**3GPP TSG-RAN WG4 Meeting #108bis R4-2316575**

**Xiamen, China, October 9 – 13, 2023**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** | - | **Current version:** |  |  |
|  | | | | | | | | |
| *For* [***HE******LP***](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:*** | CR on RRM test cases with testability issues - R17 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Apple | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI15\_Test, 5GS\_NR\_LTE-UEConTest | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | RAN4 received an LS from RAN5 (R4-2311012) on identified test cases with testability issue. After discussion, RAN4 agreed to update the principle of testing accordingly.  PUCCH SCell activation test cases are in wrong place with overlapping section number. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Update the lists of test cases UE does not have to pass in EN-DC and SA. 2. Move PUCCH SCell activation test cases from A.5.3.3 (for HO) to A.5.5.3 (for SCell activation) | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The lists of test cases UE does not have to pass in EN-DC and SA would still be incomplete.  PUCCH SCell activation test cases would still be in wrong place with overlapping section number. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.3.13, A.5.5.3.3, A.5.5.3.4, A.5.5.3.5, A.5.5.3.6, (new) A.5.5.3.9, (new) A.5.5.3.10, (new) A.5.5.3.11, (new) A.5.5.3.12 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

Start of Change 1

## A.3.13 Test Cases in SA and EN-DC Operations

### A.3.13.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements in standalone (SA) or EN-DC operations.

In Annex A test cases may be defined in SA and EN-DC operations to verify the same RRM requirement.

*Editor’s note: this clause may need to define further for NE-DC and NR-DC test cases, which subjects to the test cases defined in the future.*

### A.3.13.2 Principle of Testing

If test cases are defined in both SA and EN-DC operations to verify the same RRM requirement then the UE capable of both SA and EN-DC operations needs to verify that RRM requirement by performing test case(s) in either SA operation or in EN-DC operation.

If test cases are defined in both SA and EN-DC operations to verify at least one common RRM requirement then the UE capable of both SA and EN-DC operations needs to verify RRM requirements by performing test case(s) in either SA operation or in EN-DC operation provided that the performed test case(s):

- verifies the largest number of RRM requirements and

- verifies at least all RRM requirements covered in the test case(s), which is not performed.

## A.3.13A Test Cases involving E-UTRA/FR1 and FR2 carriers

### A.3.13A.1 Introduction

The following applies to UE compliant to this version of the specification when undergoing tests with a mix of E-UTRA/NR FR1 and NR FR2 carriers in clauses A.5, A.7 and A.8.

### A.3.13A.2 Principle of Testing in EN-DC

For test cases in clause A.5 listed in Table A.3.13A.2-1, the following applies:

- UE does not have to pass the test case.

Table A.3.13A.2-1: Test cases UE does not have to pass in current version of specification (EN-DC)

|  |  |
| --- | --- |
| Clause | Test case slogan |
| A.5.3.3.1 | Handover with PSCell with known FR2 target PSCell |
| A.5.5.2.7 | E-UTRAN – NR FR2 interruptions at E-UTRA SRS carrier based switching |
| A.5.5.3.2 | SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle |
| A.5.5.3.5 | SCell Activation and deactivation of SCell in FR2 |
| A.5.5.3.6 | Multiple SCell Activation and deactivation of one unknown SCell and one known SCell in FR2 |
| A.5.5.3.9 | PUCCH SCell Activation and deactivation of known SCell in FR2 |
| A.5.5.3.10 | PUCCH SCell Activation and deactivation of unknown SCell in FR2 |
| A.5.5.3.11 | Multiple SCell activation and deactivation of one known PUCCH SCell and one unknown SCell in FR2 |
| A.5.5.3.12 | SCell Activation and deactivation of unknown PUCCH SCell and unknown DL SCell in FR2 in non-DRX |
| A.5.5.6.1.2 | E-UTRAN – NR PSCell FR2 with FR2 SCell DL active BWP switch in non-DRX in synchronous EN-DC |
| A.5.5.6.4.2 | E-UTRAN – NR FR1 PSCell SCell dormancy switch of two FR2 SCells outside active time |
| A.5.6.2.5 | EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used |
| A.5.6.2.6 | EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used |
| A.5.6.2.7 | EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used |
| A.5.6.2.8 | EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used |
| A.5.7.1.3 | EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell |

### A.3.13A.3 Principle of Testing in SA

For test cases in clause A.7 listed in Table A.3.13A.3-1, the following applies:

- UE does not have to pass the test case.

- UE does not have to pass the test case.

Table A.3.13A.3-1: Test cases UE does not have to pass in current version of specification (SA)

|  |  |
| --- | --- |
| Clause | Test case slogan |
| A.7.3.1.1 | Inter-frequency handover from FR1 to FR2; unknown target cell |
| A.7.3.1.4 | Inter-band inter-frequency synchronous DAPS handover from FR1 to FR2 |
| A.7.3.1.5 | Inter-band inter-frequency asynchronous DAPS handover from FR1 to FR2 |
| A.7.3.1.6 | Handover with PSCell from SA to EN-DC; unknown FR2 target cell |
| A.7.3.1.7 | HO with PSCell from FR1 NR-SA to EN-DC with known E-UTRA PCell and known FR2 PSCell |
| A.7.3.1.8 | NR PSCell change delay in HO with PSCell from NR-DC to NR-DC |
| A.7.3.1.11 | Inter-frequency handover from FR1 to FR2-2; unknown target cell |
| A.7.5.3.2 | SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2 |
| A.7.5.3.6 | PUCCH SCell activation and deactivation for FR1+FR2 inter-band with target SCell in FR2 and known |
| A.7.5.3.7 | PUCCH SCell activation and deactivation delay requirements of FR2 unknown cell with FR1 PCell |
| A.7.5.6.1.2 | NR FR1- NR FR2 DL active BWP switch of PCell with non-DRX in SA |
| A.7.5.6.4.2 | NR FR1 PCell SCell dormancy switch of two FR2 SCells outside active time |
| A.7.5.7.1 | Addition and Release Delay of known NR PSCell |
| A.7.5.7.2 | Addition and Release Delay of unknown NR PSCell |
| A.7.5.7.3 | Addition and Release Delay of known NR PSCell in FR2-2 |
| A.7.5.7.4 | Addition and Release Delay of unknown NR PSCell in FR2-2 |
| A.7.5.12.1 | Addition and Release Delay of PSCell |
| A.7.5.14 | PSCell RACH-less based Activation and deactivation for FR1+FR2 inter-band with target PSCell in FR2 |
| A.7.6.2.5 | SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not used (PCell in FR1) |
| A.7.6.2.6 | SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used (PCell in FR1) |
| A.7.6.2.7 | SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used (PCell in FR1) |
| A.7.6.2.8 | SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used (PCell in FR1) |
| A.7.6.2.16 | SA event triggered reporting tests for FR2-2 without SSB time index detection when DRX is not used (PCell in FR1) |
| A.7.6.2.17 | SA event triggered reporting tests for FR2-2 without SSB time index detection when DRX is used (PCell in FR1) |
| A.7.6.2.18 | SA event triggered reporting tests for FR2-2 with SSB time index detection when DRX is not used (PCell in FR1) |
| A.7.6.2.19 | SA event triggered reporting tests for FR2-2 with SSB time index detection when DRX is used (PCell in FR1) |
| A.7.6.3.6 | Inter-cell SSB based L1-RSRP measurements on FR2 SCell when DRX is not used |
| A.7.7.1.3 | SA inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell |

End of Change 1

Start of Change 2

#### A.5.3.3 Handover with PSCell with known FR2 target PSCell

#### <<Unchanged sections omitted>>

#### A.5.5.3.3 void















#### A.5.5.3.4 void















#### A.5.5.3.5 void















#### A.5.5.3.6 void















End of Change 2

Start of Change 3

#### A.5.5.3.9 PUCCH SCell Activation and deactivation of known SCell in FR2

##### A.5.5.3.9.1 Test Purpose and Environment

The purpose of this test is to verify that the PUCCH SCell activation and deactivation times are within the requirements stated in clause 8.3, when the PUCCH SCell is in FR2.

The supported test configurations are shown in table A.5.5.3.9.1-1 below. The test parameters are the same as in clause A.4.5.3.3.1 except those described in the following clause. The listed parameter values in Tables A.5.5.3.9.1-2 will replace the values of corresponding parameters in Tables A.4.5.3.3.1-2. The listed parameter values in Tables A.5.5.3.9.1-3 will replace the values of corresponding parameters in Tables A.4.5.3.3.1-3. In this case, OTA related test parameters are shown in table A.5.5.3.9.1-4 below.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell (Cell 1), and NR has two cells, PSCell (Cell 2) in FR1 and PUCCH SCell (Cell 3) in FR2. Cell 1 and Cell 2 have constant signal levels throughout the test. Cell1, Cell2 and Cell 3 are in primary Timing Advance Group (pTAG). UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment for sTAG.

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 (PUCCH 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 PUCCH SCell (Cell 3) becomes configured on NR. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the PUCCH SCell.

The point in time at which the MAC message is received at the UE antenna connector provided that the HARQ ACK of the MAC message is received by TE, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI on for the activated PUCCH SCell on PUCCH SCell at latest in slot, as defined in clause 8.3.

Time period T3 starts when a MAC message for deactivation of PUCCH SCell, sent from the test equipment to the UEin a slot # denoted m, is received at the UE antenna connector provided that the HARQ ACK of the MAC message is received by TE. The UE shall carry out deactivation of the PUCCH SCell in a slot , 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 of PUCCH SCell, respectively.

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

Table A.5.5.3.9.1-1: FR2 SCell activation in non-DRX test configurations with FR1 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 5 | LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.5.5.3.9.1-2: General test parameters for FR2 SCell activation case with FR1 PSCell

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| Active PCell |  | Cell 1 | Primary cell on E-UTRAN RF channel number 1.  As specified in clause A.3.7.2.2 |
| T2 | s | 2 | During this time the UE shall activate the SCell. |

Table A.5.5.3.9.1-3: Cell specific test parameters for FR2 SCell activation case with FR1 PSCell

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** | | | **Cell 3** | | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | | **T3** |
| SSB ARFCN | |  | freq1 | | | freq2 | | | |
| Duplex mode | Config 1,4 |  | FDD | | | TDD | | | |
| Config 2,3,5,6 | TDD | | | TDD | | | |
| TDD configuration | Config 1,4 |  | Not Applicable | | | TDDConf.3.1 | | | |
| Config 2,5 | TDDConf.1.1 | | |
| Config 3,6 | TDDConf.2.1 | | |
| BWchannel | Config 1,4 | MHz | 10: NRB,c = 52 | | | 100: NRB,c = 66 | | | |
| Config 2,5 | 10: NRB,c = 52 | | |
| Config 3,6 | 40: NRB,c = 106 | | |
| Data RBs allocated | Config 1,4 |  | 52 | | | 66 | | | |
|  | Config 2,5 |  | 52 | | |  | | | |
|  | Config 3,6 |  | 106 | | |  | | | |
| BWP BW | Config 1,4 |  | 10: NRB,c = 52 | | | 100: NRB,c = 66 | | | |
| Config 2,5 | 10: NRB,c = 52 | | |
| Config 3,6 | 40: NRB,c = 106 | | |
| DRx Cycle | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | Config 1,4 |  | SR.1.1 FDD | | | SR.3.1 TDD | | | |
| Config 2,5 | SR.1.1 TDD | | |
| Config 3,6 | SR.2.1 TDD | | |
| RMSI CORESET Reference Channel | Config 1,4 |  | CR.1.1 FDD | | | CR.3.1 TDD | | | |
| Config 2,5 | CR.1.1 TDD | | |
| Config 3,6 | CR.2.1 TDD | | |
| RMC CORESET Reference Channel | Config 1,4 |  | CCR.1.1 FDD | | | CCR.3.1 TDD | | | |
| Config 2,5 |  | CCR.1.1 TDD | | |
| Config 3,6 |  | CCR.2.1 TDD | | |
| OCNG Patterns | |  | OP.1 | | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | | |
| TCI state | |  | NA | | | TCI.State.0 | | | |
| TRS configuration | Config 1,4 |  | TRS.2.1 TDD | | | TRS.2.1 TDD | | | |
| Config 2,5 |  | TRS.1.1 TDD | | |
| Config 3,6 |  | TRS.1.2 TDD | | |
| SSB configuration | Config 1,2,4,5 |  | SSB.1 FR1 | | | SSB.1 FR2 | | | |
| Config 3,6 | SSB.2 FR1 | | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,4,5 | kHz | 15 kHz | | | 120 kHz | | | |
| Config 3,6 | 30 kHz | | |
| CSI-RS configuration | Config 1~6 |  | NA | | | NA | | CSI-RS.3.1 TDD Note 5 | |
| reportConfigType | Config 1~6 |  | NA | | | periodic | | | |
| reportQuantity | Config 1~6 |  | NA | | | cri-RI-PMI-CQI | | | |
| CSI reporting periodicity Note 6 | Config 1~6 | slot | NA | | | 40 | | | |
| CSI reporting offset | Config 1~6 | slot | NA | | | 4 | | | |
| 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 | | - | N/A  Link only, see clause A.3.7A | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.  Note 5: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 6: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | |

Table A.5.5.3.9.1-4: OTA related test parameters for FR2 SCell activation case with FR1 PSCell

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 | | | Cell 3 | | | | |
|  | | |  | T1 | T2 | T3 | T1 | T2 | | T3 | |
| Angle of arrival configuration | | |  | NA | | | Setup 1 according to clause A.3.15.1 | | | | |
| Assumption for UE beamsNote 7 | | |  | NA | | | Rough | | | | |
| Note1 | | | dBm/15kHz |  | | | -104.7 | | | | |
| Note1 | | Config 1,2,4,5 | dBm/SCS |  | | | -95.7 | | | | |
|  | | Config 3,6 |  |  | | |  | | | | |
| SSB\_RPNote2 | | Config 1,2,4,5 | dBm/SCS Note3 | Link only, see clause | | | -88.7 | | -88.7 | | -88.7 |
|  | | Config 3,6 |  | A.3.7A | | |
|  | Config 1,2,3,4,5,6 | | dB |  | | | 7 | | 7 | | 7 |
|  | | | dB |  | | | 7 | | 7 | | 7 |
| IoNote2, Note 4 | Config 1,2,4,5 | | dBm/95.04 MHz |  | | | -58.92 | | -58.92 | | -58.92 |
|  | Config 3,6 | |  |  | | |
| 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  to be fulfilled.  Note 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: Void  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | | | | | | | |

##### A.5.5.3.9.2 Test Requirements

During T2 the UE shall start sending CSI reports for PUCCH SCell with non-zero CQI index at latest in a slot , Tactivation\_time = TFirstSSB+ 5ms, as defined in clause 8.3.

During T3 the UE shall stop sending CSI reports for PUCCH SCell at latest in a slot , as defined in clause 8.3.

All of the above test requirements shall be fulfilled in order for the observed PUCCH SCell activation delay and PUCCH SCell deactivation delay to be counted as correct. The rate of correct observed PUCCH SCell activation delay and PUCCH 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 slot then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

#### A.5.5.3.10 PUCCH SCell Activation and deactivation of unknown SCell in FR2

##### A.5.5.3.10.1 Test Purpose and Environment

The purpose of this test is to verify that the PUCCH SCell activation and deactivation times are within the requirements stated in clause 8.3, when the PUCCH SCell is in FR2.

The supported test configurations are shown in table A.5.5.3.10.1-1 below. The test parameters are the same as in clause A.4.5.3.3.1 except those described in the following clause. The listed parameter values in Tables A.5.5.3.10.1-2 will replace the values of corresponding parameters in Tables A.4.5.3.3.1-2. The listed parameter values in Tables A.5.5.3.10.1-3 will replace the values of corresponding parameters in Tables A.4.5.3.3.1-3. In this case, OTA related test parameters are shown in table A.5.5.3.10.1-4 below.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell (Cell 1), and NR has two cells, PSCell (Cell 2) in FR1 and PUCCH SCell (Cell 3) in FR2. Cell 1 and Cell 2 have constant signal levels throughout the test.

Cell1, Cell2 are in primary Timing Advance Group (pTAG), and Cell3 is in secondary Timing Advance Group (sTAG). The TimeAlignmentTimer of sTAG expires before receiving the activation command.

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 (PUCCH 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 PUCCH SCell (Cell 3) becomes configured on NR.

The point in time at which the MAC message is received at the UE antenna connector provided that the HARQ ACK of the MAC message is received by TE, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI on for the activated PUCCH SCell on PUCCH SCell at latest in slot, as defined in clause 8.3.

Time period T3 starts when a MAC message for deactivation of PUCCH SCell, sent from the test equipment to the UEin a slot # denoted m, is received at the UE antenna connector provided that the HARQ ACK of the MAC message is received by TE. The UE shall carry out deactivation of the PUCCH SCell in a slot , 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 of PUCCH SCell, respectively.

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

Table A.5.5.3.10.1-1: FR2 SCell activation in non-DRX test configurations with FR1 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 5 | LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.5.5.3.10.1-2: General test parameters for FR2 SCell activation case with FR1 PSCell

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| Active PCell |  | Cell 1 | Primary cell on E-UTRAN RF channel number 1.  As specified in clause A.3.7.2.2 |
| T2 | s | 2 | During this time the UE shall activate the SCell. |

Table A.5.5.3.10.1-3: Cell specific test parameters for FR2 SCell activation case with FR1 PSCell

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** | | | **Cell 3** | | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | | **T3** |
| SSB ARFCN | |  | freq1 | | | freq2 | | | |
| Duplex mode | Config 1,4 |  | FDD | | | TDD | | | |
| Config 2,3,5,6 | TDD | | | TDD | | | |
| TDD configuration | Config 1,4 |  | Not Applicable | | | TDDConf.3.1 | | | |
| Config 2,5 | TDDConf.1.1 | | |
| Config 3,6 | TDDConf.2.1 | | |
| BWchannel | Config 1,4 | MHz | 10: NRB,c = 52 | | | 100: NRB,c = 66 | | | |
| Config 2,5 | 10: NRB,c = 52 | | |
| Config 3,6 | 40: NRB,c = 106 | | |
| Data RBs allocated | Config 1,4 |  | 52 | | | 66 | | | |
|  | Config 2,5 |  | 52 | | |  | | | |
|  | Config 3,6 |  | 106 | | |  | | | |
| BWP BW | Config 1,4 |  | 10: NRB,c = 52 | | | 100: NRB,c = 66 | | | |
| Config 2,5 | 10: NRB,c = 52 | | |
| Config 3,6 | 40: NRB,c = 106 | | |
| DRx Cycle | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | Config 1,4 |  | SR.1.1 FDD | | | SR.3.1 TDD | | | |
| Config 2,5 | SR.1.1 TDD | | |
| Config 3,6 | SR.2.1 TDD | | |
| RMSI CORESET Reference Channel | Config 1,4 |  | CR.1.1 FDD | | | CR.3.1 TDD | | | |
| Config 2,5 | CR.1.1 TDD | | |
| Config 3,6 | CR.2.1 TDD | | |
| RMC CORESET Reference Channel | Config 1,4 |  | CCR.1.1 FDD | | | CCR.3.1 TDD | | | |
| Config 2,5 |  | CCR.1.1 TDD | | |
| Config 3,6 |  | CCR.2.1 TDD | | |
| OCNG Patterns | |  | OP.1 | | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | | |
| TCI state | |  | NA | | | TCI.State.0 | | | |
| TRS configuration | Config 1,4 |  | TRS.2.1 TDD | | | TRS.2.1 TDD | | | |
| Config 2,5 |  | TRS.1.1 TDD | | |
| Config 3,6 |  | TRS.1.2 TDD | | |
| SSB configuration | Config 1,2,4,5 |  | SSB.1 FR1 | | | SSB.1 FR2 | | | |
| Config 3,6 | SSB.2 FR1 | | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,4,5 | kHz | 15 kHz | | | 120 kHz | | | |
| Config 3,6 | 30 kHz | | |
| CSI-RS configuration | Config 1~6 |  | NA | | | NA | | CSI-RS.3.1 TDD Note 5 | |
| reportConfigType | Config 1~6 |  | NA | | | periodic | | | |
| reportQuantity | Config 1~6 |  | NA | | | cri-RI-PMI-CQI | | | |
| CSI reporting periodicity Note 6 | Config 1~6 | slot | NA | | | 40 | | | |
| CSI reporting offset | Config 1~6 | slot | NA | | | 4 | | | |
| 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 | | - | N/A  Link only, see clause A.3.7A | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Void  Note 3: Void  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.  Note 5: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 6: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | |

Table A.5.5.3.10.1-4: OTA related test parameters for FR2 SCell activation case with FR1 PSCell

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 | | | Cell 3 | | | | |
|  | | |  | T1 | T2 | T3 | T1 | T2 | | T3 | |
| Angle of arrival configuration | | |  | NA | | | Setup 1 according to clause A.3.15.1 | | | | |
| Assumption for UE beamsNote 7 | | |  | NA | | | Rough | | | | |
| Note1 | | | dBm/15kHz |  | | | -104.7 | | | | |
| Note1 | | Config 1,2,4,5 | dBm/SCS |  | | | -95.7 | | | | |
|  | | Config 3,6 |  |  | | |  | | | | |
| SSB\_RPNote2 | | Config 1,2,4,5 | dBm/SCS Note3 | Link only, see clause | | | -88.7 | | -88.7 | | -88.7 |
|  | | Config 3,6 |  | A.3.7A | | |
|  | Config 1,2,3,4,5,6 | | dB |  | | | 7 | | 7 | | 7 |
|  | | | dB |  | | | 7 | | 7 | | 7 |
| IoNote2, Note 4 | Config 1,2,4,5 | | dBm/95.04 MHz |  | | | -58.92 | | -58.92 | | -58.92 |
|  | Config 3,6 | |  |  | | |
| 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  to be fulfilled.  Note 2: Es/Iot, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 3: Void  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: Void  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation. | | | | | | | | | | | |

##### A.5.5.3.10.2 Test Requirements

During T2 the UE shall start sending CSI reports for PUCCH SCell with non-zero CQI index at latest in a slot , as defined in clause 8.3.

During T3 the UE shall stop sending CSI reports for PUCCH SCell at latest in a slot , as defined in clause 8.3.

All of the above test requirements shall be fulfilled in order for the observed PUCCH SCell activation delay and PUCCH SCell deactivation delay to be counted as correct. The rate of correct observed PUCCH SCell activation delay and PUCCH 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 slot then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

#### A.5.5.3.11 Multiple SCell activation and deactivation of one known PUCCH SCell and one unknown SCell in FR2

##### A.5.5.3.11.1 Test Purpose and Environment

The purpose of this test is to verify that the PUCCH SCell with multiple SCell activation and deactivation delay requirement defined in clause 8.3, and interruption requirement defined in clause 8.2, when one known PUCCH SCell and one unknown SCell to be activated are in FR2.

The supported test configurations are shown in Table A.5.5.3.11.1-1 below. The general test parameters are given in Table A.5.5.3.11.1-2 and cell-specific test parameters in Table A.5.5.3.11.1-3 below. OTA related test parameters are shown in table A.5.5.3.11.1-4.

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 FR2, but is not aware of Cell 3 (PUCCH SCell) or Cell 4 (SCell) on the NR carriers both in FR2. Cell 2 and Cell 4 are in the primary PUCCH group, and Cell 3 is in the secondary PUCCH group. In addition, Cell 2 and Cell 4 are in primary Timing Advance Group (pTAG), and Cell 3 is in the secondary Timing Advance Group (sTAG). 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.

There are two sub tests in this section.

- For Test 1 (valid TA case), UE is provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment for sTAG.

- For Test 2 (invalid TA case), TimeAlignmentTimer of sTAG expires before UE receives the activation command

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

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 both Cell 3 and Cell 4.

During T2, the UE shall be able to report valid CSI on PUCCH SCell for the activated PUCCH SCell at latest in

- slot *m*+ Tactivate\_total\_PUCCH\_SCell as defined in clause 8.3.13.

During T2, the UE shall be able to report valid CSI on PCell for the activated SCell at latest in

- slot *m*+ Tactivate\_total\_other\_SCell. as defined in clause 8.3.13.

Any PCell and PSCell interruption due to activation of PUCCH SCell shall occur in the slot to , as defined in clause 8.3, where is the interruption length given in clause 8.2.

Any PCell and PSCell interruption due to activation of SCell shall occur in the slot to , as defined in clause 8.3, where is the interruption length given in clause 8.2.

Time period T3 starts when a MAC message for deactivation of both 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 PUCCH SCell 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.

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

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

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

Table A.5.5.3.11.1-1: 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.5.5.3.11.1-2: 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 PUCCH SCell |  | Cell 3 | Configured deactivated secondary cell with PUCCH on NR RF channel number 3 in FR2 |
| Configured deactivated SCells |  | Cell 4 | Configured deactivated secondary cell on NR RF channel number 4 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, PUCCH SCell detected but SCell not detected. |
| T2 | s | 1 | During this time the UE shall activate both the SCells. |
| T3 | s | 1 | During this time the UE shall deactivate the SCells. |
| 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.5.5.3.11.1-3: 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.5.5.3.11.1-4: OTA related test parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 2 and 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.5.5.3.11.2 Test Requirements

During T2 the UE shall start sending CSI reports for Cell 3 with non-zero CQI index in the configured slots for CSI reporting no later than slot *m*+ Tactivate\_total\_PUCCH\_SCell , as defined in clause 8.3.

During T2 the UE shall start sending CSI reports for Cell 4 with non-zero CQI index in the configured slots for CSI reporting no later than slot *m*+ Tactivate\_total\_other\_SCell , as defined in clause 8.3.

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 PCell and PSCell during PUCCH SCell activation shall not happen outside the slot to , as defined in clause 8.3.

During T2 interruption of PCell and PSCell during SCell activation shall not happen outside the slot to , as defined in clause 8.3.

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

The interruption on any activated serving cell shall not be more than the summation of interruption length due to PUCCH SCell activation/deactivatoin and interruption length due to SCell activation/deactivatoin, the values of interruption length are specified for EN-DC in clause 8.2.

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

NOTE: During T2 if there are no uplink resources for reporting the valid CSI for PUCCH SCell in a slot *m*+ Tactivate\_total\_PUCCH\_SCell as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI for SCell in a slot *m*+ Tactivate\_total\_other\_SCell as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

#### A.5.5.3.12 SCell Activation and deactivation of unknown PUCCH SCell and unknown DL SCell in FR2 in non-DRX

##### A.5.5.3.12.1 Test Purpose and Environment

The purpose of this test is to verify that the PUCCH SCell and DL SCell activation and deactivation times are within the requirements stated in clause 8.3.13, when the PUCCH SCell in FR2 and DL SCell in FR2 is unknown to the UE at the time of activation.

The supported test configurations are shown in table A.5.5.3.12.1-1 below. The test parameters are given in Tables A.5.5.3.12.1-2 and cell-specific parameters in A.5.5.3.12.1-3 below. OTA related test parameters are shown in table A.5.5.3.12.1-4.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four carriers, each with one 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 Cell3 (PUCCH SCell1) and Cell4(DL SCell2) on the NR carriers both in FR2. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test. SCC of Cell 3 and SCC of Cell 4 are on a same band.

At the beginning of T1 the UE receives an RRC message by which the PUCCH SCell (Cell 3) and DL SCell (Cell 4) becomes 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 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.5.5.3.12.1-1: 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.5.5.3.12.1-2: 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 (PUCCH SCell 1), Cell 4(DL SCell 2) | 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 |
| TimeAlignmentTimer | ms | 1280 | Cell 1 and Cell 2 in pTAG. |
| TimeAlignmentTimerSTAG | ms | 1280 | Cell 3 and Cell 4 in sTAG |
| T1 | s | 7 | During this time the PSCell shall be known and the SCells configured, SCell1 detected but SCell2 not detected. |
| T2 | s | TBD | 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.5.5.3.12.1-3: 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.5.5.3.12.1-4: OTA related test parameters

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 2 | | | Cell 3 | | | Cell 4 | | |
|  |  | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| Angle of arrival configuration |  | NA | | | Setup 1 according to A.3.15.1 | | | | | |
| Assumption for UE beamsNote 7 |  | NA | | | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | Link only, see clause  A.3.7A | | | -112 | | | -112 | | |
| Note1 | dBm/SCSNote3 | -102.97 | | | -102.97 | | |
|  | dB | - | 14 | 14 | - | 14 | 14 |
| SS-RSRPNote2 | dBm/SCS Note4 | - | -88.97 | -88.97 | - | -88.97 | -88.97 |
|  | dB | - | 14 | 14 | - | 14 | 14 |
| IoNote2 | dBm/95.04 MHz Note4 | -73.98 | -59.81 | -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.5.5.3.12.2 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 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.x6.1-2

Tdelay\_multiple\_SCells\_PUCCH\_SCell is defined in section 8.13.13.1. In this test case, both valid TA and invalid TA cases shall be tested.

Test for case when UE has valid TA: the *TimeAlignmentTimer* [2] associated with the TAG containing the PUCCH SCell is running, and Tdelay\_multiple\_SCells\_PUCCH\_SCell = Tactivation\_time\_multiple\_scells + [X]\*Ttarget\_PL\_RS + TCSI\_Reporting .

Test for case when UE do not have valid TA: Tdelay\_multiple\_SCells\_PUCCH\_SCell = Tactivation\_time\_multiple\_scells + max ((TFirst\_available\_CSI + TCSI\_processing), [X]\*Ttarget\_PL\_RS,(T1+T2+T3)) + TCSI\_reporting\_after

Tactivation\_time\_multiple\_scells is the target SCell activation delay in millisecond in multiple SCell activation scenario as specified in section 8.3.7

TCSI\_Reporting = 10ms

- NR slot length is 0.125ms.

During T2 the UE shall start sending CSI reports for 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.x6.1-2

Tdelay\_multiple\_SCells\_other\_SCell = Tactivation\_time\_multiple\_scells +TCSI\_Reporting.

- Tactivation\_time\_multiple\_scells is the target SCell activation delay in millisecond in multiple SCell activation scenario as specified in section 8.3.7

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 8.3.14.

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 8.3.13 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

End of Change 3