38.101-1 [18, Section 7.3A.3], the relevant side conditions specifying received power levels (SSB\_RP and Io) shall be increased by the amount  $\Delta=\Delta R_{IB,c}$  defined for the corresponding downlink NR bands.

For a UE supporting CA configuration in FR1, the requirement in this section applies for both SC and CA operation.

#### B.3.2.2 Receiver sensitivity relaxation for UE configured with CA in FR1

#### B.3.2.2.1 Inter-band carrier aggregation

For a UE configured with inter-band carrier aggregation with active uplink in NR band, if there is a relaxation of receiver sensitivity  $\Delta R_{IB,c}>0$  dB as defined in TS 38.101-1, Section 7.3A.3 [2], 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 section applies, then the relaxation specified in Section B.3.2.1 should not be applied.

#### B.3.2.2.2 Reference sensitivity exceptions due to UL harmonic interference for CA

In this section, requirements exceptions are described for the UE configured with a band in FR1 when it is impacted by UL harmonic interference from another band in FR1 of the same CA configuration.

A relevant side condition (SSB\_RP and Io) in a requirement shall be increased by the amount  $\Delta$ =L2-L1, where L1 is the reference sensitivity level specified in TS 38.101-1 [2], Section 7.3.2, and L2 is the reference sensitivity level based on the requirements in TS 38.101-1 [2], Section 7.3A.4, when the following conditions are fulfilled,

- corresponding downlink component carriers on different NR bands are configured with CA and active,
- the upling is configured in the NR low operating band and is active,
- the uplink configuration is as specified in TS 38.101-1 [2], Section 7.3A.4, and
- the exception requirements specified in TS 38.101-1 [2], Section 7.3A.4 apply.

If the relaxation  $\Delta$  specified in this section applies, then the relaxation specified in Section B.3.2.1 should not be applied.

# B.3.2.2.3 Reference sensitivity exceptions due to intermodulation interference due to 2UL CA

In this section, requirements exceptions are described for the UE with an inter-band carrier aggregation with uplink assigned to two NR bands.

A relevant side condition (SSB\_RP and Io) in a requirement shall be increased by the amount  $\Delta$ =L2-L1, where L1 is the reference sensitivity level specified in TS 38.101-1 [2], Section 7.3.2, and L2 is the reference sensitivity level based on the requirements in TS 38.101-1 [2], Section 7.3A.5, when the following conditions are fulfilled,

- corresponding downlink component carriers on different bands are configured with CA and active,
- uplinks are assigned to two NR bands,
- the exception requirements specified in TS 38.101-1 [2], Section 7.3A.5 apply.

If the relaxation  $\Delta$  specified in this section applies, then the relaxation specified in Section B.3.2.1 should not be applied.

#### B.3.2.3 Receiver sensitivity relaxation for UE supporting CA in FR2

Editor's note: TBD

### B.3.2.4 Receiver sensitivity relaxation for UE configured with CA in FR2

#### B.3.2.4.1 Intra-band contiguous carrier aggregation

For a UE configured with intra-band contiguous carrier aggregation in NR band in FR2, if there is a relaxation of receiver sensitivity  $\Delta R_{IB}>0$  dB as defined in TS 38.101-2 [3], Section 7.3A.2.1 depending on the aggregated channel bandwidth, the relevant side conditions specifying received power levels (SSB\_RP and Io) shall be increased by the amount  $\Delta=\Delta R_{IB}$  defined for the corresponding downlink NR bands.

#### B.3.2.4.2 Intra-band non-contiguous carrier aggregation

For a UE configured with intra-band non-contiguous carrier aggregation in NR band in FR2, if there is a relaxation of receiver sensitivity  $\Delta R_{IB}>0$  dB as defined in TS 38.101-2 [3], Section 7.3A.2.1 depending on the aggregated channel bandwidth, the relevant side conditions specifying received power levels (SSB\_RP and Io) shall be increased by the amount  $\Delta=\Delta R_{IB}$  defined for the corresponding downlink NR bands.

## B.3.3 Receiver sensitivity relaxation for DC

Editor's note: TBD

# B.3.4 Receiver sensitivity relaxation for SUL

## B.3.4.1 Receiver sensitivity relaxation for UE supporting SUL in FR1

For a UE supporting a SUL configuration in FR1, if there is a relaxation of receiver sensitivity  $\Delta R_{IB,c}>0$  dB as defined in TS 38.101-1 [2], Section 7.3C.3, the relevant side conditions specifying received power levels (SSB\_RP and Io) shall be increased by the amount  $\Delta=\Delta R_{IB,c}$  defined for the corresponding downlink NR bands.

For a UE supporting a SUL configuration in FR1, the requirement in this section applies for both SC and SUL operation.

## B.3.4.2 Receiver sensitivity relaxation for UE configured with SUL in FR1

#### B.3.4.2.1 Reference sensitivity exceptions due to UL harmonic interference for SUL

In this section, requirements exceptions are described for the UE with a band in FR1 when it is impacted by UL harmonic interference from another band in FR1 of the same SUL configuration.

A relevant side condition (SSB\_RP and Io) in a requirement shall be increased by the amount  $\Delta$ =L2-L1, where L1 is the reference sensitivity level specified in TS 38.101-1 [2], Section 7.3.2, and L2 is the reference sensitivity level based on the requirements in TS 38.101-1 [2], Section 7.3C.2, when the following conditions are fulfilled,

- a downlink component carrier is configured in NR band and is active,
- the upling is configured in the NR low operating band and is active,
- the uplink configuration is as specified in TS 38.101-1 [2], Section 7.3C.2, and
- the exception requirements specified in TS 38.101-1 [2], Section 7.3C.2 apply.

If the relaxation  $\Delta$  specified in this section applies, then the relaxation specified in Section B.3.4.1 should not be applied.

# Annex C (normative): Downlink physical channels and propagation conditions

# C.1 Downlink physical channels

The following clauses describe the downlink physical channels that are needed for setting a connection and channels that are needed during a connection.

#### C.1.1 General

**TBD** 

# C.1.2 Default downlink signal levels

The downlink power settings in Table C.1.2-1 is used unless otherwise specified in a test case. The downlink power settings in Table C.1.2-1 are also used for the initial registration for NR SA test cases in clauses 6 and 7. For EN-DC test cases in clauses 4 and 5, the E-UTRA power settings used for initial registration are defined in Annex A.6.

If the UE has more than one Rx antenna, the downlink signal is applied to each one. All UE Rx antennas shall be connected.

| Table C.1.2-1: Default Downlink power levels for NR | | SCS (kHz) | Channel | MHz | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | |

SCS	Parameter	Unit	value											
(kHz)	Channel bandwidth	MHz	5	10	15	20	25	30	40	50	60	80	90	100
15	Number of RBs		25	50	75	100	128	160	215	270	N/A	N/A	N/A	N/A
15	Channel BW power	dBm	-60	-57	-55	-54	-53	-52	-51	-50	N/A	N/A	N/A	N/A
30	Number of RBs		10	24	36	50	64	75	100	128	162	216	243	270
30	Channel BW power	dBm	-61	-57	-55	-54	-53	-52	-51	-50	-49	-48	-47	-47
60	Number of RBs		N/A	10	18	24	30	36	50	64	75	100	120	135
60	Channel BW power	dBm	N/A	-58	-56	-54	-53	-52	-51	-50	-49	-48	-47	-47
	RS EPRE	dBm/ 15kH z	-85	-85	-85	-85	-85	-85	-85	-85	-85	-85	-85	-85

Note 1: The channel bandwidth powers are informative, based on -85dBm/15kHz SS/PBCH SSS EPRE, then scaled according to the number of RBs and rounded to the nearest integer dBm value. Full RE allocation with no boost or deboost is assumed.

Note 2: The power level is specified at each UE Rx antenna.

Note 3: DL level is applied for any of the Subcarrier Spacing configuration ( ) with the same power spectrum density of -85dBm/15kHz.

The default signal level uncertainty is  $\pm$ 3dB at each test port, for any level specified. If the uncertainty value is critical for the Test purpose, a tighter uncertainty is specified for the related test case in Annex F

## C.1.3 Default connection setup

Table C.1.3-1 describes the downlink physical channels that are required for NR connection setup. For EN-DC test cases in clauses 4 and 5, the required E-UTRA downlink physical channels are defined in TS 36.521-3 [26] Annex C.2.

Physical Channel	EPRE Ratio	Note
PBCH	PBCH_RA = 0 dB	
	PBCH_RB = 0 dB	
PSS	PSS_RA = 0 dB	
SSS	SSS_RA = 0 dB	
PDCCH	PDCCH_RA = 0 dB	
	PDCCH_RB = 0 dB	
	MPDCCH_RB = 0 dB	
PDSCH	PDSCH_RA = 0 dB	
	PDSCH_RB = 0 dB	
DMRS	TBD	
CSI-RS	TBD	
Note 1: No boosting is appli	ed	·

Table C.1.3-1: Downlink physical channels required for NR connection set-up

# C.2 Propagation conditions

The propagation conditions and channel models for various environments are specified. For each environment a propagation model is used to evaluate the propagation pathless due to the distance. Channel models are formed by combining delay profiles with a Doppler spectrum, with the addition of correlation properties in the case of a multi-antenna scenario.

#### C.2.1 No interference

The downlink connection between the SS and the UE is without AWGN, and has no fading or multipath effects.

# C.2.2 Static propagation conditions

The downlink connection between the SS and the UE is an AWGN environment (unless otherwise stated) with no fading or multipath effects.

#### C.2.2.1 UE receiver with 2Rx antenna connectors

For 1 port transmission to UE receiver with 2Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}.$$

For 2 port transmission to UE Receiver with 2Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{pmatrix} 1 & j \\ 1 & -j \end{pmatrix}$$

For 4 port transmission to UE Receiver with 2Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{bmatrix} 1 & 1 & j & j \\ 1 & 1 - j & -j \end{bmatrix}$$

#### C.2.2.2 UE receiver with 4Rx antenna connectors

For 1 port transmission to UE receiver with 4Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$$

For 2 port transmission to UE Receiver with 4Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{bmatrix} 1 & j \\ 1 & -j \\ 1 & j \\ 1 & -j \end{bmatrix}.$$

For 4 port transmission to UE Receiver with 4Rx the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{bmatrix} 1 & 1 & j & j \\ 1 & 1 & -j & -j \\ 1 & -1 & j & -j \\ 1 & -1 & -j & j \end{bmatrix}.$$

# C.2.3 Multi-path fading propagation conditions

TBD

# Annex D (normative): Deviations from standard test configuration

This annex summarizes the list of test cases which deviate from the standard test configuration.

# D.1 Test cases with different numerologies

**TBD** 

# D.2 EN-DC test cases with different EN-DC configurations

In clauses 4 and 5, 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.

## D.2.1 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, and this requirement is dependent 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 Note: The maximum number of CCs that can be used in FR2 tests in EN-DC would depend on the test equipment capability.

# D.3 Carrier aggregation test cases with different CA configurations

In clauses 6 and 7, carrier aggregation test cases may be defined for two CCs as well as for more than two CCs to verify the same RRM requirement.

# D.3.1 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, and the test requirement is dependent 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.

# D.4 Antenna connection for 4Rx capable UEs

All the tests in this test specification are defined for UEs supporting 2Rx. This section explains how to apply the 2Rx tests in clauses 4 and 6 to UEs supporting 4Rx antenna ports. No tests are currently specified in clauses 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. Please notice that 4Rx is in general not supported for the test cases in clauses 5 and 7.

## D.4.1 Principle of testing

#### D.4.1.1 Single carrier tests

For 4Rx capable UEs supporting at least one 2Rx band, all single carrier tests specified in clauses 4 and 6, except 4.7 and 6.7 shall be tested with 2Rx on any band where 2Rx is supported, with the antenna connection defined in D.4.2.1. Single carrier tests specified clauses 4.7 and 6.7 are band dependent and shall be tested in all bands supported by the UE, using 2Rx and the antenna connection defined in D.4.2.1 for the bands where 2Rx is supported, and 4Rx and the antenna connection defined in D.4.2.2 for the bands where 2Rx is not supported.

For 4Rx capable UEs that do not support any 2Rx band, all single carrier tests in clauses 4 and 6 shall be tested with 4Rx using the antenna configuration defined in D.4.2.2.

#### D.4.1.2 Carrier aggregation tests

For carrier aggregation tests, the antenna connection is selected independently for each cell, the PCell and the SCell(s). If a cell (either PCell or any of the SCell(s)) is on a band where 2Rx is supported, antenna connection in Section D.4.2.1 shall be used for this cell. If the cell is on a band where 2Rx is not supported, antenna connection in section D.4.2.2 shall be used for this cell.

#### D.4.1.3 EN-DC tests

For all EN-DC tests, the antenna connection is selected independently for each cell. For the E-UTRA PCell, the antenna connection specified in D.4.2.3 shall be used if the PCell is on an E-UTRA band supporting 2Rx, and the antenna connection specified in D.4.2.4 shall be used if the PCell is on an E-UTRA band not supporting 2Rx.

For the NR PSCell and SCell(s), the principle of testing is the same as in D.4.1.2.

#### D.4.2 Antenna connection

#### D.4.2.1 Antenna connection for NR bands where 2Rx is supported

For NR bands where 2Rx is supported, the UE shall decide via manufacturer declaration and AP configuration which 2 of the 4 antenna ports shall be connected with the downlink signal from the SS. The remaining 2 antenna ports shall be connected to zero input. The parameters and test requirements remain unmodified.

## D.4.2.2 Antenna connection for NR bands where only 4Rx is supported

For NR bands where only 4Rx is supported, all 4Rx antenna ports shall be connected to the downlink signal from the SS. The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring tests specified in section TBD, the parameters and test requirements remain unmodified.

## D.4.2.3 Antenna connection for E-UTRA bands where 2Rx is supported

For E-UTRA bands where 2Rx is supported, the UE shall decide via manufacturer declaration and AP configuration which 2 of the 4 antenna ports shall be connected with the downlink signal from the SS. The remaining 2 antenna ports shall be connected to zero input. The parameters and test requirements remain unmodified.

## D.4.2.4 Antenna connection for NR bands where only 4Rx is supported

For E-UTRA bands where only 4Rx is supported, all 4Rx antenna ports shall be connected to the downlink signal from the SS. The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except

for the modifications to radio link monitoring tests specified in section TBD, the parameters and test requirements remain unmodified.

# Annex E (normative): Cell configuration mapping

The cells used in TS 38.533 do not correspond to the cells defined in TS 38.508-1 [14] section 4.4.2. This annex describes the mapping between the test cases in TS 38.533 and the cells defined in TS 38.508-1 [14]. The test case shall apply the RF parameters as defined in TS 38.533 according to the column heading.

NOTE: For example if the second cell in a test case is an inter-frequency cell then Cell3 from TS 38.508-1 [14] section 4.4.2 is used with the radio parameters as defined for Cell2 in TS 38.533.

# E.1 Test frequency selection

The requirements defined in this test specification comprise EN-DC and NR SA test cases. The test cases are defined with a single NR cell or with multiple NR cells. The multi-cell test cases can be either intra-frequency, i.e. the NR cells defined by the test are overlapping in the frequency domain, or inter-frequency, i.e. the NR cells defined by the test have different center frequencies, separated from each other by a frequency value bigger than the respective cell bandwidths. This clause describes the general rule on how to select the test frequencies for the NR RRM test cases in this test specification.

#### E.1.1 E-UTRA PCell for EN-DC test cases

Unless otherwise stated, the E-UTRA PCell for EN-DC test cases shall be configured using the test frequency "Mid" as defined in TS 36.508 [25] for the corresponding E-UTRA band.

In case that the "Mid" test frequency overlaps with any of the NR test frequencies required by the test case, the E-UTRA PCell shall be shifted to an additional frequency within the E-UTRA same band. If the E-UTRA band channel bandwidth is not sufficient to allocate a non-overlapping E-UTRA PCell, the auxiliary band as defined in TS 36.521-3 [26] clause 3 shall be used.

#### E.1.2 Test cases with one NR cell

Unless otherwise stated, for NR test cases with one NR cell, this cell shall be configured using the test frequency "Mid" as defined in TS 38.508-1 [14] for the corresponding band under test.

## E.1.3 Test cases with more than one NR cell

### E.1.3.1 Intra-frequency test cases

Unless otherwise stated, multi-cell intra-frequency test cases shall be tested using the test frequency "Mid" as defined in TS 38.508-1 [14] for the corresponding NR band under test.

## E.1.3.2 Inter-frequency test cases

For NR SA multi-cell inter-frequency test cases, unless otherwise stated, the serving cell (and any other neighbour cell in the same frequency carrier) shall be configured using the test frequency "Mid" as defined in TS 38.508-1 [14] for the corresponding band under test. Any inter-frequency neighbour cell shall be configured using a non-overlapping test frequency adjacent to the serving cell frequency, as defined in TBD.

For EN-DC multi-cell inter-frequency test cases, unless otherwise stated, the PSCell (and any other neighbour cell in the same frequency carrier) shall be configured using the test frequency "Mid" as defined in TS 38.508-1 [14] for the corresponding band under test. Any inter-frequency neighbour cell shall be configured using a non-overlapping test frequency adjacent to the PSCell frequency, as defined in TBD.

## E.1.4 Carrier aggregation test cases

#### E.1.4.1 Inter-band carrier aggregation

For inter-band carrier aggregation test cases, each of the component carriers and their respective neighbour cells shall be configured following the sample principles defined in E.1.2 and E.1.3.

### E.1.4.2 Intra-band contiguous carrier aggregation

For intra-band contiguous carrier aggregation, the test frequency selection shall be done following the same principle as in E.1.3.2 for inter-frequency test cases.

### E.1.4.3 Intra-band non-contiguous carrier aggregation

For intra-band non-contiguous carrier aggregation in FR1, unless otherwise specified, the test frequency selection shall be done following the maximum Wgap principle, i.e. selecting the test frequencies (of the test frequencies defined in TS 38.508-1 [14]) with the widest frequency separation within the band under test.

For intra-band non-contiguous carrier aggregation in FR2, the test frequency selection is TBD.

# E.2 Cell configuration mapping for EN-DC FR1 test cases in Chapter 4

Table E.2-1 defines the cell configuration mapping for EN-DC FR1 test cases in chapter 4 of this test specification.

Table E.2-1: Cell configuration mapping for RRM testing

TC	Description	38.533 LTE Cell1	38.533 NR Cell2	38.533 NR Cell3	38.533 NR Cell4	CA Type
4.4.3.1	EN-DC FR1 timing advance adjustment accuracy	LTE Cell 1	NR Cell 1			
4.4.1.1	EN-DC FR1 UE transmit timing accuracy	LTE Cell 1	NR Cell 1			
4.5.1.1	EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode	LTE Cell 1	NR Cell 1			
4.5.1.2	EN-DC FR1 radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode	LTE Cell 1	NR Cell 1			
4.5.1.3	EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in DRX mode	LTE Cell 1	NR Cell 1			
4.5.1.4	EN-DC FR1 radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in DRX mode	LTE Cell 1	NR Cell 1			
4.5.1.5	EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with CSI-RS-based RLM RS in non-DRX mode	LTE Cell 1	NR Cell 1			
4.5.1.6	EN-DC FR1 radio link monitoring in-sync test for PSCell configured with CSI-RS-based RLM RS in non-DRX mode	LTE Cell 1	NR Cell 1			
4.5.1.7	EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with CSI-RS- based RLM RS in DRX mode	LTE Cell 1	NR Cell 1			
4.5.1.8	EN-DC FR1 radio link monitoring in-sync test for PSCell configured with CSI-RS-based RLM RS in DRX mode	LTE Cell 1	NR Cell 1			
4.5.3.1	EN-DC FR1 SCell activation and deactivation of known SCell in non-DRX for 160ms SCell measurement cycle	LTE Cell 1	NR Cell 6	NR Cell 3		

TC	Description	38.533 LTE Cell1	38.533 NR Cell2	38.533 NR Cell3	38.533 NR Cell4	CA Type
4.5.3.2	EN-DC FR1 SCell activation and deactivation of known SCell in non-DRX for 320ms SCell measurement cycle	LTE Cell 1	NR Cell 6	NR Cell 3		
4.5.3.3	EN-DC FR1 SCell activation and deactivation of unknown SCell in non-DRX	LTE Cell 1	NR Cell 6	NR Cell 3		
4.6.1.1	EN-DC FR1 event-triggered reporting without gap in non-DRX	LTE Cell 1	NR Cell 1	NR Cell 2		
4.6.1.2	EN-DC FR1 event-triggered reporting without gap in DRX	LTE Cell 1	NR Cell 1	NR Cell 2		
4.6.1.3	EN-DC FR1 event-triggered reporting with gap in non-DRX	TBD	TBD	TBD		
4.6.1.4	EN-DC FR1 event-triggered reporting with gap in DRX	TBD	TBD	TBD		
4.6.1.5	EN-DC FR1 event-triggered reporting without gap in non-DRX with SSB time index detection	TBD	TBD	TBD		
4.6.1.6	EN-DC FR1 event-triggered reporting with gap in non-DRX with SSB time index detection	TBD	TBD	TBD		
4.6.2.1	EN-DC FR1-FR1 event-triggered reporting in non-DRX	LTE Cell 1	NR Cell 6	NR Cell 3		
4.6.2.2	EN-DC FR1-FR1 event-triggered reporting in DRX	LTE Cell 1	NR Cell 6	NR Cell 3		
4.6.2.5	EN-DC FR1-FR1 event-triggered reporting in non-DRX with SSB time index detection	LTE Cell 1	NR Cell 6	NR Cell 3		
4.6.2.6	EN-DC FR1-FR1 event-triggered reporting in DRX with SSB time index detection	LTE Cell 1	NR Cell 6	NR Cell 3		
4.7.1.1.1	EN-DC FR1 SS-RSRP absolute measurement accuracy	TBD	TBD	TBD		
4.7.1.1.2	EN-DC FR1 SS-RSRP relative measurement accuracy	TBD	TBD	TBD		
4.7.1.2.1	EN-DC FR1-FR1 SS-RSRP absolute measurement accuracy	TBD	TBD	TBD		
4.7.1.2.2	EN-DC FR1-FR1 SS-RSRP relative measurement accuracy	TBD	TBD	TBD		

# E.3 Cell configuration mapping for EN-DC FR2 test cases in Chapter 5

Table E.3-1 defines the cell configuration mapping for EN-DC FR2 test cases in chapter 5 of this test specification.

Table E.3-1: Cell configuration mapping for EN-DC FR2 RRM testing

TC	Description	38.533 LTE Cell1	38.533 NR Cell2	38.533 NR Cell3	38.533 NR Cell4	CA Type
5.5.3.1	EN-DC FR2 SCell activation and deactivation intra-band in non-DRX	LTE Cell 1	NR Cell 6	NR Cell 3		
5.6.2.1	EN-DC FR2-FR2 event-triggered reporting in non-DRX	TBD	TBD	TBD		
5.6.2.2	EN-DC FR2-FR2 event-triggered reporting in DRX	TBD	TBD	TBD		
5.6.2.3	EN-DC FR2-FR2 event-triggered reporting in non-DRX with SSB time index detection	TBD	TBD	TBD		
5.6.2.4	EN-DC FR2-FR2 event-triggered reporting in DRX with SSB time index detection	TBD	TBD	TBD		
5.7.1.1	EN-DC FR2 SS-RSRP measurement accuracy	TBD	TBD	TBD		
5.7.1.2	EN-DC FR2-FR2 SS-RSRP measurement accuracy	TBD	TBD	TBD		

# E.4 Cell configuration mapping for SA FR1 test cases in Chapter 6

Table E.4-1 defines the cell configuration mapping for SA FR1 test cases in chapter 6 of this test specification.

Table E.4-1: Cell configuration mapping for SA FR1 RRM testing

TC	Description	38.533 NR Cell1	38.533 NR Cell2	38.533 NR Cell3	38.533 NR Cell4	CA Type
6.1.1.1	NR SA FR1 cell re-selection	NR Cell 1	NR Cell 2			
6.1.1.2	NR SA FR1-FR1 cell re-selection	NR Cell 1	NR Cell 3			
6.3.2.1.1	NR SA FR1 RRC re-establishment	NR Cell 1	NR Cell 2			
6.3.2.1.2	NR SA FR1 - FR1 RRC re-establishment	NR Cell 1	NR Cell 3			
	Contention based random access test in					
6.3.2.2.1	FR1 for NR standalone	NR Cell 1				
	Non-Contention based random access test					
6.3.2.2.2	in FR1 for NR standalone	NR Cell 1				
6.3.2.3.1	NR SA FR1 RRC connection release with redirection	NR Cell 1	NR Cell 2			
6.4.3.1	NR SA FR1 timing advance adjustment accuracy	NR Cell 1				
6.5.1.1	NR SA FR1 radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode	NR Cell 1				
6.5.1.2	NR SA FR1 radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode	NR Cell 1				
6.5.1.3	NR SA FR1 radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in DRX mode	NR Cell 1				
6.5.1.4	NR SA FR1 radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in DRX mode	NR Cell 1				
6.5.1.5	NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode	NR Cell 1				
6.5.1.6	NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode	NR Cell 1				
6.5.1.7	NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode	NR Cell 1				
6.5.1.8	NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode	NR Cell 1				
6.5.4.1	NR SA FR1 UE UL carrier RRC reconfiguration delay	NR Cell 1	NR Cell 33			
6.5.5.3	NR SA FR1 CSI-RS-based beam failure detection and link recovery in non-DRX	NR Cell 1				
6.5.5.4	NR SA FR1 CSI-RS-based beam failure detection and link recovery in DRX	NR Cell 1				
6.6.1.1	SA event triggered reporting tests without gap under non-DRX	NR Cell 1	NR Cell 2			
6.6.1.2	SA event triggered reporting tests without gap under DRX	NR Cell 1	NR Cell 2			
6.6.1.3	SA event triggered reporting tests with per- UE gaps under non-DRX	NR Cell 1	NR Cell 2			
6.6.1.4	SA event triggered reporting tests with per- UE gaps under DRX	NR Cell 1	NR Cell 2			
6.6.1.5	SA event triggered reporting tests without gap under non-DRX with SSB index reading	NR Cell 1	NR Cell 2			
6.6.1.6	SA event triggered reporting tests with per- UE gaps under non-DRX with SSB index reading	NR Cell 1	NR Cell 2			

тс	Description	38.533 NR Cell1	38.533 NR Cell2	38.533 NR Cell3	38.533 NR Cell4	CA Type
6.6.2.1	NR SA FR1-FR1 event-triggered reporting in non-DRX	NR Cell 6	NR Cell 3			
6.6.2.2	NR SA FR1-FR1 event-triggered reporting in DRX	NR Cell 6	NR Cell 3			
6.6.2.5	NR SA FR1-FR1 event-triggered reporting in non-DRX with SSB time index detection	NR Cell 6	NR Cell 3			
6.6.2.6	NR SA FR1-FR1 event-triggered reporting in DRX with SSB time index detection	NR Cell 6	NR Cell 3			
6.7.1.3.1	NR SA FR1-FR2 SS-RSRP absolute measurement accuracy	NR Cell 1	NR Cell 2			
6.7.1.3.2	NR SA FR1-FR2 SS-RSRP relative measurement accuracy	NR Cell 1	NR Cell 2			
6.7.1.1.1	NR SA FR1 SS-RSRP absolute measurement accuracy	TBD	TBD			
6.7.1.1.2	NR SA FR1 SS-RSRP relative measurement accuracy	TBD	TBD			
6.7.1.2.1	NR SA FR1-FR1 SS-RSRP absolute measurement accuracy	TBD	TBD			
6.7.1.2.2	NR SA FR1-FR1 SS-RSRP relative measurement accuracy	TBD	TBD			

Table E.4-2: Cell configuration mapping for SA FR1 - E-UTRA Inter-RAT RRM testing

TC	Description		38.533 LTE			CA Type
		Cell1	Cell2	Cell3	Cell4	
6.1.2.1	NR SA FR1 – E-UTRA cell re-selection to higher priority E-UTRA	NR Cell 1	LTE Cell 1			
6.1.2.2	NR SA FR1 – E-UTRA cell re-selection to lower priority E-UTRA	NR Cell 1	LTE Cell 1			
6.3.1.4	NR SA FR1 – E-UTRA handover with known target cell	NR Cell 1	LTE Cell 1			
6.3.1.5	NR SA FR1 – E-UTRA handover with unknown target cell	NR Cell 1	LTE Cell 1			
6.3.2.3.2	NR SA FR1 – E-UTRA RRC connection release with redirection	NR Cell 1	LTE Cell 1			
6.6.3.1	NR SA FR1 – E-UTRAN event-triggered reporting in non-DRX	NR Cell 1	LTE Cell 1			
6.6.3.2	NR SA FR1 – E-UTRAN event-triggered reporting in DRX	NR Cell 1	LTE Cell 1			

## E.5 Cell configuration mapping for SA FR2 test cases in Chapter 7

Table E.5-1 defines the cell configuration mapping for SA FR2 test cases in chapter 7 of this test specification.

Table E.5-1: Cell configuration mapping for SA FR2 RRM testing

TC	Description	38.533 NR Cell1	38.533 NR Cell2	38.533 NR Cell3	38.533 NR Cell4	CA Type
7.5.5.1	NR SA FR2 SSB-based beam failure detection and link recovery in non-DRX	NR Cell 1				
7.5.5.2	NR SA FR2 SSB-based beam failure detection and link recovery in DRX	NR Cell 1				
7.5.5.3	NR SA FR2 CSI-RS-based beam failure detection and link recovery in non-DRX	NR Cell 1				
7.5.5.4	NR SA FR2 CSI-RS-based beam failure detection and link recovery in DRX	NR Cell 1				
7.6.1.1	NR SA FR2 event-triggered reporting without gap in non-DRX	NR Cell 1	NR Cell 2			

TC	Description	38.533 NR Cell1	38.533 NR Cell2	38.533 NR Cell3	38.533 NR Cell4	CA Type
7.6.1.2	NR SA FR2 event-triggered reporting without gap in DRX	NR Cell 1	NR Cell 2			
7.6.1.3	NR SA FR2 event-triggered reporting with gap in non-DRX	NR Cell 1	NR Cell 2			
7.6.1.4	NR SA FR2 event-triggered reporting with gap in DRX	NR Cell 1	NR Cell 2			
7.6.2.1	NR SA FR2-FR2 event-triggered reporting in non-DRX	TBD	TBD			
7.6.2.2	NR SA FR2-FR2 event-triggered reporting in DRX	TBD	TBD			
7.6.2.3	NR SA FR2-FR2 event-triggered reporting in non-DRX with SSB time index detection	TBD	TBD			
7.6.2.4	NR SA FR2-FR2 event-triggered reporting in DRX with SSB time index detection	TBD	TBD			
7.6.2.5	NR SA FR1-FR2 event-triggered reporting in non-DRX	TBD	TBD			
7.6.2.6	NR SA FR1-FR2 event-triggered reporting in DRX	TBD	TBD			
7.6.2.7	NR SA FR1-FR2 event-triggered reporting in non-DRX with SSB time index detection	TBD	TBD			
7.6.2.8	NR SA FR1-FR2 event-triggered reporting in DRX with SSB time index detection	TBD	TBD			
7.7.1.1	NR SA FR2 SS-RSRP measurement accuracy	TBD	TBD	TBD		
7.7.1.2	NR SA FR2-FR1 SS-RSRP measurement accuracy	TBD	TBD	TBD		

## Annex F (normative): Measurement uncertainties and test tolerances

The requirements of this clause apply to all tests in the present document.

### F.1 Measurement uncertainties and test tolerances for FR1

#### F.1.1 Acceptable uncertainty of test system (normative)

See TS 38.521-1 [17] annex F.1.

#### F.1.1.1 Measurement of test environments

See TS 38.521-1 [17] Annex F1.1.

#### F.1.1.2 Measurement of RRM requirements

This clause defines the maximum test system uncertainty for the RRM requirements. The maximum uncertainty values allowed for the typical RRM measurement uncertainty contributors is defined in Table F.1.1.2-1. Unless explicitly stated for a particular test case, these maximum uncertainty values should be used as starting point to perform the test tolerance analysis in TR 38.903 [22] for each of the test cases. Specific test cases might require a tigher measurement uncertainty value for some of the contributors. Exceptions to the general values in Table F.1.1.2-1 shall be handled case by case.

Table F.1.1.2-1: Maximum allowed measurement uncertainty values for the test system for FR1 (up to 6 GHz) and Cell BW BW ≤ 40 MHz

MU contributor	Unit	Value	Comment
AWGN absolute power, Noc	dB	±1.5	
Ratio of cell X signal / AWGN, Ês <sub>x</sub> / N <sub>oc</sub>	dB	±0.3	Same as in LTE
Fading profile uncertainty*	dB	±TBD	Depends on fading profile, can be referenced from TS 38.101-4 [20]
AWGN and signal flatness*	dB	±2.0	Same as in LTE, can be referenced from TS 38.101-4 [20]
Uplink absolute power measurement	dB	±1.5	Same as in TS 38.101-1 [17]
Uplink relative power measurement	dB	±0.7	Same as in TS 38.101-1 [17]
Uplink signal transmit timing relative to downlink	Тс	±112	
Relative transmit timing accuracy during UE timing adjustment	Тс	±88	
Timing Advance Adjustment accuracy	Тс	±88	

Note 1: The values in this table are specified per cell. Multi-cell test cases need to combined these values in the TT analysis in TR 38.903

Note 2:These values apply for cell BW ≤ 40 MHz. The maximum allowed measurement uncertainty for higher cell BW is FFS.

The maximum test system uncertainty for the EN-DC FR1 test cases in chapter 4 is defined in Table F.1.1.2-2.

The maximum test system uncertainty for the NR SA FR1 test cases in chapter 6 is defined in Table F.1.1.2-3.

Table F.1.1.2-2: Maximum test system uncertainty for RRM requirements for EN-DC FR1 test cases

Subclause	Maximum Test Sys Uncertainty <sup>1</sup>	tem Derivation of Test System Uncertainty
4.3.2.2.1	Noc ±1.5 dB Ês / Noc ±0.3 dB	$\hat{E}_{S1}$ / $N_{oc}$ is the ratio of cell 1 signal / AWGN $T_c = 1/(480000 \times 4096)$ seconds, the basic
	Uplink absolute power measurement ±1.5 dB	timing unit defined in TS 38.211 [7]
	Uplink relative power measurement ±0.7 dB	
	±112T <sub>c</sub> Uplink signal tra timing relative to downl	
4.3.2.2.2	Same as 4.3.2.2.1	Same as 4.3.2.2.1
4.4.3.1 EN-DC FR1 timing advance	Noc ±1.5 dB	Ês₁ / N₀c is the ratio of cell 1 signal / AWGN
	NOC ±1.5 dB	LS1 / Noc is the fatio of cell 1 signal / AVVOIN
adjustment accuracy	Ês <sub>1</sub> / N <sub>oc</sub> ±0.3 dB	$T_c = 1/(480000 \times 4096)$ seconds, the basic timing unit defined in TS 38.211 [7]
	±88T <sub>c</sub> Timing Advance	
	Adjustment accuracy	
4.5.3.1 EN-DC FR1 SCell activation	Noc1 ±1.5 dB	Note:
and deactivation of known SCell in	Ês1 / Noc1 ±0.3 dB	Noc1 is the AWGN on cell 1 frequency
non-DRX for 160ms SCell	Noc2 ±1.5 dB	Ês1 / Noc1 is the ratio of cell 1 signal /
measurement cycle	Ês2 / Noc2 ±0.3 dB	AWGN
moded of form by the	2027 11002 ±0.0 dB	Noc2 is the AWGN on cell 2 frequency
		Ês2 / Noc2 is the ratio of cell 2 signal /
1 - 2 - 11 - 2 - 11 - 11 - 11		AWGN
4.5.3.2 EN-DC FR1 SCell activation	Same as 4.5.3.1	Same as 4.5.3.1
and deactivation of known SCell in		
non-DRX for 320ms SCell		
measurement cycle		
4.5.3.3 EN-DC FR1 SCell activation	Same as 4.5.3.1	Same as 4.5.3.1
and deactivation of unknown SCell in		
non-DRX		
4.6.1.1 EN-DC FR1 event-triggered	Noc ±1.5 dB	Note:
reporting without gap in non-DRX	Ês1 / Noc ±0.3 dB	Ês1 / Noc is the ratio of cell 1 signal / AWGN
reporting without gap in non-DRX	l a	
4 0 4 0 EN DO ED4	Ës2 / Noc ±0.3 dB	Ês2 / Noc is the ratio of cell 2 signal / AWGN
4.6.1.2 EN-DC FR1 event-triggered	Same as 4.6.1.1	Same as 4.6.1.1
reporting without gap in DRX		
4.6.1.3 EN-DC FR1 event-triggered	Same as 4.6.1.1	Same as 4.6.1.1
reporting with gap in non-DRX		
4.6.1.4 EN-DC FR1 event-triggered	Same as 4.6.1.1	Same as 4.6.1.1
reporting with gap in DRX		
4.6.2.1 EN-DC FR1-FR1 event-	Freq 2 Noc ±1.5 dB	Note:
triggered reporting in non-DRX	Freq 3 Noc ±1.5 dB	Ês2 / Noc is the ratio of cell 2 signal / AWGN
	Ês2 / Noc ±0.3 dB	Ês3 / Noc is the ratio of cell 3 signal / AWGN
	Ês3 / Noc ±0.3 dB	
4.6.2.2 EN-DC FR1-FR1 event-	Same as 4.6.2.1	Same as 4.6.2.1
triggered reporting in DRX	Gaine de 1.6.2.1	Our do 1.0.2.1
4.6.2.5 EN-DC FR1-FR1 event-	Same as 4.6.2.1	Same as 4.6.2.1
	Same as 4.0.2.1	Saille as 4.0.2.1
triggered reporting in non-DRX with		
SSB time index detection		
4.6.2.6 EN-DC FR1-FR1 event-	Same as 4.6.2.1	Same as 4.6.2.1
triggered reporting in DRX with SSB		
time index detection		

Table F.1.1.2-3 Maximum test system uncertainty for RRM requirements for SA FR1 test cases

Subclause	Maximum Test Syste Uncertainty <sup>1</sup>	m Derivation of Test System Uncertainty
6.1.1.1 NR SA FR1 cell re-selection	Noc ±1.5 dB	Note:
	Ês1 / Noc ±0.3 dB	Ês1 / Noc is the ratio of cell 1 signal / AWGN
	Ês2 / Noc ±0.3 dB	Ês2 / Noc is the ratio of cell 2 signal / AWGN
6.1.1.2 NR SA FR1-FR1 cell re-	Noc1 ±1.5 dB	Note:
selection	Ês1 / Noc1 ±0.3 dB	Noc1 is the AWGN on cell 1 frequency
	Noc2 ±1.5 dB	Ês1 / Noc1 is the ratio of cell 1 signal /
	Ês2 / Noc2 ±0.3 dB	AWGN
		Noc2 is the AWGN on cell 2 frequency
		Ês2 / Noc2 is the ratio of cell 2 signal /
		AWGN
6.1.2.1 NR SA FR1 – E-UTRA cell re-	Noc1 ±1.5 dB	Note:
selection to higher priority E-UTRA	Ês1 / Noc1 ±0.3 dB	Noc1 is the AWGN on cell 1 (NR) frequency
personal to mg.re. priemy = e m	Noc2 ±1.5 dB	Ês1 / Noc1 is the ratio of cell 1 signal /
	Ês2 / Noc2 ±0.3 dB	AWGN
	2027 14002 20.0 GB	Noc2 is the AWGN on cell 2 (E-UTRAN)
		frequency
		Ês2 / Noc2 is the ratio of cell 2 signal /
		AWGN
6.1.2.2 NR SA FR1 – E-UTRA cell re-	Same as 6.1.2.1	Same as 6.1.2.1
	Jaille as 0.1.2.1	Jaille 45 U. 1.2. I
selection to lower priority E-UTRA 6.3.1.4 NR SA FR1 – E-UTRA	Comp. co. 6.4.0.4	Same as 6.1.2.1
	Same as 6.1.2.1	Same as 6.1.2.1
handover with known target cell	0	0-77
6.3.1.5 NR SA FR1 – E-UTRA	Same as 6.1.2.1	Same as 6.1.2.1
handover with unknown target cell		^
6.3.2.2.1	N₀c ±1.5 dB	Ês₁ / N₀c is the ratio of cell 1 signal / AWGN
	Ês / N <sub>oc</sub> ±0.3 dB	
		$T_c = 1/(480000 \text{ x } 4096) \text{ seconds, the basic}$
	Uplink absolute power	timing unit defined in TS 38.211 [7]
	measurement ±1.5 dB	
	Uplink relative power	
	measurement ±0.7 dB	
	±112Tc Uplink signal transmit	
	timing relative to downlink	
6.3.2.2.2	Same as 6.3.2.2.1	Same as 6.3.2.2.1
6.6.1.1 SA event triggered reporting	Same as 4.6.1.1	Same as 4.6.1.1
tests without gap under non-DRX		
6.6.1.2 SA event triggered reporting	Same as 4.6.1.1	Same as 4.6.1.1
tests without gap under DRX		
6.6.1.3 SA event triggered reporting	Same as 4.6.1.1	Same as 4.6.1.1
tests with per-UE gaps under non-DI		
6.6.1.4 SA event triggered reporting	Same as 4.6.1.1	Same as 4.6.1.1
tests with per-UE gaps under DRX	Camo ao 4.0.1.1	Samo do 1.0.1.1
6.6.1.5 SA event triggered reporting	Same as 4.6.1.1	Same as 4.6.1.1
tests without gap under non-DRX with		Jame as 4.0.1.1
SSB index reading	""	
	Comp. 00. 4.0.4.4	Comp on 4 6 1 1
6.6.1.6 SA event triggered reporting	Same as 4.6.1.1	Same as 4.6.1.1
tests with per-UE gaps under non-DI	۲۸	
with SSB index reading		N
6.6.2.1 NR SA FR1-FR1 event-	Freq 1 Noc ±1.5 dB	Note:
triggered reporting in non-DRX	Freq 2 Noc ±1.5 dB	Ês1 / Noc is the ratio of cell 1 signal / AWGN
	Ês1 / Noc ±0.3 dB	Ês2 / Noc is the ratio of cell 2 signal / AWGN
	Ës2 / Noc ±0.3 dB	
6.6.2.2 NR SA FR1-FR1 event-	Same as 6.6.2.1	Same as 6.6.2.1
triggered reporting in DRX		
6.6.2.5 NR SA FR1-FR1 event-	Same as 6.6.2.1	Same as 6.6.2.1
triggered reporting in non-DRX with		
SSB time index detection		
6.6.2.6 NR SA FR1-FR1 event-	Same as 6.6.2.1	Same as 6.6.2.1
triggered reporting in DRX with SSE		
time index detection		
		I

#### F.1.2 Interpretation of measurement results (normative)

See TS 38.521-1 [17] Annex F.2.

### F.1.3 Test Tolerance and Derivation of Test Requirements (informative)

See TS 38.521-1 [17] Annex F.3.

#### F.1.3.1 Measurement of test environments

See TS 38.521-1 [17] Annex F.3.1.

#### F.1.3.2 Measurement of RRM requirements

Because the relationships between the test system uncertainties and the test tolerances are often complex, it is not always possible to give a simple derivation of the test requirement in this document. The analysis is recorded in 3GPP TR 38 903 [22].

The derivation of the test requirements for the EN-DC FR1 test cases in chapter 4 is defined in Table F.1.3.2-1.

The derivation of the test requirements for the NR SA FR1 test cases in chapter 6 is defined in Table F.1.3.2-2.

Table F.1.3.2-1: Derivation of test requirements for EN-DC FR1 RRM tests

Test	Minimum requirement in TS 38.133 [6]	Test tolerance (TT)	Test requirement in TS 38.533
4.3.2.2.1	Absolute uplink power: Normal conditions ±9dB	2.1dB	Absolute uplink power: Normal conditions ±11.1dB
	Relative uplink power step: Normal conditions ±2.5dB	0.7dB	Relative uplink power step: Normal conditions ±3.2dB
	Uplink timing: 15kHz SCS T <sub>e</sub> ±12*64*T <sub>c</sub> 30kHz SCS T <sub>e</sub> ±8*64*T <sub>c</sub>	112Tc 112Tc	Uplink timing: 15kHz SCS T <sub>e</sub> ±880*T <sub>c</sub> 30kHz SCS Te ±624*T <sub>c</sub>
4.3.2.2.2	Same as 4.3.2.2.1	Same as 4.3.2.2.1	Same as 4.3.2.2.1
4.4.1.1 EN-DC FR1 UE transmit timing accuracy	Test 1 (no DRX): Uplink timing: ±12*64 T <sub>c</sub> for 15 KHz SSB SCS,15 kHz UL SCS ±10*64 T <sub>c</sub> for 15 KHz SSB SCS,30 kHz UL SCS ±10*64 T <sub>c</sub> for 15 KHz SSB SCS,60 kHz UL SCS ±8*64 T <sub>c</sub> for 30 KHz SSB SCS,15 kHz UL SCS ±8*64 T <sub>c</sub> for 30 KHz SSB SCS,30 kHz UL SCS ±7*64 T <sub>c</sub> for 30 KHz SSB SCS,60 kHz UL SCS	±1.75*64*T <sub>c</sub> ±1.75*64*T <sub>c</sub> ±1.75*64*T <sub>c</sub> ±1.75*64*T <sub>c</sub> ±1.75*64*T <sub>c</sub> ±1.75*64*T <sub>c</sub>	Test 1 (10MHz Ch BW): Uplink timing: ±13.75*64*T <sub>c</sub> Uplink timing: ±11.75*64*T <sub>c</sub> Uplink timing: ±11.75*64*T <sub>c</sub> Uplink timing: ±9.75*64*T <sub>c</sub> Uplink timing: ±9.75*64*T <sub>c</sub> Uplink timing: ±8.75*64*T <sub>c</sub>
	Max step size $T_q$ : 5.5*64* $T_c$ Min adjust rate $T_p$ : 5.5*64* $T_c$ Max adjust rate: 5.5*64* $T_c$ Ês / $N_{oc}$ : +3.00dB $N_{oc}$ = -98 dBm/15 kHz (Config 1,2,3)	+0.5*64T <sub>c</sub> -3.6*64*T <sub>c</sub> +1.1*64*T <sub>c</sub> +0.3 dB +1.5 dB	Max step size $T_q$ : $6.0*64*T_c$ Min adjust rate: $1.9*64*T_c$ Max adjust rate: $6.6*64*T_c$ Ês / $N_{oc}$ : +3.30dB $N_{oc}$ = -98 dBm/15 kHz (Config 1,2,3) +1.5 dB
	Test 2 (with DRX): $\pm 12^{\circ}64$ T <sub>c</sub> for 15 KHz SSB SCS,15 kHz UL SCS $\pm 10^{\circ}64$ T <sub>c</sub> for 15 KHz SSB SCS,30 kHz UL SCS $\pm 10^{\circ}64$ T <sub>c</sub> for 15 KHz SSB SCS,60 kHz UL SCS $\pm 8^{\circ}64$ T <sub>c</sub> for 30 KHz SSB SCS,15 kHz UL SCS $\pm 8^{\circ}64$ T <sub>c</sub> for 30 KHz SSB SCS,30 kHz UL SCS $\pm 8^{\circ}64$ T <sub>c</sub> for 30 KHz SSB SCS,30 kHz UL SCS $\pm 7^{\circ}64$ T <sub>c</sub> for 30 KHz SSB SCS,60 kHz UL SCS	±1.75*64*T <sub>c</sub> ±1.75*64*T <sub>c</sub> ±1.75*64*T <sub>c</sub> ±1.75*64*T <sub>c</sub> ±1.75*64*T <sub>c</sub> ±1.75*64*T <sub>c</sub>	Test 2 (with DRX):  Uplink timing: ±13.75*64*Tc Uplink timing: ±11.75*64*Tc Uplink timing: ±11.75*64*Tc Uplink timing: ±9.75*64*Tc Uplink timing: ±9.75*64*Tc Uplink timing: ±8.75*64*Tc
	Ês / N <sub>oc</sub> : +3.00dB	+0.3dB	Ês / N <sub>oc</sub> : +3.30dB
4.4.3.1 EN-DC FR1 timing advance	N <sub>oc</sub> = -98 dBm/15 kHz (Config 1, 2, 4, 5)	0	N <sub>oc</sub> = -98 dBm/15 kHz (Config 1, 2, 4, 5)
adjustment accuracy	$N_{oc} = -95 \text{ dBm}/15 \text{ kHz (Config 3, 6)}$	0	$N_{oc} = -95 \text{ dBm}/15 \text{ kHz (Config 3, 6)}$
	$\hat{E}s_x / N_{oc} = 3 dB$	0	$\hat{E}s_x / N_{oc} = 3 dB$
	UE Timing Advance Adjustment Accuracy for 15kHz SCS = ±256 T <sub>c</sub> + TT	+/- 88 Tc	UE TAAA for 15kHz SCS = ±344 T <sub>c</sub>
	UE Timing Advance Adjustment Accuracy for 30kHz SCS = ±256 T <sub>c</sub> + TT	+/- 88 Tc	UE TAAA for 30kHz SCS = ±344 T <sub>c</sub>
4.5.3.1 EN-DC FR1 SCell activation and deactivation of known SCell in non-DRX for 160ms SCell	During T1: Noc1: -104dBm/15kHz Noc2: -104dBm/15kHz Ês1 / Noc1: +17dB Ês2 / Noc2: +17dB	During T1: 0dB 0dB 0dB 0dB	During T1: Noc1: -104dBm/15kHz Noc2: -104dBm/15kHz Ês1 / Noc1: +17dB Ês2 / Noc2: +17dB
measurement cycle	During T2: Noc1: -104dBm/15kHz Noc2: -104dBm/15kHz Ês1 / Noc1: +17dB Ês2 / Noc2: +17dB	During T2: 0dB 0dB 0dB 0dB	During T2: Noc1: -104dBm/15kHz Noc2: -104dBm/15kHz Ês1 / Noc1: +17dB Ês2 / Noc2: +17dB
	During T3: Noc1: -104dBm/15kHz Noc2: -104dBm/15kHz Ês1 / Noc1: +17dB Ês2 / Noc2: +17dB	During T3: 0dB 0dB 0dB 0dB	During T3: Noc1: -104dBm/15kHz Noc2: -104dBm/15kHz Ês1 / Noc1: +17dB Ês2 / Noc2: +17dB

	T-		1-
4.5.3.2 EN-DC FR1 SCell	Same as 4.5.3.1	Same as 4.5.3.1	Same as 4.5.3.1
activation and			
deactivation of known			
SCell in non-DRX for			
320ms SCell			
measurement cycle			
	Same as 4.5.3.1	Same as 4.5.3.1	Same as 4.5.3.1
activation and			
deactivation of unknown			
SCell in non-DRX			
4.6.1.1 EN-DC FR1	During T1:	During T1:	During T1:
event-triggered reporting	Noc: -98dBm/15kHz	0dB	Noc: -98dBm/15kHz
without gap in non-DRX	Ês1 / Noc: +4.00dB	0dB	Ês1 / Noc: +4.00dB
without gap in hon Brox	Ês2 / Noc: -infinity	0dB	Ês2 / Noc: -infinity
	20271100	OGB	2027 1400. Illinity
	During T2:	During T2:	During T2:
	Noc: -98dBm/15kHz	OdB	Noc: -98dBm/15kHz
	Ês1 / Noc: +4.00dB	0dB	Ês1 / Noc: +4.00dB
	Ês2 / Noc: +4.00dB	0dB	Ês2 / Noc: +4.00dB
4.6.1.2 EN-DC FR1	Same as 4.6.1.1	Same as 4.6.1.1	Same as 4.6.1.1
	Same as 4.6.1.1	Same as 4.6.1.1	Same as 4.6.1.1
event-triggered reporting			
without gap in DRX			
4.6.1.3 EN-DC FR1	Same as 4.6.1.1	Same as 4.6.1.1	Same as 4.6.1.1
event-triggered reporting			
with gap in non-DRX			
4.6.1.4 EN-DC FR1	Same as 4.6.1.1	Same as 4.6.1.1	Same as 4.6.1.1
event-triggered reporting			
with gap in DRX			
4.6.2.1 EN-DC FR1-FR1	During T1:	During T1:	During T1:
event-triggered reporting	Freq 2 Noc: -98dBm/15kHz	0dB	Freq 2 Noc: -98dBm/15kHz
in non-DRX	Freq 3 Noc: -98dBm/15kHz	0dB	Freq 3 Noc: -98dBm/15kHz
	Ês2 / Noc: +4.00dB	0dB	Ês2 / Noc: +4.00dB
	Ês3 / Noc: -infinity	0dB	Ês3 / Noc: -infinity
	1		
	During T2:	During T2:	During T2:
	Freq 2 Noc: -98dBm/15kHz	0dB	Freq 2 Noc: -98dBm/15kHz
	Freq 3 Noc: -98dBm/15kHz	0dB	Freq 3 Noc: -98dBm/15kHz
	Ês2 / Noc: +4.00dB	0dB	Ês2 / Noc: +4.00dB
	Ês3 / Noc: +7.00dB	0dB	Ês3 / Noc: +7.00dB
4.6.2.2 EN-DC FR1-FR1	Same as 4.6.2.1	Same as 4.6.2.1	Same as 4.6.2.1
_	Jame as 4.0.2.1	Same as 4.0.2.1	Jame as 4.0.2.1
event-triggered reporting			
in DRX	Comp. 00. 4.6.0.4	C 4 C C 4	Comp. op. 4.6.2.4
4.6.2.5 EN-DC FR1-FR1	Same as 4.6.2.1	Same as 4.6.2.1	Same as 4.6.2.1
event-triggered reporting			
in non-DRX with SSB			
time index detection			
4.6.2.6 EN-DC FR1-FR1	Same as 4.6.2.1	Same as 4.6.2.1	Same as 4.6.2.1
event-triggered reporting			
in DRX with SSB time			
index detection			

Table F.1.3.2-2: Derivation of test requirements for NR SA FR1 RRM tests

Test	Minimum requirement in TS 38.133 [6]	Test tolerance (TT)	Test requirement in TS 38.533
6.1.1.1 NR SA FR1 cell re-	During T1:	During T1:	During T1:
selection	Noc: -98dBm/15kHz	0dB	Noc: -98dBm/15kHz
	Ês1 / Noc: +16dB	0dB	Ês1 / Noc: +16dB
	Ês2 / Noc: -infinity	0dB	Ês2 / Noc: -infinity
	ESZ / NOCIIIIIIty	ОСВ	L32 / NOCIllility
	During T2:	During T2:	During T2:
	Noc: -98dBm/15kHz	0dB	Noc: -98dBm/15kHz
	Ês1 / Noc: +13dB	0dB	Ês1 / Noc: +13dB
	Es2 / Noc: +16dB	0.45dB	Ës2 / Noc: +16.45dB
	During T3:	During T3:	During T3:
	Noc: -98dBm/15kHz	0dB	Noc: -98dBm/15kHz
	Ês1 / Noc: +16dB	0.45dB	Ês1 / Noc: +16.45dB
	Ês2 / Noc: +13dB	0dB	Ês2 / Noc: +13dB
6.1.1.2 NR SA FR1-FR1 cell re-	During T1:	During T1:	During T1:
selection	Noc1: -98dBm/15kHz	0dB	Noc1: -98dBm/15kHz
	Noc2: -98dBm/15kHz	-2dB	Noc2: -100dBm/15kHz
	Ês1 / Noc1: +14dB	1.6dB	Ês1 / Noc1: +15.6dB
	Ês2 / Noc2: -4dB	0.4dB	Ês2 / Noc2: -3.6dB
	LSZ / NOCZ4dB	0.405	L52 / NOC23.00B
	During T2:	During T2:	During T2:
	Noc1: -98dBm/15kHz	0dB	Noc1: -98dBm/15kHz
	Noc2: -98dBm/15kHz	0dB	Noc2: -98dBm/15kHz
	Ês1 / Noc1: +14dB	1.6dB	Ês1 / Noc1: +15.6dB
	Ês2 / Noc2: -infinity	0dB	Ês2 / Noc2: -infinity
	2027 11002. Hilling	oub	2027 14002. Hillinity
	During T3:	During T3:	During T3:
	Noc1: -98dBm/15kHz	0dB	Noc1: -98dBm/15kHz
	Noc2: -98dBm/15kHz	0dB	Noc2: -98dBm/15kHz
	Ês1 / Noc1: +14dB	1.6dB	Ês1 / Noc1: +15.6dB
	Ês2 / Noc2: +12dB	1.6dB	Ês2 / Noc2: 13.6dB
6.1.2.1 NR SA FR1 – E-UTRA	During T1:	During T1:	During T1:
cell re-selection to higher priority	Noc1: -98dBm/15kHz	0dB	Noc1: -98dBm/15kHz
E-UTRA	Noc2: -98dBm/15kHz	0dB	Noc2: -98dBm/15kHz
L-OTIVA	Ês1 / Noc1: +14dB	0dB	Ês1 / Noc1: +14dB
	•	0dB	Ês2 / Noc2: -infinity
	Ës2 / Noc2: -infinity	UUB	ES2 / NOC2IIIIIIIty
	During T2:	During T2:	During T2:
	Noc1: -98dBm/15kHz	0dB	Noc1: -98dBm/15kHz
	Noc2: -98dBm/15kHz	0dB	Noc2: -98dBm/15kHz
	Es1 / Noc1: +14dB	1.6dB	Es1 / Noc1: +15.6dB
	Ës2 / Noc2: +12dB	1.6dB	Ës2 / Noc2: 13.6dB
	During T3:	During T3:	During T3:
	Noc1: -98dBm/15kHz	0dB	Noc1: -98dBm/15kHz
	Noc2: -98dBm/15kHz	-2dB	Noc2: -100dBm/15kHz
	Ês1 / Noc1: +14dB	1.6dB	Ês1 / Noc1: +15.6dB
	Ês2 / Noc2: -4dB	0.4dB	Ês2 / Noc2: -3.6dB
6.1.2.2 NR SA FR1 – E-UTRA	During T1:	During T1:	During T1:
cell re-selection to lower priority	Noc1: -98dBm/15kHz	-2dB	Noc1: -100dBm/15kHz
E-UTRA	Noc2: -98dBm/15kHz	0dB	Noc2: -98dBm/15kHz
	Ês1 / Noc1: -4dB	0.4dB	Ês1 / Noc1: -3.6dB
	Ês2 / Noc2: +14dB	1.6dB	Ês2 / Noc2: +15.6dB
	During T2:	During T2:	During T2:
		•	
	Noc1: -98dBm/15kHz	0dB	Noc1: -98dBm/15kHz
	Noc2: -98dBm/15kHz	0dB	Noc2: -98dBm/15kHz
	Es1 / Noc1: +12dB	1.6dB	Es1 / Noc1: +13.6dB
	Ës2 / Noc2: +14dB	0dB	Ês2 / Noc2: +14dB

	Description TA	Din a. T4.	Di.a. a. T4
6.3.1.4 NR SA FR1 – E-UTRA	During T1:	During T1:	During T1:
handover with known target cell	Noc1: -100dBm/15kHz	0dB	Noc1: -100dBm/15kHz
	Noc2: -98dBm/15kHz	0dB	Noc2: -98dBm/15kHz
	Ês1 / Noc1: +12dB	1.55dB	Ês1 / Noc1: +13.55dB
	Ës2 / Noc2: -infinity	0dB	Ēs2 / Noc2: -infinity
	During T2:	During T2:	During T2:
	Noc1: -100dBm/15kHz	0dB	Noc1: -100dBm/15kHz
	Noc2: -98dBm/15kHz	0dB	Noc2: -98dBm/15kHz
	Ês1 / Noc1: -4dB	-1.55dB	Ês1 / Noc1: -5.55dB
	Ês2 / Noc2: +8dB	1.55dB	Ês2 / Noc2: +9.55dB
	L32 / 11002. 100B	1.00dB	L32 / 14002. 13.000D
	During T3:	During T3:	During T3:
	Noc1: -100dBm/15kHz	0dB	Noc1: -100dBm/15kHz
	Noc2: -98dBm/15kHz	0dB	Noc2: -98dBm/15kHz
	Ês1 / Noc1: -4dB	-1.55dB	Ês1 / Noc1: -5.55dB
	Ës2 / Noc2: +8dB	1.55dB	Ês2 / Noc2: +9.55dB
6.3.1.5 NR SA FR1 – E-UTRA	During T1:	During T1:	During T1:
	Noc1: -98dBm/15kHz	0dB	Noc1: -98dBm/15kHz
handover with unknown target			
cell	Noc2: -98dBm/15kHz	0dB	Noc2: -98dBm/15kHz
	Ês1 / Noc1: 0dB	0dB	Ês1 / Noc1: 0dB
	Ês2 / Noc2: -infinity	0dB	Ês2 / Noc2: -infinity
	LOZ / NOOZ. Hilling	100D	LOZ / 1400Z. Hillillty
	During T2:	During T2:	During T2:
	Noc1: -98dBm/15kHz	0dB	Noc1: -98dBm/15kHz
	Noc2: -98dBm/15kHz	0dB	Noc2: -98dBm/15kHz
	Ës1 / Noc1: 0dB	0dB	Ês1 / Noc1: 0dB
	Ês2 / Noc2: +7dB	0dB	Ês2 / Noc2: +7dB
6.3.2.2.1	Absolute uplink power:		Absolute uplink power:
0.0.2.2.1	Normal conditions ±9dB	2.1dB	Normal conditions ±11.1dB
	Normal Conditions ±905	2.1ub	Normal Conditions ±11.10b
	Relative uplink power step:		Relative uplink power step:
	Normal conditions ±2.5dB	0.7dB	Normal conditions ±3.2dB
	Troffilal conditions ±2.0db	0.7 dB	1401111al conditions ±3.2ab
	Uplink timing:		Uplink timing:
	15kHz SCS T <sub>e</sub> ±12*64*T <sub>c</sub>	112T <sub>c</sub>	15kHz SCS T <sub>e</sub> ±880*T <sub>c</sub>
	30kHz SCS T <sub>e</sub> ±8*64*T <sub>c</sub>	112T <sub>c</sub>	30kHz SCS T <sub>e</sub> ±624*T <sub>c</sub>
6.3.2.2.2	Same as 6.3.2.2.1	Same as 6.3.2.2.1	Same as 6.3.2.2.1
6.6.1.1 SA event triggered	Same as 4.6.1.1	Same as 4.6.1.1	Same as 4.6.1.1
reporting tests without gap under			
non-DRX	<u> </u>		_
6.6.1.2 SA event triggered	Same as 4.6.1.1	Same as 4.6.1.1	Same as 4.6.1.1
reporting tests without gap under			
reperming teete trimie at gap arrae.			
DDY			
DRX	0	0	0
6.6.1.3 SA event triggered	Same as 4.6.1.1	Same as 4.6.1.1	Same as 4.6.1.1
	Same as 4.6.1.1	Same as 4.6.1.1	Same as 4.6.1.1
6.6.1.3 SA event triggered reporting tests with per-UE gaps	Same as 4.6.1.1	Same as 4.6.1.1	Same as 4.6.1.1
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX			
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered	Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1  Same as 4.6.1.1
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps			
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered			
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX	Same as 4.6.1.1	Same as 4.6.1.1	Same as 4.6.1.1
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered			
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under	Same as 4.6.1.1	Same as 4.6.1.1	Same as 4.6.1.1
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading	Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading	Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1  Same as 4.6.1.1
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered	Same as 4.6.1.1	Same as 4.6.1.1	Same as 4.6.1.1
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps	Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1  Same as 4.6.1.1
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index	Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1  Same as 4.6.1.1
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading 6.6.2.1 NR SA FR1-FR1 event-	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1:	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1:	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1:
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: 0dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading 6.6.2.1 NR SA FR1-FR1 event-	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: 0dB 0dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading 6.6.2.1 NR SA FR1-FR1 event-	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: 0dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading 6.6.2.1 NR SA FR1-FR1 event-	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: 0dB 0dB 0dB 0dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading 6.6.2.1 NR SA FR1-FR1 event-	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: 0dB 0dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading 6.6.2.1 NR SA FR1-FR1 event-	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: 0dB 0dB 0dB 0dB 0dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading 6.6.2.1 NR SA FR1-FR1 event-	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity  During T2:	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: 0dB 0dB 0dB 0dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity  During T2:
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading 6.6.2.1 NR SA FR1-FR1 event-	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity  During T2:	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: 0dB 0dB 0dB 0dB 0dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity  During T2:
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading 6.6.2.1 NR SA FR1-FR1 event-	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity  During T2: Freq 1 Noc: -98dBm/15kHz	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: 0dB 0dB 0dB 0dB 0dB 0dB 0dB 0dB 0dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity  During T2: Freq 1 Noc: -98dBm/15kHz
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading 6.6.2.1 NR SA FR1-FR1 event-	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity  During T2: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: 0dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity  During T2: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading 6.6.2.1 NR SA FR1-FR1 event-	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity  During T2: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: 0dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity  During T2: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz
6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX 6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX 6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading 6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading 6.6.2.1 NR SA FR1-FR1 event-	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity  During T2: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: 0dB	Same as 4.6.1.1  Same as 4.6.1.1  Same as 4.6.1.1  During T1: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Ês1 / Noc: +4.00dB Ês2 / Noc: -infinity  During T2: Freq 1 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz Freq 2 Noc: -98dBm/15kHz

6.6.2.2 NR SA FR1-FR1 event- triggered reporting in DRX	Same as 6.6.2.1	Same as 6.6.2.1	Same as 6.6.2.1
	Same as 6.6.2.1	Same as 6.6.2.1	Same as 6.6.2.1
triggered reporting in non-DRX			
with SSB time index detection	0 0004	0 0004	0.004
6.6.2.6 NR SA FR1-FR1 event- triggered reporting in DRX with	Same as 6.6.2.1	Same as 6.6.2.1	Same as 6.6.2.1
SSB time index detection			

## Annex G (normative): Statistical testing

#### G.1 General

The test requirements are expressed as absolute requirements with a single value stating the requirement or expressed as a success rate. The statistical nature depends on the type of test 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 Device Under Test (DUT) passing the test actually meets the test requirement and determines how many times a test have to be repeated and what the pass and fail criteria is. This Annex describes how to set the statistical significance.

## G.2 Statistical testing of delay and UE measurement performance in RRM tests

#### G.2.1 General

The RRM tests are either of deterministic or of statistical nature. The pass fail limits in tests of statistical nature are expressed as a limit (e.g. delay limit) and a success ratio applicable for the limit. The success ratio is 90% uniform (the complement is the error ratio ER = 10%).

#### G.2.2 Design of the test

The test is defined by the following design principles (see TS 36.521-1 clause G.X, Theory):

- 1) The early decision concept is applied.
- 2) A second limit is introduced: bad DUT factor M>1

To decide the test pass:

Supplier risk is applied based on the bad DUT quality

To decide the test fails

Customer risk is applied based on the specified DUT quality

The test is defined by the following parameters:

- 1) Limit ER = 0.1 (success ratio = 90%)
- 2) Bad DUT factor M=1.5 (selectivity)
- 3) Confidence level CL = 95% (for specified DUT and bad DUT-quality)

#### G.2.3 Numerical definition of the pass fail limits

#### Editor's Note:

- Further investigate the technical details behind this statistical method to ensure that this is applicable for FR2 radiated test cases.

Table G.2.3-1: pass fail limits

ne	nsp	ns <sub>f</sub>	ne	nsp	ns <sub>f</sub>	ne	nsp	ns <sub>f</sub>	ne	nsp	ns <sub>f</sub>
0	33	NA	43	408	283	86	737	644	129	1056	1021
1	46	NA	44	416	291	87	745	653	130	1064	1030
2	58	NA	45	424	299	88	752	661	131	1071	1039
3	69	NA	46	432	307	89	760	670	132	1078	1048
4	79	NA	47	440	315	90	767	679	133	1086	1057
5	89	NA	48	447	324	91	775	687	134	1093	1066
6	99	NA	49	455	332	92	782	696	135	1100	1074
7	109	NA	50	463	340	93	790	705	136	1108	1083
8	118	NA	51	471	348	94	797	713	137	1115	1092
9	127	NA	52	478	356	95	804	722	138	1122	1101
10	136	39	53	486	365	96	812	731	139	1130	1110
11	145	45	54	494	373	97	819	739	140	1137	1119
12	154	51	55	502	381	98	827	748	141	1144	1128
13	163	58	56	509	389	99	834	757	142	1152	1137
14	172	64	57	517	398	100	842	766	143	1159	1147
15	180	71	58	525	406	101	849	774	144	1166	1155
16	189	78	59	532	414	102	857	783	145	1174	1164
17	197	85	60	540	423	103	864	792	146	1181	1173
18	206	92	61	548	431	104	871	801	147	NA	1182
19	214	99	62	555	440	105	879	809	148		
20	223	106	63	563	448	106	886	818	149		
21	231	113	64	571	456	107	894	827	150		
22	239	120	65	578	465	108	901	836	151		
23	248	128	66	586	473	109	909	844	152		
24	256	135	67	594	482	110	916	853	153		
25	264	142	68	601	490	111	923	862	154		
26	272	150	69	609	499	112	931	871	155		
27	281	157	70	616	507	113	938	880	156		
28	289	165	71	624	516	114	946	888	157		
29	297	173	72	632	524	115	953	897	158		
30	305	180	73	639	533	116	960	906	159		
31	313	188	74	647	541	117	968	915	160		
32	321	196	75	654	550	118	975	924	161		
33	329	204	76	662	558	119	983	933	162		
34	337	211	77	669	567	120	990	941	163		
35	345	219	78	677	575	121	997	950	164		
36	353	227	79	684	584	122	1005	959	165		
37	361	235	80	692	592	123	1012	968	166		
38	369	243	81	700	601	124	1019	977	167		
39	377	251	82	707	610	125	1027	986	168		
40	385	259	83	715	618	126	1034	994	169		
41	393	267	84	722	627	127	1042	1003			
42	400	275	85	730	635	128	1049	1012			

The first column is the number of errors (ne = number of exceeded delays or number of wrong reports)

The second column is the number of samples for the pass limit (ns<sub>p</sub>, ns=Number of samples= number of successes + number of exceedings or number of reports)

The third column is the number of samples for the fail limit (ns<sub>f</sub>)

#### G.2.4 Pass fail decision rules

The pass fail decision rules apply for a single test, comprising one component in the test vector. The over all Pass /Fail conditions are defined in clause G.2.6

Having observed 0 errors, pass the test at 33+ samples, otherwise continue

Having observed 1 error, pass the test at 46+ samples, otherwise continue

Having observed 2 errors, pass the test at 58+ samples, otherwise continue

Having observed 10 errors, pass the test at 136+ samples, fail the test at 39 samples, otherwise continue Having observed 146 errors, pass the test at 1181+ samples, fail the test at 1173- samples, otherwise continue

Having observed 147 errors, fail the test at 1182- samples,

Where x+ means: x or more, x- means x or less

NOTE 1: an ideal DUT passes after 33 samples. The maximum test time is 1181 samples.

#### G.2.5 Void

## G.2.6 Test conditions for delay tests and UE measurement performance

Table G.2.6-1: test conditions

Test	Statistical independence	Number of components in the test vector, as specified in the test requirements and initial conditions of the applicable test	Over all Pass/Fail condition	
All tests in clauses 4.4.3, 4.5, 4.6, 5.4.3, 5.5, 5.6, 6.1, 6.2, 6.3.1, 6.3.2.1, 6.3.2.3, 6.4.3, 6.5, 6.6, 7.1, 7.2, 7.3.1, 7.3.2.1, 7.3.2.3, 7.4.3, 7.5, 7.6 are delay tests of statistical nature while 4.3.2.2, 4.4.1, 5.3.2.2, 5.4.1, 6.3.2.2, 6.4.1, 7.3.2.2, 7.4.1 are not applicable, since they are deterministic.	Test procedure in all statistical tests ensures independency	1 per operating band (if tested, see 3A.3.3)	Full set of environmental conditions (5) per operating band	
All tests in clauses 4.7, 5.7, 6.7 and 7.7 are UE level reports of statistical nature	Independency is assumed, although Layer 1 filtering is applied to the reported results	Full set of environmental conditions (5) per operating band	Full set of environmental conditions (5) per operating band	

## G.X Theory to derive the numbers in Table G.2.3-1 (informative)

TS 36.521-1 Annex G.X applies.

### Annex H (normative): Default message contents for RRM

H.1

H.2

## H.2.1 System information blocks message contents exceptions for NR intra frequency cell re-selection

SystemInformationBlockType2: for NR intra-frequency cell re-selection

Table H.2.1-1: SIB2: NR intra frequency cell re-selection

Derivation Path: TS 38.508-1 [14], Table 4.6.2-1			
Information Element	Value/remark	Comment	Condition
SIB2 ::= SEQUENCE {			
cellReselectionInfoCommon SEQUENCE {			
rangeToBestCell	Not present		
}			
intraFreqCellReselectionInfo SEQUENCE {			
q-RxLevMin	-70	-140 is actual value in dBm (-70 * 2 dBm)	dBm/15kHz
	-69	-137 is actual value in dBm (-69 * 2 + 1 dBm)	dBm/30kHz
smtc SEQUENCE {			
duration	sf1		SMTC.1
	sf5		SMTC.2
}			
deriveSSB-IndexFromCell	false		Asynchronous cells
	true		Synchronous cells
}			
}			

Condition	Explanation
SMTC.n	SMTC pattern n according to TS 38.133 [6] A.3.11
Synchronous cells	SSB indices of neigibour cells can be derived from timing of serving cell
Asynchronous cells	SSB indices of neigibour cells can not be derived from timing of serving cell

SystemInformationBlockType3: for NR intra-frequency cell re-selection

For NR Cell 2

Table H.2.1-2: SIB3: NR intra frequency cell re-selection

Information Element	Value/remark	Comment	Condition
SIB3 ::= SEQUENCE {			
intraFreqNeighCellList SEQUENCE (SIZE (1maxCellIntra)) OF SEQUENCE {			
IntraFreqNeighCellInfo ::= SEQUENCE{			
physCellId	2	NR Cell 2 ld	
q-OffsetCell	dB0	0 is actual value in dB (0 * 2 dB)	
}			
}			
}			

## H.2.2 System information blocks message contents exceptions for NR inter frequency cell re-selection

SystemInformationBlockType2: for NR inter-frequency cell re-selection

Table H.2.2-1: SIB2: NR inter frequency cell re-selection

Derivation Path: TS 38.508-1 [14], Table 4.6.2-1			
Information Element	Value/remark	Comment	Condition
SIB2 ::= SEQUENCE {			
cellReselectionInfoCommon SEQUENCE {			
rangeToBestCell	Not present		
}			
cellReselectionServingFreqInfo SEQUENCE {			
s-NonIntraSearchP	25	50 is actual value in dB (25 * 2 dB)	NR Cell 1
	Not present		NR Cell 2
threshServingLowP	22	44 is actual value	NR Cell 1
		in dB (22 * 2 dB)	
	22	44 is actual value	NR Cell 2
		in dB (22 * 2 dB)	
cellReselectionPriority	4		NR Cell 1
	5		NR Cell 2
}			
intraFreqCellReselectionInfo SEQUENCE {			
smtc SEQUENCE {			
periodicityAndOffset CHOICE {			
sf20	0		
}			
duration	sf1		SMTC.1
	sf5		SMTC.2
}			
}			

Condition	Explanation
SMTC.n	SMTC pattern n according to TS 38.133 [6] A.3.11

SystemInformationBlockType4: for NR inter-frequency cell re-selection

For NR Cell 2

Table H.2.2-2: SIB4: NR inter frequency cell re-selection

Derivation Path: TS 38.508-1 [14], Table 4.6.2-3			
Information Element	Value/remark	Comment	Condition
SIB4 ::= SEQUENCE {			
interFreqCarrierFreqList SEQUENCE (SIZE	1 Entry		
(1maxFreq)) OF SEQUENCE {			
dl-CarrierFreq[1]	Downlink NR SSB ARFCN of NR Cell 2		
smtc[1] SEQUENCE {			
periodicityAndOffset CHOICE {			
sf20	0		
}			
duration	sf1		SMTC.1
	sf5		SMTC.2
}			
ssbSubcarrierSpacing[1]	kHz15		SSB.1 FR1
	kHz30		SSB.2 FR1
deriveSSB-IndexFromCell[1]	false		Asynchronous cells
	true		Synchronous cells
q-RxLevMin[1]	-70	-140 is actual value in dBm (-70 * 2 dBm)	dBm/15kHz
	-69	-137 is actual value in dBm (-69 * 2 +1 dBm)	dBm/30kHz
threshX-HighP[1]	24	48 is actual value in dB (24 * 2 dB)	
threshX-LowP[1]	25	50 is actual value in dB (25 * 2 dB)	
cellReselectionPriority[1]	5	,	
q-OffsetFreq[1]	dB0	0 is actual value in dB (0 * 2 dB).	
}			
}			

Condition	Explanation
SSB.n FRm	SSB pattern n in FRm according to TS 38.133 [6] A.3.10
SMTC.n	SMTC pattern n according to TS 38.133 [6] A.3.11
Synchronous cells	SSB indices of neigibour cells can be derived from timing of serving cell
Asynchronous cells	SSB indices of neigibour cells can not be derived from timing of serving cell

### H.2.3 System information blocks message contents exceptions for NR inter-RAT cell re-selection

SystemInformationBlockType1: for inter-RAT NR – E-UTRA cell re-selection

Table H.2.3-1: SIB1: Inter-RAT NR - E-UTRA cell re-selection

Derivation Path: TS 38.508-1 [14], Table 4.6.1-28	3		
Information Element	Value/remark	Comment	Condition
SIB1 ::= SEQUENCE {			
cellSelectionInfo SEQUENCE {			
q-RxLevMin	-70	-140 is actual value in dBm (-70 * 2 dBm)	dBm/15kHz
	-69	-137 is actual value in dBm (-69 * 2 +1 dBm)	dBm/30kHz
}			
}			

SystemInformationBlockType2: for inter-RAT NR – E-UTRA cell re-selection

For NR Cell 1

Table H.2.3-2: SIB2: Inter-RAT NR - E-UTRA cell re-selection

Derivation Path: TS 38.508-1 [14], Table 4.6.2-1			
Information Element	Value/remark	Comment	Condition
SIB2 ::= SEQUENCE {			
cellReselectionServingFreqInfo SEQUENCE {			
s-NonIntraSearchP	25	50 is actual value in dB (25 * 2 dB)	
threshServingLowP	22	44 is actual value in dB (22 * 2 dB)	
cellReselectionPriority	4		higher priority
	5		lower priority
}			
intraFreqCellReselectionInfo SEQUENCE {			
smtc SEQUENCE {			
periodicityAndOffset CHOICE {			
sf20	0		
}			
duration	sf1		SMTC.1
	sf5		SMTC.2
}			
}			
}			

Condition	Explanation
SMTC.n	SMTC pattern n according to TS 38.133 [6] A.3.11
higher priority	NR cell re-selection to higher priority E-UTRA
lower priority	NR cell re-selection to lower priority E-UTRA

SystemInformationBlockType5: for inter-RAT NR – E-UTRA cell re-selection

For E-UTRA Cell 1

Table H.2.3-3: SIB5: Inter-RAT NR - E-UTRA cell re-selection

Derivation Path: TS 38.508-1 [14], Table 4.6.2-4 Information Element	Value/remark	Comment	Condition
SIB5 ::= SEQUENCE {			
carrierFreqListEUTRA SEQUENCE (SIZE (1maxEUTRA-Carrier)) OF SEQUENCE {	1 Entry		
carrierFreq[1]	Downlink EUTRA ARFCN of E-UTRA Cell 1		
allowedMeasBandwidth[1]	mbw6		
presenceAntennaPort1[1]	FALSE		
cellReselectionPriority[1]	5		higher priority
	4		lower priority
threshX-High	24	48 is actual value in dB (24 * 2 dB)	
threshX-Low	25	50 is actual value in dB (25 * 2 dB)	
q-RxLevMin	-70	-140 is actual value in dBm (-70 * 2 dBm)	
eutra-FreqNeighCellList[1] SEQUENCE (SIZE (1maxCellEUTRA)) OF SEQUENCE {		,	
physCellId	0		
q-OffsetCell	dB0		
}			
}			
}			

Condition	Explanation
higher priority	NR cell re-selection to higher priority E-UTRA
lower priority	NR cell re-selection to lower priority E-UTRA

#### H.3

## H.3.1 RRC messages and information elements contents exceptions for NR measurement configuration

RRCReconfiguration: to setup NR Measurement Configuration

Table H.3.1-1: RRCReconfiguration: NR measurement Configuration

Derivation Path: TS 38.508-1 [14], Table 4.6.1-13 with condition MEAS and NR					
Information Element	Value/remark	Comment	Condition		
RRCReconfiguration ::= SEQUENCE {					
criticalExtensions CHOICE {					
rrcReconfiguration ::= SEQUENCE {					
measConfig	MeasConfig-DEFAULT	Measurements configuration			
}					
}					
}					

MeasConfig-DEFAULT: Configuration for NR measurement

Table H.3.1-2: MeasConfig-DEFAULT: Configuration of NR measurement

Derivation path: 38.508-1 [14] table 4.6.3-69			
Information Element	Value/Remark	Comment	Condition
measConfig ::= SEQUENCE {			
measObjectToAddModList SEQUENCE (SIZE	1 entry		
(1maxNrofMeasId)) OF SEQUENCE {	-		
measObjectId[1]	0		
measObject[1] CHOICE {			
measObjectNR	MeasObjectNR-		
	DEFAULT with		
	Condition INTRA-		
	FREQ MO		
}			
measObjectId[2]	1		INTER-
			FREQ OR
			INTER-
01: ([0] 011010E (			RAT
measObject[2] CHOICE {	ManaOhia-tAID		INITED
measObjectNR	MeasObjectNR- DEFAULT with		INTER- FREQ
	Condition INTER-		FREQ
	FREQ MO		
measObjectEUTRA	MeasObjectEUTRA-		INTER-
measObjectEOTRA	DEFAULT		RAT
1	DELAGET		IXAT
1			
reportConfigToAddModList SEQUENCE(SIZE	1 entry		
(1maxReportConfigId)) OF SEQUENCE {	1 Chity		
reportConfigId[1]	ReportConfigld		
reportConfig[1] CHOICE {			
reportConfigNR	ReportConfigNR-		INTRA-
3	DEFAULT		FREQ OR
			INTER-
			FREQ
reportConfigInterRAT	ReportConfigInterRAT-		INTER-
	DEFAULT		RAT
}			
}			
measIdToAddModList SEQUENCE (SIZE	1 entry		
(1maxNrofMeasId)) OF SEQUENCE {			
measId[1]	Measld		
measObjectId[1]	0		INTRA-
			FREQ
	1		INTER-
			FREQ OR
			INTER-
roportConfield[1]	PoportConfield		RAT
reportConfigId[1]	ReportConfigld		
auantityConfig	QuantityConfig		
quantityConfig	QuantityConfig- DEFAULT		
measGapConfig	MeasGapConfig-		GAP
ineasGapComig	DEFAULT		NEEDED
1	DELAGET		INCLUED
<u> </u>			I

Condition	Explanation
GAP NEEDED	Measurement gap is needed for measurement
INTRA-FREQ	Configuration for intra-frequency NR measurement tests
INTER-FREQ	Configuration for inter-frequency NR measurement tests
INTER-RAT	Configuration for inter-RAT EUTRA measurement tests

MeasObjectNR-DEFAULT: NR measurement object configuration

Table H.3.1-3: MeasObjectNR-DEFAULT: NR intra-frequency measurement object configuration for FR1

Derivation Path: TS 38.508-1 [14], Table 4.6.3-76				
Information Element	Value/remark	Comment	Condition	
MeasObjectNR::= SEQUENCE {				
ssbFrequency	ARFCN-ValueNR of the	frequency of	INTRA-FREQ MO	
	SSB associated to	the serving		
	serving cell	cell		
	ARFCN-ValueNR of the		INTER-FREQ MO	
	SSB associated to inter-			
	frequency neighbour cell			
ssbSubcarrierSpacing	kHz15		SSB.1 FR1	
	kHz30		SSB.2 FR1	
	kHz120		SSB.1 FR2	
	kHz240		SSB.2 FR2	
smtc1 SEQUENCE{				
periodicityAndOffset CHOICE {				
sf20	0			
}				
duration	sf1		SMTC pattern 1	
	sf5		SMTC pattern 2	
}				
referenceSignalConfig SEQUENCE {				
ssb-ConfigMobility SEQUENCE {				
ssb-ToMeasure	Not present			
deriveSSB-IndexFromCell	false		Asynchronous cells	
	true		Synchronous cells OR RLM	
}				
}				
absThreshSS-BlocksConsolidation SEQUENCE {				
thresholdRSRP	0	SS-RSRP < -156dB		
}				

Condition	Explanation
SSB.n FR1	SSB pattern n in FR1 according to TS 38.133 [6] A.3.10.1.1
SSB.n FR2	SSB pattern n in FR2 according to TS 38.133 [6] A.3.10.1.2
SMTC pattern 1	SMTC pattern 1 according to TS 38.133 [6] A.3.11.1
SMTC.n	SMTC.n according to TS 38.133 [6] A.3.11.2
INTRA-FREQ MO	Configuration for NR MO associated to intra-frequency carrier
INTER-FREQ MO	Configuration for NR MO associated to inter-frequency carrier
Synchronous cells	SSB indices of neigibour cells can be derived from timing of serving cell
Asynchronous cells	SSB indices of neigibour cells can not be derived from timing of serving cell
RLM	Configuration for RLM tests

MeasObjectEUTRA-DEFAULT: EUTRA measurement object configuration for NR FR1 to E-UTRAN handover

Table H.3.1-3A: MeasObjectEUTRA-DEFAULT: InterRAT EUTRA measurement object configuration for FR1 to E-UTRAN handover

Derivation Path: TS 38.508-1 [14], Table 4.6.3-74			
Information Element	Value/remark	Comment	Condition
MeasObjectEUTRA ::= SEQUENCE {			
carrierFreq	ARFCN-ValueEUTRA		
	with condition DL SSB		
allowedMeasBandwidth	mbw6		
cellsToAddModListEUTRAN SEQUENCE (SIZE			
(1maxCellMeasEUTRA)) OF SEQUENCE{			
cellIndexEUTRA	1		
physCellId	0		
cellIndividualOffset	dB0		
}			
eutra-PresenceAntennaPort1	false		
}			

ReportConfigNR-DEFAULT: NR Report Configuration

Table H.3.1-4: ReportConfigNR-DEFAULT(Thres): NR report configuration for event A3 with a3-offset = Thres dB

Derivation Path: 38.508-1 [14] Table 4.6.3-142			
Information Element	Value/remark	Comment	Condition
ReportConfigNR::= SEQUENCE {			
reportType CHOICE {			
eventTriggered SEQUENCE {			
eventId CHOICE {			
eventA3 SEQUENCE {			
a3-Offset CHOICE {			
rsrp	Thres*2	a3 offset = Thres dB	
}			
hysteresis	[0]	0 dB	
timeToTrigger	ms0		
}			
}			
reportAmount	infinity		
reportQuantityRsIndexes ::= SEQUENCE {			SSB Index
rsrp	[FALSE]		
rsrq	[FALSE]		
sinr	[FALSE]		
}			
maxNrofRSIndexesToReport	[2]		SSB Index
includeBeamMeasurements	FALSE		SSB Index
}			
}			
}			

Condition	Explanation
SSB Index	To include SSB Index

ReportConfigInterRAT-DEFAULT: InterRAT NR Report Configuration for NR FR1 to E-UTRAN handover

Table H.3.1-4A: ReportConfigInterRAT- DEFAULT (b2-Thres1, b2-Thres2): InterRAT NR report configuration for FR1 to E-UTRAN handover with b2-Threshold1 = b2-Thres1 and b2-Threshold2EUTRA = b2-Thres2 dBm

Derivation Path: 38.508-1 [4] Table 4.6.3-141			
Information Element	Value/remark	Comment	Condition
ReportConfigInterRAT ::= SEQUENCE {			
reportType CHOICE {			
eventTriggered SEQUENCE {			
eventId CHOICE {			
eventB2 SEQUENCE {			
b2-Threshold1 CHOICE {			
rsrp	b2-Thres1	b2-Thres1 – 156 dBm - 1 dBm ≤ SS-RSRP < b2-Thres1 – 156 dBm	
}			
b2-Threshold2EUTRA CHOICE {			
rsrp	b2-Thres2	b2-Thres2 – 156 dBm - 1 dBm ≤ SS-RSRP < b2-Thres2 – 156 dBm	
}			
hysteresis	0	0 dB	
timeToTrigger	ms0		
}			
}			
reportAmount	infinity		
reportQuantityCell SEQUENCE {			
rsrp	true		
rsrq	false		
sinr	false		
}			
}			
}			
}			1

QuantityConfig-DEFAULT: NR quantity configuration when L3 filtering is not used

Table H.3.1-5: QuantityConfig-DEFAULT: NR quantity configuration when L3 filtering is not used

Information Element	Value/remark	Comment	Condition
QuantityConfig::= SEQUENCE {			
quantityConfigNR-List SEQUENCE (SIZE	1 entry		
(1maxNrofQuantityConfig)) OF SEQUENCE {			
quantityConfigCell[1] SEQUENCE {			
ssb-FilterConfig SEQUENCE {			
filterCoefficientRSRP	fc0	No L3 filtering	
filterCoefficientRSRQ	fc0	No L3 filtering	
filterCoefficientRS-SINR	fc0	No L3 filtering	
}			
csi-RS-FilterConfig SEQUENCE {			
filterCoefficientRSRP	fc0	No L3 filtering	
filterCoefficientRSRQ	fc0	No L3 filtering	
filterCoefficientRS-SINR	fc0	No L3 filtering	
}			
}			
}			
quantityConfigEUTRA	Not present		
quantityConfigEUTRA SEQUENCE {			
filterCoefficientRSRP	fc0		
filterCoefficientRSRQ	fc0		
filterCoefficientRS-SINR	fc0		

INTRA-FREQ	Configuration for intra-frequency NR measurement tests
INTER-FREQ	Configuration for inter-frequency NR measurement tests
INTER-RAT	Configuration for inter-RAT EUTRA measurement tests

MeasGapConfig-DEFAULT: measurement gap configuration

Table H.3.1-6: MeasGapConfig: per-UE measurement gap configuration

Derivation Path: TS 38.508-1 [14], Table 4.6.3-70					
Information Element	Value/remark	Comment	Condition		
MeasGapConfig ::= SEQUENCE {					
gapUE CHOICE {					
setup SEQUENCE {					
gapOffset	39		Pattern #0 OR Pattern #2 OR Pattern #13		
	19		Pattern #4		
	0		RLM		
mgl	ms6		Pattern #0 OR Pattern #4 OR RLM		
	ms3		Pattern #2		
	ms5dot5		Pattern #13		
mgrp	ms40		Pattern #0 OR Pattern #2 OR Pattern #13 OR RLM		
	ms20		Pattern #4		
mgta	ms0				
}					
}					
}					

Pattern #0	Measurement gap pattern #0 defined in TS 38.133 [6] Table 9.1.2-1 is used for measurement tests
Pattern #2	Measurement gap pattern #2 defined in TS 38.133 [6] Table 9.1.2-1 is used for measurement tests
Pattern #4	Measurement gap pattern #4 defined in TS 38.133 [6] Table 9.1.2-1 is used for measurement tests
Pattern #13	Measurement gap pattern #13 defined in TS 38.133 [6] Table 9.1.2-1 is used for measurement tests
RLM	Measurement gap pattern for RLM tests

MeasResults-DEFAULT: measurement result for NR measurements

Table H.3.1-7: MeasResults: measurement result for NR measurements

Derivation Path: TS 38.508-1 [14], Table 4.6.3-79 with condition	on A3		
Information Element	Value/remark	Comment	Condition
measResults SEQUENCE {			
measld	Measld		
measResultServingMOList SEQUENCE (SIZE	1 entry		
(1maxNrofServingCells)) OF SEQUENCE {			
servCellId[1]	ServCellIndex of NR SpCell		
measResultServingCell[1] SEQUENCE {			
physCellId	PhysCellId of NR SpCell		
measResult SEQUENCE {			
cellResults SEQUENCE {			
resultsSSB-Cell SEQUENCE {			
rsrp	(0127)		
rsrq	(0127)		
}			
}			
}			
}			
}			
measResultNeighCells CHOICE {			
measResultListNR SEQUENCE (SIZE(1maxCellReport)) OF SEQUENCE {	1 entry		INTRA- FREQ OR INTER- FREQ
physCellId[1]	PhysCellId of NR neighbour Cell		FREQ
measResult[1] SEQUENCE {			
cellResults SEQUENCE {			
resultsSSB-Cell SEQUENCE {			
rsrp	(0127)		
}	(0.1.2.7)		
}			
rsIndexResults SEQUENCE {	n entires of ResultsPerSSB-Index	ResultsPerS SB-IndexList	SSB Index
ResultsPerSSB-Index SEQUENCE {	entry [1]		
ssb-Index	SSB-Index	an SS-Block within an SS-Burst	
}			
}			
}			
}			
measResultListEUTRA SEQUENCE (SIZE (1maxCellReport)) OF SEQUENCE {	1 entry		INTER-RAT
eutra-PhysCellId [1]	PhysCellId of E-UTRA neighbour Cell		
measResult[1] SEQUENCE {			
rsrp	(097)		
rsrq	(034)		
}			
cgi-Info	Not present		
}			
}			
}			

Condition	Explanation
SSB Index	To include SSB Index
INTRA-FREQ	Configuration for intra-frequency NR measurement tests
INTER-FREQ	Configuration for inter-frequency NR measurement tests
INTER-RAT	Configuration for inter-RAT EUTRA measurement tests

RadioLinkMonitoringConfig -DEFAULT: Default configuration for RLM resources

Table H.3.1-8: RadioLinkMonitoringConfig-DEFAULT: Default configuration for RLM resources

Derivation Path: TS 38.508-1 [14], Table 4.6.3-133			
Information Element	Value/remark	Comment	Condition
RadioLinkMonitoringConfig ::= SEQUENCE {			
failureDetectionResourcesToAddModList	1 entry		
SEQUENCE			
(SIZE(1maxNrofFailureDetectionResources)) OF			
SEQUENCE {			
purpose	both		BFD
detectionResource CHOICE {			
ssb-Index	0		SSB
csi-RS-Index	NZP-CSI-RS-Resourceld		CSI-RS
	for CSI-RS used for		
	Tests		
}			
}			
beamFailureInstanceMaxCount	n2		BFD
beamFailureDetectionTimer	pbfd4		BFD
}			

Condition	Explanation
SSB	Configuration for RLM/BFD based on SSB
CSI-RS	Configuration for RLM/BFD based on CSI-RS
BFD	Configuration for BFD test cases

H.3.2 RRC messages and information elements contents exceptions for NR cell re-selection and handoverRACH-ConfigGeneric: for NR cell re-selection and handover

Table H.3.2-1: RACH-ConfigGeneric: NR cell re-selection and handover

Derivation Path: TS 38.508-1 [14], Table 4.6.3-130			
Information Element	Value/remark	Comment	Condition
RACH-ConfigGeneric ::= SEQUENCE {			
prach-ConfigurationIndex	87		
}			

### H.3.3 RRC messages and information elements contents exceptions for NR inter-RAT handover

MobilityFromNRCommand: for Inter-RAT NR handover

Table H.3.3-1: MobilityFromNRCommand: InterRAT NR handover

Derivation Path: TS 38.508-1 [14], Table 4.6.1-8			
Information Element	Value/remark	Comment	Condition
MobilityFromNRCommand::= SEQUENCE {			
rrc-TransactionIdentifier	RRC-		
	TransactionIdentifier		
criticalExtensions CHOICE {			
mobilityFromNRCommand SEQUENCE {			
targetRAT-Type	eutra		
targetRAT-MessageContainer	OCTET STRING including the RRCConnectionReconfig		
	uration message according TS 36.508 [2], table 4.6.1-8 with condition HO-TO-EUTRA		
nas-SecurityParamFromNR	The 4 LSB of the downlink NAS COUNT		
lateNonCriticalExtension	Not present		
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}		·	

### H.3.4 E-UTRA RRC messages and information elements contents exceptions for NR measurement configuration

RRCConnectionReconfiguration: Includes the nr-SecondaryCellGroupConfig-r15 to convey NR RRCReconfiguration message as specified in TS 38.331[13].

Table H.3.4-1: RRCConnectionReconfiguration: NR RRC Reconfiguration in EN-DC

Derivation Path: 36.508 [25], Table 4.6.1-8 with condition MCG_and_SCG				
Information Element	Value/remark	Comment	Condition	
RRCConnectionReconfiguration ::= SEQUENCE {				
criticalExtensions CHOICE {				
c1 CHOICE{				
rrcConnectionReconfiguration-r8 ::= SEQUENCE				
{				
setup SEQUENCE {				
nr-SecondaryCellGroupConfig-r15	RRCReconfiguration			
}				
}				
}				
}				
}				
}				

ULInformationTransferMRDC: uplink transfer of MR DC information for transferring the NR RRC Measurement Report message in EN-DC

Table H.3.4-2: ULInformationTransferMRDC: uplink transfer of MR DC information

Derivation Path: 36.508 [25], Table 4.6.1-27			
Information Element	Value/remark	Comment	Condition
ULInformationTransferMRDC ::= SEQUENCE {			
ul-DCCH-MessageNR-r15	OCTET STRING including the MeasurementReport		
}			

### H.3.5 System information blocks message contents exceptions for NR radio link monitoring (RLM)

H.3.6

## H.3.7 RRC messages and information elements contents exceptions for NR cell search when DRX is used

Table H.3.7-1: MAC-CellGroupConfig: NR intra-frequency cell search when DRX is used

Derivation Path: TS 38.508-1, Table 4.6.3-68			
Information Element	Value/remark	Comment	Condition
MAC-CellGroupConfig ::= SEQUENCE {			
drx-Config CHOICE {			
setup SEQUENCE {			
drx-onDurationTimer CHOICE {			
milliSeconds	ms1		DRX.1 or DRX.2
	ms6		DRX.3
}			
drx-InactivityTimer	ms1		
drx-RetransmissionTimerDL	sl1		
drx-RetransmissionTimerUL	sl1		
drx-LongCycleStartOffset CHOICE {			
ms40	9	To avoid overlapping with measurement gap	DRX.1 or DRX.3
ms640	9	To avoid overlapping with measurement gap	DRX.2
}			
shortDRX	not present		
drx-SlotOffset	0		
}			
}			
tag-Config SEQUENCE {	N		
tag-ToReleaseList	Not present		
tag-ToAddModList SEQUENCE (SIZE (1maxNrofTAGs)) OF SEQUENCE {	1 entry		
tag-ld[1]	0		
timeAlignmentTimer[1]	ms500		DRX.1 or DRX.2
	infinity		DRX.3
}			
}			

Condition	Explanation
DRX.1	DRX Configuration 1 according to TS 38.133 [6] A.3.3.1
DRX.2	DRX Configuration 1 according to TS 38.133 [6] A.3.3.2
DRX.3	DRX Configuration 1 according to TS 38.133 [6] A.3.3.3

# Annex I (informative): Change history

						Change history	
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New
		_					version
2017-08	RAN5#76		-	-	-	Introduction of TS 38.533	0.0.1
2018-08			-	-	-	Added specification structure including headers up to third level	0.0.2
2018-11	RAN5#81	R5-186706	-	-	-	Added references and common sections	0.1.0
2018-11	RAN5#81	R5-187847	-	-	-	Added RMCs, OCGN, SMTC and SSB configurations to Annex A	0.1.0
2018-11	RAN5#81	R5-187996	-	-	-	Added test cases 6.7.1.1.1 to 6.7.1.2.2	0.1.0
2018-11	RAN5#81	R5-187997	-	-	-	Added test cases 4.6.2.1 to 4.6.2.8	0.1.0
2018-11	RAN5#81	R5-187998	-	-	-	Added test cases 5.6.2.1 to 5.6.2.4	0.1.0
2018-11	RAN5#81	R5-187999	-	-	-	Added test cases 6.6.2.1 to 6.6.2.8	0.1.0
2018-11	RAN5#81	R5-188000	-	-	-	Added test cases 7.6.2.1 to 7.6.2.4	0.1.0
2018-11	RAN5#81	R5-188001	-	<b>†</b> -	_	Added test case 4.4.1.1	0.1.0
2018-11	RAN5#81	R5-188002	_	<u> </u>	<b>-</b>	Added test cases 4.7.1.1.1 to 4.7.1.2.2	0.1.0
2018-11	RAN5#81	R5-188005	-	-	-	Added Annexes B to H	0.1.0
2018-11	RAN5#81	R5-188011	-	<del>                                     </del>		Added test case 4.4.3.1	
			_	-	-		0.1.0
2019-01	RAN5#4 5G-NR AH	R5-190448	-	-	-	Updating FR1 MU for timing measurements	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190476	-	-	-	Addition of band group power offsets	0.2.0
2019-01	RAN5#4 5G-NR	R5-190477	_	_	_	Update of the annexes	0.2.0
2019-01	AH RAN5#4	R5-190478				Changes to 4.7.1.x tests	0.2.0
2019 <b>-</b> 01	5G-NR AH	NJ-1804/8	-	-	-	Onanges to 4.7.1.x tests	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190479	-	-	-	Addition of 4.7.2.x tests	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190480	-	-	-	Addition of 4.7.4.x tests	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190481	-	-	-	Changes to 6.7.1.x tests	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190482	-	-	-	Addition of 6.7.2.x tests	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190483	-	-	-	Addition of 6.7.4.x tests	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190512	-	-	-	Addition of EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with CSI-RS-based RLM RS in non-DRX mode test case 4.5.1.5	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190513	-	-	-	Addition of EN-DC FR1 radio link monitoring in-sync test for PSCell configured with CSI-RS-based RLM RS in non-DRX mode test case 4.5.1.6	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190514	-	-	-	Addition of EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with CSI-RS-based RLM RS in DRX mode test case 4.5.1.7	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190515	-	-	-	Addition of EN-DC FR1 radio link monitoring in-sync test for PSCell configured with CSI-RS-based RLM RS in DRX mode test case 4.5.1.8	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190516	-	-	-	Addition of EN-DC FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC test case 4.5.2.1	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190517	-	-	-	Addition of EN-DC FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC test case 4.5.2.2	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190518	-	-	-	Addition of EN-DC FR1 interruptions during measurements on deactivated NR SCC in synchronous EN-DC test case 4.5.2.3	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190519	-	-	-	Addition of EN-DC FR1 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC test case 4.5.2.4	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190520	-	-	-	Addition of EN-DC FR1 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC test case 4.5.2.5	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190582	-	-	-	Annex F correction	0.2.0

2019-01	RAN5#4 5G-NR AH	R5-190803	-	-	-	Update Annex G in TS 38.533	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190874	-	-	-	Addition of NR test case 6.6.1.1-reporting without gap non-DRX	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190875	-	-	-	Addition of NR test case 6.6.1.2-reporting without gap DRX	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190876	-	-	-	Addition of NR test case 6.6.1.3-with gap non DRX	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190877	-	-	-	Addition of NR test case 6.6.1.4-with gap DRX	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190878	-	-	-	Addition of NR test case 6.6.1.5-without gap non DRX SBI reading	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190879	-	-	-	Addition of NR test case 6.6.1.6-with gap non DRX SBI reading	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190880	-	-	-	CR to 38.533 annex for event triggered reorting test cases	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190881	-	-	-	Addition of EN-DC FR1 event triggered reporting test case 4.6.1.5	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190882	-	-	-	Addition of EN-DC FR1 event triggered reporting test case 4.6.1.6	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190883	=	-	-	Addition of EN-DC FR1 event triggered reporting test case 4.6.1.3	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190884	=	-	-	Addition of EN-DC FR1 event triggered reporting test case 4.6.1.4	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190885	-	-	-	Addition of defualt config for event triggered test cases	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190886	-	-	-	Introduction of 5G RRM TC 4.5.3.1	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190887	-	-	-	Introduction of 5G RRM TC 4.5.3.2	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190888	-	-	-	Introduction of 5G RRM TC 4.5.3.3	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190889	-	-	-	Introduction of 5G RRM TC 4.6.1.1	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190890	-	-	-	Introduction of 5G RRM TC 4.6.1.2	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190891	-	-	-	Introduction of 5G RRM TC 5.5.3.1	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190892	-	-	-	Introduction of 5G RRM TC 6.6.3.1	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190893	-	-	-	pCR for Addition of TC 6.5.1.3 NR SA FR1 RLM OOS in DRX	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190894	-	-	-	pCR for Addition of TC 6.4.3.1 NR SA FR1 TAA Accuracy	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190895	-	-	-	pCR for Modification of TC 4.4.3.1 EN-DC FR1 TAA accuracy	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190896	-	-	-	pCR for Addition of TC 6.5.1.1 NR SA FR1 RLM OOS	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190897		-	-	pCR for Addition of TC 4.5.1.1 EN-DC FR1 RLM OOS	0.2.0

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2019-01	RAN5#4 5G-NR AH	R5-190898	-	-	-	pCR for Addition of TC 4.5.1.3 EN-DC FR1 RLM OOS in DRX	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190899	-	-	-	Update to EN-DC FR1 transmit timing accuracy test	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190900	-	-	-	Addition of EN-DC FR1 RLM IS non-DRX test with SSB-based RLM RS	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190901	-	-	-	Addition of EN-DC FR1 RLM IS DRX test with SSB-based RLM RS	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190902	-	-	-	Addition of NR SA FR1 RLM IS non-DRX test with SSB-based RLM RS	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190903	-	-	-	Addition of NR SA FR1 RLM IS DRX test with SSB-based RLM RS	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190904	-	-	-	Correction of RRM 5G Test Cases 4.6.2 - EN-DC FR1-FR1 Inter- frequency measurements	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190905	-	-	-	Correction of RRM 5G Test Cases 6.6.2 - NR SA FR1-FR1 Inter- frequency measurements	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190906	-	-	-	Correction of RRM 5G Test Cases 7.6.2 - NR SA FR2-FR2 Inter- frequency measurements	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190907	-	-	-	Addition of RRM Test Cases 4.5.2.6: EN-DC FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190908	-	-	-	Addition of RRM Test Cases 5.5.2.1: EN-DC FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190909	-	-	-	Addition of RRM Test Cases 5.5.2.2: EN-DC FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190910	-	-	-	Addition of RRM Test Cases 5.5.2.3: EN-DC FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190911	-	-	-	Addition of RRM Test Cases 5.5.2.4: EN-DC FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190912	-	-	-	Addition of RRM Test Cases 5.5.2.5: EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190913	-	-	-	Addition of RRM Test Cases 5.5.2.6: EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190914	-	-	-	Addition of RRM Test Cases 6.1.1.1: NR SA FR1 cell re-selection	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190915	-	-	-	Addition of RRM Test Cases 6.1.1.2: NR SA FR1-FR1 cell reselection	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190916	-	-	-	Addition of cell re-selection to higher priority E-UTRAN test case 6.1.2.1	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190917	-	-	-	Addition of cell re-selection to lower priority E-UTRAN test case 6.1.2.2	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190918	-	-	-	Addition of SA NR to E-UTRAN handover test case 6.3.1.4	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190919	-	-	-	Addition of SA NR to E-UTRAN handover test case 6.3.1.5	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190920	-	-	-	Addition of NR SA FR1 UE UL carrier RRC reconfiguration delay test case 6.5.4.1	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190921	-	-	-	Addition of NR SA FR1 CSI-RS based RLM out-of-sync non-DRX test case 6.5.1.5	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190922	-	-	-	Addition of NR SA FR1 CSI-RS based RLM in-sync non-DRX test case 6.5.1.6	0.2.0

2019-01	RAN5#4 5G-NR AH	R5-190923	-	-	-	Addition of NR SA FR1 CSI-RS based RLM out-of-sync in DRX test case 6.5.1.7	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190924	-	-	-	Addition of NR SA FR1 CSI-RS based RLM in-sync in DRX test case 6.5.1.8	0.2.0
2019-01	RAN5#4 5G-NR AH	R5-190987	-	-	-	38.533 Common Section updates to clarify leverage across architecture options	0.2.0
2019-03	RAN5#82	R5-191484	-	•	-	Correction Annex G	0.3.0
2019-03		R5-191485	-	-	-	Correction NSA Options	0.3.0
		R5-191486	-	-	-	Modifications NSA FR1 SS-RSRP tests	0.3.0
		R5-191487	-	-	-	Modifications NSA FR1 SS-RSRQ tests	0.3.0
2019-03			-	-	-	Modifications NSA FR1 L1-RSRP tests	0.3.0
		R5-191489 R5-191490	-	-	-	Modifications SA FR1 SS-RSRP tests  Modifications SA FR1 SS-RSRQ tests	0.3.0
2019-03			-	_	_	Modifications SA FR1 L1-RSRP tests	0.3.0
		R5-191492	-	-	-	Addition NSA FR1 BWP switch tests	0.3.0
		R5-191493	-	-	-	Addition SA FR1 BWP switch tests	0.3.0
		R5-191494	-	-	-	Addition NSA FR2 BWP switch tests	0.3.0
		R5-191495	-	-	-	Addition SA FR2 BWP switch tests	0.3.0
		R5-191720	-	-	-	addition of cell mapping for BFD and measurement	0.3.0
		R5-191924	-	-	-	Correction of default message contents for RRM	0.3.0
2019-03	KAN5#82	R5-191926	-	-	-	Addition of event-triggered reporting Test Cases to Cell configuration mapping in Annex E	0.3.0
2019-03	RAN5#82	R5-191930	_	_	-	Correction of 5G RRM Test Case 4.6.2.3	0.3.0
		R5-191931	_	-	-	Correction of 5G RRM Test Case 4.6.2.4	0.3.0
	RAN5#82		-	-	-	Correction of 5G RRM Test Case 4.6.2.7	0.3.0
	RAN5#82		-	-	-	Correction of 5G RRM Test Case 4.6.2.8	0.3.0
		R5-191936	-	-	-	Addition of Minimum conformance requirements 5.6.2.0	0.3.0
2019-03	RAN5#82	R5-191937	-	ı	-	Correction of 5G RRM Test Case 5.6.2.1	0.3.0
	RAN5#82		-	-	-	Correction of 5G RRM Test Case 5.6.2.2	0.3.0
		R5-191939	-	-	-	Correction of 5G RRM Test Case 5.6.2.3	0.3.0
2019-03			-	-	-	Correction of 5G RRM Test Case 5.6.2.4	0.3.0
	RAN5#82		-	-	-	Addition of Minimum conformance requirements 7.6.2.0	0.3.0
		R5-191946	-	-	-	Correction of 5G RRM Test Case 7.6.2.1	0.3.0
		R5-191947 R5-191948	-	-	-	Correction of 5G RRM Test Case 7.6.2.2  Correction of 5G RRM Test Case 7.6.2.3	0.3.0
		R5-191949	-		<del>-</del>	Correction of 5G RRM Test Case 7.6.2.4	0.3.0
2019-03			-	-	-	Correction of 5G RRM Test Case 7.6.2.5	0.3.0
			-	-	-	Correction of 5G RRM Test Case 7.6.2.6	0.3.0
2019-03	RAN5#82	R5-191952	-	-	-	Correction of 5G RRM Test Case 7.6.2.7	0.3.0
		R5-191953	-	-	-	Correction of 5G RRM Test Case 7.6.2.8	0.3.0
	RAN5#82		-	-	-	Update of EN-DC FR1 event triggered reporting test case 4.6.1.6	0.3.0
		R5-192063	-	-	-	Update of EN-DC FR1 event triggered reporting test case 4.6.1.3	0.3.0
		R5-192064	-	-	-	Update of EN-DC FR1 event triggered reporting test case 4.6.1.4	0.3.0
2019-03		R5-192221 R5-192477	-	-	-	Update on RRC_Connected generic procedure within RRM tests Introduction of FR1 EN-DC Contention based random access Test	0.3.0
2019-03	RAN5#82		-	-	-	case Introduction of FR1 EN-DC Contention based random access Test case	0.3.0
2019-03	RAN5#82	R5-192479	-	-	-	Test case Introduction of FR1 standalone Contention based random access	0.3.0
	RAN5#82		-	-	-	Test case Introduction of FR1 standalone Non-contention based random	0.3.0
2019-03	RAN5#82		-	-	-	access Test case Updated to 5G RRM TC 4.6.1.1	0.3.0
		R5-192481	-	-	-	Updated to 5G RRM TC 4.6.1.1  Updated to 5G RRM TC 4.6.1.2	0.3.0
		R5-192483	_	-	-	Addition of NR test case 6.7.1.3.1-absolute RSRP	0.3.0
2019-03	RAN5#82		-	-	-	Addition of NR test case 6.7.1.3.2-relative RSRP	0.3.0
2019-03	RAN5#82		-		-	Addition of NR test case 6.5.5.3 FR1 CSI-RS BFD nonDRX	0.3.0
2019-03	RAN5#82	R5-192486	-	-	-	Addition of NR test case 6.5.5.4 FR1 CSI-RS BFD DRX	0.3.0
2019-03	RAN5#82	R5-192487	-	-	-	Addition of NR test case 7.5.5.1 FR2 SSB BFD nonDRX	0.3.0
2019-03	RAN5#82	R5-192488	-	-	-	Addition of NR test case 7.5.5.2 FR2 SSB BFD DRX	0.3.0
2019-03	RAN5#82		-	-	-	Addition of NR test case 7.5.5.3 FR2 CSI-RS BFD nonDRX	0.3.0
2019-03	RAN5#82	R5-192490	-	-	-	Addition of NR test case 7.5.5.4 FR2 CSI-RS BFD DRX	0.3.0
2019-03	RAN5#82		-	-	-	Correction of 5G RRM Test Case 4.6.2.1	0.3.0
2019-03	RAN5#82		-	-	-	Correction of 5G RRM Test Case 4.6.2.2	0.3.0
2019-03 2019-03	RAN5#82 RAN5#82	R5-192494 R5-192495	-		H-	Correction of 5G RRM Test Case 4.6.2.5  Correction of 5G RRM Test Case 4.6.2.6	0.3.0
2019-03			-		-	Correction of 5G RRM Test Case 4.6.2.0	0.3.0
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2019-03	RAN5#82	R5-192497	-	-	-	Correction of 5G RRM Test Case 6.6.2.2	0.3.0

	DANE#00	R5-192499		l _	l -	Correction of EC DDM Test Cose 6.6.2.4	020
2019-03	RAN5#82		-			Correction of 5G RRM Test Case 6.6.2.4  Update of EN-DC FR1 event triggered reporting test case 4.6.1.5	0.3.0 0.3.0
		R5-192500	-	-	-		
	RAN5#82	R5-192503	-	-	-	Update to EN-DC FR1 transmit timing accuracy test	0.3.0
2019-03	RAN5#82	R5-192674	-	-	-	Update to EN-DC FR1 RLM IS non-DRX test with SSB-based RLM	0.3.0
						RS	
2019-03		R5-192675	-	-	-	Update to EN-DC FR1 RLM IS DRX test with SSB-based RLM RS	0.3.0
2019-03	RAN5#82	R5-192676	_	_	_	Update to NR SA FR1 RLM IS non-DRX test with SSB-based RLM	0.3.0
			_	-	_	RS	
2019-03	RAN5#82	R5-192677	-	-	-	Update to NR SA FR1 RLM IS DRX test with SSB-based RLM RS	0.3.0
2019-03	RAN5#82	R5-192678	-	-	_	pCR for modification of TAAA TC for EN-DC FR1	0.3.0
2019-03	RAN#83	RP-190161	-	_	-	Presented to the RAN#83 plenary for 1-step approval	1.0.0
		101 - 130 10 1		<del>-</del>	-	. , ,	
2019-03	RAN#83	-	-			Upgraded to Rel-15 with small editorial changes	15.0.0
2019-06		R5-193578	0100	-	F	Update the test case number of TC 4.3.2.2.2	15.1.0
2019-06	RAN#84	R5-193755	0102	-	F	Update of Minimum conformance requirements 6.6.1.0	15.1.0
2019-06	RAN#84	R5-193758	0104	l-	F	Update of EN-DC RLM in-sync in non-DRX test case 4.5.1.6	15.1.0
2019-06	RAN#84	R5-193759	0105	-	F	Update of EN-DC RLM out-of-sync in DRX test case 4.5.1.7	15.1.0
2019-06		R5-193760	0106	-	F	Update of EN-DC RLM in-sync in DRX test case 4.5.1.8	15.1.0
2019-06		R5-193761	0107	t	F	Addition of Minimum conformance requirements 6.3.2	15.1.0
2019-06		R5-193762	0108	<u> </u>	F	Addition of NR RRM TC 6.3.2.1.1-Intra Freq RRC Re-establishment	15.1.0
				<del> </del>			
2019-06	RAN#84	R5-193763	0109	-	F	Addition of FR1-FR1 re-establishment test case 6.3.2.1.2	15.1.0
2019-06	RAN#84	R5-193764	0110	-	F	Addition of FR1 RRC connection release with redirection test case	15.1.0
						6.3.2.3.1	
2019-06	RAN#84	R5-193765	0111	-	F	Addition of FR1-E-UTRA RRC connection release with redirection	15.1.0
			1			test case 6.3.2.3.2	
2019-06	RAN#84	R5-193766	0112	-	F	Update of TC 6.5.1.5 SA FR1 CSI-RS RLM OOS non-DRX	15.1.0
2019-06		R5-193767	0113	t <u> </u>	F	Update of TC 6.5.1.6 SA FR1 CSI-RS RLM IS non-DRX	15.1.0
					F	•	
2019-06		R5-193768	0114	-		Update of TC 6.5.1.7 SA FR1 CSI-RS RLM OOS DRX	15.1.0
2019-06		R5-193769	0115	-	F	Update of TC 6.5.1.8 SA FR1 CSI-RS RLM IS DRX	15.1.0
2019-06	RAN#84	R5-193770	0116	-	F	Addition of Minimum conformance requirements 6.5.5.0	15.1.0
2019-06	RAN#84	R5-193771	0117	-	F	Update of TC 6.5.5.3 SA FR1 CSI-RS BFD non-DRX	15.1.0
2019-06	RAN#84	R5-193772	0118	-	F	Update of TC 6.5.5.4 SA FR1 CSI-RS BFD DRX	15.1.0
2019-06		R5-193773	0119	1	F	Addition of Minimum conformance requirements 7.5.5.0	15.1.0
2019-06		R5-193774	0120	1_	F	Update of TC 7.5.5.1 SA FR2 SSB BFD non-DRX	15.1.0
				ļ	F		
2019-06	RAN#84	R5-193775	0121	-		Update of TC 7.5.5.2 SA FR2 SSB BFD DRX	15.1.0
2019-06		R5-193776	0122	-	F	Update of TC 7.5.5.3 SA FR2 CSI-RS BFD non-DRX	15.1.0
2019-06		R5-193777	0123	-	F	Update of TC 7.5.5.4 SA FR2 CSI-RS BFD DRX	15.1.0
2019-06	RAN#84	R5-193778	0124	-	F	Addition of Minimum conformance requirements 7.6.1.0	15.1.0
2019-06	RAN#84	R5-193779	0125	Ĭ-	F	Addition of 7.6.1.1 SA FR2 RRM measurement no-gap non-DRX	15.1.0
2019-06		R5-193780	0126	1_	F	Addition of 7.6.1.2 SA FR2 RRM measurement no-gap DRX	15.1.0
2019-06		R5-193781	0127	1_	F	Addition of 7.6.1.3 SA FR2 RRM measurement gap non-DRX	15.1.0
2019-06		R5-193782	0128	1	F		15.1.0
				-		Addition of 7.6.1.4 SA FR2 RRM measurement gap DRX	
2019-06		R5-193784	0130	-	F	Update of FR1 cell re-selection test case 6.1.1.1	15.1.0
2019-06	RAN#84	R5-193785	0131	-	F	Update of FR1-FR1 cell re-selection test case 6.1.1.2	15.1.0
2019-06	RAN#84	R5-193786	0132	l-	F	Update of FR1-EUTRA higher priority cell re-selection test case	15.1.0
						6.1.2.1	
2019-06	RAN#84	R5-193787	0133	-	F	Update of FR1-EUTRA lower priority cell re-selection test case	15.1.0
			0.00			6.1.2.2	
2019-06	RAN#84	R5-193788	0134		F	Update of FR1-EUTRA handover known cell test case 6.3.1.4	15.1.0
				-			
2019-06		R5-193790	0136	-	F	Update of 6.6.1.1 SA FR1 RRM measurement no-gap non-DRX	15.1.0
2019-06		R5-193791	0137	-	F	Update of 6.6.1.2 SA FR1 RRM measurement no-gap DRX	15.1.0
2019-06	RAN#84	R5-193792	0138	-	F	Update of 6.6.1.3 SA FR1 RRM measurement gap non-DRX	15.1.0
2019-06	RAN#84	R5-193793	0139	-	F	Update of 6.6.1.4 SA FR1 RRM measurement gap DRX	15.1.0
2019-06	RAN#84	R5-193794	0140	-	F	Update of FR1 event-triggered without gap with SSB index test case	15.1.0
	1					6.6.1.5	
•				1	F	Update of FR1 event-triggered with gap with SSB index test case	15.1.0
2010-06	RAN#91	R5-103705	0141	_		ropadio or introvenicinggered with gap with 330 index test (dse	10.1.0
2019-06	RAN#84	R5-193795	0141	-		6616	
				-		6.6.1.6	45.4.0
2019-06	RAN#84	R5-193812	0145	-	F	Addition of 6.3.2.2 minimum conformance requirements	15.1.0
				- - -		Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure	15.1.0 15.1.0
2019-06	RAN#84	R5-193812	0145	-	F	Addition of 6.3.2.2 minimum conformance requirements	
2019-06	RAN#84	R5-193812	0145		F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure	
2019-06 2019-06 2019-06	RAN#84 RAN#84	R5-193812 R5-193872 R5-193949	0145 0146 0148	- - -	F F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX Correction of PRACH Configurations	15.1.0 15.1.0
2019-06 2019-06 2019-06 2019-06	RAN#84 RAN#84 RAN#84 RAN#84	R5-193812 R5-193872 R5-193949 R5-194328	0145 0146 0148 0153	- - - -	F F F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX Correction of PRACH Configurations Additional of new reference used in RRM test spec	15.1.0 15.1.0 15.1.0
2019-06 2019-06 2019-06 2019-06 2019-06	RAN#84 RAN#84 RAN#84 RAN#84 RAN#84	R5-193812 R5-193872 R5-193949 R5-194328 R5-194329	0145 0146 0148 0153 0154	- - - - -	F F F F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX Correction of PRACH Configurations Additional of new reference used in RRM test spec Correction of reference spec number in RRM spec	15.1.0 15.1.0 15.1.0 15.1.0
2019-06 2019-06 2019-06 2019-06 2019-06 2019-06	RAN#84 RAN#84 RAN#84 RAN#84 RAN#84	R5-193812 R5-193872 R5-193949 R5-194328 R5-194329 R5-194494	0145 0146 0148 0153 0154 0165	- - - - - -	F F F F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX Correction of PRACH Configurations Additional of new reference used in RRM test spec Correction of reference spec number in RRM spec Addition missing Editor's note 4.5.2.5	15.1.0 15.1.0 15.1.0 15.1.0 15.1.0
2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06	RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84	R5-193812 R5-193872 R5-193949 R5-194328 R5-194329 R5-194494 R5-194549	0145 0146 0148 0153 0154 0165 0173	- - - - - -	F F F F F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX Correction of PRACH Configurations Additional of new reference used in RRM test spec Correction of reference spec number in RRM spec Addition missing Editor's note 4.5.2.5 Correction of 5G RRM Test Case 5.6.2.1	15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0
2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06	RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84	R5-193812 R5-193872 R5-193949 R5-194328 R5-194329 R5-194494 R5-194549 R5-194550	0145 0146 0148 0153 0154 0165 0173 0174	- - - - - - -	F F F F F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX Correction of PRACH Configurations Additional of new reference used in RRM test spec Correction of reference spec number in RRM spec Addition missing Editor's note 4.5.2.5 Correction of 5G RRM Test Case 5.6.2.1 Correction of 5G RRM Test Case 5.6.2.2	15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0
2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06	RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84	R5-193812 R5-193872 R5-193949 R5-194328 R5-194329 R5-194494 R5-194549 R5-194550 R5-194551	0145 0146 0148 0153 0154 0165 0173	- - - - - - - - -	F F F F F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX Correction of PRACH Configurations Additional of new reference used in RRM test spec Correction of reference spec number in RRM spec Addition missing Editor's note 4.5.2.5 Correction of 5G RRM Test Case 5.6.2.1 Correction of 5G RRM Test Case 5.6.2.2 Correction of 5G RRM Test Case 5.6.2.3	15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0
2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06	RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84	R5-193812 R5-193872 R5-193949 R5-194328 R5-194329 R5-194494 R5-194549 R5-194550 R5-194551	0145 0146 0148 0153 0154 0165 0173 0174	- - - - - - - - -	F F F F F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX Correction of PRACH Configurations Additional of new reference used in RRM test spec Correction of reference spec number in RRM spec Addition missing Editor's note 4.5.2.5 Correction of 5G RRM Test Case 5.6.2.1 Correction of 5G RRM Test Case 5.6.2.2 Correction of 5G RRM Test Case 5.6.2.3	15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0
2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06	RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84	R5-193812 R5-193872 R5-193949 R5-194328 R5-194329 R5-194549 R5-194550 R5-194551 R5-194552	0145 0146 0148 0153 0154 0165 0173 0174 0175 0176	- - - - - - - - - -	F F F F F F F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX Correction of PRACH Configurations Additional of new reference used in RRM test spec Correction of reference spec number in RRM spec Addition missing Editor's note 4.5.2.5 Correction of 5G RRM Test Case 5.6.2.1 Correction of 5G RRM Test Case 5.6.2.2 Correction of 5G RRM Test Case 5.6.2.3 Correction of 5G RRM Test Case 5.6.2.4	15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0
2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06	RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84	R5-193812 R5-193872 R5-193949 R5-194328 R5-194329 R5-194549 R5-194550 R5-194551 R5-194552 R5-194553	0145 0146 0148 0153 0154 0165 0173 0174 0175 0176	- - - - - - - - -	F F F F F F F F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX Correction of PRACH Configurations Additional of new reference used in RRM test spec Correction of reference spec number in RRM spec Addition missing Editor's note 4.5.2.5 Correction of 5G RRM Test Case 5.6.2.1 Correction of 5G RRM Test Case 5.6.2.2 Correction of 5G RRM Test Case 5.6.2.3 Correction of 5G RRM Test Case 5.6.2.4 Correction of 5G RRM Test Case 5.6.2.4 Correction of 5G RRM Test Case 5.6.2.5	15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0
2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06	RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84	R5-193812 R5-193872 R5-193949 R5-194328 R5-194329 R5-194549 R5-194550 R5-194551 R5-194553 R5-194553	0145 0146 0148 0153 0154 0165 0173 0174 0175 0176 0177	- - - - - - - - - - -	F F F F F F F F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX Correction of PRACH Configurations Additional of new reference used in RRM test spec Correction of reference spec number in RRM spec Addition missing Editor's note 4.5.2.5 Correction of 5G RRM Test Case 5.6.2.1 Correction of 5G RRM Test Case 5.6.2.2 Correction of 5G RRM Test Case 5.6.2.3 Correction of 5G RRM Test Case 5.6.2.4 Correction of 5G RRM Test Case 5.6.2.5 Correction of 5G RRM Test Case 5.6.2.5 Correction of 5G RRM Test Case 5.6.2.5	15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0
2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06	RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84	R5-193812 R5-193872 R5-193949 R5-194328 R5-194329 R5-194549 R5-194550 R5-194551 R5-194552 R5-194553 R5-194555 R5-194556	0145 0146 0148 0153 0154 0165 0173 0174 0175 0176 0177 0179 0180	- - - - - - - - - - - - -	F F F F F F F F F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX Correction of PRACH Configurations Additional of new reference used in RRM test spec Correction of reference spec number in RRM spec Addition missing Editor's note 4.5.2.5 Correction of 5G RRM Test Case 5.6.2.1 Correction of 5G RRM Test Case 5.6.2.2 Correction of 5G RRM Test Case 5.6.2.3 Correction of 5G RRM Test Case 5.6.2.4 Correction of 5G RRM Test Case 5.6.2.5 Correction of 5G RRM Test Case 5.6.2.5 Correction of 5G RRM Test Case 5.6.2.7 Correction of 5G RRM Test Case 5.6.2.7	15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0
2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06 2019-06	RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84 RAN#84	R5-193812 R5-193872 R5-193949 R5-194328 R5-194329 R5-194549 R5-194550 R5-194551 R5-194553 R5-194553	0145 0146 0148 0153 0154 0165 0173 0174 0175 0176 0177	- - - - - - - - - - - - - - - -	F F F F F F F F	Addition of 6.3.2.2 minimum conformance requirements Introduction of TC 4.5.5.4 EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX Correction of PRACH Configurations Additional of new reference used in RRM test spec Correction of reference spec number in RRM spec Addition missing Editor's note 4.5.2.5 Correction of 5G RRM Test Case 5.6.2.1 Correction of 5G RRM Test Case 5.6.2.2 Correction of 5G RRM Test Case 5.6.2.3 Correction of 5G RRM Test Case 5.6.2.4 Correction of 5G RRM Test Case 5.6.2.5 Correction of 5G RRM Test Case 5.6.2.5 Correction of 5G RRM Test Case 5.6.2.5	15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0 15.1.0

2019-06	RAN#84	R5-194564	0188	I_	F	Correction of 5G RRM Test Case 7.6.2.2	15.1.0
2019-06	RAN#84	R5-194565	0189	_	F	Correction of 5G RRM Test Case 7.6.2.3	15.1.0
2019-06	RAN#84	R5-194566	0190	_	F	Correction of 5G RRM Test Case 7.6.2.4	15.1.0
2019-06	RAN#84	R5-194567	0191	_	F	Correction of 5G RRM Test Case 7.6.2.5	15.1.0
2019-06	RAN#84	R5-194568	0192	-	F	Correction of 5G RRM Test Case 7.6.2.6	15.1.0
2019-06	RAN#84	R5-194569	0193	-	F	Correction of 5G RRM Test Case 7.6.2.7	15.1.0
2019-06	RAN#84	R5-194570	0194	-	F	Correction of 5G RRM Test Case 7.6.2.8	15.1.0
2019-06	RAN#84	R5-194571	0195	-	F	Correction of Minimum conformance requirements 7.3.2.1.0	15.1.0
2019-06	RAN#84	R5-194572	0196	-	F	Correction of 5G RRM Test Case 7.3.2.1.1	15.1.0
2019-06	RAN#84	R5-194573	0197	-	F	Correction of 5G RRM Test Case 7.3.2.1.2	15.1.0
2019-06	RAN#84	R5-194700		-	F	Clean-up in EN-DC FR1 transmit timing accuracy test	15.1.0
2019-06	RAN#84	R5-194702	0210	-	F	Update to EN-DC FR1 RLM IS DRX test with SSB-based RLM RS	15.1.0
2019-06	RAN#84	R5-194703	0211	-	F	Update to NR SA FR1 RLM IS non-DRX test with SSB-based RLM RS	15.1.0
2019-06	RAN#84	R5-194704	0212	-	F	Update to NR SA FR1 RLM IS DRX test with SSB-based RLM RS	15.1.0
2019-06	RAN#84	R5-194710	0214	-	F	Update to E-UTRA configuration for RRM EN-DC tests to align with core spec update	15.1.0
2019-06	RAN#84	R5-194713	0216	-	F	Update to EN-DC FR1 RLM IS DRX test with SSB-based RLM RS	15.1.0
2019-06	RAN#84	R5-195013	0156	1	F	Updated to EN-DC FR1 RRM tests in clause 4.5.3	15.1.0
2019-06	RAN#84	R5-195016	0198	1	F	Test tolerance and measurement uncertainty in Annex F for Inter- Freq measurement test cases	15.1.0
2019-06	RAN#84	R5-195017	0129	1	F	Addition of default configuration in Annex H	15.1.0
2019-06	RAN#84	R5-195018	0143	1	F	Update of 6.3.2.2.1 random access	15.1.0
2019-06	RAN#84	R5-195019	0144	1	F	Update of 6.3.2.2.2 non-contention random access	15.1.0
2019-06	RAN#84	R5-195020	0151	1	F	Updated to EN-DC FR1 RRM tests in cluase 4.6.1	15.1.0
2019-06	RAN#84	R5-195021	0207	1	F	Modification of EN-DC FR1 TAAA	15.1.0
2019-06	RAN#84	R5-195024	0199	1	F	Modification of EN-DC FR1 SSB RLM OOS in non-DRX	15.1.0
2019-06	RAN#84	R5-195025	0200	1	F	Modification of EN-DC FR1 SSB RLM OOS in DRX	15.1.0
2019-06	RAN#84	R5-195026	0201	1	F	Modification of NR SA FR1 TAAA	15.1.0
2019-06	RAN#84	R5-195027	0202	1	F	Modification of SA FR1 SSB RLM OOS in non-DRX	15.1.0
2019-06	RAN#84	R5-195028	0203	1	F	Modification of SA FR1 SSB RLM OOS in DRX	15.1.0
2019-06	RAN#84	R5-195029	0204	1	F	Modification of EN-DC FR2 TAAA	15.1.0
2019-06	RAN#84	R5-195030	0205	1	F	Modification of EN-DC FR2 SSB RLM OOS in non-DRX	15.1.0
2019-06	RAN#84	R5-195031	0206	1	F	Modification of EN-DC FR2 SSB RLM OOS in DRX	15.1.0
2019-06	RAN#84	R5-195032	0219	1	F	Update to EN-DC FR2 RLM IS non-DRX test with SSB-based RLM RS	15.1.0
2019-06	RAN#84	R5-195033	0220	1	F	Update to EN-DC FR2 RLM IS DRX test with SSB-based RLM RS	15.1.0
2019-06	RAN#84	R5-195034	0221	1	F	Addition of EN-DC FR2 Transmit Timing Accuracy tests	15.1.0
2019-06	RAN#84	R5-195035	0209	1	F	Update to EN-DC FR1 RLM IS non-DRX test with SSB-based RLM RS	15.1.0
2019-06	RAN#84	R5-195036	0150	1	F	Correction to EN-DC FR1 UE transmit timing accuracy TC 4.4.1.1	15.1.0
2019-06	RAN#84	R5-195037	0155	1	F	Updated to cell configuration mapping table for RRM tests	15.1.0
2019-06	RAN#84	R5-195038	0147	1	F	Introduction of TC 6.5.2.1 NR SA FR1 interruptions during measurements on deactivated NR SCC	15.1.0
2019-06		R5-195039		1	F	Correction of 5G RRM Test Case 5.6.2.6	15.1.0
2019-06	RAN#84	R5-195040	0166	1	F	Correction of default message content for RRM in Annex H	15.1.0
2019-06	RAN#84	R5-195041	0217	1	F	Update to NR SA FR1 RLM IS non-DRX test with SSB-based RLM RS	15.1.0
2019-06	RAN#84	R5-195042	0218	1	F	Update to NR SA FR1 RLM IS DRX test with SSB-based RLM RS	15.1.0
2019-06	RAN#84	R5-195043	0215	1	F	Update to EN-DC FR1 RLM IS non-DRX test with SSB-based RLM RS	15.1.0
2019-06	RAN#84	R5-195044	0187	1	F	Correction of 5G RRM Test Case 7.6.2.1	15.1.0
2019-06	RAN#84	R5-195045	0103	1	F	Update of EN-DC RLM out-of-sync in non-DRX test case 4.5.1.5	15.1.0
2019-06	RAN#84	R5-195099	0223	-	F	RRM implementation of FR2 UL demod OTA tests using single pol Rx TE	15.1.0
2019-06	RAN#84	R5-195173	0167	1	F	Correction of Minimum conformance requirements 4.6.2.0	15.1.0
2019-06	RAN#84		0168	1	F	Correction of 5G RRM Test Case 4.6.2.1 with FR1 Test tolerance	15.1.0
2019-06	RAN#84	R5-195175	0169	1	F	Correction of 5G RRM Test Case 4.6.2.2 with FR1 Test tolerance	15.1.0
2019-06	RAN#84	R5-195176	0170	1	F	Correction of 5G RRM Test Case 4.6.2.3 with FR1 Test tolerance	15.1.0
2019-06	RAN#84	R5-195177	0171	1	F	Correction of 5G RRM Test Case 4.6.2.4 with FR1 Test tolerance	15.1.0
2019-06	RAN#84	R5-195179	0172	1	F	Correction of Minimum conformance requirements 5.6.2.0	15.1.0
2019-06	RAN#84	R5-195182	0142	1	F	Addition of FR1-E-UTRAN event-triggered reporting in DRX test case 6.6.3.2	15.1.0
2019-06	RAN#84	R5-195185	0158	1	F	Update of FR1 Test tolerance and uncertainties in AnnexF	15.1.0
2019-06	RAN#84	R5-195186	0182	1	F	Correction of 5G RRM Test Case 6.6.2.1 with FR1 Test tolerance	15.1.0
2019-06	RAN#84	R5-195187	0183	1	F	Correction of 5G RRM Test Case 6.6.2.2 with FR1 Test tolerance	15.1.0
2019-06	RAN#84	R5-195188	0184	1	F	Correction of 5G RRM Test Case 6.6.2.3 with FR1 Test tolerance	15.1.0
		IDE 40E400	10405	1	F	I Correction of EC DDM Tost Cose 6.6.2.4 with ED1 Tost telerones	15.1.0
2019-06 2019-06	RAN#84 RAN#84	R5-195189 R5-195445	0185 0152	2	F	Correction of 5G RRM Test Case 6.6.2.4 with FR1 Test tolerance Updated to SA FR1 RRM tests in clause 6.6.3	15.1.0

### History

Document history							
V15.0.0	May 2019	Publication					
V15.1.0	July 2019	Publication					