3GPP TSG-RAN WG4 Meeting #97-e R4-2017386

Electronic Meeting, 2 Nov. – 13 Nov., 2020

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** |  | **rev** |  | **Current version:** | **16.5.0** |  |
|  | | | | | | | | |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Draft CR on Introduction of Rel-16 NR RRM enhancements WI performance requirements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Intel Corporation, ZTE Corporation, Apple | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_RRM\_Enh-Perf | | | | |  | ***Date:*** | | | 2020-11-16 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduce NR RRM enhancement performance requirements. It is draft big CR to merge the endorsed CRs/draftCRs in RAN4#97e. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce NR RRM enhancement performance requirements based on the endorsed CRs/draftCRs in RAN4 #96e:   * UL spatial relation switch:   + R4-2017177, R4-2017178, R4-2017179 * SRS carrier switching:   + R4-2017364, R4-2017365, R4-2017366, R4-2017184, R4-2017185 * CGI reading:   + R4-2017195, R4-2017196, R4-2017197, R4-2017198，R4-2017194 * Mandatory gap pattern:   + R4-2017339, R4-2017340 * Multiple SCell activation:   + R4-2017210, R4-2017211, R4-2017212 * Inter-band FR2 CA:   + R4-2017221 * Inter-frequency measurement without MG:   + R4-2017213, R4-2017387, R4-2017215, R4-2017216 * UE specific CBW change:   + R4-2017217, R4-2017218, R4-2017219, R4-2017220 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The specification is incomplete. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.3.x, A.5.5.x, A.7.5.x  A.5.5.2.x, A.6.5.2x, A.4.5.2.x  A.6.6.x.y, A.7.6.x, A.5.6.x, A.4.6.x, A.6.6.x.1  A.7.6.2.x, A.6.6.2.x, A.4.5.3.4, A.7.5.3.x, A.5.5.3.Y, A.7.5.3.3, A.6.6.2.x, A.7.6.2.9, A.4.5.x, A.6.5.x | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS38.533 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

# UL spatial relation switch delay

----------------------------------------------- Beginning of Change 1 (R4-2017177) --------------------------------------------------

## A.3.x Spatial Relation Configuration

### A.3.x.1 Introduction

This clause provides the configurations for spatial relation towards either SSB or CSI-RS. The spatial relation defined in this clause are configured in each test when applicable to indicate spatial setting for certain UL signals with the referenceSignal configured in the spatial relation.

### A.3.x.2 Spatial Relation

**Table A.3.x.2-1: PUCCH Spatial Relation**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **PUCCH.SRI.0** | **PUCCH.SRI.1** |
| pucch-SpatialRelationInfoId | Id0 | Id1 |
| referenceSignal | SSB0 | SSB1 |
| Note 1: referenceSignal configurations towards which the spatial relation are configured in a test-specific manner. | | |

**Table A.3.x.2-2: SRS Spatial Relation**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **SRS.SRI0** | **SRS.SRI1** |
| srs-SpatialRelationInfoId | Id0 | Id1 |
| referenceSignal | SSB0 | SSB1 |
| Note 1: referenceSignal configurations towards which the spatial relation are configured in a test-specific manner. | | |

--------------------------------------------------------- End of change 1 ----------------------------------------------------------------

----------------------------------------------------- Beginning of Change 2 (R4-2017177) --------------------------------------------

### A.5.5.x Uplink spatial relation switch delay

#### A.5.5.x.1 MAC-CE based uplink spatial relation switch

##### A.5.5.x.1.1 E-UTRAN – NR PSCell FR2 uplink spatial relation switch for a known spatial relation

###### A.5.5.x.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the uplink spatial relation switch delay requirement defined in clause 8.12.3 by a UE capable of beam correspondence without the need for UL beam sweeping. Supported test configurations are shown in Table A.5.5.x.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.x.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.x.1.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.x.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have continuous ACK/NACK sending by PUCCH.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).

- UE is configured with 2 different spatial relations for PSCell, PUCCH spatial relation 0 (QCL’d to SSB0) and spatial relation 1 (QCL’d to SSB1), in Cell 2 before starting the test.

- UE is indicated in spatial relation 0 as the active PUCCH spatial relation

The test consists of two time periods, T1 and T2. During T1 only SSB to which PUCCH spatial relation 0 QCLed is transmitted. At the beginning of T2, the SSB corresponding to spatial relation 1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured. In slot n which is within 1280ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a MAC-CE command indicating a switch to transmit PUCCH with spatial relation 1.

The test equipment verifies that UE can be scheduled on PSCell on spatial relation 0 till *n* + THARQ/NR slot length + . The test equipment also verifies the spatial relation switch time in PSCell by scheduling the UE on spatial relation 1 from slot *n* + THARQ/NR slot length + + 1 and onwards.

Table A.5.5.x.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Table A.5.5.x.1.1.1-2: General test parameters for spatial relation switch

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | PSCell on RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | For both PCell and PSCell |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on PSCC. |
| Cell2 timing offset to cell1 | μs | 3 | Synchronous EN-DC |
| L1-RSRP reporting period | slot | 160 | Periodic L1-RSRP reporting configured |
| L1-RSRP measured RS |  | SSB0, SSB1 | L1-RSRP measurements of SSB0 and SSB1. |
| Number of reported RS |  | 2 | L1-RSRP reporting of measurements on SSB0 and SSB1. |
| T1 | s | 0.2 |  |
| T2 | s | 2 |  |

Table A.5.5.x.1.1.1-3: NR Cell specific test parameters for spatial relation switch

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell 2 |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP.1 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| Spatial Relation 0 |  | PUCCH.  SRI.0 |
| Spatial Relation 1 |  | PUCCH.  SRI.1 |
| TRS Configuration |  | TRS.2.1 TDD |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| EPRE ratio of PSS to SSS | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.5.5.x.1.1.1-4: OTA related test parameters for uplink spatial relation switch

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | | | |
| SSB0 | | SSB1 | |
| T1 | T2 | T1 | T2 |
| Angle of arrival configuration |  | Setup 3 according to clause A.3.15.3 | | | |
| AoA1 | | AoA2 | |
| NocNote 1 | dBm/15 kHz | -92.1 | | | |
| NocNote 1 | dBm/SCS | -83.1 | | | |
| Ês/Noc | dB | 1 | 1 | -Infinity | 1 |
| SS-RSRP Note 2 | dBm/120 kHz Note3 | -82.1 | -82.1 | -Infinity | -82.1 |
| IoNote2,Note6 | dBm/95.04 MHz Note4 | -50.6 | -50.6 | -54.1 | -50.6 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | |

###### A.5.5.x.1.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for SSB1.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to transmit PUCCH on spatial relation 0 till n+ THARQ/NR slot length + ;

- be able to start transmitting PUCCH on spatial relation 1 from slot n+ THARQ/NR slot length + +1.

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

--------------------------------------------------------- End of change 2 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 3 (R4-2017178) -------------------------------------------

#### A.5.5.x.2 RRC based spatial relation switch

##### A.5.5.X.2.1 E-UTRAN – NR PSCell FR2 spatial relation switch associated with a known DL-RS

###### A.5.5.X.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the RRC based spatial relation switch delay requirement defined in clause 8.12.5 by a UE capable of beam correspondence without the need for UL beam sweeping. Supported test configurations are shown in Table A.5.5.X.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.X.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.X.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.X.2.1.1-4.

Periodic SRS is transmitted on NR PSCell (Cell2), and the SRS configuration is SRSConf.1 given in Table A.5.4.1.1.1-3.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).

- UE is configured with 1 SRS-SpatialRelation0 associated with SSB0.

- UE is indicated SRS-SpatialRelation0 as the active SRS spatial relation.

The test consists of two time periods, T1 and T2. During T1 only SSB0 to which SRS-SpatialRelation0 associated is transmitted. UE shall transmits periodic SRS with SRS-SpatialRelation0 of PSCell. At the beginning of T2, the SSB1 corresponding to SRS-SpatialRelation1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a RRC command indicating a switch to transmit periodic SRS with target SRS-SpatialRelation1. The test equipment verifies that UE shall be able to transmit periodic SRS with target spatial relation (SRS-SpatialRelation1) on PSCell in the slot n+ TRRC\_processing/NR slot length +1.

Table A.5.5.X.2.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | |

Table A.5.5.X.2.1.1-2: General test parameters for spatial relation switch associated with a known DL-RS

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | PSCell on RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | For both PCell and PSCell |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on PSCC. |
| T1 | s | 0.2 |  |
| T2 | s | 2 |  |

Table A.5.5.X.2.1.1-3: NR Cell specific test parameters for spatial relation switch associated with a known DL-RS

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell 2 |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP.1 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| SRS-SpatialRelation0 |  | SRS.SRI0 |
| SRS-SpatialRelation1 |  | SRS.SRI1 |
| reportConfigType |  | ssb-Index-RSRP |
| reportConfigType |  | periodic |
| Number of reported RS |  | 2 |
| L1-RSRP reporting period | slot | 160 |
| TRS Configuration |  | TRS.2.1 TDD |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| EPRE ratio of PSS to SSS | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |
| EPRE ratio of PDSCH DMRS to SSS |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |
| Propagation Condition |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

Table A.5.5.X.2.1.1-4: OTA related test parameters for spatial relation switch associated with a known DL-RS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 2 | | | |
|  |  | SSB0 | | SSB1 | |
|  |  | T1 | T2 | T1 | T2 |
| Angle of arrival |  | Setup 3 according to clause A.3.15.3 | | | |
| configuration |  | **AoA1** | | **AoA2** | |
| Assumption for UE beamsNote 6 |  | Rough | | Rough | |
| NocNote 1 | dBm/15 kHz | -92.1 | | | |
| NocNote 1 | dBm/SCS | -83.1 | | | |
| Ês/Noc | dB | 1 | 1 | -Infinity | 1 |
| SS-RSRP Note 2 | dBm/120 kHz Note3 | -82.1 | -82.1 | -Infinity | -82.1 |
| IoNote2,Note6 | dBm/95.04 MHz Note4 | -50.6 | -50.6 | -54.1 | -50.6 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | |

###### A.5.5.X.2.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with SSB1 to which SRS-SpatialRelation1 is associated.

After receiving RRC command in slot n, UE shall be able to transmit target periodic SRS with SRS-SpatialRelation1 on PSCell in the slot n+ TRRC\_processing/*NR slot length* +1.

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

----------------------------------------------------------End of change 3 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 4 (R4-2017179) -------------------------------------------

### A.7.5.x Uplink spatial relation switch delay

A.7.5.x.1 MAC-CE based Spatial Relation switch

A.7.5.x.1.1 NR PCell FR2 spatial relation associated with known DL-RS

###### A.7.5.x.1.1.1 Test Purpose and Environment

The purpose of this test is to verify fulfillment of the uplink spatial relation switch delay requirement defined in clause 8.12.3 by a UE capable of beam correspondence without the need for UL beam sweeping. The supported test configurations are shown in Table A.7.5.x.1.1.1-1.

The test scenario comprises one PCell (Cell 1) as outlined in Table A.7.5.x.1.1.1-2. Cell-specific parameters are provided in Table A.7.5.x.1.1.1-3. OTA-related test parameters are provided in Table A.7.5.x.1.1.1-4.

Throughout the test, PDCCH indicating new transmissions shall ge sent continuously on PCell to ensure that the UE will send ACK/NACKs on PUCCH.

Before the test starts,

* UE is connected to Cell 1 on radio channel 1.
* UE is configured with a single TCI state, TCI State-0, which is QCLed with SSB0.
* UE is configured with two spatial relation information configurations Spatial Relation Info-0 and Spatial Relation Info-1 for PUCCH, each associated with SSB0 and SSB1, respectively.
* UE is indicated via MAC-CE activation of *PUCCH-SpatialRelationInfoId* corresponding to Spatial Relation Info-0
* UE is configured with a CSI measurement configuration indicating L1-RSRP measurements on SSB0 and SSB1 with periodic reporting. The L1-RSRP measurement period is influenced by the following: the higher layer parameter *timeRestrictionForChannelMeasurement* is configured, measured SSBs are fully overlapping with SMTC window, and there are no conflicts with measurement gaps.

The test consists of two time periods, T1 and T2. During T1 only the SSB associated with PDCCH TCI state-0 and PUCCH Spatial Relation Info-0 is transmitted. At the beginning of T2, transmission of the SSB associated with PUCCH Spatial Relation Info-1 starts. The UE conducts periodic L1-RSRP measurements and *SSB-Index-RSRP* reporting for SSB0 and SSB1. In slot *n*, and after having reported valid results for both SSB0 and SSB1, the UE receives a MAC-CE indicating a switch of spatial relation to PUCCH Spatial Relation Info 1.

The test equipment verifies that the UE transmits according to PUCCH Spatial Relation Info 0 up until slot *n* + THARQ/NR slot length + , and according to PUCCH Spatial Relation Info 1 from slot *n* + THARQ/NR slot length + + 1 and onwards.

**Table A.7.5.x.1.1.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

**Table A.7.5.x.1.1.1-2: General test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| L1-RSRP reporting period | slot | 160 | Periodic L1-RSRP reporting configured |
| L1-RSRP measured RS |  | SSB0, SSB1 | L1-RSRP measurements of SSB0 and SSB1. |
| Number of reported RS |  | 2 | L1-RSRP reporting of measurements on SSB0 and SSB1. |
| T1 | s | [0.2] |  |
| T2 | s | [2] |  |

**Table A.7.5.x.1.1.1-3: NR Cell specific test parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** |
| Frequency Range |  | FR2 |
| Duplex mode |  | TDD |
| TDD configuration |  | TDDConf.3.1 |
| BWchannel |  | 100 MHz: NRB,c = 66 |
| Initial DL BWP Configuration |  | DLBWP.0.2 |
| Dedicated DL BWP Configuration |  | DLBWP.1.1 |
| Initial UL BWP Configuration |  | ULBWP.0.2 |
| Dedicated UL BWP Configuration |  | ULBWP.1.1 |
| PDSCH Reference measurement channel |  | SR.3.1 TDD |
| RMSI CORESET parameters |  | CR.3.1 TDD |
| Dedicated CORESET parameters |  | CCR.3.1 TDD |
| OCNG Patterns |  | OP.1 |
| SSB Configuration |  | SSB.1 FR2 |
| SMTC Configuration |  | SMTC.1 |
| TCI State-0 Configuration |  | TCI.State.0 |
| TRS Configuration |  | TRS.2.1 TDD |
| Spatial Relation Info-0 Configuration |  | PUCCH.SRI.0 |
| Spatial Relation Info-1 Configuration |  | PUCCH.SRI.1 |
| Correlation Matrix and Antenna Configuration |  | 1x2 Low |
| EPRE ratio of PSS to SSS | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS |
| EPRE ratio of PBCH to PBCH DMRS |
| EPRE ratio of PDCCH DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH DMRS |
| EPRE ratio of PDSCH DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRSNote 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. | | |

**Table A.7.5.x.1.1.1-4: OTA related test parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | | |
| **SSB0** | | **SSB1** | | |
| **T1** | **T2** | **T1** | **T2** | |
| Angle of arrival configuration |  | Setup 3 according to clause A.3.15.3 | | | | |
| AoA1 | | AoA2 | | |
| Assumption for UE beams Note 6 |  | Rough | | | | |
| NocNote 1 | dBm/15 kHz | -92.1 | | | | |
| NocNote 1 | dBm/SCS | -83.1 | | | | |
| Ês/Noc | dB | 1 | | -infinity | | 1 |
| SS-RSRP Note 2 | dBm/120 kHz Note3 | -82.1 | | -infinity | | -82.1 |
| IoNote2 | dBm/95.04 MHz Note4 | -50.6 | | -54.1 | | -50.6 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.  Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | |

###### A.7.5.x.1.1.2 Test Requirements

During T2, the UE shall send L1-RSRP report with results for SSB0 and SSB1.

After receiving MAC-CE command in slot *n*, the UE shall:

* Continue transmitting using PUCCH spatial relation associated with SSB0 up to and including slot *n* + THARQ/NR slot length +
* Start transmitting using PUCCH spatial relation associated with SSB1 from slot *n* + THARQ/NR slot length + + 1 and onwards.

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

------------------------------------------------------------- End of change 4 ------------------------------------------------------------

# SRS carrier based switching

----------------------------------------------------- Beginning of Change 5 (R4-2017366) --------------------------------------------

#### A.4.5.2.x1 E-UTRAN - NR FR1 interruptions at NR SRS carrier based switching in asynchronous EN-DC

##### A.4.5.2.x1.1 Test Purpose and Environment

The purpose of this test is to verify that when a UE needs to transmit periodic SRS, the UE can perform carrier based switching to one carrier not configured for PUCCH/PUSCH transmission from a CC with PUCCH/PUSCH transmission. The test will verify the interruption requirements on E-UTRAN PCell and NR PSCell in clause 8.2.1.2.12. Supported test configurations are shown in table A.4.5.2.x1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.x.1-2 and A 4.5.2.x.1-3 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is E-UTRAN PCell, Cell2 is NR PSCell in FR1 with PUCCH/PUSCH transmission, Cell3 is an activated NR SCell in FR1 which operates in downlink without PUCCH/PUSCH transmission. The UE is configured with the SRS carrier based switching between PSCell and SCell.

The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall be continuously scheduled on PCell and PSCell. Immediately at the beginning of T2, a PDCCH with TPC-SRS-RNTI is sent to the UE to initiate NR SRS switching.

Table A.4.5.2.x1.1-1: Interruptions at SRS carrier switching supported test configurations in FR1

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

Table A.4.5.2.x1.1-2: General test parameters for E-UTRAN – NR FR1 interruptions at SRS carrier based switching in asynchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is E-UTRAN RF channel and the other two are NR RF channels |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | Configured PSCell on NR RF channel number 2. |
| Configured SCell |  | Cell3 | Configured activated secondary cell on NR RF channel number 3. |
| CP length |  | Normal | Applicable to Cell1, Cell2 and Cell3. |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Filter coefficient |  | 0 | L3 filtering is not used |
| T1 | s | 5 |  |
| T2 | ms | 40 | UE shall perform SRS switching during T2 |

Table A.4.5.2.x1.1-3: NR Cell specific test parameters for E-UTRAN – NR FR1 interruptions at SRS carrier based switching in asynchronous EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell2 | Cell3 |
| Frequency Range | |  | FR1 | FR1 |
| Duplex mode | Config 1,4 |  | FDD | TDD |
| Config 2,3,5,6 |  | TDD | TDD |
| TDD configuration | Config 1,4 |  | Not Applicable | TDDConfig.1.1 |
| Config 2,5 | TDDConf.1.1 | TDDConfig.1.1 |
| Config 3,6 | TDDConf.2.1 | TDDConfig.2.1 |
| BWchannel | Config 1,2,4,5 | MHz | 10: NRB,c = 52 | 10: NRB,c = 52 |
| Config 3,6 | 40: NRB,c = 106 | 40: NRB,c = 106 |
| DL Initial BWP configuration | Config 1-6 |  | DLBWP.0.1 | DLBWP.0.1 |
| DL dedicated BWP configuration | Config 1-6 |  | DLBWP.1.1 | DLBWP.1.1 |
| UL Initial BWP configuration | Config 1-6 |  | ULBWP.0.1 | - |
| UL dedicated BWP configuration | Config 1-6 |  | ULBWP.1.1 | - |
| PDSCH Reference measurement channel | Config 1,4 |  | SR.1.1 FDD | SR.1.1 TDD |
| Config 2,5 | SR.1.1 TDD | SR.1.1 TDD |
| Config 3,6 | SR.2.1 TDD | SR.2.1 TDD |
| RMSI CORESET Reference Channel | Config 1,4 |  | CR.1.1 FDD | CR.1.1 TDD |
| Config 2,5 | CR.1.1 TDD | CR.1.1 TDD |
| Config 3,6 | CR.2.1 TDD | CR.2.1 TDD |
| RMC CORESET Reference Channel | Config 1,4 |  | CCR.1.1 FDD | CCR.1.1 TDD |
| Config 2,5 |  | CCR.1.1 TDD | CCR.1.1 TDD |
| Config 3,6 |  | CCR.2.1 TDD | CCR.2.1 TDD |
| OCNG Patterns | |  | OP.1 | OP.1 |
| TRS configuration | Config 1,4 |  | TRS.1.1 FDD | TRS.1.1 TDD |
| Config 2,5 |  | TRS.1.1 TDD | TRS.1.1 TDD |
| Config 3,6 |  | TRS.1.2 TDD | TRS.1.2 TDD |
| SMTC configuration | |  | SMTC.1 | SMTC.1 |
| SSB configuration | Config 1,2,4,5 |  | SSB.1 FR1 | SSB.1 FR1 |
| Config 3,6 |  | SSB.2 FR1 | SSB.2 FR1 |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,4,5 | kHz | 15 kHz | 15 kHz |
| Config 3,6 | 30 kHz | 30 kHz |
|  |  |  |  |  |
| PUCCH/PUSCH subcarrier spacing | Config 1,2,4,5 | kHz | 15 kHz | - |
| Config 3,6 | 30 kHz | - |
| EPRE ratio of PSS to SSS | | dB | 0 | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Note2 | | dBm/15kHz | -104 | -104 |
| Note2 | Config 1,2,4,5 | dBm/SCS | -104 | -104 |
| Config 3,6 | -101 | -101 |
| SS-RSRPNote3 | Config 1,2,4,5 | dBm/SCS | -87 | -87 |
| Config 3,6 | -84 | -84 |
|  | | dB | 17 | 17 |
|  | | dB | 17 | 17 |
| IoNote3 | Config 1,2,4,5 | dBm/  9.36MHz | -58.96 | -58.96 |
| Config 3,6 | dBm/  38.16MHz | -52.86 | -52.86 |
| Time offset to Cell1 Note 5 | | μs | - | 3 |
| Propagation condition | | - | AWGN | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  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. | | | | |

Table A.4.5.2.x1.1-4: Sounding Reference Symbol Configuration for E-UTRAN – NR FR1 interruptions at SRS carrier based switching in asynchronous EN-DC

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| c-SRS | [12] for 10MHz CBW  [24] for 40MHz CBW  [17] for 100MHz CBW | Frequency hopping is disabled |
| b-SRS | [0] |  |
| b-hop | [0] |  |
| freqDomainPosition | [0] | Frequency domain position of SRS |
| freqDomainShift | [0] |  |
| groupOrSequenceHopping | [neither] | No group or sequence hopping |
| pathlossReferenceRS | [ssb-Index=0] | SSB #0 is used for SRS path loss estimation |
| usage | [Codebook] | Codebook based UL transmission |
| startPosition | [0] | resourceMapping setting. SRS on last |
| nrofSymbols | TBD | TBD |
| repetitionFactor | [n1] | without repetition. |
| combOffset-n2 | TBD | transmissionComb setting |
| cyclicShift-n2 | [0] |  |
| nrofSRS-Ports | [port1] | Number of antenna ports used for SRS transmission |
| transmissionComb | TBD |  |
| resourceType | [Periodic] |  |
| periodicityAndOffset-p | TBD | TBD |
| Note: For further information see clause 6.3.2 in TS 38.331 [2]. | | |

Note: General UL configuration parameters for the tests can be impacted based on agreed SRS configurations

##### A.4.5.2.x1.2 Test Requirements

The UE shall be continuously scheduled in E-UTRAN 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 interruption on NR PSCell during the switching from NR PSCell to NR SCell shall not exceed the value as defined in Table A.4.5.2.x1.2-1 dependent on the applied SRS carrier switching time [TBD].

Table A4.5.2.x1.2-1: Interruption length on NR active serving cells at NR SRS carrier switching (slot)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | NR Slot length | SRS carrier | Interruption length X1 (slots) | |
|  | (ms) of victim cell | switching time (us)Note 1 | Sub carrier spacing for agressor cell (kHz) | |
|  |  |  | 15 | 30 |
| 0 | 1 | ≤ 200 | 2 | 2 |
|  |  | 300, 500 | 2 | 2 |
|  |  | 900 | 3 | 3 |
| 1 | 0.5 | ≤ 200 | 3 | 2 |
|  |  | 300, 500 | 3 | 3 |
|  |  | 900 | 4 | 4 |
| Note1: NR SRS carrier switching time is UE capability indicated by higher layer parameter *SRS-SwitchingTimeNR*. | | | | |

The interruption on E-UTRAN PCell during the switching from NR PSCell to NR SCell shall not exceed the value as defined in Table A.4.5.2.x1.2-2 dependent on the applied SRS carrier switching time [TBD].

Table 4.5.2.x1.2-2: Interruption length on E-UTRAN active serving cells at NR SRS carrier switching

|  |  |
| --- | --- |
| NR SRS carrier switching time (us)note1 | Interruption length X1 (subframes) |
|
| ≤500 | 2 |
| 900 | 3 |
| Note1: NR SRS carrier switching time is UE capability indicated by higher layer parameter *SRS-SwitchingTimeNR*. | |

----------------------------------------------------- End of Change 5 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 6 (R4-2017185) --------------------------------------------

#### A.4.5.2.x2 E-UTRAN – NR interruptions at E-UTRA SRS carrier based switching

##### A.4.5.2.x2.1 Test Purpose and Environment

The purpose of this test is to verify that when a UE needs to transmit aperiodic SRS on a PUSCH-less carrier of SCell, the UE can perform carrier based switching to one PUSCH-less SCCs from a CC with PUSCH. The test will verify the interruption requirements on active serving cell in SCG in clause 8.2.1.2.13. Supported test configurations are shown in table A.4.5.2. x2.1-1.

In the test there are three cells: cell1, cell2 and cell3. Cell1 is E-UTRAN PCell on the primary component carrier. Cell3 is E-UTRAN SCell on the TDD secondary component carrier which operates in downlink without PUCCH/PUSCH. Cell2 is NR FR1 PSCell. The UE is configured with the SRS switching between E-UTRAN PCell and E-UTRAN SCell. The general test parameters, NR cell specific test parameters and E-UTRA SRS configurations are given in Table A.4.5.2.x2.1-2, A.4.5.2.x2.1-3 and Table A.4.5.2.x2.1-4 below. And the E-UTRAN cell specific test parameters (for cell1 and cell3) can refer to Table A.3.7.2.1-1. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 LTE PCell and NR PSCell are continuously scheduled in DL. Immediately at the beginning of T2, a PDCCH with SRS-TPC-RNTI is sent to the UE to initiate SRS switching.

Table A.4.5.2.x2.1-1: E-UTRAN – NR interruptions at E-UTRA SRS carrier based switching supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD(cell1), LTE TDD (cell3), NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD(cell1), LTE TDD (cell3), NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD(cell1), LTE TDD (cell3), NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD(cell1), LTE TDD (cell3), NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD(cell1), LTE TDD (cell3), NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD(cell1), LTE TDD (cell3), NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.4.5.2.x2.1-2: General test parameters for E-UTRAN – NR interruptions at E-UTRA SRS carrier based switching

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is NR RF channel and the other two are E-UTRAN RF channels |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Active PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| Activated SCell |  | Cell3 | SCell on E-UTRAN RF channel number 3. |
| CP length |  | Normal | Applicable to Cell1, Cell2 and Cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 | UE shall perform SRS switching during T2 |

Table A.4.5.2.x2.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions at E-UTRA SRS carrier based switching

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell2 |
| Frequency Range | |  | FR1 |
| Duplex mode | Config 1,4 |  | FDD |
|  | Config 2,3,5,6 |  | TDD |
| TDD configuration | Config 1,4 |  | Not Applicable |
|  | Config 2,5 |  | TDDConf.1.1 |
|  | Config 3,6 |  | TDDConf.2.1 |
| BWchannel | Config 1,4 | MHz | 10: NRB,c = 52 |
|  | Config 2,5 |  | 10: NRB,c = 52 |
|  | Config 3,6 |  | 40: NRB,c = 106 |
| Initial DL BWP | Config 1,4 |  | DLBWP.0.1 |
| Configuration | Config 2,5 |  | DLBWP.0.1 |
|  | Config 3,6 |  | DLBWP.0.1 |
| Dedicated DL BWP | Config 1,4 |  | DLBWP.1.1 |
| Configuration | Config 2,5 |  | DLBWP.1.1 |
|  | Config 3,6 |  | DLBWP.1.1 |
| Initial UL BWP | Config 1,4 |  | ULBWP.0.1 |
| Configuration | Config 2,5 |  | ULBWP.0.1 |
|  | Config 3,6 |  | ULBWP.0.1 |
| Dedicated UL BWP | Config 1,4 |  | ULBWP.1.1 |
| Configuration | Config 2,5 |  | ULBWP.1.1 |
|  | Config 3,6 |  | ULBWP.1.1 |
| PDSCH Reference | Config 1,4 |  | SR.1.1 FDD |
| measurement channel | Config 2,5 |  | SR.1.1 TDD |
|  | Config 3,6 |  | SR.2.1 TDD |
| RMSI CORESET | Config 1,4 |  | CR.1.1 FDD |
| parameters | Config 2,5 |  | CR.1.1 TDD |
|  | Config 3,6 |  | CR.2.1 TDD |
| PDCCH CORESET | Config 1,4 |  | CCR.1.1 FDD |
| parameters | Config 2,5 |  | CCR.1.1 TDD |
|  | Config 3,6 |  | CCR.2.1 TDD |
| TRS configuration | Config 1,4 |  | TRS.1.1 FDD |
|  | Config 2,5 |  | TRS.1.1 TDD |
|  | Config 3,6 |  | TRS.1.2 TDD |
| OCNG Patterns | |  | OP.1 |
| SMTC Configuration | |  | SMTC.1 |
| TCI state | |  | TCI.State.0 |
| SSB Configuration | Config 1,2,4,5 |  | SSB.1 FR1 |
|  | Config 3,6 |  | SSB.2 FR1 |
| Correlation Matrix and Antenna Configuration | |  | 1x2 Low |
| EPRE ratio of PSS to SSS | |  |  |
| EPRE ratio of PBCH DMRS to SSS | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |
| NocNote 2 | | dBm/15 kHz | -104 |
| SS-RSRP Note 3 | | dBm/15 kHz | -87 |
| Ês/Iot | | dB | 17 |
| Ês/Noc | | dB | 17 |
| IoNote3 | Config 1,2,4,5 | dBm/9.36MHz | -58.96 |
|  | Config 3,6 | dBm/38.16MHz | -52.86 |
| Time offset to Cell1 Note 4 | | μs | 33 |
| Propagation Condition | |  | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for 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 | | | |

Table A.4.5.2.x2.1-4: Sounding Reference Symbol Configuration for E-UTRAN – NR interruptions at E-UTRA SRS carrier based switching

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| srsBandwidthConfiguration | bw5 |  |
| srsSubframeConfiguration | Sc8 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE |  |
| srsMaxUpPTS | N/A | Not applicable for E-UTRAN FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 |
| frequencyDomainPosition | 0 |  |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 47 | SRS periodicity of 40ms. |
| transmissionComb | 0 |  |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

##### A.4.5.2.x2.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell throughout the test and during the time duration T2, Each interruption on NR PSCell shall not exceed X defined in Table A.4.5.2.x2.2-1.

Table A.4.5.2.x2.2-1: Interruption length X (slot) E-UTRAN – NR at E-UTRA SRS carrier based switching

|  |  |  |
| --- | --- | --- |
|  | NR Slot | Interruption length X3 |
|  | length (ms) | (slots) |
| 0 | 1 | 2 |
| 1 | 0.5 | 3 |

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

----------------------------------------------------- End of Change 6 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 7 (R4-2017184)--------------------------------------------

#### A.5.5.2.x1 E-UTRAN – NR FR2 interruptions at E-UTRA SRS carrier based switching

##### A.5.5.2.x1.1 Test Purpose and Environment

The purpose of this test is to verify that when a UE needs to transmit periodic or aperiodic SRS and/or non-contention based PRACH on a PUSCH-less carrier of SCell, the UE can perform carrier based switching to one PUSCH-less SCCs from a CC with PUSCH. The test will verify the interruption requirements on active serving cell in SCG in clause 8.2.1.2.13. Supported test configurations are shown in table A.5.5.2.x1.1-1.

In the test there are three cells: cell1, cell2 and cell3. Cell1 is E-UTRAN PCell on the primary component carrier. Cell3 is E-UTRAN SCell on the TDD secondary component carrier which operates in downlink without PUCCH/PUSCH. Cell2 is NR FR2 PSCell. The UE is configured with the SRS switching between E-UTRAN PCell and E-UTRAN SCell. The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.x1.1-2, A.4.5.2.x1.1-3 and xxx below. And the E-UTRAN cell specific test parameters (for cell1 and cell3) can refer to Table A.3.7.2.1-1. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 LTE PCell and NR PSCell are continuously scheduled in DL. Immediately at the beginning of T2, a PDCCH with SRS-TPC-RNTI is sent to the UE to initiate SRS switching.

Table A.5.5.2.x2.1-1: E-UTRAN – NR FR2 interruptions at E-UTRA SRS carrier based switching supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD(cell1), LTE TDD (cell3), NR 120 kHz SSB SCS, 100 MHz bandwidth,TDD duplex mode |
| 2 | LTE TDD(cell1), LTE TDD (cell3), NR 120 kHz SSB SCS, 100 MHz bandwidth,TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.5.5.2.x1.1-2: General test parameters for E-UTRAN – NR FR2 interruptions at E-UTRA SRS carrier based switching

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2, 3 | One is NR RF channel and the other two are E-UTRAN RF channels |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Active PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| Activated SCell |  | Cell3 | SCell on E-UTRAN RF channel number 3. |
| CP length |  | Normal | Applicable to Cell1, Cell2 and Cell3 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| T1 | s | 0.2 |  |
| T2 | s | 0.2 | UE shall perform SRS switching during T2 |

Table A.5.5.2.x1.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions at E-UTRA SRS carrier based switching

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 |
| Frequency Range | |  | FR2 |
| Duplex mode | Config 1,2 |  | TDD |
| TDD configuration | Config 1,2 |  | TDDConf.3.1 |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 |
| Downlink initial BWP Configuration | Config 1,2 |  | DLBWP.0.1 |
| Downlink dedicated BWP Configuration | Config 1,2 |  | DLBWP.1.1 |
| Uplink initial BWP configuration | Config 1,2 |  | ULBWP.0.1 |
| Uplink dedicated BWP configuration | Config 1,2 |  | ULBWP.1.1 |
| TRS configuration | Config 1,2 |  | TRS.2.1 TDD |
| TCI state | Config 1,2 |  | TCI.State.0 |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.3.1 TDD |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD |
| RMC CORESET Reference Channel | Config 1,2 |  | CCR.3.1 TDD |
| OCNG Patterns | |  | OP.1 |
| SSB Configuration | |  | SSB.1 FR2 |
| SMTC Configuration | Config 1,2 |  | SMTC.1 |
| EPRE ratio of PSS to SSS | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |
| Ês/Noc | | dB | 17 |
| Propagation Condition | |  | AWGN |
| Time offset to cell1 Note 2 | | ms | 3 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells | | | |

Table A.5.5.2.x1.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Cell2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 |
| Assumption for UE beamsNote 6 |  | Fine |
| Note1 | dBm/15kHzNote4 | -112 |
| Note1 | dBm/SCSNote3 | -102.97 |
|  | dB | 17 |
| SS-RSRPNote2 | dBm/SCS Note4 | -85.97 |
|  | dB | 17 |
| IoNote2 | dBm/95.04 MHz Note4 | -56.90 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | |

Table A.5.5.2.x1.1-5: Sounding Reference Symbol Configuration for E-UTRAN – NR FR2 interruptions at E-UTRA SRS carrier based switching

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| srsBandwidthConfiguration | bw5 |  |
| srsSubframeConfiguration | Sc8 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE |  |
| srsMaxUpPTS | N/A | Not applicable for E-UTRAN FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 |
| frequencyDomainPosition | 0 |  |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 47 | SRS periodicity of 40ms. |
| transmissionComb | 0 |  |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

##### A.5.5.2.x1.2 Test Requirements

The UE shall be continuously scheduled in NR FR2 PSCell throughout the test. During T2 two interruption time periods are allowed on Cell2 and Cell1, each interruption due to SRS carrier based switching on Cell2 shall not exceed X defined in Table A.5.5.2.x1.2-1.

Table A.5.5.2.x1.2-1: Interruption length X (slot) E-UTRAN – NR at E-UTRA SRS carrier based switching

|  |  |  |
| --- | --- | --- |
|  | NR Slot | Interruption length X |
|  | length (ms) | (slots) |
| 2 | 0.25 | 5 |
| 3 | 0.125 | 9 |

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

----------------------------------------------------- End of Change 7 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 8 (R4-2017364)---------------------------------------------

#### A.5.5.2.x2 E-UTRAN – NR FR2 interruptions at NR SRS carrier based switching

##### A.5.5.2.x2.1 Test Purpose and Environment

The purpose of the test is to verify interruptions at NR SRS carrier based switching requirements defined in TS38.133 clause 8.2.1.2.12 and TS36.133 clause 7.32.2.13. The general test parameters are given in Table A.5.5.2.x2.1-2, and NR cell specific test parameters are given in Table A.5.5.2.x2.1-3. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.2-1.

In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 is NR FR2 PSCell and Cell3 is NR FR2 SCell. Cell3 is not configured with PUCCH/PUSCH transmission. The test consists of two time periods, with duration of T1 and T2, respectively. During T1 and T2, Cell1, Cell2 and Cell3 are continuously scheduled in DL. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell, Cell2 shall be configured as NR PSCell and Cell3 shall be configured as NR SCell.

At the beginning of T2, TE shall trigger aperiodic SRS transmission on Cell3. SRS configurations on Cell3 are given in Table A.5.5.2.x2.1-4.

Table A.5.5.2.x2.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.5.5.2.x2.1-2: General test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1, 2 | One is E-UTRAN RF channel and the other is NR RF channel |
| Active PCell |  | Cell1 | PCell on E-UTRAN RF channel number 1. |
| Configured PSCell |  | Cell2 | PSCell on NR RF channel number 2. |
| Configured SCell |  | Cell3 | SCell on NR RF channel number 3. |
| CP length |  | Normal | Applicable to cell1 and cell 2 |
| DRX |  | OFF |  |
| Measurement gap pattern Id |  | OFF |  |
| T1 | s | 5 |  |
| T2 | s | 0.1 |  |

Table A.5.5.2.x2.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | Cell 3 |
| Frequency Range | |  | FR2 | |
| Duplex mode | Config 1,2 |  | TDD | |
| TDD configuration | Config 1,2 |  | TDDConf.3.1 | |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 | |
| Downlink initial BWP Configuration | Config 1,2 |  | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration | Config 1,2 |  | DLBWP.1.1 | |
| Uplink initial BWP configuration | Config 1,2 |  | ULBWP.0.1 | |
| Uplink dedicated BWP configuration | Config 1,2 |  | ULBWP.1.1 | |
| TRS configuration | Config 1,2 |  | TRS.2.1 TDD | |
| TCI state | Config 1,2 |  | TCI.State.0 | |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.3.1 TDD | |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD | |
| RMC CORESET Reference Channel | Config 1,2 |  | CCR.3.1 TDD | |
| OCNG Patterns | |  | OP.1 | |
| SSB Configuration | |  | SSB.1 FR2 | |
| SMTC Configuration | Config 1,2 |  | SMTC.1 | |
| EPRE ratio of PSS to SSS | | dB | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  | |
| Ês/Noc | | dB | 17 | |
| Propagation Condition | |  | AWGN | |
| Time offset to cell1 Note 2 | | μs | 33 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells | | | | |

Table A.5.5.2.x2.1-3A: OTA related test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Test 1 | |
|  |  | T1 | T2 |
| Angle of arrival configuration |  | Setup 1 according to clause A.3.15.1 | |
| Assumption for UE beamsNote 6 |  | Fine | |
| Note1 | dBm/15kHzNote4 | -112 | |
| Note1 | dBm/SCSNote3 | -103 | |
|  | dB | 4 | |
| SS-RSRPNote2 | dBm/SCS Note4 | -99 | |
|  | dB | 4 | |
| IoNote2 | dBm/95.04 MHz Note4 | -68.5 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | |

Table A.5.5.2.x2.1-4: Sounding Reference Symbol Configuration for Cell3

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| c-SRS | [17] for 100MHz CBW | Frequency hopping is disabled |
| b-SRS | [0] |  |
| b-hop | [0] |  |
| freqDomainPosition | [0] | Frequency domain position of SRS |
| freqDomainShift | [0] |  |
| groupOrSequenceHopping | [neither] | No group or sequence hopping |
| pathlossReferenceRS | [ssb-Index=0] | SSB #0 is used for SRS path loss estimation |
| usage | [Codebook] | Codebook based UL transmission |
| startPosition | [0] | resourceMapping setting. SRS on last |
| nrofSymbols | TBD | TBD |
| repetitionFactor | [n1] | without repetition. |
| combOffset-n2 | TBD | transmissionComb setting |
| cyclicShift-n2 | [0] |  |
| nrofSRS-Ports | [port1] | Number of antenna ports used for SRS transmission |
| transmissionComb | TBD |  |
| resourceType | [Periodic] |  |
| periodicityAndOffset-p | TBD | TBD |
| Note: For further information see clause 6.3.2 in TS 38.331 [2]. | | |

##### A.5.5.2.x2.3 Test Requirements

In T2 UE shall transmit SRS on Cell3 as requested. During T2 interruption on Cell2 due to SRS carrier based switching from Cell2 to Cell3 shall not exceed the requirements defined in TS38.133 clause 8.2.1.2.12. Interruption on Cell1 due to SRS carrier based switching from Cell2 to Cell3 shall not exceed the requirements defined in TS36.133 clause 7.32.2.13.

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

----------------------------------------------------- End of Change 8 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 9 (R4-2017365)---------------------------------------------

#### A.6.5.2.x SA interruptions at NR SRS carrier based switching

##### A.6.5.2.x.1 Test purpose and Environment

The purpose of this test is to verify that when a UE needs to transmit periodic SRS, the UE can perform carrier based switching to one carrier not configured for PUCCH/PUSCH transmission from a carrier with PUCCH/PUSCH transmission. The test will partly verify the interruption requirements on PCell in clause 8.2.2.2.9.

##### A.6.5.2.x.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the FR1 PCell and Cell 2 is activated SCell on the TDD SCC which operats in downlink without PUCCH/PUSCH. The UE is configured with the SRS switching between PCell and SCell.The test parameters for PCell and SCell are given in Table A.6.5.2.x.2-2 and A.6.5.2.x.2-3 below. The test consists of two successive time periods, with duration of T1 and T2, respectively. Immediately at the beginning of T2, the UE is triggered for SRS switching.

The test equipment verifies that potential interruption is carried out correctly by monitoring ACK/NACK sent in PCell.

Table A.6.5.2.x.2-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD – TDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD – TDD duplex mode |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD – TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

Table A.6.5.2.x.2-2: General test parameters for SA interruptions at NR SRS carrier based switching

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channel (1, 2) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1 |
| Configured SCell |  | Cell 2 | Activated secondary cell on NR RF channel number 2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 5 |  |
| T2 | ms | 40 | UE shall perform SRS switching during T2 |

Table A.6.5.2.x.2-3: Cell specific test parameters for SA interruptions at NR SRS carrier based switching

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | T1 | | T2 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| Duplex mode | | Config 1 | |  | FDD | TDD | FDD | TDD |
| Config 2,3 | | TDD | | | |
| TDD configuration | | Config 1 | |  | N/A | TDDConf.1.1 | N/A | TDDConf.1.1 |
| Config 2 | | TDDConf.1.1 | | | |
| Config 3 | | TDDConf.2.1 | | | |
| BWchannel | | Config 1,2 | | MHz | 10: NRB,c = 52 | | | |
| Config 3 | | 40: NRB,c = 106 | | | |
| Initial BWP configuration | | | |  | DLBWP.0.2 | | | |
| TCI state | | | |  | TCI.State.0 | | | |
| TRS Configuration | | | |  | TRS.1.1 TDD | | | |
|  | | | |  | SR.1.1 FDD | | | |
| PDSCH Reference measurement channel | | Config 1 | |  | SR.1.1 FDD | SR.1.1 TDD | SR.1.1 FDD | SR.1.1 TDD |
| Config 2 | | SR.1.1 TDD | SR.1.1 TDD | SR.1.1 TDD | SR.1.1 TDD |
| Config 3 | | SR2.1 TDD | SR2.1 TDD | SR2.1 TDD | SR2.1 TDD |
| Dedicated CORESET parameters | | Config 1 | |  | CCR.1.1 FDD | CCR.1.1 TDD | CCR.1.1 FDD | CCR.1.1 TDD |
| Config 2 | | CCR.1.1 TDD | CCR.1.1 TDD | CCR.1.1 TDD | CCR.1.1 TDD |
| Config 3 | | CCR.2.1 TDD | CCR.2.1 TDD | CCR.2.1 TDD | CCR.2.1 TDD |
| RMSI CORESET parameters | | Config 1 | |  | CR.1.1 FDD | CR.1.1 TDD | CR.1.1 FDD | CR.1.1 TDD |
| Config 2 | | CR.1.1 TDD | CR.1.1 TDD | CR.1.1 TDD | CR.1.1 TDD |
| Config 3 | | CR2.1 TDD | CR2.1 TDD | CR2.1 TDD | CR2.1 TDD |
| OCNG Patterns | | | |  | OP.1 | | | |
| SSB Configuration | Config 1,2 | | |  | SSB.1 FR1 | | | |
| Config 3 | | | SSB.2 FR1 | | | |
| SMTC configuration | | | |  | SMTC.1 | | | |
| EPRE ratio of PSS to SSS | | | | dB | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | |
| EPRE ratio of PDSCH to PDSCH | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | | |
| Note2 | | | Config 1,2,4,5 | dBm/15kHz | -104 | | | |
| Config 3,6 | -101 | | | |
|  | | | | dB | 17 | | | |
|  | | | | dB | 17 | | | |
| SS-RSRPNote3 | | | Config 1,2,4,5 | dBm/SCS | -87 | | | |
| Config 3,6 | -84 | | | |
| SCH\_RP Note 3 | | | | dBm/15 kHz | -87 | | | |
| Propagation condition | | | | - | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. | | | | | | | | |

Table A.6.5.2.x.2-4: Sounding Reference Symbol Configuration for Cell 2

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| c-SRS | [12] for 10MHz CBW  [24] for 40MHz CBW | Frequency hopping is disabled |
| b-SRS | [0] |  |
| b-hop | [0] |  |
| freqDomainPosition | [0] | Frequency domain position of SRS |
| freqDomainShift | [0] |  |
| groupOrSequenceHopping | [neither] | No group or sequence hopping |
| pathlossReferenceRS | [ssb-Index=0] | SSB #0 is used for SRS path loss estimation |
| usage | [Codebook] | Codebook based UL transmission |
| startPosition | [0] | ResourceMapping setting. SRS on last |
| nrofSymbols | TBD | TBD |
| repetitionFactor | [n1] | without repetition |
| combOffset-n2 | TBD | transmissionComb setting |
| cyclicShift-n2 | [0] |  |
| nrofSRS-Ports | [port1] | Number of antenna ports used for SRS transmission |
| transmissionComb | TBD |  |
| resourceType | [Periodic] |  |
| periodicityAndOffset-p | TBD | TBD |
| Note: For further information see clause 6.3.2 in TS 38.331 [2]. | | |

##### A.6.5.2.x.3 Test Requirements

The UE shall be scheduled on PCell continuously throughout the test. From the start of T2 to the instance UE finishes SRS transmission on cell 2, the interruption on PCell shall not be more than the values specified for SA in clause 8.2.2.2.9.

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

----------------------------------------------------- End of Change 9 ------------------------------------------------------------

# CGI reading

----------------------------------------------------- Beginning of Change 10 (R4-2017198) -------------------------------------------

A.4.6.x Measurements with autonomous gaps

A.4.6.x.1 EN-DCintra-frequency CGI identification of NR FR1 cell with autonomous gaps in synchronous EN-DC

A.4.6.x.1.1 Test purpose and Environment

The purpose of this test is to verify the requirements for intra-frequency identification of a new CGI of NR FR1 cell with autonomous gaps in clause 8.1.2.4.27 and 8.1.2.4.28 in 36.133 [15] for EN-DC.

The test scenario comprises of one E-UTRA carrier and one NR FR1 carrier. Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1) on E-UTRA RF channel 1, NR FR1 PSCell (Cell 2) and NR FR1 neighbour cell (Cell 3) on NR RF channel 1. The supported test configurations are shown in table A.4.6.x.1.1-1 below. The test parameters for NR Cells are given in Table A.4.6.x.1.2-2, A.4.6.x.1.2-3 below. The test parameters and applicability for the E-UTRAN PCell are defined in A.3.7.2.1. 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 3. Starting T2, Cell 3 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* which *cellForWhichToReportCGI* set to the physical cell identity of Cell 3. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading of the neighbour cell (Cell 3) using autonomous gap is sent to the UE.

**Table A.4.6.x.1.1-1: intra-frequency CGI identification of NR FR1 cell with autonomous gaps in synchronous EN-DC**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2 | |

**Table A.4.6.x.1.1-2: General test parameters for intra-frequency CGI identification of NR FR1 cell with autonomous gaps in synchronous EN-DC**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Value** | **Comment** |
|  |  | **configuration** |  |
| E-UTRA RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | One E-UTRAN radio channel is used. |
| NR RF Channel Number |  | Config 1,2,3,4,5,6 | 1 | One NR FR1 radio channel is used. |
| Active cell |  | Config 1,2,3,4,5,6 | LTE Cell 1 (PCell) and NR Cell 2 (PScell) | LTE Cell 1 is on E-UTRA RF channel number 1.  NR Cell 2 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1,2,3,4,5,6 | NR Cell 3 | NR Cell 3 is on NR RF channel number 1. |
| A3-Offset | dB | Config 1,2,3,4,5,6 | -4.5 |  |
| Hysteresis | dB | Config 1,2,3,4,5,6 | 0 |  |
| CP length |  | Config 1,2,3,4,5,6 | Normal |  |
| TimeToTrigger | s | Config 1,2,3,4,5,6 | 0 |  |
| Filter coefficient |  | Config 1,2,3,4,5,6 | 0 | L3 filtering is not used |
| DRX |  | Config 1,2,3,4,5,6 | OFF | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2,3,4,5,6 | 3 μs | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,4 | 3 ms | Asynchronous cells.  The timing of Cell 3 is 3ms later than the timing of Cell 2. |
|  |  | Config 2,3,5,6 | 3 μs | Synchronous cells. |
| T1 | s | Config 1,2,3,4,5,6 | 5 |  |
| T2 | s | Config 1,2,3,4,5,6 | ≤10 |  |
| T3 | s | Config 1,2,3,4,5,6 | 5 |  |

**Table A.4.6.x.1.1-3: Cell specific test parameters for intra-frequency CGI identification of NR FR1 cell with autonomous gaps in synchronous EN-DC**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test** | **Cell 2** | | **Cell 3** | |
|  |  | **configuration** | **T1** | **T2** | **T1** | **T2** |
| Duplex mode |  | Config 1,4 | FDD | | | |
|  |  | Config 2,3,5,6 | TDD | | | |
| BWchannel | MHz | Config 1,4 | 10: NRB,c = 52 | | | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | | |
| BWP BW | MHz | Config 1,4 | 10: NRB,c = 52 | | | |
|  |  | Config 2,5 | 10: NRB,c = 52 | | | |
|  |  | Config 3,6 | 40: NRB,c = 106 | | | |
| TDD configuration |  | Config 1,4 | N/A | | N/A | |
|  | Config 2,5 | TDDConf.1.1 | | TDDConf.1.1 | |
|  |  | Config 3,6 | TDDConf.2.1 | | TDDConf.2.1 | |
| Initial DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.0.1 | | NA | |
| Dedicated DL BWP |  | Config 1,2,3,4,5,6 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2,3,4,5,6 | ULBWP.1.1 | | NA | |
| TRS configuration |  | Config 1,4 | TRS.1.1 FDD | | NA | |
|  |  | Config 2,5 | TRS.1.1 TDD | |
|  |  | Config 3,6 | TRS.1.2 TDD | |
| 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 | | NA | |
| measurement channel |  | Config 2,5 | SR.1.1 TDD | |
|  |  | Config 3,6 | SR2.1 TDD | |
| RMSI CORESET Reference Channel |  | Config 1,4 | CR.1.1 FDD | | NA | |
|  | Config 2,5 | CR.1.1 TDD | | NA | |
|  |  | Config 3,6 | CR2.1 TDD | | NA | |
| RMC CORESET  Reference Channel |  | 1, 4 | CCR.1.1 FDD | | NA | |
|  | 2, 5 | CCR.1.1 TDD | | NA | |
|  | 3, 6 | CCR.2.1 TDD | | NA | |
| SSB parameters |  | Config 1,2,4,5 | SSB.1 FR1 | | | |
|  |  | Config 3,6 | SSB.2 FR1 | | | |
| SMTC configuration |  | Config 1,4 | SMTC.2 | | | |
| defined in A.3.11 |  | Config 2,3,5,6 | SMTC.1 | | | |
| RMSI scheduling periodicity | ms | Config 1,2,3,4,5,6 | 20ms | | | |
| PDSCH/PDCCH | kHz | Config 1,2,4,5 | 15 | | | |
| subcarrier spacing |  | Config 3,6 | 30 | | | |
| RLM-RS |  | Config 1,2,3,4,5,6 | SSB | | SSB | |
| EPRE ratio of PSS to SSS |  |  | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |
| EPRE ratio of PBCH to PBCH DMRS |  |  |
| EPRE ratio of PDCCH DMRS to SSS |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS |  | Config 1,2,3,4,5,6 |
| EPRE ratio of PDSCH DMRS to SSS |  |  |
| EPRE ratio of PDSCH to PDSCH |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |
| Note2 | dBm/15kHz |  | -98 | | -98 | |
| Note2 | dBm/SCS | Config 1,2,4,5 | -98 | | -98 | |
|  | Config 3,6 | -95 | | -95 | |
| SS-RSRP Note 3 | dBm/SCS | Config 1,2,4,5 | -94 | -94 | -Infinity | -94 |
|  | Config 3,6 | -91 | -91 | -Infinity | -91 |
|  | dB | Config 1,2,3,4,5,6 | 4 | -1.46 | -Infinity | -1.46 |
|  | dB | Config 1,2,3,4,5,6 | 4 | 4 | -Infinity | 4 |
| IoNote3 | dBm/9.36MHz | Config 1,2,4,5 | -64.60 | -62.25 | -64.60 | -62.25 |
|  | dBm/38.16MHz | Config 3,6 | -58.50 | -56.16 | -58.50 | -56.16 |
| 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  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | |

A.4.6.x.1.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of Cell 3 within 257 ms from the start of T3.

Test requirement = RRC Procedure delay + Tidentify\_CGI\_NR + reporting delay

= 15 + 240 + 2

= 257 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 257 ms the number of interrupted slots shall not exceed the allowed number [TBD].

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

----------------------------------------------------- End of Change 10 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 11 (R4-2017197) -------------------------------------------

### A.5.6.x Measurements with autonomous gaps

#### A.5.6.x.1 EN-DC inter-frequency CGI identification of NR neighbor cell in FR2

##### A.5.6.x.1.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of NR cell with autonomous gaps in clause 9.11.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.x.1.1-1, A.5.6.x.1.1-2, and A.5.6.x.1.1-3.

The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 3 Starting T2, cell 3 becomes detectable and the UE is expected to detect and send a measurement report with SSB index. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used.Gap pattern configuration with id #0 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying SI reading with autonomous gap shall be sent to the UE during period T2, within 3s after the UE has reported Event A3. The RRC message shall create a measurement report configuration with *reportCGI* and *useAutonomousGaps-r16* setup. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE. Measurement gaps shall be deconfigured before the start of T3.

PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of NR cell.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.x.1.1-1.

Table A.5.6.x.1.1-1 Supported test configurations for EN-DC inter-frequency CGI identification of NR neighbor cell in FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

Table A.5.6.x.1.1-2: General test parameters for EN-DC inter-frequency CGI identification of NR neighbor cell in FR2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Value | Comment |
|  |  | configuration |  |
| 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 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2 | 39 |  |
| SMTC-SSB parameters |  | Config 1,2 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| A3-Offset | dB | Config 1,2 | [-30] |  |
| Hysteresis | dB | Config 1,2 | 0 |  |
| CP length |  | Config 1,2 | Normal |  |
| TimeToTrigger | s | Config 1,2 | 0 |  |
| Filter coefficient |  | Config 1,2 | 0 | L3 filtering is not used |
| DRX |  | Config 1,2 | OFF | DRX is not used |
| Time offset between PCell and PSCell |  | Config 1,2 | 3 μs | Synchronous EN-DC |
| Time offset between serving and neighbour cells |  | Config 1,2 | 3μs | Synchronous cells. |
| T1 | s | Config 1,2 | 5 |  |
| T2 | s | Config 1,2 | 7 for PC1; 4.5 for other PC |  |
| T3 | s | Config 1,2 | 5 |  |

Table A.5.6.x.1.1-3: Cell specific test parameters for EN-DC inter-frequency CGI identification of NR neighbor cell in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test | Cell 2 | | Cell 3 | |
|  |  | configuration | T1 | T2, T3 | T1 | T2, T3 |
| NR RF Channel Number |  | Config 1,2 | 1 | | 2 | |
| Duplex mode |  | Config 1,2 | TDD | | TDD | |
| BWchannel | MHz | Config 1,2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | MHz | Config 1,2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| TDD configuration |  | Config 1,2 | TDDConf.3.1 | | TDDConf.3.1 | |
| Initial DL BWP |  | Config 1,2 | DLBWP.0.1 | | NA | |
| Initial UL BWP |  | Config 1,2 | DLBWP.0.1 | |  | |
| Dedicated DL BWP |  | Config 1,2 | DLBWP.1.1 | | NA | |
| Dedicated UL BWP |  | Config 1,2 | ULBWP.1.1 | | NA | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) |  | Config 1,2 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel |  | Config 1,2 | SR.3.1 TDD | | - | |
| CORESET Reference Channel |  | Config 1,2 | CR.3.1 TDD | | - | |
| RMSI scheduling periodicity | ms | Config 1,2 | NA | | 40 | |
| TRS configuration |  | Config 1,2 | TRS.2.1 TDD | | NA | |
| TCI configuration |  | Config 1,2 | CSI-RS.Config.0 | | NA | |
| SMTC configuration defined in A.3.11 |  | Config 1,2 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | kHz | Config 1,2 | 120 | | 120 | |
| EPRE ratio of PSS to SSS |  | Config 1,2 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS |  |  |  | |  | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | |  | |
| Propagation Condition |  | Config 1,2 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | |

Table A.5.6.x.1.1-4: OTA cell specific test parameters for EN-DC inter-frequency CGI identification of NR neighbor cell in FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 2 | | Cell 3 | |
|  |  |  | T1 | T2, T3 | T1 | T2, T3 |
| AoA setup |  | Config 1,2 | Setup 1 defined in A.3.15.1 | | | |
| Assumption for UE beamsNote 4 |  | Config 1,2 | Rough | | Rough | |
|  | dB | Config 1,2 | 4 | 4 | -Infinity | -3 |
| Note 2 | dBm/15 KHz | Config 1,2 | -102 | | | |
| Note 2 | dBm/SCS | 1, 2 | -93 | | | |
|  |  |
| SS-RSRP | dBm/SCS | 1, 2 | -89 | -89 | -Infinity | -96 |
|  |  |
|  | dB | 1~4 | 4 | 4 | -Infinity | -3 |
|  | dBm/95.04MHz | 1~4 | -58.56 | | -62.25 | |
| 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  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone | | | | | | |

##### A.5.6.x.1.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 3 within 775 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + Tidentify\_CGI + processing time for FR2 + reporting delay

= 10 + (25\*20 + 6\*40) + 20 + 2ms from the start of T3

= 772 ms, allow 775 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 775 ms the number of interrupted slots shall not exceed the allowed number [as defined in clause 8.2.1.2.16 plus TBD].

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

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

----------------------------------------------------- End of Change 11 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 12 (R4-2017196)-------------------------------------------

### A.6.6.x NR measurements with autonomous gaps

#### A.6.6.x.1 SA intra-frequency CGI identification of NR neighbor cell in FR1

##### A.6.6.x.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of intra-frequency CGI identification of an NR neighbour cell in FR1 with autonomous gaps. This test shall partly verify the measurement requirements in Clause 9.11.

##### A.6.6.x.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the FR1 PCell and Cell 2 is an FR1 neighbour cell on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Table A.6.6.x.1.1-2 and A.6.6.x.1.3-2 below. 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. 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 UE is expected to detect and send a measurement report with Event A3.

A new RRC message triggering CGI identification shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *useAutonomousGaps* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying CGI identification is sent to the UE.

The test equipment verifies that potential interruption is carried out correctly by monitoring ACK/NACK sent in PCell during T3 untill a measurement report with CGI is sent.

Table A.6.6.x1.1.2-1: Supported test configurations

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

Table A.6.6.x.1.2-2: General test parameters for SA intra-frequency CGI identification of NR neighbor cell in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| Active cell |  | 1, 2, 3 | Cell 1 |  |
| Neighbour cell |  | 1, 2, 3 | Cell 2 | Cell to be identified. |
| RF Channel Number |  | 1, 2, 3 | 1: Cell 1 and Cell 2 |  |
| SSB configuration |  | 1 | SSB.1 FR1 |  |
| 2 | SSB.1 FR1 |  |
| 3 | SSB.2 FR1 |  |
| SMTC configuration |  | 1 | SMTC.2 |  |
| 2 | SMTC.1 |  |
| 3 | SMTC.1 |  |
| A3-Offset | dB | 1, 2, 3 | -4.5 |  |
| CP length |  | 1, 2, 3 | Normal |  |
| Hysteresis | dB | 1, 2, 3 | 0 |  |
| Time To Trigger | s | 1, 2, 3 | 0 |  |
| Filter coefficient |  | 1, 2, 3 | 0 | L3 filtering is not used |
| DRX |  | 1, 2, 3 |  | OFF |
| Time offset between serving and neighbour cells |  | 1 | 3 ms | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
| 2 | 3 μs | Synchronous cells |
| 3 | 3 μs | Synchronous cells |
| T1 | s | 1, 2, 3 | 5 |  |
| T2 | s | 1, 2, 3 | 5 |  |
| T2 | s | 1, 2, 3 | 5 |  |

Table A.6.6.x.1.2-3: NR Cell specific test parameters for SA intra-frequency CGI identification of NR neighbor cell in FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TN/A | | TN/A | |
| 2 | TDDConf.1.1 | | TDDConf.1.1 | |
| 3 | TDDConf.2.1 | | TDDConf.2.1 | |
| PDSCH RMC configuration |  | 1 | SR.1.1 FDD | | N/A | |
| 2 | SR.1.1 TDD | |
| 3 | SR.2.1 TDD | |
| RMSI CORESET RMC configuration |  | 1 | CR.1.1 FDD | | CR.1.1 FDD | |
| 2 | CR.1.1 TDD | | CR.1.1 TDD | |
| 3 | CR.2.1 TDD | | CR.2.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.1.1 FDD | | CCR.1.1 FDD | |
| 2 | CCR.1.1 TDD | | CCR.1.1 TDD | |
| 3 | CCR.2.1 TDD | | CCR.2.1 TDD | |
| OCNG Patterns |  | 1, 2, 3 | OP.1 | | OP.1 | |
| TRS Configuration |  | 1 | TRS.1.1 FDD | | N/A | |
| 2 | TRS.1.1 TDD | | N/A | |
| 3 | TRS.1.2 TDD | | N/A | |
| IInitial BWP configuration |  | 1, 2, 3 | DLBWP.0.1 ULBWP.0.1 | | DLBWP.0.1 ULBWP.0.1 | |
| Active DL BWP configuration |  | 1, 2, 3 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1, 2, 3 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1, 2, 3 | SSB | | SSB | |
| Note 2 | dBm/SCS | 1 | -98 | | | |
| 2 | -98 | | | |
| 3 | -95 | | | |
| Note 2 | dBm/15 kHz | 1 | -98 | | | |
| 2 |
| 3 |
|  | dB | 1 | 4 | -1.46 | -Infinity | -1.46 |
| 2 |
| 3 |
|  | dB | 1 | 4 | 4 | -Infinity | 4 |
| 2 |
| 3 |
| SS-RSRP Note 3 | dBm/SCS kHz | 1 | -94 | -94 | -Infinity | -94 |
| 2 | -94 | -94 | -Infinity | -94 |
| 3 | -91 | -91 | -Infinity | -91 |
| Io | dBm/9.36 MHz | 1 | -64.60 | -62.25 | --64.60 | -62.25 |
| dBm/9.36 MHz | 2 | -64.60 | -62.25 | --64.60 | -62.25 |
| dBm/38.16 MHz | 3 | -58.50 | -56.16 | --58.50 | -56.16 |
| Propagation Condition |  | 1, 2, 3 | AWGN | | | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

##### A.6.6.x.1.3 Test Requirements

The UE shall send a measurement report containing the CGI of cell 2 within 252 ms from the start of time period T3.

Test requirement = RRC Procedure delay + Tidentify\_CGI + reporting delay

= 10 + 240 + 2ms from the start of T3

= 252 ms

The UE shall be scheduled continuously throughout the test. From the start of T3 until 252 ms, the interruption on PCell shall not be more than the values specified for SA in clause 8.2.2.2.14.

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

----------------------------------------------------- End of Change 12 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 13 (R4-2017194)-------------------------------------------

#### A.6.6.x.y Identification of a new CGI of inter-RAT E-UTRA cell using autonomous gaps in NR SA

##### A.6.6.x.y.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in NR SA in clause 9.4.7.

The test scenario comprises of one NR carrier and an E-UTRA carrier and two cells as given in tables A.6.6.x.y.1-1, A.6.6.x.y.1-2, A.6.6.x.y.1-3 and A.6.6.x.y.1-4. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN 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.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.6.6.x.y.1-1: Supported test configurations of inter-RAT E-UTRAN cell using autonomous gap in SA**

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

Table A.6.6.x.y.1-2: General test parameters for identification of a new CGI of inter-RAT E-UTRA cell using autonomous gaps in NR SA

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | 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 |
| Active cell |  | Cell 1 |  |
| Neighbour cell |  | Cell 2 | Cell to be identified. |
| LTE Channel Bandwidth | MHz | 10 |  |
| LTE PDSCH/PCFICH/PDCCH/PHICH parameters |  |  | As specified in clause A.3.7.2.1 |
| CP length |  | Normal |  |
| A3-Offset | dB | -3 |  |
| Hysteresis | dB | 0 |  |
| Time To Trigger | s | 0 |  |
| Filter coefficient |  | 0 | L3 filtering is not used |
| DRX |  | OFF |  |
| si-RequestForHO |  | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| T1 | s | 5 |  |
| T2 | s | ≤10 |  |
| T3 | s | 5 |  |

**Table A.6.6.x.y.1-3: PCell specific test parameters for identification of a new CGI of inter-RAT E-UTRA cell using autonomous gaps in NR**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Configuration** | **Cell 1** | | | |
|  | **T1** | **T2** | | **T3** |
| RF channel number | | |  | 1, 2, 3, 4, 5, 6 | 1 | | | |
| Duplex mode | | |  | 1, 2, 3 | FDD | | | |
| 4, 5, 6 | TDD | | | |
| TDD Configuration | | SCS=15 KHz |  | 2, 5 | TDDConf.1.1 | | | |
| SCS=30 KHz |  | 3, 6 | TDDConf.1.2 | | | |
| BWchannel | | | MHz | 1, 4 | 10: NRB,c = 52 (FDD) | | | |
| 2, 5 | 10: NRB,c = 52 (TDD) | | | |
| 3, 6 | 40: NRB,c = 106 (TDD) | | | |
| PDSCH reference measurement channel | | |  | 1, 4 | SR.1.1 FDD | | | |
| 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 | | | |
| BWP configurations | Initial DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.0.1 | | | |
| Dedicated DL BWP | |  | 1, 2, 3, 4, 5, 6 | DLBWP.1.1 | | | |
| Initial UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.0.1 | | | |
| Dedicated UL BWP | |  | 1, 2, 3, 4, 5, 6 | ULBWP.1.1 | | | |
| OCNG patternNote1 | | |  | 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 | -98 | | | |
| 3, 6 | -95 | | | |
| EPRE ratio of PSS to SSS | | | dB | 1, 2, 3, 4, 5, 6 | 0 | | | |
| EPRE ratio of PBCH\_DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH\_DMRS | | |
| EPRE ratio of PDCCH\_DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | |
| EPRE ratio of PDSCH\_DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | |
| EPRE ratio of OCNG DMRS to SSS | | |
| EPRE ratio of OCNG to OCNG DMRS | | |
| *Noc*Note2 | | | dBm/15 KHz | 1, 2, 3, 4, 5, 6 | -106 | | | |
| *Noc*Note2 | | | dBm/SCS | 1, 2, 4, 5 | -106 | | | |
| 3, 6 | -103 | | | |
| Ês/Noc | | | dB | 1, 2, 3, 4, 5, 6 | 18 | | -2 | |
| Ês/IotNote3 | | | dB | 1, 2, 3, 4, 5, 6 | 18 | | -2 | |
| SS-RSRPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | | -108 | |
|  | | | 3, 6 | -85 | | -105 | |
| SSB\_RPNote3 | | | dBm/SCS | 1, 2, 4, 5 | -88 | | -108 | |
|  | | | 3, 6 | -85 | | -105 | |
| IoNote3 | | | dBm/9.36 MHz | 1, 2, 4, 5 | -59.98 | | -75.92 | |
| dBm/38.16 MHz | 3, 6 | -53.88 | | -69.82 | |
| Propagation condition | | |  | 1, 2, 3, 4, 5, 6 | AWGN | | | |
| Antenna Configuration and Correlation Matrix | | |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | |

Table A.6.6.x.y.1-4: Cell specific test parameters for inter-RAT E-UTRAN cell for identification of a new CGI of E-UTRA cell using autonomous gaps

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Configuration** | **Cell 2** | | |
| **T1** | **T2** | **T3** |
| RF channel number |  | 1, 2, 3, 4, 5, 6 | 2 | | |
| Duplex mode |  | 1, 2, 3 | FDD | | |
| 4, 5, 6 | TDD | | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | | |
| BWchannel | MHz | 1, 2, 3, 4, 5, 6 | 10 MHz: NRB,c = 50 | | |
| PDSCH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 10 MHz: R.3 FDD | | |
| 4, 5, 6 | 10 MHz: R.0 TDD | | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote2 |  | 1, 2, 3 | 10 MHz: R.6 FDD | | |
| 4, 5, 6 | 10 MHz: R.6 TDD | | |
| OCNG PatternsNote2 |  | 1, 2, 3 | 10 MHz: OP.10 FDD | | |
| 4, 5, 6 | 10 MHz: OP.1 TDD | | |
| PBCH\_RA | dB | 1, 2, 3, 4, 5, 6 | 0 | | |
| PBCH\_RB |
| PSS\_RA |
| SSS\_RA |
| PCFICH\_RB |
| PHICH\_RA |
| PHICH\_RB |
| PDCCH\_RA |
| PDCCH\_RB |
| PDSCH\_RA |
| PDSCH\_RB |
| OCNG\_RANote3 |
| OCNG\_RBNote3 |
| NocNote4 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -106 | | |
| Ês/Noc | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 | 7 |
| Ês/IotNote5 | dB | 1, 2, 3, 4, 5, 6 | -Infinity | 7 | 7 |
| RSRPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -99 | -99 |
| SCH\_RPNote5 | dBm/15kHz | 1, 2, 3, 4, 5, 6 | -Infinity | -99 | -99 |
| Propagation Condition |  | 1, 2, 3, 4, 5, 6 | AWGN | | |
| Antenna Configuration and Correlation Matrix |  | 1, 2, 3, 4, 5, 6 | 1x2 Low | | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 5: Ês/Iot, RSRP, and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

##### A.6.6.x.y.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + Tidentify\_CGI,E-UTRAN + reporting delay

= [15] + 150 + 2ms from the start of T3

= [167] ms, allow [170] ms.

* The UE shall be scheduled continuously throughout the test, and from the start of T3 until 170 ms at least the following number of ACK/NACK shall be detected as being transmitted by the UE.Config 1, 2, 4, 5: 80 ACK/NACK
* Config 3, 6: 160 ACK/NACK

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

NOTE: The overall ACK/NACK number is caused by two parts. Firstly, at least 60/120 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requirement in Clause 9.4.7.1. Secondly, given that continuous DL data allocation, additional 20/40 ACK/NACK shall be sent from the start of T3 until 170 ms excludes 150 ms for identifying the cell global identifier of cell 2.

----------------------------------------------------- End of Change 13 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 14 (R4-2017195)-------------------------------------------

A.7.6.x NR Measurements with autonomous gaps

#### A.7.6.x.1 SA interfrequency CGI reporting in autonomous gaps test (PCell in FR2)

##### A.7.6.x.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an CGI. This test will partly verify the SA inter-frequency NR cell search requirements in clause 8.2.1.2.16 and 9.11

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.x.1.1-1, A.7.6.x.1.1-2, and A.7.6.x.1.1-3.

Measurement gap patterns are configured. During T1 the UE shall report event A3 for cell 2. Within 3 seconds of the event report, the test equipment shall add a measurement reporting configuration using *ReportConfigNR* which containsa ReportCGI IE with cellForWhichToReportCGI set to the physical Cell ID of cell 2 and including the optional IE useAutonomousGaps-r16

In the measurement control information, it is indicated to the UE to decode the CGI of the neighbour cell using autonomous gaps. The test consists of two time phases, T1 and T2. Time period T2 begins 10ms after the test equipment has transmitted the RRC reconfiguration message containing the ReportCGI IE.

Supported test configurations are shown in table A.7.6.x.1.1-1.

Table A.7.6.x.1.1-1 SA interfrequency CGI reporting test in autonomous gaps

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.7.6.x.1.1-2: General test parameters for SA interfrequency CGI reporting in autonomous gaps

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1, 2 | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1 | NR cell 2 | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1 | 13 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| SI-RNTI scheduling rate | ms |  | 40 ms | S-RNTI scheduled on four occasions per 160ms transmission period |
| A3-Offset | dB | Config 1 | -30 |  |
| Hysteresis | dB | Config 1 | 0 |  |
| CP length |  | Config 1 | Normal |  |
| TimeToTrigger | s | Config 1 | 0 |  |
| Filter coefficient |  | Config 1 | 0 | L3 filtering is not used |
| DRX |  | Config 1 | OFF | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | Synchronous cells. |
| T1 | s | Config 1 | <10 | UE expected to report event A3 for cell 2 within 5,2s (PC1)or 3.5s (other PC) of the start of T1. Test equipment shall configure CGI reporting within 3s after receiving the event A3 report. T2 begins 10ms after test equipment has transmitted the RRC reconfiguration to configure CGI reporting. |
| T2 | s | Config 1 | 1 |  |

Table A.7.6.x.1.1-3: Cell specific test parameters SA interfrequency CGI reporting in autonomous gaps

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 3 as specified in clause A.3.15 | | | |
|  | |  |  | AoA1 | | AoA2 | |
| Beam AssumptionNote 7 | |  | 1,2 | Rough | | | |
| NR RF Channel Number | |  | Config 1 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | N/A | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | N/A | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | Not sent | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | N/A | |
| TCI configuration | |  | Config 1 | CSI-RS.Config.0 | | N/A | |
| EPRE ratio of PSS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |  | |  | |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDCCH to PDCCH DMRS | |  | Config 1 | 0 | | 0 | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |  | |  | |
| EPRE ratio of PDSCH to PDSCH | |  |  |  | |  | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |  | |  | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |  | |  | |
| Note2 | | dBm/15kHz Note5 |  | -99.03 | | -99.03 | |
| Note2 | | dBm/SCS Note4 | Config 1 | -90 | | -90 | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -87 | | -93 | |
|  | | dB | Config 1 | 3 | | -3 | |
|  | | dB | Config 1 | 3 | | -3 | |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -56.25 | | -59.25 | |
| Propagation Condition | |  | Config 1 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.7.6.x.1.2 Test Requirements

The UE shall report the CGI of cell 2 within 25\*Tsmtc + 6\*Tsi-rnti+20ms +2ms= 762ms from the start of T2, allow 765ms. The rate of correct events observed during repeated tests shall be at least 90%.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 775 ms the number of interrupted slots shall not exceed the allowed number [as defined in clause 8.2.1.2.16 plus TBD].

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

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

----------------------------------------------------- End of Change 14 ------------------------------------------------------------

# Mandatory gap pattern

----------------------------------------------------- Beginning of Change 15 (R4-2017340)-------------------------------------------

#### A.6.6.2.x SA event triggered reporting tests with additional mandatory gap pattern

##### A.6.6.2.x.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event when mandatory gap pattern with 3ms MGL is configured.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.x.1-1, A.6.6.2.x.1-2 and A.6.6.2.x.1-3.

In test 1 measurement gap pattern configuration # 3 as defined in Table A.6.6.2.x.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #2 as defined in Table A.6.6.2.x.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #2, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.x.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

Table A.6.6.2.x.1-2: General test parameters for SA inter-frequency event triggered reporting with additional mandatory gap pattern

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | | Comment |
| 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 | 3 | 2 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1,2,3 | 9 | 9 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  | Config 2 | SSB.1 FR1 | | As specified in clause A.3.10.1 |
|  | Config 3 | SSB.2 FR1 | | As specified in clause A.3.10.1 |
| A3-Offset | dB | Config 1,2,3 | -6 | |  |
| Hysteresis | dB | Config 1,2,3 | 0 | |  |
| CP length |  | Config 1,2,3 | Normal | |  |
| TimeToTrigger | s | Config 1,2,3 | 0 | |  |
| Filter coefficient |  | Config 1,2,3 | 0 | | L3 filtering is not used |
| DRX |  | Config 1,2,3 | OFF | | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1 | 3ms | | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 2,3 | 3μs | | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 | |  |
| T2 | s | Config 1,2,3 | 1 | 1 |  |

Table A.6.6.2.x.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting with additional mandatory gap pattern

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | | Cell 2 | |
| T1 | T2 | | T1 | T2 |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | | 2 | |
| Duplex mode | |  | Config 1 | FDD | | | | |
|  | Config 2,3 | TDD | | | | |
| TDD configuration | |  | Config 1 | Not Applicable | | | | |
|  | Config 2 | TDDConf.1.1 | | | | |
|  | Config 3 | TDDConf.2.1 | | | | |
| BWchannel | | MHz | Config 1,2 | 10: NRB,c = 52 | | | | |
| Config 3 | 40: NRB,c = 106 | | | | |
| BWP BW | | MHz | Config 1,2 | 10: NRB,c = 52 | | | | |
| Config 3 | 40: NRB,c = 106 | | | | |
| BWP configuration | Initial DL BWP |  | Config 1, 2, 3 | DLBWP.0.1 | | | NA | |
| Initial UL BWP |  | ULBWP.0.1 | | | NA | |
| Dedicated DL BWP |  | DLBWP.1.1 | | | NA | |
| Dedicated UL BWP |  | ULBWP.1.1 | | | NA | |
| TRS configuration | |  | 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.1.1 FDD | | |  | |
|  | Config 2 | SR.1.1 TDD | | |  | |
|  | Config 3 | SR2.1 TDD | | |  | |
| CORESET Reference Channel | |  | Config 1 | CR.1.1 FDD | | |  | |
|  | Config 2 | CR.1.1 TDD | | |  | |
|  | Config 3 | CR2.1 TDD | | |  | |
| SSB parameters | |  | Config 1 | SSB.1 FR1 | | | SSB.5 FR1 | |
|  | Config 2 | SSB.1 FR1 | | | SSB.5 FR1 | |
|  | Config 3 | SSB.2 FR1 | | | SSB.6 FR1 | |
| SMTC configuration defined in A.3.11 | |  | Config 1 | SMTC.1 | | | SMTC.4 | |
|  | Config 2, 3 | SMTC.1 | | | SMTC.4 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | | | |
| Config 3 | 30 | | | | |
| EPRE ratio of PSS to SSS | |  | Config 1,2,3 | 0 | | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |
| EPRE ratio of PDSCH to PDSCH | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |
| Note2 | | dBm/15kHz |  | -98 | | -98 | | |
| Note2 | | dBm/SCS | Config 1,2 | -98 | | -98 | | |
| Config 3 | -95 | | -95 | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -94 | -94 | | -Infinity | -91 |
| Config 3 | -91 | -91 | | -Infinity | -88 |
|  | | dB | Config 1,2,3,4,5,6 | 4 | 4 | | -Infinity | 7 |
|  | | dB | Config 1,2,3 | 4 | 4 | | -Infinity | 7 |
| IoNote3 | | dBm/9.36MHz | Config 1,2 | -64.59 | -64.59 | | -70.05 | -62.26 |
| dBm/38.16MHz | Config 3 | -58.49 | -58.49 | | -63.94 | -56.15 |
| Propagation Condition | |  | Config 1,2,3 | 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  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | | |

##### A.6.6.2.x.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

----------------------------------------------------- End of Change 15 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 16 (R4-2017339)-------------------------------------------

#### A.7.6.2.x SA event triggered reporting tests For FR2 without SSB time index detection when DRX is not used (PCell in FR2) (rel16 additional mandatory gap pattern 17)

##### A.7.6.2.x.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.x.1-1, A.7.6.2.x.1-2, and A.7.6.2.x.1-3.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.x.1-1.

Table A.7.6.2.x.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

|  |  |
| --- | --- |
| Config | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: Void. | |

Table A.7.6.2.x.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection (GP17)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| NR RF Channel Number |  | Config 1 | 1, 2 | Two FR2 NR carrier frequencies is used. |
| Active cell |  | Config 1 | NR cell 1 (Pcell) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | Config 1 | NR cell 2 | NR cell 2 is on NR RF channel number 2. |
| Gap Pattern Id |  | Config 1 | 17 | As specified in clause 9.1.2-1. |
| Measurement gap offset |  | Config 1 | 39 |  |
| SMTC-SSB parameters |  | Config 1 | SSB.3 FR2 | As specified in clause A.3.10.2 |
| A3-Offset | dB | Config 1 | -30 |  |
| Hysteresis | dB | Config 1 | 0 |  |
| CP length |  | Config 1 | Normal |  |
| TimeToTrigger | s | Config 1 | 0 |  |
| Filter coefficient |  | Config 1 | 0 | L3 filtering is not used |
| DRX |  | Config 1 | OFF | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1 | 3μs | Synchronous cells. |
| T1 | s | Config 1 | 5 |  |
| T2 | s | Config 1 | 6 (PC1)  4 (other PC) |  |

Table A.7.6.2.x.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection (GP17)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | Cell 1 | |
| T1 | T2 | T1 | T2 |
| AoA setup | |  | Config 1 | Setup 3 as specified in clause A.3.15 | | | |
| AoA1 | | AoA2 | |
| NR RF Channel Number | |  | Config 1 | 1 | | 2 | |
| Duplex mode | |  | Config 1 | TDD | | TDD | |
| TDD configuration | |  | Config 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP BW | | MHz | Config 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| BWP configuration | Initial DL BWP |  | Config 1 | DLBWP.0.1 | | N/A | |
| Initial UL BWP |  | ULBWP.0.1 | | N/A | |
| Dedicated DL BWP |  | DLBWP.1.1 | | N/A | |
| Dedicated UL BWP |  | ULBWP.1.1 | | N/A | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1) | |  | Config 1 | OP.1 | | OP.1 | |
| PDSCH Reference measurement channel | |  | Config 1 | SR.3.1 TDD | | - | |
| CORESET Reference Channel | |  | Config 1 | CR.3.1 TDD | | - | |
| SMTC configuration defined in A.3.11.1 and A.3.11.2 | |  | Config 1 | SMTC.1 | | SMTC.1 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1 | 120 | | 120 | |
| TRS configuration | |  | Config 1 | TRS.2.1 TDD | | N/A | |
| TCI configuration | |  | Config 1 | CSI-RS.Config.0 | | N/A | |
| EPRE ratio of PSS to SSS | |  | Config 1 | 0 | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |
| EPRE ratio of PDSCH to PDSCH | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |
| Note2 | | dBm/15kHz Note5 |  | N/A | | N/A | |
| Note2 | | dBm/SCS Note4 | Config 1 | N/A | | N/A | |
| SS-RSRP Note 3 | | dBm/SCS Note5 | Config 1 | -87 | -87 | -Infinity | -87 |
|  | | dB | Config 1 | N/A | N/A | -Infinity | N/A |
|  | | dB | Config 1 | N/A | N/A | -Infinity | N/A |
| IoNote3 | | dBm/95.04 MHz Note5 | Config 1 | -58.01 | -58.01 | -Infinity | -58.01 |
| Propagation Condition | |  | Config 1 | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone | | | | | | | |

##### A.7.6.2.x.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 5120ms (PC1) or 3200ms (other than PC1) from the beginning of time period T2.

The UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

----------------------------------------------------- End of Change 16 ------------------------------------------------------------

# Multiple SCell activation

----------------------------------------------------- Beginning of Change 17 (R4-2017210)-------------------------------------------

#### A.4.5.3.4 SCell Activation and deactivation of multiple unknown SCells in FR1 with single activation/deactivation command

##### A.4.5.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the multiple SCell activation and deactivation times are within the requirements stated in clause 8.3.7 and 8.3.8, when the two configured deactivated SCells in FR1 are unknown by the UE at the time of activation.

The supported test configurations are the same as defined in clause A.4.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Table A.4.5.3.4.1-1 will replace the values of corresponding parameters in Table A.4.5.3.1.1-2. The cell specific test parameter values in Table A.4.5.3.4.1-2 will replace the values of corresponding parameters in Table A.4.5.3.1.1-3.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four carriers, E-UTRA has one cell, NR has three 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) and Cell 4(SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCells (Cell 3 and Cell 4) become configured on NR. During T1 the SCells (Cell 3 and Cell 4) are powered off and UE is not aware of SCells.

A MAC message for activation of SCells(Cell 3 and Cell 4) is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCells is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of cell 3 and cell 4 are increased to same level as for cell 2. The UE shall be able to report valid CSI for the activated SCells (Cell3 and Cell 4) at latest in slot respectively as defined in clause 8.3.7 provided the SCells can be successfully detected on the first attempt. The UE shall start reporting CSI for cell 3 and cell 4 in slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation for cell 3 and cell 4 has been completed, respectively. Any PSCell interruption due to activation of SCells shall occur in the slot to slot, as defined in clause 8.3, where is the interruption length given in section 8.2. Any E-UTRA PCell interruption due to activation of SCells shall occur in the subframe to subframe, where and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m, and is the interruption length given in TS 36.133 [14] clause 7.32.

Time period T3 starts when a MAC message for deactivation of the SCells (Cell 3 and Cell 4), 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 SCells at latest in slot as defined in clause 8.3. The starting point of any PSCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3. The starting point of any E-UTRA PCell interruption due to the deactivation shall occur in the subframe to subframe , where and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

The test equipment verifies the activation time for Cell 3 by counting the slots from the time when the SCell activation command is sent until CSI report of acticated Cell 3 with other than CQI index 0 is received.

The test equipment verifies the activation time for Cell 4 by counting the slots from the time when the SCell activation command is sent until CSI report of acticated Cell 4 with other than CQI index 0 is received.

The test equipment verifies the deactivation time for Cell 3 by counting the slots from the time when the SCell deactivation command is sent until CSI reporting for Cell 3 is discontinued.

The test equipment verifies the deactivation time for Cell 4by counting the slots from the time when the SCell deactivation command is sent until CSI reporting for Cell 4 is discontinued.

Table A.4.5.3.4.1-1: General test parameters for unknown FR1 SCell activation case with 2 deactivated SCells, 160ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Configured deactivated SCell 1 |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3 which is an intra-band contiguous CC to PSCC of Cell 2;  *ssb-PositionInBurst* of Cell 3 is same as the one for Cell 2 |
| Configured deactivated SCell 2 |  | Cell 4 | Configured deactivated secondary cell on NR RF channel number 4 which is an inter-band CC to PSCC of Cell 2 |
| Cell3 timing offset to cell2 | μs | 0 |  |
| Cell4 timing offset to cell2 | μs | 0 |  |
| Time alignment error between cell3 and cell2 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Time alignment error between cell4 and cell2 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| T1 | ms | 100 | During this time the PSCell shall be known and the SCell configured, but not detected. |

**Table A. 4.5.3.4.1-2: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | Cell 3 | | Cell 4 | |
| T2 | T3 | T2 | T3 |
| SSB ARFCN | | |  | Freq2 | | Freq3 | |
| Duplex mode | Config 1,4 | |  | FDD | | | |
| Config 2,3,5,6 | | TDD | | | |
| TDD configuration | Config 1,4 | |  | Not Applicable | | | |
| Config 2,5 | | TDDConf.1.1 | | | |
| Config 3,6 | | TDDConf.2.1 | | | |
| BWchannel | Config 1,4 | | MHz | 10: NRB,c = 52 | | | |
| Config 2,5 | | 10: NRB,c = 52 | | | |
| Config 3,6 | | 40: NRB,c = 106 | | | |
| DL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 | |  | DLBWP.0.1 | | | |
| DL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 | |  | DLBWP.1.1 | | | |
| UL initial BWP configuration | Config 1, 2, 3, 4, 5, 6 | |  | ULBWP.0.1 | | | |
| UL dedicated BWP configuration | Config 1, 2, 3, 4, 5, 6 | |  | ULBWP.1.1 | | | |
| DRX Cycle | | | ms | Not Applicable | | | |
| PDSCH Reference measurement channel | Config 1,4 | |  | SR.1.1 FDD | | SR.1.1 FDD | |
| Config 2,5 | | SR.1.1 TDD | | SR.1.1 TDD | |
| Config 3,6 | | SR.2.1 TDD | | SR.2.1 TDD | |
| RMSI CORESET Reference Channel | Config 1,4 | |  | CR.1.1 FDD | | CR.1.1 FDD | |
| Config 2,5 | | CR.1.1 TDD | | CR.1.1 TDD | |
| Config 3,6 | | CR.2.1 TDD | | CR.2.1 TDD | |
| RMC CORESET Reference Channel | Config 1,4 | |  | CCR.1.1 FDD | | CCR.1.1 FDD | |
| Config 2,5 | |  | CCR.1.1 TDD | | CCR.1.1 TDD | |
| Config 3,6 | |  | CCR.2.1 TDD | | CCR.2.1 TDD | |
| TRS configuration | Config 1,4 | |  | TRS.1.1 FDD | | TRS.1.1 FDD | |
| Config 2,5 | |  | TRS.1.1 TDD | | TRS.1.1 TDD | |
| Config 3,6 | |  | TRS.1.2 TDD | | TRS.1.2 TDD | |
| OCNG Patterns | | |  | OP.1 | | | |
| SMTC configuration | | |  | SMTC.1 | | | |
| SSB configuration | Config 1,2,4,5 | |  | SSB.1 FR1 | | | |
| Config 3,6 | | SSB.2 FR1 | | | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,4,5 | | kHz | 15 kHz | | | |
| Config 3,6 | | 30kHz | | | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | |
| EPRE ratio of PBCH DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH DMRS | | |
| EPRE ratio of PDCCH DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |
| EPRE ratio of PDSCH DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |
| Note2 | | | dBm/15kHz | -104 | | | |
| Note2 | | Config 1,2,4,5 | dBm/SCS | -104 | | | |
| Config 3,6 | -101 | | | |
|  | | | dB | 17 | | | |
|  | | | dB | 17 | | | |
| SS-RSRPNote3 | | Config 1,2,4,5 | dBm/SCS | -87 | | | |
| Config 3,6 | -84 | | | |
| SCH\_RP Note 3 | | | dBm/15 kHz | -87 | | | |
| Propagation condition | | | - | AWGN | | | |

##### A.4.5.3.3.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case for both Cell 3 and Cell 4, except the followings:

* For Cell 3 activation delay, Tactivation\_time will be replaced with the value = TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells+Trs +5ms as defined in clause 8.3.7.
* For Cell 4 activation delay, Tactivation\_time will be replaced with the value = TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells+2\*Trs +5ms as defined in clause 8.3.7.

----------------------------------------------------- End of Change 17 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 18 (R4-2017212)-------------------------------------------

#### A.5.5.3.x Multiple SCell Activation and deactivation of one unknown SCell and one known SCell in FR2

##### A.5.5.3.x.1 Test Purpose and Environment

The purpose of this test is to verify that the multiple SCell activation and deactivation delay and interruption are within the requirements stated in clause 8.3, when the two SCells to be activated are in FR2 and one SCell is known and the other SCell is unknown by the UE at the time of activation.

The supported test configurations are shown in Table A.5.5.3.x.1-1 below. The general test parameters are given in Table A.5.5.3.x.1-2 and cell-specific test parameters in Table A.5.5.3.x.1-3 below. OTA related test parameters are shown in table A.5.5.3.x.1-4.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four carriers, one E-UTRA cell, and three NR cells. Before the test starts the UE is connected to Cell 1 (PCell) on the E-UTRA carrier and Cell 2 (PSCell) on the NR carrier in FR1, but is not aware of Cell 3 (SCell1) or Cell 4 (SCell2) on the NR carriers both in FR2. Cell 1, Cell 2 and Cell 3 have constant signal levels throughout the test. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the Cell 3 (SCell1) and Cell 4 (SCell2) are configured on NR. The test equipment sends a single MAC message for activation of both SCells within 3s for UE power class 2/3/4 or 4s for UE power class 1 after RRM reports is sent for SCell1.

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. In the same MAC PDU, the test equipment activates the TCI state of RMC CORESET. In slot #m, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell1 and SCell2.

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 test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation and deactivation of SCells, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CSI reporting for SCell is discontinued.

Table A.5.5.3.x.1-1: Supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.5.5.3.x.1-2: General test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2,3,4 | One E-UTRAN radio channel (1) and three NR radio channels (2,3,4) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on E-UTRAN RF channel number 1.  As specified in clause A.3.7.2.2 |
| Active PSCell |  | Cell 2 | Primary secondary cell on NR RF channel number 2 in FR1. |
| Configured deactivated SCells |  | Cell 3, Cell 4 | Configured deactivated secondary cell on NR RF channel number 3 and RF channel number 4, both in FR2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| SCell measurement cycle (measCycleSCell) | ms | 160 | For both Cell 3 and Cell 4 |
| T1 | s | 7 | During this time the PSCell shall be known and the SCells configured, SCell1 detected but SCell2 not detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots indicated by the PDSCH-to-HARQ\_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3] |
| k | slot |  | As specified in clause 4.3 of TS 38.213 [3] |

Table A. 5.5.3.x.1-3: Cell specific test parameters

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | | | Cell 3 | | | Cell 4 | | |
| T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| SSB ARFCN | |  | freq1 | | | freq2 | | | freq3 | | |
| Duplex mode | Config 1,2 |  | TDD | | | | | | | | |
| TDD configuration | Config 1,2 |  | TDDConf.3.1 | | | | | | | | |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 | | | | | | | | |
| DL initial BWP configuration | Config 1,2 |  | DLBWP.0.1 | | | | | | | | |
| DL dedicated BWP configuration | Config 1,2 |  | DLBWP.1.1 | | | | | | | | |
| UL initial BWP configuration | Config 1,2 |  | ULBWP.0.1 | | | | | | | | |
| UL dedicated BWP configuration | Config 1,2 |  | ULBWP.1.1 | | | | | | | | |
| Timing offset to Cell 2 | | ms | Not Applicable | | | 0 | | | 0 | | |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.3.1 TDD | | | SR.3.1 TDD | | | SR.3.1 TDD | | |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD | | | CR.3.1 TDD | | | CR.3.1 TDD | | |
| RMC CORESET Reference Channel | Config 1,2 |  | CCR.3.1 TDD | | | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| TRS configuration | Config 1,2 |  | TRS.2.1 TDD | | | TRS.2.1 TDD | | | TRS.2.1 TDD | | |
| CSI-RS configuration | Config 1,2 |  | CSI-RS.3.1 TDD | | | N/A | CSI-RS.3.1 TDD | | N/A | CSI-RS.3.1 TDD | |
| CSI reporting periodicity | Config 1,2 | ms | 5 | | | 5 | | | 5 | | |
| OCNG Patterns | |  | OP.1 | | | | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR2 | | | SSB.1 FR2 | | | N/A | SSB.1 FR2 | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | | | | | | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Propagation condition | | - | AWGN | | | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | | | | | | |

Table A.5.5.3.x.1-4: OTA related test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 3 | | | Cell 4 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 |
| Angle of arrival configuration |  | Setup 1 according to A.3.15.1 | | | | | |
| Assumption for UE beamsNote 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -112 | | | -112 | | |
| Note1 | dBm/SCSNote3 | -102.97 | | | -102.97 | | |
|  | dB | 14 | | | N/A | 14 | 14 |
| SS-RSRPNote2 | dBm/SCS Note4 | -88.97 | | | N/A | -88.97 | -88.97 |
|  | dB | 14 | | | N/A | 14 | 14 |
| IoNote2 | dBm/95.04 MHz Note4 | -59.81 | | | -73.98 | -59.81 | -59.81 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: All parameters apply for configuration 1 and 2  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | |

##### A.5.5.3.x.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after slot (m+k). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PSCell in the slot.

During T2 the UE shall start sending CSI reports for SCell1 and SCell2 with non-zero CQI index in the configured slots for CSI reporting no later than slot , where

- THARQ is defined in Table A.5.5.3.Y.1-2

- Tactivation\_time = 5ms + TFineTiming = 25ms,

- TCSI\_Reporting = 10ms

- NR slot length is 0.125ms.

During T3 the UE shall stop sending CSI reports for both SCells no later than slot , as defined in clause 8.3.

During T2 interruption of PSCell during SCell activation shall not happen outside the slot to , and interruption of E-UTRA PCell during SCell activation shall not happen outside the subframe to subframe, as defined in clause 8.3, where TX =20ms, and where and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m.

During T3 the starting point of interruption of PSCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3 and the starting point of interruption of E-UTRA PCell during SCell deactivation shall not happen outside the subframe to subframe , where and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

The interruption of PSCell due to activation of SCell1 and SCell2 shall not be more than the values specified for EN-DC in Clause 8.2.1.2.10.

The interruption of PCell due to activation of SCell1 and SCell2 shall not be more than the values specified for EN-DC in Clause 7.32.2.5 of TS 36.133 [50].

If UE support per-FR gap, UE is not allowed to cause interruption during T2 and T3 to E-UTRA PCell or PSCell.

All of the above test requirements shall be fulfilled in order for the observed SCell activation 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 as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

----------------------------------------------------- End of Change 18 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 19 (R4-2017211)-------------------------------------------

#### A.7.5.3.x Multiple SCell Activation and deactivation of unknown SCell in both FR1 and FR2 in non-DRX

##### A.7.5.3.x.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 and FR2 are both unknown by the UE at the time of activation. The test UE shall supports per-FR measurement gap capability.

The supported test configurations are as defined in clause A.7.5.3.x.1-1 below.

The general test parameters in MCG are the same as defined in Table A.6.5.3.1.1-2 except those described in the following clause.

The cell specific test parameters for MCG are described in Tables A.6.5.3.2.1-3.

The cell specific test parameters for SCG are described in Tables A.7.5.3.x.1-3. OTA related test parameters are the same as defined in Table A.7.5.3.x.1-4.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four NR carriers each with one cell. PCell(Cell 1) and SCell1 (Cell 2) are in FR1 inter-band. PSCell(Cell 3) and SCell2 (Cell 4) are in FR2 intra-band.

All cells have constant signal levels throughout the test. Before the test starts, the UE is connected to Cell 1 in MCG and Cell 3 in SCG, but is not aware of Cell2 and Cell 4. The UE is only monitoring the PCC(Cell 1) and PSCC(Cell 3). The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1, the UE receives an RRC message by which the SCell1 (Cell 2) and SCell2 (Cell 4) become configured on radio channel 2. The test equipment sends two MAC messages for activation of the SCells in each CG.

The point in time at which the 1st MAC message is received at the UE antenna connector, in slot # denoted n1, defines the start of time period T2. The point in time at which the 2nd MAC message is received at the UE antenna connector, in slot # denoted n2 which is later than slot #n1.

The UE shall be able to report valid CSI in PCell for the activated SCell1 (Cell 2) at latest in slot , as defined in clause 8.3. The UE shall start reporting CSI in PCell in slot and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell1 shall occur in the slot to , as defined in clause 8.3, where is the interruption length given in section 8.2.

The UE shall be able to report valid CSI in PSCell for the activated SCell2 (Cell 4) at latest in slot , as defined in clause 8.3. The UE shall start reporting CSI in PSCell in slot and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption due to activation of SCell2 shall occur in the slot to , as defined in clause 8.3, where is the interruption length given in section 8.2.

Time period T3 starts when one MAC message for deactivation of SCell1 in MCG, sent from the test equipment to the UE in a slot # denoted m1, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell1 in MCG in a slot , as defined in clause 8.3, and the starting point of any PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.

Another MAC message for deactivation of SCell2 in SCG, sent from the test equipment to the UE in a slot # denoted m2 later than slot #m1, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell2 in SCG in a slot , as defined in clause 8.3, and the starting point of any PSCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation and deactivation of SCells, respectively.

The test equipment verifies the activation time by counting the slots from the time when the multiple SCells activation command are sent until a CSI report with other than CQI index 0 is received in both CGs.

The test equipment verifies the deactivation time by counting the slots from the time when the multiple SCells deactivation command are sent until CQI reporting for SCells are discontinued.

**Table A.7.5.3.x.1-1: Supported test configurations for unknown FR1+FR2 SCell activation in non-DRX**

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | PCell and SCell1 in MCG: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  PSCell and SCell2 in SCG: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell and SCell1 in MCG: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  PSCell and SCell2 in SCG: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 3 | PCell and SCell1 in MCG: NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  PSCell and SCell2 in SCG: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to pass in one of the supported test configurations | |

**Table A.7.5.3.x.1-2: General test parameters for unknown FR1+FR2 SCell activation in non-DRX**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1,2,3,4 | Four NR radio channels are used for this test, cell 1, cell 2, cell 3 and cell 4 use RF channel 1,2,3 and 4, respectively. |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell1 |  | Cell 2 | Configured deactivated secondary cell in MCG on NR RF channel number 2 |
| Active PSCell |  | Cell 3 | Primary secondary cell on NR RF channel number 3. |
| Configured deactivated SCell2 |  | Cell 4 | Configured deactivated secondary cell in SCG on NR RF channel number 4 |
| Time alignment error between cell1 and cell2 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Time alignment error between cell3 and cell4 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | ms | 100 | During this time the PCell and PSCell shall be known and the SCells configured, but not detected. |

**Table A.7.5.3.x.1-3: FR2 serving cell specific test parameters for unknown FR1+FR2 SCell activation in non-DRX**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 5** | | | **Unit** | **T1** | | **T2** | | **T3** | |
| **Cell 3** | **Cell 4** | **Cell 3** | **Cell 4** | **Cell 3** | **Cell 4** |
| SSB ARFCN | | Config 1,2,3 |  | Freq3 | Freq4 | Freq3 | Freq4 | Freq3 | Freq4 |
| Duplex mode | |  | TDD | | TDD | | TDD | |
| TDD configuration | |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| Downlink initial BWP Configuration | |  | DLBWP.0.1 | | DLBWP.0.1 | | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration | |  | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | |
| Uplink initial BWP configuration | |  | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 | |
| Uplink dedicated BWP configuration | |  | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | |
| TRS configuration | |  | TRS.2.1 TDD | | TRS.2.1 TDD | | TRS.2.1 TDD | |
| TCI state | |  | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | |
| BWchannel | | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Parameters | |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Parameters | |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| OCNG Patterns | |  | OP.1 | - | OP.1 | | | |
| SSB Configuration | |  | SSB.1 FR2 | - | SSB.1 FR2 | | | |
| SMTC Configuration | |  | SMTC.1 | - | SMTC.1 | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | - | 0 | | | |
| EPRE ratio of PBCH\_DMRS to SSS | |
| EPRE ratio of PBCH to PBCH\_DMRS | |
| EPRE ratio of PDCCH\_DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |
| EPRE ratio of PDSCH\_DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| Propagation conditions | | AWGN | | | | | | |
|  | Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 5: All parameters apply for configuration 1 and 2 | | | | | | | | |

**Table A.7.5.3.x.1-4: OTA related test parameters for FR2 SCell**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | Cell 4 | | | Cell 3 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| Angle of arrival configuration | |  | NA | According to clause A.3.15.1 | | NA | | |
| Note1 | | dBm/15kHz | NA | -112 | | NA  Link only, see clause A.3.7A | | |
| Assumption for UE beams Note 7 | |  | Rough | |
| Note1 | Config 1,2 | dBm/SCS | -102.97 | |
| Config 3, |
| SS-RSRPNote2 | Config 1,2 | dBm/SCS Note3 | -85.97 | |
| Config 3 |
|  | Config 1,2,3 | dB | 17 | |
|  | | dB | 17 | |
| IoNote2 | Config 1,2 | dBm/ChBWNote4,Note6 | -56.90 | |
| Config 3 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: ChBW is 94.04 MHz for Cell2, 9.36 MHz for Cell 3 in configurations 1,2,4,5, 38.1 MHz in configurations 3,6  Note 7: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation. | | | | | | | | |

##### A.7.5.3.x.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except Tactivation\_time for SCell in MCG will be replaced with the value TFirstSSB\_MAX + TSMTC\_MAX + 2\*Trs + 5ms and Tactivation\_time for SCell in SCG will be replaced with the value max(Tuncertainty\_MAC\_multiple\_scells + 5ms + TFineTiming, Tuncertainty\_RRC\_multiple\_scells + TRRC\_delay-THARQ) as defined in clause 8.3.7.

----------------------------------------------------- End of Change 19 ------------------------------------------------------------

# Inter-band FR2 CA

--------------------------------------------------Beginning of Change 20 (R4-2017221)-----------------------------------------

#### A.7.5.3.3 SCell Activation and deactivation for SCell in FR2 inter-band in non-DRX

##### A.7.5.3.3.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell and SCell are in FR2 inter-band.

The supported test configurations are shown in table A.7.5.3.3.1-1 below. The general test parameters are described in Tables A.7.5.3.3.1-2, and cell specific test parameters are described in Tables A.7.5.3.3.1-3. OTA related test parameters are shown in table A.7.5.3.3.1-4 below.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell. A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m.

The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 is increased to same level as for cell 2. During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+TL1-RSRP. In the next DL slot after slot m+TL1-RSRP, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.7.5.3.3.1-1: Supported test configurations for FR2 SCell activation in FR2 inter-band

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |

Table A.7.5.3.3.1-2: General test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channels are used for this test. RF channel number 1 is in band 1 and RF channel number 2 is in band 2, where bands 1 and 2 are inter-band CA operating bands in FR2 as specified in Table 5.2A.2-1 in TS38.101-2. |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index |  | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | s | 2 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE’s capability |
| TCSI\_Reporting | ms | 2 | the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

Table A.7.5.3.3.1-3: Cell specific test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | T1 | | T2 | | T3 | |
| Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| SSB ARFCN |  | freq1 | freq2 | freq1 | freq2 | freq1 | freq2 |
| Duplex mode |  | TDD | | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | DLBWP.0.1 | | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | |
| TRS configuration |  | TRS.2.1 TDD | | TRS.2.1 TDD | | TRS.2.1 TDD | |
| TCI state |  | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Parameters |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| CSI-RS configuration |  | NA | NA | NA | CSI-RS.3.1 TDD Note 2 | NA | CSI-RS.3.1 TDD |
| CSI reporting periodicity Note 3 |  | NA | 5 | NA | 5 | NA | 5 |
| OCNG Patterns |  | OP.1 | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | |
| SMTC Configuration |  | SMTC.1 | | | | | |
| EPRE ratio of PSS to SSS | dB | 0 | | | | | |
| EPRE ratio of PBCH\_DMRS to SSS |
| EPRE ratio of PBCH to PBCH\_DMRS |
| EPRE ratio of PDCCH\_DMRS to SSS |
| EPRE ratio of PDCCH to PDCCH\_DMRS |
| EPRE ratio of PDSCH\_DMRS to SSS |
| EPRE ratio of PDSCH to PDSCH\_DMRS |
| EPRE ratio of OCNG DMRS to SSSNote 1 |
| EPRE ratio of OCNG to OCNG DMRS Note 1 |
| Propagation conditions |  | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 3: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | |

Table A.7.5.3.3.1-4: OTA related test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| Angle of arrival configuration |  | TBD | | | TBD | | |
| Assumption for UE beams Note 7 |  | TBD | | | TBD | | |
| Note1 | dBm/15kHzNote4 | -112 | | | -112 | | |
| Note1 | dBm/SCSNote3 | -102.97 | | | -102.97 | | |
|  | dB | 14 | | | 14 | | |
| SS-RSRPNote2 | dBm/SCS Note4 | -88.97 | | | -88.97 | | |
|  | dB | 14 | | | 14 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -88.80 | | | -88.80 | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 6: All parameters apply for configuration 1 and 2  Note 7: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | | | | | |

##### A.7.5.3.3.2 Test Requirements

During T2 the UE shall start sending CSI report for the SCell in the configured slots for CSI reporting after slot (m+k). UE shall send the first CSI report for SCell in slot (m+k), or in the next available uplink resource for CSI reporting if slot (m+k) was subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PCell in the slot.

During T2, the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot (m+TL1-RSRP), where TL1-RSRP is no larger than 3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report as defined in clause 8.3.2. For this test case, TFirstSSB\_MAX=TSMTC\_MAX=Trs=20ms; TL1-RSRP, measure=480ms and TL1-RSRP, report=5ms, which allows TL1-RSRP =1000ms.

During T2, the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot , where

- THARQ is defined in Table A.7.5.3.3.1-2

- Tactivation\_time = 3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows 1030ms

- TCSI\_Reporting = 10ms

- NR slot length is 0.125ms for this test case.

During T2, the interruption of PCell during SCell activation shall not happen outside the slot to , where TX =20ms.

During T3, the UE shall stop sending CSI reports for SCell no later than slot , as defined in clause 8.3.

During T3, the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to as defined in clause 8.3.

----------------------------------------------------- End of Change 20 ------------------------------------------------------------

# Inter-frequency measurement without MG

----------------------------------------------------- Beginning of Change 21 (R4-2017213)-------------------------------------------

#### A.6.6.2.x1 SA event triggered reporting tests for FR1 when DRX is used

##### A.6.6.2.x1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE which supports interFrequencyMeas-Nogap-r16 makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search without measurement gap requirements in clause 9.3.9.

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 RF channel 2. The SSB of cell 2 is completely within UE’s active BWP BW. The RBs containing SSB from cell 1 and cell 2 should be different in frequency location within the cell bandwidth. The test parameters are given in Tables A.6.6.2.x1.1-1, A.6.6.2.x1.1-2 and A.6.6.2.x1.1-3.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.2.x1.1-1: SA event triggered reporting tests when DRX is used for FR1-FR1

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

Table A.6.6.2.x1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 when DRX is used

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Test configuration | Value | Comment |
| 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. |
| 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 | As specified in clause A.3.3 |
| Time offset between serving and neighbour cells |  | Config 1 | 3ms | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 2,3 | 3μs | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 |  |
| T2 | s | Config 1,2,3 | 1 |  |

Table A.6.6.2.x1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 when DRX is used

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test configuration | Cell 1 | | | | Cell 2 | |
| T1 | T2 | | | T1 | T2 | |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | | | 2 | | |
| Duplex mode | |  | Config 1 | FDD | | | | | | |
|  | Config 2,3 | TDD | | | | | | |
| TDD configuration | |  | Config 1 | Not Applicable | | | | | | |
|  | Config 2 | TDDConf.1.1 | | | | | | |
|  | Config 3 | TDDConf.2.1 | | | | | | |
| BWchannel | | MHz | Config 1,2 | 10: NRB,c = 52 | | | | | | |
| Config 3 | 40: NRB,c = 106 | | | | | | |
| BWP BW | | MHz | Config 1,2 | 10: NRB,c = 52 | | | | | | |
| Config 3 | 40: NRB,c = 106 | | | | | | |
| BWP configuration | Initial DL BWP |  | Config 1, 2, 3 | DLBWP.0.1 | | | | NA | | |
| Initial UL BWP |  | Config 1, 2, 3 | ULBWP.0.1 | | | | NA | | |
| Dedicated DL BWP |  |  | DLBWP.1.1 | | | | NA | | |
| Dedicated UL BWP |  |  | ULBWP.1.1 | | | | NA | | |
| TRS configuration | |  | 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.1.1 FDD | | | | NA | | |
|  | Config 2 | SR.1.1 TDD | | | | NA | | |
|  | Config 3 | SR2.1 TDD | | | | NA | | |
| CORESET Reference Channel | |  | Config 1 | CR.1.1 FDD | | | | NA | | |
|  | Config 2 | CR.1.1 TDD | | | | NA | | |
|  | Config 3 | CR2.1 TDD | | | | NA | | |
| SSB parameters | |  | Config 1 | SSB.1 FR1 | | | | SSB.5 FR1 | | |
|  | Config 2 | SSB.1 FR1 | | | | SSB.5 FR1 | | |
|  | Config 3 | SSB.2 FR1 | | | | SSB.6 FR1 | | |
| SMTC configuration defined in A.3.11 | |  | Config 1 | SMTC.2 | | | | SMTC.5 | | |
|  | Config 2, 3 | SMTC.1 | | | | SMTC.4 | | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | | | | | |
| Config 3 | 30 | | | | | | |
| EPRE ratio of PSS to SSS | |  | Config 1,2,3 | 0 | | | | 0 | | |
| EPRE ratio of PBCH DMRS to SSS | |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |
| EPRE ratio of PDSCH to PDSCH | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |
| Note2 | | dBm/15kHz | Config 1,2,3 | -98 | | -98 | | | | |
| Note2 | | dBm/SCS | Config 1,2 | -98 | | -98 | | | | |
| Config 3 | -95 | | -95 | | | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -94 | -94 | | | -Infinity | -91 | |
| Config 3 | -91 | -91 | | | -Infinity | -88 | |
|  | | dB | Config 1,2,3,4,5,6 | 4 | 4 | | | -Infinity | 7 | |
|  | | dB | Config 1,2,3 | 4 | 4 | | | -Infinity | 7 | |
| IoNote3 | | dBm/9.36MHz | Config 1,2 | -64.59 | -64.59 | | | -70.05 | -62.2 | |
| dBm/38.16MHz | Config 3 | -58.49 | -58.49 | | | -63.94 | -56.15 | |
| Propagation Condition | |  | Config 1,2,3 | AWGN | | | 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  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. | | | | | | | | | | |

Table A.6.6.2.x1.1-4: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting when DRX is used

|  |  |  |
| --- | --- | --- |
| Field | Value | Comment |
| TimeAlignmentTimer | ms500 | As specified in clause 6.3.2 in TS 38.331 [2] |

##### A.6.6.2.x1.2 Test Requirements

In test config 1, UE is required to report SSB time index. UE is not required to report SSB time index. The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test config 2 and 3, UE is not required to report SSB time index. The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 900 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

----------------------------------------------------- End of Change 21 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 22 (R4-2017215)-------------------------------------------

A.6.6.2.x2 SA event triggered reporting tests for FR1 without gap when DRX is not used

A.6.6.2.x2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.9.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The SSB of Cell 2 is completely within UE’s active BWP BW. The RBs containing SSB from cell 1 and cell 2 should be different in frequency location within the cell bandwidth. The test parameters are given in Tables A.6.6.2.x2.1-1, A.6.6.2.x2.1-2 and A.6.6.2.x2.1-3.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

**Table A.6.6.2.x2.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell | |

**Table A.6.6.2.x2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without gap**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test configuration** | **Value** | **Comment** |
| 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. |
| SMTC-SSB parameters |  | Config 1 | SSB.1 FR1 | As specified in clause A.3.10.1 |
|  | Config 2 | SSB.1 FR1 | As specified in clause A.3.10.1 |
|  | Config 3 | SSB.2 FR1 | As specified in clause A.3.10.1 |
| A3-Offset | dB | Config 1,2,3 | -6 |  |
| Hysteresis | dB | Config 1,2,3 | 0 |  |
| CP length |  | Config 1,2,3 | Normal |  |
| TimeToTrigger | s | Config 1,2,3 | 0 |  |
| Filter coefficient |  | Config 1,2,3 | 0 | L3 filtering is not used |
| DRX |  | Config 1,2,3 | OFF | DRX is not used |
| Time offset between serving and neighbour cells |  | Config 1 | 3ms | Asynchronous cells.  The timing of Cell 2 is 3ms later than the timing of Cell 1. |
|  | Config 2,3 | 3μs | Synchronous cells. |
| T1 | s | Config 1,2,3 | 5 |  |
| T2 | s | Config 1,2,3 | 1 |  |

**Table A.6.6.2.x2.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without gap**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test configuration** | **Cell 1** | | | **Cell 2** | |
| **T1** | **T2** | | **T1** | **T2** |
| NR RF Channel Number | |  | Config 1,2,3 | 1 | | | 2 | |
| Duplex mode | |  | Config 1 | FDD | | | | |
|  | Config 2,3 | TDD | | | | |
| TDD configuration | |  | Config 1 | Not Applicable | | | | |
|  | Config 2 | TDDConf.1.1 | | | | |
|  | Config 3 | TDDConf.2.1 | | | | |
| BWchannel | | MHz | Config 1,2 | 10: NRB,c = 52 | | | | |
| Config 3 | 40: NRB,c = 106 | | | | |
| BWP BW | | MHz | Config 1,2 | 10: NRB,c = 52 | | | | |
| Config 3 | 40: NRB,c = 106 | | | | |
| BWP configuration | Initial DL BWP |  | Config 1, 2, 3 | DLBWP.0.1 | | | NA | |
| Initial UL BWP |  | ULBWP.0.1 | | | NA | |
| Dedicated DL BWP |  | DLBWP.1.1 | | | NA | |
| Dedicated UL BWP |  | ULBWP.1.1 | | | NA | |
| TRS configuration | |  | 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.1.1 FDD | | |  | |
|  | Config 2 | SR.1.1 TDD | | |  | |
|  | Config 3 | SR2.1 TDD | | |  | |
| CORESET Reference Channel | |  | Config 1 | CR.1.1 FDD | | |  | |
|  | Config 2 | CR.1.1 TDD | | |  | |
|  | Config 3 | CR2.1 TDD | | |  | |
| SSB parameters | |  | Config 1 | SSB.1 FR1 | | | SSB.5 FR1 | |
|  | Config 2 | SSB.1 FR1 | | | SSB.5 FR1 | |
|  | Config 3 | SSB.2 FR1 | | | SSB.6 FR1 | |
| SMTC configuration defined in A.3.11 | |  | Config 1 | SMTC.2 | | | SMTC.5 | |
|  | Config 2, 3 | SMTC.1 | | | SMTC.4 | |
| PDSCH/PDCCH subcarrier spacing | | kHz | Config 1,2 | 15 | | | | |
| Config 3 | 30 | | | | |
| EPRE ratio of PSS to SSS | |  | Config 1,2,3 | 0 | | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |
| EPRE ratio of PDSCH to PDSCH | |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |
| Note2 | | dBm/15kHz |  | -98 | | -98 | | |
| Note2 | | dBm/SCS | Config 1,2 | -98 | | -98 | | |
| Config 3 | -95 | | -95 | | |
| SS-RSRP Note 3 | | dBm/SCS | Config 1,2 | -94 | -94 | | -Infinity | -91 |
| Config 3 | -91 | -91 | | -Infinity | -88 |
|  | | dB | Config 1,2,3,4,5,6 | 4 | 4 | | -Infinity | 7 |
|  | | dB | Config 1,2,3 | 4 | 4 | | -Infinity | 7 |
| IoNote3 | | dBm/9.36MHz | Config 1,2 | -64.59 | -64.59 | | -70.05 | -62.26 |
| dBm/38.16MHz | Config 3 | -58.49 | -58.49 | | -63.94 | -56.15 |
| Propagation Condition | |  | Config 1,2,3 | 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  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | | |

A.6.6.2.x2.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

The UE is not required to read the neighbour cell SSB index in this test.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

----------------------------------------------------- End of Change 22 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 23 (R4-2017216)-------------------------------------------

#### A.7.6.2.x1 SA event triggered reporting test without gap under non-DRX

##### A.7.6.2.x1.1 Test purpose and Environment

The purpose of this test is to verify that if UE supports *interFrequencyMeas-NoGap-r16* and the flag *interFrequencyConfig-NoGap-r16* is configured by the network, the UE makes correct reporting of an event. This test will partly verify the inter-frequency without gap cell search requirements in clause 9.3.9. Supported test configurations are shown in table A.7.6.2.x1.1-1.

Table A.7.6.2.x.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

There are two cells in the test, 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 SSB of Cell 2 is completely within UE’s active BWP BW. The RBs containing SSB from cell 1 and cell 2 should be different in frequency location within the cell bandwidth. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.2.x1.1-2, A.7.6.2.x1.1-3 and A.7.6.2.x1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.2.x1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| Active cell |  | 1 | PCell (Cell 1) | NR Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | 1 | Cell 2 | NR cell 2 is on NR RF channel number 2. |
| RF Channel Number |  | 1 | 1, 2 | Two FR2 NR carrier frequencies is used. |
| SMTC configuration |  | 1 | SMTC.1 |  |
| A3-Offset | dB | 1 | -6 |  |
| 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 | OFF |  |
| Time offset between Cell 1 and Cell 2 |  | 1 | 3 μs | Synchronous cells |
| T1 | s | 1 | 5 |  |
| T2 | s | 1 | 5 |  |

Table A.7.6.2.x1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| TDD configuration |  | 1 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Intial BWP configuration |  | 1 | DLBWP.0.1  ULBWP.0.1 | | DLBWP.0.1  ULBWP.0.1 | |
| Active DL BWP configuration |  | 1 | DLBWP.1.1 | | DLBWP.1.1 | |
| Active UL BWP configuration |  | 1 | ULBWP.1.1 | | ULBWP.1.1 | |
| RLM-RS |  | 1 | SSB | | SSB | |
| PDSCH RMC configuration |  | 1 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1 | CR.3.1 TDD | | CR.3.1 TDD | |
| Dedicated CORESET RMC configuration |  | 1 | CCR.3.1 TDD | | CCR.3.1 TDD | |
| TRS configuration |  | 1 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1 | TCI.State.2 | | N/A | |
| OCNG Patterns |  | 1 | OP.1 | | OP.1 | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.3 FR2 | |
| Propagation Condition |  | 1 | AWGN | | | |

Table A.7.6.2.x1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | 1 | Setup 1 defined in A.3.15.1 | | | |
|  |  |  |
| Beam assumptionNote 4 |  | 1 | Rough | | Rough | |
|  | dB | 1 | 4 | 4 | -Infinity | 8 |
| Note 2 | dBm/15 KHz | 1 | -102 | | | |
| Note 2 | dBm/SCS | 1 | -93 | | | |
|  |  |
| SS-RSRP | dBm/SCS | 1 | -89 | -89 | -Infinity | -85 |
|  |  |
|  | dB | 1 | 4 | 4 | -Infinity | 8 |
|  | dBm/95.04MHz | 1 | -58.56 | | -55.38 | |
| Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

##### A.7.6.2.x1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,

- 1.44s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

----------------------------------------------------- End of Change 23 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 24 (R4-2017387)-------------------------------------------

#### A.7.6.2.x2 SA event triggered reporting test without gap under DRX

##### A.7.6.2.x2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD inter-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.2.x2.1-1.

Table A.7.6.2.x2.1-1: supported test configurations

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

There are two cells in the test: PCell (Cell 1) on NR RF channel 1 and a FR2 neighbour cell (Cell 2) on NR RF channel 2. The SSB of Cell 2 is completely within UE’s active BWP BW. The RBs containing SSB from cell 1 and cell 2 should be different in frequency location within the cell bandwidth. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.2.x2.1-2 ~ 6.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

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. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.x2.1-2: General test parameters for inter-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Value | Comment |
| NR RF Channel Number |  | 1, 2 | 1, 2 | 2 TDD carrier frequency are used for the NR cells. |
| Active cell |  | 1, 2 | PCell (Cell 1) | Cell 1 is on NR RF channel number 1. |
| Neighbour cell |  | 1, 2 | Cell 2 | Cell to be identified. Cell 2 is on NR RF channel number 2. |
| 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.2 |  |
| Time offset between Cell 1 and Cell 2 |  | 1, 2 | 3 μs | Synchronous cells |
| T1 | s | 1, 2 | 5 |  |
| T2 | s | 1, 2 | 52 |  |

Table A.7.6.2.x2.1-3: NR Cell specific test parameters for inter-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| NR RF Channel Number |  | 1, 2 | 1 | | 2 | |
| TDD configuration |  | 1, 2 | TDDConf.3.1 | | TDDConf.3.1 | |
| BWchannel | MHz | 1, 2 | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| Intial BWP configuration |  | 1, 2 | DLBWP.0.1  ULBWP.0.1 | | N/A | |
| Active DL BWP configuration |  | 1, 2 | DLBWP.1.1 | | N/A | |
| Active UL BWP configuration |  | 1, 2 | ULBWP.1.1 | | N/A | |
| RLM-RS |  | 1, 2 | SSB | | N/A | |
| PDSCH RMC configuration |  | 1, 2 | SR.3.1 TDD | | N/A | |
| RMSI CORESET RMC configuration |  | 1, 2 | CR.3.1 TDD | | N/A | |
| Dedicated CORESET RMC configuration |  | 1, 2 | CCR.3.1 TDD | | N/A | |
| TRS configuration |  | 1, 2 | TRS.2.1 TDD | | N/A | |
| PDSCH/PDCCH TCI states |  | 1, 2 | TCI.State.2 | | N/A | |
| OCNG Patterns |  | 1, 2 | OP.1 | | OP.1 | |
| SSB |  | 1 | SSB.3 FR2 | | SSB.3 FR2 | |
| 2 | SSB.4 FR2 | | SSB.4 FR2 | |
| Propagation Condition |  | 1, 2 | AWGN | | | |

Table A.7.6.2.x2.1-4: NR OTA Cell specific test parameters for inter-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Cell 1 | | Cell 2 | |
| T1 | T2 | T1 | T2 |
| AoA setup |  | 1, 2 | Setup 1 defined in A.3.15.1 | | | |
| Beam assumptionNote 4 |  | 1,2 | Rough | | Rough | |
|  | dB | 1, 2 | 4 | -1.46 | -Infinity | -1.46 |
| Note 2 | dBm/15 KHz | 1, 2 | -98 | | | |
| Note 2 | dBm/SCS | 1 | -89 | | | |
|  |  | 2 | -86 | | | |
| SS-RSRP | dBm/SCS | 1 | -85 | -85 | -Infinity | -85 |
| 2 | -82 | -82 | -Infinity | -82 |
|  | dB | 1, 2 | 4 | 4 | -Infinity | 4 |
|  | dBm/95.04MHz | 1 | -54.53 | -52.18 | -54.53 | -52.18 |
| 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  to be fulfilled.  Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | | |

##### A.7.6.2.x2.2 Test Requirements

In test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,

- 30.72s for a UE supporting power class 2, 3 and 4est

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

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

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.















----------------------------------------------------- End of Change 24 ------------------------------------------------------------

# UE specific CBW change

----------------------------------------------------- Beginning of Change 25 (R4-2017218)-------------------------------------------

## A.3.x Channel bandwidth (CBW) configurations

### A.3.x.1 DL UE specific CBW

Table A.3.x.1-1: DL CBW patterns for UE specific CBW configuration

|  |  |  |  |
| --- | --- | --- | --- |
| BWP Parameters | Unit | Values | |
| Reference CBW |  | DLCBW.1.1 | DLCBW.1.2 |
| OffsetToCarrier | RB | 0 | RBx Note 1 |
| carrierBandwidth | RB | Same as RF channel defined in each test | Same as RF channel defined in each test |
| Note 1: RBx is offset in frequency domain between Point A (lowest subcarrier of common RB 0) and the lowest usable subcarrier on this carrier. Note that RBx has to be within the CBW of BS. | | | |

----------------------------------------------------- End of Change 25 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 26 (R4-2017217)-------------------------------------------

### A.4.5.x UE specific CBW change

#### A.4.5.x.1 UE specific CBW change on FR1 NR PSCell with non-DRX in synchronous EN- DC

##### A.4.5.x.1.1 Test Purpose and Environment

The purpose of this test is to verify the UE specific CBW change delay requirement defined in clause 8.13.1. Supported test configurations are shown in Table A.4.5.x.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one NR PSCell (Cell 2) as given in Table A.4.5.x.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell are specified in Table A.4.5.x.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and to Cell 2 (PSCell) on radio channel 2 (PSCC).

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PSCell).

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 of initial condition in PSCell.

- UE is indicated in *SCS-SpecificCarrier* that the active CBW is CBW-1 of initial condition in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated CBW configuration, sent from the test equipment to the UE, is completely received at the UE side in PSCell’s slot # denoted *i*. The UE shall reconfigure its CBW with the updated CBW of final condition.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell’s DL slot (*i+* ) as defined in clause 8.13.1 and be ready for the reception of uplink grant for the PSCell no later than at the beginning of the DL slot right after slot (*i+* ). The UE shall be continuously scheduled on PSCell’s BWP-1 of CBW-1 starting from the beginning of the DL slot right after slot (*i+* ).

*TRRCprocessingDelay* and *TCBWchangeDelayRRC* are defined in clause 8.13.1.

The test equipment verifies the UE specific CBW change time in PSCell by counting the time from the time when the RRC Reconfiguration message including updated CBW configurationis sent till the time when RRC Reconfiguration Complete message is received.

Table A.4.5.x.1.1-1: UE specific CBW change supported test configurations

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

**Table A.4.5.x.1.1-2: General test parameters for UE specific CBW change in synchronous EN-DC**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | PSCell on RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on PSCC. |
| Cell2 timing offset to cell1 | μs | 3 | Synchronous EN-DC |
| T1 | s | [0.2] |  |

A.4.5.x.1.1-3: NR Cell specific test parameters for UE specific CBW change in synchronous EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 |
| Frequency Range | | |  | FR1 |
| Duplex mode | | Config 1,4 |  | FDD |
|  | | Config 2,3,5,6 |  | TDD |
| TDD configuration | | Config 1,4 |  | Not Applicable |
|  | | Config 2,5 |  | TDDConf.1.1 |
|  | | Config 3,6 |  | TDDConf.1.2 |
| BWchannel | | Config 1,4 |  | 10 MHz: NRB,c = 52 |
|  | | Config 2,5 |  | 10 MHz: NRB,c = 52 |
|  | | Config 3,6 |  | 40 MHz: NRB,c = 106 |
| Active DL BWP ID | | |  | 1 |
| Initial DL BWP | | Config 1,4 |  | DLBWP.0.2 |
| Configuration (BWP-1) before and after UE specific CBW change | | Config 2,5 |  |  |
|  | | Config 3,6 |  |  |
| Initial UL BWP | | Config 1,4 |  | ULBWP.0.2 |
| Configuration before and after UE specific CBW change | | Config 2,5 |  |  |
|  | | Config 3,6 |  |  |
| Initial | Active DL | Config 1,4 |  | DLCBW.1.1 |
| Condition | CBW-1 | Config 2,5 |  |
|  | Configuration | Config 3,6 |  |
| Final | Active DL | Config 1,4 |  | DLCBW.1.2 |
| Condition | CBW-1 | Config 2,5 |  |
|  | Configuration | Config 3,6 |  |
| PDSCH Reference | | Config 1,4 |  | SR.1.1 FDD |
| measurement channel | | Config 2,5 |  | SR.1.1 TDD |
|  | | Config 3,6 |  | SR2.1 TDD |
| RMSI CORESET | | Config 1,4 |  | CR.1.1 FDD |
| parameters | | Config 2,5 |  | CR.1.1 TDD |
|  | | Config 3,6 |  | CR2.1 TDD |
| Dedicated CORESET | | Config 1,4 |  | CCR.1.1 FDD |
| parameters | | Config 2,5 |  | CCR.1.1 TDD |
|  | | Config 3,6 |  | CCR.2.1 TDD |
| OCNG Patterns | | |  | OP.1 |
| SSB Configuration | | Config 1,2,4,5 |  | SSB.1 FR1 |
|  | | Config 3,6 |  | SSB.2 FR1 |
| SMTC Configuration | | |  | SMTC.1 |
| TRS Configuration | | Config 1,4 |  | TRS.1.1 FDD |
|  | | Config 2,5 |  | TRS.1.1 TDD |
|  | | Config 3,6 |  | TRS.1.2 TDD |
| Antenna Configuration | | |  | 1x2 |
| Propagation Condition | | |  | AWGN |
| EPRE ratio of PSS to SSS | | |  |  |
| EPRE ratio of PBCH DMRS to SSS | | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | | | dB | 0 |
| EPRE ratio of PDSCH DMRS to SSS | | |  |  |
| EPRE ratio of PDSCH to PDSCH | | |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |  |  |
| NocNote 2 | | | dBm/15 kHz | [-104] |
| SS-RSRP Note 3 | | | dBm/15 kHz | [-87] |
| Ês/Iot | | | dB | 17 |
| Ês/Noc | | | dB | 17 |
| IoNote3 | | Config 1,2,4,5 | dBm/9.36MHz | [-59] |
|  | | Config 3,6 | dBm/38.16MHz | [-61.9] |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | | |

##### A.4.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PSCell in the beginning of the DL slot right after slot (*i+* ).

All of the above test requirements shall be fulfilled in order for the observed PSCell UE specific CBW change delay to be counted as correct.

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

----------------------------------------------------- End of Change 26 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 27 (R4-2017219)-------------------------------------------

### A.5.5.x UE specific CBW change

#### A.5.5.x.1 UE specific CBW change on FR2 NR PSCell

##### A.5.5.x.1.1 Test Purpose and Environment

The purpose of this test is to verify the UE specific CBW change delay requirement defined in clause 8.13. Supported test configurations are shown in Table A.5.5.x.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one NR PSCell (Cell 2) as given in Table A.5.5.x.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell are specified in Table A.5.5.X.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and to Cell 2 (PSCell) on radio channel 2 (PSCC).

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 2 (PSCell).

- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 of initial condition in PSCell.

- UE is indicated in *SCS-SpecificCarrier* that the active CBW is CBW-1 of initial condition in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* which reconfigure the UE specific CBW parameter, sent from the test equipment to the UE, is received at the UE side in PSCell’s slot # denoted *i*. The UE shall reconfigure its UE specific CBW with the updated UE specific CBW of final condition.

The UE shall be able to completely receive PDSCH at the beginning of the DL slot right after PSCell’s DL slot (*i+*) as defined in clause 8.13 and be ready for the reception of uplink grant for the PSCell no later than at the beginning of the DL slot right after slot (*i+*). The UE shall be continuously scheduled on PSCell’s BWP-1 starting from the beginning of the DL slot right after slot (*i+*).

*TRRCprocessingDelay* and *TCBWchangeDelayRRC* are defined in clause 8.13.

The test equipment verifies the UE specific CBW change switch time in PSCell by counting the time from the time when the RRC Reconfiguration message including updated UE specific CBW configuration is sent till the time when RRC Reconfiguration Complete message is received.

Table A.5.5.x.1.1-1: UE specific CBW change supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

Table A.5.5.x.1.1-2: General test parameters for UE specific CBW change in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| E-UTRA RF Channel Number |  | 1 | One E-UTRA radio channel is used for this test |
| NR RF Channel Number |  | 2 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Active PSCell |  | Cell 2 | PSCell on RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on PSCC. |
| Cell2 timing offset to cell1 | μs | 3 | Synchronous EN-DC |
| T1 | s | [0.2] |  |

Table A.5.5.x.1.1-3: NR Cell specific test parameters for UE specific CBW change in synchronous EN-DC

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 |
| Frequency Range | |  | FR2 |
| Duplex mode | |  | TDD |
| TDD configuration | |  | TDDConf.3.1 |
| BWchannel | |  | 100 MHz: NRB,c = 66 |
| Active BWP ID | |  | 1 |
| Initial DL BWP Configuration | |  | DLBWP.0.2 |
| Initial UL BWP Configuration | |  | ULBWP.0.2 |
| Active DL BWP Configuration | |  | DLBWP.1.3 |
| Active UL BWP Configuration | |  | DLBWP.1.3 |
| Initial Condition | Active DL  CBW-1  Configuration |  | DLCBW.1.1 |
|  |
| Final Condition | Active DL  CBW-1  Configuration |  | DLCBW.1.2 |
|  |
| PDSCH Reference measurement channel | |  | SR.3.1 TDD |
| RMSI CORESET parameters | |  | CR.3.1 TDD |
| Dedicated CORESET parameters | |  | CCR.3.1 TDD |
| OCNG Patterns | |  | OP.1 |
| SSB Configuration | |  | SSB.1 FR2 |
| SMTC Configuration | |  | SMTC.1 |
| TCI State | |  | TCI.State.0 |
| TRS Configuration | |  | TRS.2.1 TDD |
| Antenna Configuration | |  | 1x2 |
| Propagation Condition | |  | AWGN |
| EPRE ratio of PSS to SSS | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | |  |  |
| EPRE ratio of PBCH to PBCH DMRS | |  |  |
| EPRE ratio of PDCCH DMRS to SSS | |  |  |
| EPRE ratio of PDCCH to PDCCH DMRS | |  |  |
| EPRE ratio of PDSCH DMRS to SSS | |  |  |
| EPRE ratio of PDSCH to PDSCH | |  |  |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3]. | | | |

Table A.5.5.x.1.1-4: OTA related test parameters for UE specific CBW change test case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 |
| Angle of arrival configuration | |  | Setup 1 according to table A.3.15 |
| Assumption for UE beamsNote 5 | |  | Fine |
| Note1 | NR\_TDD\_FR2\_A | dBm/15kHz | -112 |
|  | NR\_TDD\_FR2\_B |  |  |
|  | NR\_TDD\_FR2\_F |  |  |
|  | NR\_TDD\_FR2\_G |  |  |
|  | NR\_TDD\_FR2\_T |  |  |
|  | NR\_TDD\_FR2\_Y |  |  |
| Note1 | NR\_TDD\_FR2\_A | dBm/SCS | -103 |
|  | NR\_TDD\_FR2\_B |  |  |
|  | NR\_TDD\_FR2\_F |  |  |
|  | NR\_TDD\_FR2\_G |  |  |
|  | NR\_TDD\_FR2\_T |  |  |
|  | NR\_TDD\_FR2\_Y |  |  |
| SS-RSRPNote2 | NR\_TDD\_FR2\_A | dBm/SCS Note3 | -85 |
|  | NR\_TDD\_FR2\_B |  |  |
|  | NR\_TDD\_FR2\_F |  |  |
|  | NR\_TDD\_FR2\_G |  |  |
|  | NR\_TDD\_FR2\_T |  |  |
|  | NR\_TDD\_FR2\_Y |  |  |
|  | | dB | 18 |
| IoNote2 | NR\_TDD\_FR2\_A | dBm/95.04 MHz | -56 |
|  | NR\_TDD\_FR2\_B | Note4 |  |
|  | NR\_TDD\_FR2\_F |  |  |
|  | NR\_TDD\_FR2\_G |  |  |
|  | 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  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | |

##### A.5.5.x.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PSCell in the beginning of the DL slot right after slot (*i+*).

All of the above test requirements shall be fulfilled in order for the observed PSCell UE specific CBW change switch delay to be counted as correct.

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

----------------------------------------------------- End of Change 27 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 28 (R4-2017220)-------------------------------------------

A.6.5.x UE specific CBW change

#### A.6.5.x.1 UE specific CBW change on PCell in FR1 in non-DRX

##### A.6.5.x.1.1 Test Purpose and Environment

The purpose of this test is to verify the UE specific CBW change delay requirement defined in clause 8.13.

The supported test configurations are shown in Table A.6.5.x.1.1-1. The test scenario comprises of one Cell (Cell 1), which is PCell as given in Table A.6.5.x.1.1-2. Cell-specific parameters are specified in Table A.6.5.x.1.1-3.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE sends ACK/NACK during the test.

Before the test starts:

* UE is connected to Cell 1 (PCell) on radio channel 1.
* UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).
* UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWPis BWP-1 of initial condition in PCell.
* UE has been configured with UE specific CBW (CBW-1).
* UE is indicated in *SCS-SpecificCarrier* [2] that the UE specific CBW is CBW-1 as the initial condition in Cell 1 (PCell).

Cell1 (PCell) has constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* containing *SCS-SpecificCarrier* with updated UE specific CBW, sent from the test equipment to the UE, is completely received at the UE side in PCell’s slot # denoted *i*. The UE shall reconfigure its UE specific CBW with the updated CBW-2 for the final condition.

The UE shall be able to receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot as defined in clause 8.13 and starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot on the PCell’s BWP-1 on CBW-2 for the final condition. The UE shall be continuously scheduled on the PCell’s BWP-1 on CBW-2 for the final condition starting from the first DL slot right after slot .

and are defined in clause 8.13.

The test equipment verifies the UE specific CBW switching delay in PCell by estimating the time from the moment the RRC Reconfiguration message including updated UE specific CBW configuration is sent until the moment a vaild ACK/NACK is received.

Table A.6.5.x.1.1-1: Supported test configurations for UE specific CBW change in SA scenario

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

Table A.6.5.x.1.1-2: General test parameters for UE specific CBW change in SA scenario

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| Active Cell |  | Cell 1 | Cell on RF channel number 1. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| T1 | s | 0.2 |  |

Table A.6.5.x.1.1-3: NR Cell specific test parameters for UE specific CBW change in SA scenario

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | | Unit | Cell 1 |
| Frequency Range | | | |  | FR1 |
| Duplex mode | | Config 1 | |  | FDD |
| Config 2,3 | | TDD |
| TDD configuration | | Config 1 | |  | Not Applicable |
| Config 2 | | TDDConf.1.1 |
| Config 3 | | TDDConf.2.1 |
| BWchannel | | Config 1 | |  | 10 MHz: NRB,c = 52 |
| Config 2 | | 10 MHz: NRB,c = 52 |
| Config 3 | | 40 MHz: NRB,c = 106 |
| Active DL BWP ID | | Config 1,2, 3 | |  | 1 |
| Initial DL BWP Configuration (BWP-1) | | Config 1,2, 3 | |  | DLBWP.0.2 |
| Initial UL BWP Configuration | | Config 1,2, 3 | |  | ULBWP.0.2 |
| Initial Condition | CBW-1 | Config 1, 2, 3 | |  | DLCBW.1.1 |
| Final Condition | CBW-1 | Config 1, 2, 3 | |  | DLCBW.1.2 |
| PDSCH Reference measurement channel | | Config 1 | |  | SR.1.1 FDD |
| Config 2 | | SR.1.1 TDD |
| Config 3 | | SR2.1 TDD |
| RMSI CORESET parameters | | Config 1 | |  | CR.1.1 FDD |
| Config 2 | | CR.1.1 TDD |
| Config 3 | | CR2.1 TDD |
| Dedicated CORESET parameters | | Config 1 | |  | CCR.1.1 FDD |
| Config 2 | | CCR.1.1 TDD |
| Config 3 | | CCR.2.1 TDD |
| OCNG Patterns | | | |  | OP.1 |
| SSB Configuration | | Config 1,2 | |  | SSB.1 FR1 |
| Config 3 | | SSB.2 FR1 |
| SMTC Configuration | | | |  | SMTC.1 |
| TRS Configuration | | | Config 1 |  | TRS.1.1 FDD |
| Config 2 |  | TRS.1.1 TDD |
| Config 3 |  | TRS.1.2 TDD |
| Antenna Configuration | | | |  | 1x2 Low |
| Propagation Condition | | | |  | AWGN |
| EPRE ratio of PSS to SSS | | | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | | | |
| EPRE ratio of PBCH to PBCH DMRS | | | |
| EPRE ratio of PDCCH DMRS to SSS | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | | |
| EPRE ratio of PDSCH DMRS to SSS | | | |
| EPRE ratio of PDSCH to PDSCH | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | | |
| EPRE ratio of OCNG to OCNG DMRS(Note 1) | | | |
| NocNote 2 | | Config 1,2 | | dBm/SCS | -104 |
| Config 3 | | -101 |
| SS-RSRP Note 3 | | Config 1,2 | | dBm/SCS | -87 |
| Config 3 | | -84 |
| Ês/Iot | | | | dB | 17 |
| Ês/Noc | | | | dB | 17 |
| IoNote3 | | Config 1,2 | | dBm/  9.36MHz | -58.96 |
| Config 3 | | dBm/  38.16MHz | -52.86 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.1 is linked with ULBWP.0.1; DLBWP.1.1 is linked with ULBWP.1.1; as defined in clause 12 of TS 38.213 [3]. | | | | | |

##### A.6.5.x.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for the PCell from the first DL slot that occurs right after the begining of slot and starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot.

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed UE specific CBW change delay on the PCell to be counted as correct.

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

----------------------------------------------------- End of Change 28 ------------------------------------------------------------

----------------------------------------------------- Beginning of Change 29 (R4-2017218)------------------------------------------

### A.7.5.x UE specific CBW change

#### A.7.5.x.1 NR FR2 UE specific CBW change of PCell with non-DRX in SA

##### A.7.5.x.1.1 Test Purpose and Environment

The purpose of this test is to verify the UE specific CBW change delay requirement defined in clause 8.13. Supported test configurations are shown in Table A.7.5.x.1.1-1.

The test scenario comprises of one PCell (Cell 1) as given in Table A.7.5.x.1.1-2. Cell-specific parameters of PCell are specified in Table A.7.5.x.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK transmission.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).

- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).

- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 of initial condition in PCell.

- UE has been configured with UE-specific CBW (CBW-1)

- UE is indicated in SCS-SpecificCarrier [2] that the UE-specific CBW is CBW-1 as the initial condition in Cell 1 (PCell).

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated CBW configuration, sent from the test equipment to the UE, is received at the UE side in PCell’s slot # denoted *i*. The UE shall reconfigure its CBW with the updated CBW of final condition.

The UE shall be able to completely receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot as defined in clause 8.13.2 and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot. The UE shall be continuously scheduled on PCell’s new CBW starting from the first DL slot that occurs after the beginning of DL slot .

*TRRCprocessingDelay* and *TCBWchangeDelayRRC* are defined in clause 8.13.

The test equipment verifies the UE specific CBW switch time in PCell by counting the time from the time when the RRC Reconfiguration message including updated CBW configurations sent till the time when RRC Reconfiguration Complete message is received.

**Table A.7.5.x.1.1-1: UE specific CBW change supported test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations | |

**Table A.7.5.x.1.1-2: General test parameters for UE specific CBW change in NR SA**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| NR RF Channel Number |  | 1 | One NR radio channel is used for this test |
| Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| T1 | s | [0.2] |  |

**Table A.7.5.x.1.1-3: NR Cell specific test parameters for UE specific CBW change in NR SA**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** |
| Frequency Range | |  | FR2 |
| Duplex mode | |  | TDD |
| TDD configuration | |  | TDDConf.3.1 |
| BWchannel | |  | 100 MHz: NRB,c = 66 |
| Active DL BWP ID | |  | 1 |
| Initial DL BWP Configuration (BWP-1) | |  | DLBWP.0.2 |
| Initial UL BWP Configuration | |  | ULBWP.0.2 |
| Initial Condition | Active DL CBW-1 Configuration |  | DLCBW.1.1 |
| Final Condition | Active DL CBW-1 Configuration |  | DLCBW.1.2 |
| 'PDSCH Reference measurement channel | |  | SR.3.1 TDD |
| RMSI CORESET parameters | |  | CR.3.1 TDD |
| Dedicated CORESET parameters | |  | CCR.3.1 TDD |
| OCNG Patterns | |  | OP.1 |
| SSB Configuration | |  | SSB.1 FR2 |
| SMTC Configuration | |  | SMTC.1 |
| TCI State | |  | TCI.State.0 |
| TRS Configuration | |  | TRS.2.1 TDD |
| Antenna Configuration | |  | 1x2 |
| Propagation Condition | |  | AWGN |
| EPRE ratio of PSS to SSS | | dB | 0 |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

**Table A.7.5.x.1.1-4: OTA related test parameters for UE specific CBW change test case**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** |
| Angle of arrival configuration | |  | Setup 1 according to table A.3.15 |
| Assumption for UE beams Note 5 | |  | Fine |
| Note1 | NR\_TDD\_FR2\_A | dBm/15kHz | -112 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| Note1 | NR\_TDD\_FR2\_A | dBm/SCS | -103 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
| SS-RSRPNote2 | NR\_TDD\_FR2\_A | dBm/SCS Note3 | -85 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| NR\_TDD\_FR2\_T |
| NR\_TDD\_FR2\_Y |
|  | | dB | 18 |
| IoNote2 | NR\_TDD\_FR2\_A | dBm/95.04 MHz Note4 | -56 |
| NR\_TDD\_FR2\_B |
| NR\_TDD\_FR2\_F |
| NR\_TDD\_FR2\_G |
| 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  to be fulfilled.  Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation. | | | |

##### A.7.5.x.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell from the first DL slot that occurs after the beginning of slot and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot.

Where, *k1* is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed PCell UE specific CBW change delay to be counted as correct.

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

----------------------------------------------------- End of Change 29 ------------------------------------------------------------