**3GPP TSG-RAN4 Meeting #104-e *R4-22XXXX***

**Electronic meeting, August 15 – August 26, 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **TBD** | **rev** | **-** | **Current version:** | **17.6.0** |  |
|  | | | | | | | | |
| *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:*** | Big CR for test cases of Rel-17 FeRRM - PUCCH SCell activation (Rel-17) | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | MCC, CATT | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_RRM\_enh2-Perf | | | | |  | ***Date:*** | | | 2022-08-30 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The core requirements for PUCCH SCell activation and deactivation have been completed, and the corresponding test cases are not defined, thus it is necessary to introduce the test case for verifying the delay requirements for PUCCH SCell activation and deactivation.  This big CR merges the following endorsed draft CRs.   1. R4-2214331 draftCR on TC 1-7 PUCCH SCell activation and deactivation delay requirements of FR1 known PUCCH SCell and one FR1 unknown SCell 2. R4-2214663 TC1-6 for PUCCH SCell activation and deactivation delay requirements of FR2 unknown cell with inter-band FR2 PCell 3. R4-2214671 Draft CR on TC for PUCCH SCell activation and deactivation delay requirements of FR1 unknown PUCCH SCell and one FR1 unknown SCell (All NR cells in FR1) 4. R4-2214672 Draft CR on TC for PUCCH SCell activation and deactivation delay requirements of FR2 unknown PUCCH SCell and one FR2 unknown SCell with FR2 PSCell 5. R4-2214688 draft CR of TC 1-4 and 1-10 (FR2 unknown PUCCH SCell Activation) 6. R4-2214691 draftCR on TC1-5 and TC2-6 PUCCH SCell activation in FR2 inter-band 7. R4-2214694 Draft CR on TC for PUCCH SCell activation and deactivation delay of FR1 unknown cell 8. R4-2214695 Draft CR on FR2 TC for PUCCH SCell activation and deactivation delay of known PUCCH SCell and one unknown SCell with PSCell 9. R4-2214710 Draft CR on TC for PUCCH SCell activation and deactivation 10. R4-2214734 TC for PUCCH SCell activation and deactivation delay requirements of FR2 known cell with FR1 PCell 11. R4-2214735TC for PUCCH SCell activation and deactivation delay requirements of FR2 known PUCCH SCell and one FR2 unknown SCell with FR2 PCell | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce the test cases for PUCCH SCell activation and deactivation delay requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The test cases for PUCCH SCell activation and deactivation delay requirements are missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | The clauses affected for each endorsed draft CR are coppied below.   1. A.6.5.3.x3 2. A.7.5.3.x4 3. A.6.5.3.x4 4. A.5.5.3.x6 5. A.3.13A.3, A.7.5.3.x2, A.7.5.3.x6 6. A.7.5.3.x3 7. A.6.5.3.x2 8. A.5.5.3.x5 9. A.5.5.3.x1, A.6.5.3.x1, A.5.5.3.x2 10. A.7.5.3.x1 11. A.7.5.3.x5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

#### << Start of Change #1>>

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

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

- UE does not have to pass the test case.

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

|  |  |
| --- | --- |
| Clause | Test case slogan |
| A.7.5.3.2 | SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2 |
| A.7.5.6.1.2 | NR FR1- NR FR2 DL active BWP switch of PCell with non-DRX in SA |
| A.7.5.6.4.2 | NR FR1 PCell SCell dormancy switch of two FR2 SCells outside active time |
| 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.7.5.3.x2 | PUCCH SCell activation and deactivation delay requirements of FR2 unknown cell with FR1 PCell |

#### << End of Change #1>>

#### << Start of Change #2>>

#### A.5.5.3.x1 PUCCH SCell Activation and deactivation of known SCell in FR2

##### A.5.5.3.x1.1 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.x1.1-1 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.x1.1-2 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.x1.1-3 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.x1.1-4 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.x1.1-1: 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.x1.1-2: 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.x1.1-3: 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.x1.1-4: 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.x1.2 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.x2 PUCCH SCell Activation and deactivation of unknown SCell in FR2

##### A.5.5.3.x2.1 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.x2.1-1 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.x2.1-2 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.x2.1-3 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.x2.1-4 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.x2.1-1: 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.x2.1-2: 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.x2.1-3: 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.x2.1-4: 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.x2.2 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.

#### << End of Change #2>>

#### << Start of Change #3>>

#### A.5.5.3.x5 Multiple SCell activation and deactivation of one known PUCCH SCell and one unknown SCell in FR2

##### A.5.5.3.x5.1 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.x5.1-1 below. The general test parameters are given in Table A.5.5.3.x5.1-2 and cell-specific test parameters in Table A.5.5.3.x5.1-3 below. OTA related test parameters are shown in table A.5.5.3.x5.1-4.

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.x5.1-1: 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.x5.1-2: 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.x5.1-3: 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.x5.1-4: 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.x5.2 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.

#### << End of Change #3>>

#### << Start of Change #4>>

#### A.5.5.3.x6 SCell Activation and deactivation of unknown PUCCH SCell and unknown DL SCell in FR2 in non-DRX

##### A.5.5.3.x6.1 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.x6.1-1 below. The test parameters are given in Tables A.5.5.3.x6.1-2 and cell-specific parameters in A.5.5.3.x6.1-3 below. OTA related test parameters are shown in table A.5.5.3.x6.1-4.

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.x6.1-1: 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.x6.1-2: 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.x6.1-3: 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.x6.1-4: 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.x6.2 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 #4>>

#### << Start of Change #5>>

#### A.6.5.3.x1 PUCCH SCell Activation and deactivation of known SCell in FR1

##### A.6.5.3.x1.1 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 in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.6.5.3.x1.1-1 below. The test parameters are given in Tables A.6.5.3.x1.1-2 and cell-specific parameters in A.6.5.3.x1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Cell 1 is the PCell in primary Timing Advance Group (pTAG) and cell 2 is the PUCCH SCell in the secondary Timing Advance Group (sTAG). Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

The test consists of two sub tests. In Test 1, UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment for sTAG. In Test 2, the TimeAlignmentTimer of sTAG expires before receiving the activation command.

At the beginning of T1 the UE receives an RRC message by which the PUCCH SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the PUCCH SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. In Test 1, 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. In Test 2, 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.

Any PCell 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.

Time period T3 starts when a MAC message for deactivation of PUCCH SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the 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 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 CQI reporting for PUCCH SCell is discontinued.

Table A.6.5.3.x1.1-1: known FR1 SCell activation test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test configuration, | |

Table A.6.5.3.x1.1-2: General test parameters for known FR1 SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channel (1, 2) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| TimeAlignmentTimer | ms | 500 | Test 1 and Test 2 |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configured and 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 | Config 1: 2  Config 2: 3  Config 3: 2.5 | 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] that will meet the timing constraints of this test case. |
| TCSI\_Reporting | ms | 15 | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

Table A.6.5.3.x1.1-3: Cell specific test parameters for known FR1 SCell activation case

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| 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 1,2 | MHz | Note 7 | | | | | |
|  | Config 3 |  | Note 7 | | | | | |
| BWoccupied | Config 1,2 | RB | 52 Note 5 | | | | | |
| Config 3 | 106 Note 6 | | | | | |
| Initial BWP configuration | |  | DLBWP.0.2 | | | | | |
| TCI state | |  | TCI.State.0 | | | | | |
| TRS Configuration | Config 1 |  | TRS.1.1 FDD | | | | | |
| Config 2 | TRS.1.1 TDD | | | | | |
| Config 3 | TRS.1.2 TDD | | | | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | - | | |
| Config 2 | SR.1.1 TDD | | | - | | |
| Config 3 | SR.2.1 TDD | | | - | | |
| Dedicated CORESET parameters | Config 1 |  | CCR.1.1 FDD | | | - | | |
| Config 2 | CCR.1.1 TDD | | | - | | |
| Config 3 | CCR.2.1 TDD | | | - | | |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 FDD | | | - | | |
| Config 2 | CR.1.1 TDD | | | - | | |
| Config 3 | CR.2.1 TDD | | | - | | |
| OCNG Patterns | Config 1,2 |  | OP.1 Note 5 | | | | | |
| Config 3, | OP.1 Note 6 | | | | | |
| SSB Configuration | Config 1,2 |  | SSB.1 FR1 | | | | | |
|  | Config 3 | SSB.2 FR1 | | | | | |
| CSI-RS configuration for CSI reporting (Note 8) | Config 1 |  | CSI-RS.1.1 FDD | | | | | |
| Config 2 |  | CSI-RS.1.1 TDD | | | | | |
| Config 3 |  | CSI-RS.2.1 TDD | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | |
| reportConfigType | |  | periodic | | | | | |
| reportQuantity | |  | cri-RI-PMI-CQI | | | | | |
| CSI reporting periodicity for PCell | Config 1,2 | slot | 5 | | | - | | |
|  | Config 3 |  | 10 | | | - | | |
| CSI reporting offset for PCell | Config 1,2 | slot | 3 | | | - | | |
|  | Config 3 |  | 5 | | | - | | |
| CSI reporting periodicity for SCell | Config 1,2 | slot | - | | | 5 | | |
| Config 3 | - | | | 10 | | |
| CSI reporting offset for SCell | Config 1,2 | slot | - | | | 2 | | |
| Config 3 | - | | | 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) | |  |  | | | | | |
| Note2 | Config 1,2 | dBm/SCS | -104 | | | | | |
|  | Config 3 | -101 | | | | | |
|  | | dB | 17 | | | | | |
|  | | dB | 17 | | | | | |
| SS-RSRPNote3 | Config 1,2 | dBm/SCS | -87 | | | | | |
|  | Config 3 | -84 | | | | | |
| SCH\_RP Note 3 | | dBm/15 kHz | -87 | | | | | |
| Io Note3 | Config 1,2 | dBm/  9.36MHz | -58.96 | | | | | |
| Config 3 | dBm/  38.16MHz | -52.87 | | | | | |
| 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 within BWoccupied.  Note 3: SS-RSRP, Io and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.  Note 5: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 6: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel.  Note 8: On top of the reference configurations, CSI-RS offset should be set to meet the CSI reference resource timing definition in TS 38.214 cl. 5.2.2.5. | | | | | | | | |

##### A.6.5.3.x1.2 Test Requirements

In Test1，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. In Test2，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.

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

During T3 the starting point of interruption of PCell during PUCCH SCell deactivation 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 values specified for SA in clause 8.2.2.2.18.

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 in Test 1 or in slot in Test 2 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 #5>>

#### << Start of Change #6>>

#### A.6.5.3.x2 SCell Activation and deactivation of unknown SCell in FR1 in non-DRX

##### A.6.5.3.x2.1 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 in FR1 is unknown by the UE at the time of activation. In this test, UE shall support cross PUCCH group CSI reporting capability [TBD].

The supported test configurations are shown in Table A.6.5.3.x2.1-1 below. The test parameters are given in Table A.6.5.3.x2.1-2 and cell-specific parameters in Table A.6.5.3.x2.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Cell 1 is the PCell in primary Timing Advance Group (pTAG) and Cell 2 is the PUCCH SCell in the secondary Timing Advance Group (sTAG). Both cells have constant signal levels throughout the 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

Before the test starts the UE is connected to PCell, but is not aware of PUCCH SCell. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the PUCCH SCell becomes configured on NR. During T1 the PUCCH SCell is powered off and UE is not aware of PUCCH SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI on PUCCH SCell for the activated PUCCH SCell at latest in

* slot for Test 1, or
* slot for Test 2
* Note: Tdelay\_PUCCH\_SCell = Tactivation\_time + [X] + max ((TFirst\_available\_CSI + TCSI\_processing), (T1+T2+T3)) + TCSI\_reporting\_after, as defined in clause 8.3,

Any PCell 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, and is and for Test 1 and Test 2, respectively.

Time period T3 starts when a MAC message for deactivation of PUCCH SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the 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 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 CQI reporting for PUCCH SCell is discontinued.

Table A.6.5.3.x2.1-1: unknown FR1 PUCCH SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test configuration, | |

Table A.6.5.3.x2.1-2: General test parameters for unknown FR1 PUCCH SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channel (1, 2) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated PUCCH secondary cell on NR RF channel number 2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| TimeAlighmentTimer | ms | 500 | Identify the whether TA information is valie or not |
| T1 | s | [7] | During this time the PCell shall be known and the PUCCH SCell configured and detected. |
| T2 | s | [1] | During this time the UE shall activate the PUCCH SCell. |
| T3 | s | [1] | During this time the UE shall deactivate the PUCCH SCell. |
| THARQ | ms | Config 1: 2  Config 2: 3  Config 3: 2.5 | 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] that will meet the timing constraints of this test case. |
| TCSI\_Reporting | ms | 15 | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

Table A.6.5.3.x2.1-3: Cell specific test parameters for unknown FR1 PUCCH SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 | | | | |
| T1 | T2 | T3 | T1 | T2 | | T3 | |
| 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 1,2 | MHz | Note 7 | | | | | | | |
|  | Config 3 |  | Note 7 | | | | | | | |
| BWoccupied | Config 1,2 | RB | 52 Note 5 | | | | | | | |
| Config 3 | 106 Note 6 | | | | | | | |
| Initial BWP configuration | |  | DLBWP.0.2 | | | | | | | |
| TCI state | |  | TCI.State.0 | | | | | | | |
| TRS Configuration | Config 1 |  | TRS.1.1 FDD | | | | | | | |
| Config 2 | TRS.1.1 TDD | | | | | | | |
| Config 3 | TRS.1.2 TDD | | | | | | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | SR.1.1 FDD | | | | |
| Config 2 | SR.1.1 TDD | | | SR.1.1 TDD | | | | |
| Config 3 | SR.2.1 TDD | | | SR.2.1 TDD | | | | |
| Dedicated CORESET parameters | Config 1 |  | CCR.1.1 FDD | | | CCR.1.1 FDD | | | | |
| Config 2 | CCR.1.1 TDD | | | CCR.1.1 TDD | | | | |
| Config 3 | CCR.2.1 TDD | | | CCR.2.1 TDD | | | | |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 FDD | | | N/A | | | | |
| Config 2 | CR.1.1 TDD | | | N/A | | | | |
| Config 3 | CR.2.1 TDD | | | N/A | | | | |
| OCNG Patterns | Config 1,2 |  | OP.1 Note 5 | | | | | | | |
| Config 3, | OP.1 Note 6 | | | | | | | |
| SSB Configuration | Config 1,2 |  | SSB.1 FR1 | | | | | | | |
|  | Config 3 | SSB.2 FR1 | | | | | | | |
| CSI-RS configuration for CSI reporting (Note 8) | Config 1 |  | CSI-RS.1.1 FDD | | | | | | | |
| Config 2 |  | CSI-RS.1.1 TDD | | | | | | | |
| Config 3 |  | CSI-RS.2.1 TDD | | | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | | | |
| reportConfigType | |  | periodic | | | | | | | |
| reportQuantity | |  | cri-RI-PMI-CQI | | | | | | | |
| CSI reporting (CQI index non 0) periodicity for PUCCH SCell | Config 1,2 | slot | N/A | | | 5 | | | | |
| Config 3 | N/A | | | 10 | | | | |
| CSI reporting (CQI index non 0) offset for PUCCH SCell | Config 1,2 | slot | N/A | | | 4 | | | | |
| Config 3 | N/A | | | 6 | | | | |
| 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 | dBm/SCS | -104 | | | N/A | | -104 | | -104 |
|  | Config 3 | -101 | | | N/A | | -101 | | -101 |
|  | | dB | 17 | | | -infinity | | 17 | | 17 |
|  | | dB | 17 | | | -infinity | | 17 | | 17 |
| SS-RSRPNote3 | Config 1,2 | dBm/SCS | -87 | | | -infinity | | -87 | | -87 |
|  | Config 3 | -84 | | | -infinity | | -84 | | -84 |
| SCH\_RP Note 3 | | dBm/15 kHz | -87 | | | N/A | | -87 | | -87 |
| Io Note3 | Config 1,2 | dBm/  9.36MHz | -58.96 | | | N/A | | -58.96 | | -58.96 |
| Config 3 | dBm/  38.16MHz | -52.87 | | | N/A | | -52.87 | | -52.87 |
| Propagation condition | | - | AWGN | | | N/A | | 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 within BWoccupied.  Note 3: SS-RSRP, Io and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.  Note 5: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 6: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel.  Note 8: On top of the reference configurations, CSI-RS offset should be set to meet the CSI reference resource timing definition in TS 38.214 cl. 5.2.2.5. | | | | | | | | | | |

##### A.6.5.3.x2.2 Test Requirements

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

* a slot for Test 1.
* a slot for Test 2.

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

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

During T3 the starting point of interruption of PCell during PUCCH SCell deactivation 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 values specified for SA in clause 8.2.2.2.18.

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 a slot and in a slot for Test 1 and Test 2, respectively, 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 #6>>

#### << Start of Change #7>>

#### A.6.5.3.x3 SCell Activation and Deactivation of one FR1 known PUCCH SCell and one FR1 unknown SCell with single activation/deactivation command

##### A.6.5.3.x3.1 Test Purpose and Environment

The purpose of this test is to verify the SCell activation and deactivation delay requirements for PUCCH SCell with multiple SCells specified in clause 8.3.13 and 8.3.15, when one configured deactivated known PUCCH SCells in FR1 and one configured unknown SCell in FR1 by the UE at the time of activation.

The supported test configurations are defined in table A.6.5.3.x3.1-1 below. The test parameters are given in table A.6.5.3.x3.1-2 and cell-specific parameters in A.6.5.3.x3.1-3 below.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three NR carriers. All Cells has constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCC), but is not aware of Cell 2 (PUCCH SCell) and Cell 3(SCell). The UE is monitoring the Cell 1 (PCC). The UE shall be continuously scheduled in the Cell 1 throughout the whole test. PCC, SCC of Cell 2 and SCC of Cell3 are on different FR1 bands.

At the beginning of T1 the UE receives an RRC message by which the PUCCH SCell (Cell 2) and SCell (Cell 3) become configured on radio channel 2 and 3 respectively.

A MAC message for activation of UCCH SCell (Cell 2) and SCell (Cell 3) 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 UCCH SCell (Cell 2) and SCell (Cell 3) 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 and cell 3 are increased to same level as for cell 1. The UE shall be able to report valid CSI on PCell for the activated PUCCH SCell (Cell2) at latest in slot as defined in clause 8.3.13 provided the PUCCH SCell can be successfully detected on the first attempt.

For Cell2 activtion, the UE shall start reporting CSI in PCell in slot and shall report CQI index 0 (out-of-range) until the PUCCH SCell activation has been completed. For Cell3 activtion, the UE shall start reporting CSI in PCell in slot and shall report CQI index 0 (out-of-range) until the DL SCell activation has been completed.

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

Time period T3 starts when a MAC message for deactivation of the SCells (Cell 2 and Cell 3), 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 at latest in slot as defined in clause 8.3. The starting point of PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.

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

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

Table A.6.5.3.x3.1-1: Supported test configurations

|  |  |
| --- | --- |
| 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 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test configuration, | |

Table A.6.5.3.x3.1-2: General test parameters for unknown FR1 SCell activation case with 2 deactivated SCells, 160ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2,3 | Three NR radio channel (1, 2, 3) are used for this test |
| Active Cell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated PUCCH SCell |  | Cell 2 | Configured deactivated PUCCH SCell on NR RF channel number 2 which is an inter-band CC to PCC of Cell 1; |
| Configured deactivated SCell |  | Cell 3 | Configured deactivated SCell on NR RF channel number 3 which is an inter-band CC to PCC of Cell 1 and SCC of Cell2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Cell3 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. |
| Time alignment error between cell3 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. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
|  |  |  |  |
| T1 | ms | 100 | During this time the PSCell shall be known and the SCell configured, but 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] |
| TCSI\_Reporting | ms | 15 | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |
| k | slot |  | As specified in clause 4.3 of TS 38.213 [3] |

**Table A. 6.5.3.x3.1-3: 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 | | | |
| CSI-RS configuration for CSI reporting | | Config 1,4 | |  | CSI-RS.1.1 FDD | | | |
| Config 2,5 | |  | CSI-RS.1.1 TDD | | | |
| Config 3,6 | |  | CSI-RS.2.1 TDD | | | |
| reportConfigType | | Config 1-6 | |  | periodic | | | |
| reportQuantity | | Config 1-6 | |  | cri-RI-PMI-CQI | | | |
| CSI reporting periodicity | | Config 1,2,4,5 | | slot | 5 | | N/A | |
| CSI reporting offset | | Config 3,6 | | slot | 10 | | N/A | |
| Config 1,2,4,5 | | 2 | | N/A | |
| Config 3,6 | | 4 | | N/A | |
| 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 | | | |
| IoNote3 | Config 1,2,4,5 | | | dBm/  9.36MHz | -58.96 | | | |
|  | Config 3,6 | | | dBm/  38.16MHz | -52.87 | | | |
| Note 1: OCNG shall be 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 within BWoccupied.  Note 3: SS-RSRP, Io and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.]  Note 5: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 6: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel. | | | | | | | | |

##### A.6.5.3.x3.2 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 uplink resource if an available uplink resource is subject to interruption. Whether CSI report in slot (m+k) was interrupted is checked by monitoring ACK/NACK sent in PCell in slot (m+k). And the UE shall be able to report valid CSI for the activated PUCCH SCell (Cell2) at latest in slot as defined in clause 8.3.13. And the PCell interruption due to activation of PUCCH SCell shall occur in the slot to slot, as defined in clause 8.3, where is the interruption length given in section 8.2.

During T3, the UE shall carry out deactivation of the PUCCH SCell at latest in slot as defined in clause 8.3. And the starting point of PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.

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

#### << End of Change #7>>

#### << Start of Change #8>>

#### A.6.5.3.X4 SCell Activation and deactivation of unknown PUCCH SCell and unknown DL SCell in FR1 in non-DRX

##### A.6.5.3.X4.1 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 FR1 and DL SCell in FR1 is unknown to the UE at the time of activation.

The supported test configurations are shown in table A.6.5.3.X4.1-1 below. The test parameters are given in Tables A.6.5.3.X4.1-2 and cell-specific parameters in A.6.5.3.X4.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three NR carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2 (PUCCH SCell) and Cell3(DL SCell). The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test. PCC, SCC of Cell 2 and SCC of Cell 3 are on different bands. The primary PUCCH group contain Cell1 and the secondary PUCCH group contains Cell2 and Cell3.

At the beginning of T1 the UE receives an RRC message by which the PUCCH SCell (Cell 2) and DL SCell (Cell 3) becomes configured on radio channel 2 and 3 respectively. The UE starts monitoring the SCC1(Cell 2 CC) and SCC2(Cell 3 CC). The test equipment sends a MAC message for activation of the PUCCH SCell and DL SCell simultaneously.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated PUCCH SCell at latest in slot*n*+ , and report valid CSI in PCell for the activated DL SCell at latest in slot*n*+, as defined in clause 8.3.13. 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

For Cell2 activtion, the UE shall start reporting CSI in PCell in slot and shall report CQI index 0 (out-of-range) until the PUCCH SCell activation has been completed. For Cell3 activtion, the UE shall start reporting CSI in PCell in slot and shall report CQI index 0 (out-of-range) until the DL SCell activation has been completed.

Any PCell interruption due to activation of PUCCH SCell or DL SCell shall occur in the slot to , as defined in clause 8.3.13, where is the interruption length given in clause 8.2.2.2.7.

Time period T3 starts when a MAC message for deactivation of PUCCH SCell abd DL SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot , as defined in clause 8.3.15, and the starting point of any PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.15.

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 and DL SCell, respectively.

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

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

Table A.6.5.3.X4.1-1: unknown FR1 PUCCH SCell and DL SCell activation test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode, for both PUCCH SCell and DL SCell |
| 2 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode, for both PUCCH SCell and DL |
| 3 | NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode, for both PUCCH SCell and DL |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test configuration | |

Table A.6.5.3.X4.1-2: General test parameters for unknown FR1 PUCCH SCell and DL SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2,3 | Three NR radio channel (1, 2, 3) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated PUCCH SCell |  | Cell 2 | Configured deactivated PUCCH secondary cell on NR RF channel number 2 |
| Configured deactivated DL SCell |  | Cell 3 | Configured deactivated DL secondary cell on NR RF channel number 3 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 | For both cell 2 and cell 3 |
| Cell2/Cell 3 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1; cell3 and cell1; cell3 and cell2 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 0.1 | During this time the PCell shall be known and the SCell configured and 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 | Config 1: 2  Config 2: 3  Config 3: 2.5 | 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] that will meet the timing constraints of this test case. |
| TCSI\_Reporting | ms | 15 | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

Table A.6.5.3.X1.1-3: Cell specific test parameters for unknown FR1 PUCCH SCell and DL SCell activation case

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 and Cell 3 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| 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 1,2 | MHz | Note 7 | | | | | |
|  | Config 3 |  | Note 7 | | | | | |
| BWoccupied | Config 1,2 | RB | 52 Note 5 | | | | | |
| Config 3 | 106 Note 6 | | | | | |
| Initial BWP configuration | |  | DLBWP.0.2 | | | | | |
| TCI state | |  | TCI.State.0 | | | | | |
| TRS Configuration | Config 1 |  | TRS.1.1 FDD | | | | | |
| Config 2 | TRS.1.1 TDD | | | | | |
| Config 3 | TRS.1.2 TDD | | | | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | - | | |
| Config 2 | SR.1.1 TDD | | | - | | |
| Config 3 | SR.2.1 TDD | | | - | | |
| Dedicated CORESET parameters | Config 1 |  | CCR.1.1 FDD | | | - | | |
| Config 2 | CCR.1.1 TDD | | | - | | |
| Config 3 | CCR.2.1 TDD | | | - | | |
| RMSI CORESET parameters | Config 1 |  | CR.1.1 FDD | | | - | | |
| Config 2 | CR.1.1 TDD | | | - | | |
| Config 3 | CR.2.1 TDD | | | - | | |
| OCNG Patterns | Config 1,2 |  | OP.1 Note 5 | | | | | |
| Config 3, | OP.1 Note 6 | | | | | |
| SSB Configuration | Config 1,2 |  | SSB.1 FR1 | | | | | |
|  | Config 3 | SSB.2 FR1 | | | | | |
| CSI-RS configuration for CSI reporting (Note 8) | Config 1 |  | CSI-RS.1.1 FDD | | | | | |
| Config 2 |  | CSI-RS.1.1 TDD | | | | | |
| Config 3 |  | CSI-RS.2.1 TDD | | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | |
| reportConfigType | |  | periodic | | | | | |
| reportQuantity | |  | cri-RI-PMI-CQI | | | | | |
| CSI reporting periodicity for PCell | Config 1,2 | slot | 5 | | | - | | |
|  | Config 3 |  | 10 | | | - | | |
| CSI reporting offset for PCell | Config 1,2 | slot | 3 | | | - | | |
|  | Config 3 |  | 5 | | | - | | |
| CSI reporting periodicity for SCell | Config 1,2 | slot | 5 | | | 5 (on cell 2) | | |
| Config 3 | 10 | | | 10 (on cell 2) | | |
| CSI reporting offset for SCell | Config 1,2 | slot | 2 | | | 2 (on cell 2) | | |
| Config 3 | 4 | | | 4 (on cell 2) | | |
| 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 | dBm/SCS | -104 | | | | | |
|  | Config 3 | -101 | | | | | |
|  | | dB | 17 | | | | | |
|  | | dB | 17 | | | | | |
| SS-RSRPNote3 | Config 1,2 | dBm/SCS | -87 | | | | | |
|  | Config 3 | -84 | | | | | |
| SCH\_RP Note 3 | | dBm/15 kHz | -87 | | | | | |
| Io Note3 | Config 1,2 | dBm/  9.36MHz | -58.96 | | | | | |
| Config 3 | dBm/  38.16MHz | -52.87 | | | | | |
| 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 within BWoccupied.  Note 3: SS-RSRP, Io and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.  Note 5: All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 6: All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) from FC,low, and Io is independent of the BWchannel configured.  Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BWchannel.  Note 8: On top of the reference configurations, CSI-RS offset should be set to meet the CSI reference resource timing definition in TS 38.214 cl. 5.2.2.5. | | | | | | | | |

##### A.6.5.3.X4.2 Test Requirements

The test requirements defined in clause A.6.5.3.X1.2 shall apply to this test case for PUCCH SCell, except Tactivation\_time will be replaced with the value [TBD] as defined in clause 8.3.13.

The test requirements defined in clause A.6.5.3.3.2 shall apply to this test case for DL SCell, except Tactivation\_time will be replaced with the value [TBD] as defined in clause 8.3.13.

#### << End of Change #8>>

#### << Start of Change #9>>

A.7.5.3.x1 PUCCH SCell activation and deactivation for FR1+FR2 inter-band with target SCell in FR2 and known

A.7.5.3.x1.1 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 8.3.12 and 8.3.14, when the PUCCH SCell in FR2 is known by the UE at the time of activation.

The supported test configurations are shown in table A.7.5.3.x1.1-1 below. The test parameters are given in Tables A.7.5.3.x2.1-2 and cell-specific parameters in A.7.5.3.x1.1-3 below. The test consists of four successive time periods, with duration of T1, T2 T3, and T4 respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the PUCCH SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the PUCCH SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI for the activated PUCCH SCell at latest in slot*n*+ , and report valid CSI for the activated DL SCell at latest in slot*n*+, as defined in clause 8.3.13. 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

Any PCell 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

Time period T3 starts when a MAC message for deactivation of PUCCH SCell abd DL SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot , as defined in clause 8.3.14and the starting point of any PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.14.

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 is received.

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

**Table A.7.5.3.x1.1-1: Supported test configurations for FR2 SCell activation case**

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

**Table A.7.5.3.x1.1-2: Cell specific test parameters for FR2 SCell activation case**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter Note 5** | | **Unit** | **Cell 1** | | | | | | | **Cell 2** | | | | | | |
| **T1** | **T2** | | **T3** | | **T4** | | **T1** | **T2** | | **T3** | | **T4** |
| SSB ARFCN | |  | Freq1 | | | | | | | Freq2 | | | | | | |
| Duplex mode | Config 1 |  | FDD | | | | | | | TDD | | | | | | |
| Config 2,3 |  | TDD | | | | | | | | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | | | | TDDConf.3.1 | | | | | | | |
| Config 2 | TDDConf.1.1 | | | | | |
| Config 3 | TDDConf.2.1 | | | | | |
| Downlink initial BWP Configuration | Config 1,2,3 |  | DLBWP.0.1 | | | | | | | | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2,3 |  | DLBWP.1.1 | | | | | | | | | | | | | |
| Uplink initial BWP configuration | Config 1,2,3 |  | ULBWP.0.1 | | | | | | | | | | | | | |
| Uplink dedicated BWP configuration | Config 1,2,3 |  | ULBWP.1.1 | | | | | | | | | | | | | |
| TRS configuration | Config 1,2,3 |  | N/A | | | | | | | TRS.2.1 TDD | | | | | | |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | | | | | | | | | | | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | | | | 100: NRB,c = 66 | | | | | | |
| Config 3 | 40: NRB,c = 106 | | | | | | |
| Data RBs allocated | Config 1,2 |  | 52 | | 66 | | 52 | | | 66 | | 52 | | 66 | | |
| Config 3 | 106 | | 106 | | | 106 | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | | | | | - | | | | | | |
| Config 2 |  | SR.1.1 TDD | | | | | | |
| Config 3 |  | SR.2.1 TDD | | | | | | |
| RMSI CORESET Parameters | Config 1 |  | CR.1.1 FDD | | | | | | | - | | | | | | |
| Config 2 |  | CR.1.1 TDD | | | | | | |
| Config 3 |  | CR.2.1 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 | | | | | | | SSB.3 FR2 | | | | | | |
| Config 3 | SSB.2 FR1 | | | | | | |
| CSI-RS configuration for CSI reporting | Config 3 |  | N/A | | | | | | | CSI-RS.3.1 TDD | | | | | | |
| reportConfigType for CSI reporting |  |  | periodic | | | | | | |
| reportQuantity for CSI reporting |  |  | cri-RI-PMI-CQI | | | | | | |
| CSI reporting periodicity | Config 3 | slot | 40 | | | | | | |
| CSI reporting offset | Config 3 | slot | 8 | | | | | | |
| 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 | |  | 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: Void  Note 5: All parameters apply for configuration 1, 2 and 3 | | | | | | | | | | | | | | | | |

**Table A.7.5.3.x1.1-3: OTA related test parameters for FR2 SCell with FR1 PCell**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | | | **Cell 2** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Angle of arrival configuration | |  | N/A | | | According to clause A.3.15.1 | | |
| Assumption for UE beams Note 7 | |  | N/A | | | Rough | | |
| Note 1 | Config 1,2,3 | dBm/15kHz | Link only, see clause A.3.7A | | | -104.7 | | |
| Note 1 | Config 1,2,3 | dBm/SCS | -95.7 | | |
|  | Config 1,2,3 | dB | -∞ | 7 | 7 |
|  | Config 1,2,3 | dB | -∞ | 7 | 7 |
| SSB\_RPNote 2, Note 4 | Config 1,2,3 | dBm/SCS | -∞ | -88.7 | -88.7 |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -66.68 | -58.92 | -58.92 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  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 imit UE implementation or test system implementation. | | | | | | | | |

A.7.5.3.x1.2 Test Requirements

By end of T2 the UE shall finish the DL activation for the PUCCH SCell. Assuming the periodic CSI reporting is used and assuming periodic CSI activation and TCI state is sent along with SCell activation MAC CE, UE shall finish the DL activation by slot n+ 10ms + THARQ + TFineTiming

With SSB periodicity of 20ms, UE shall complete DL activation of PUCCH SCell with in 30ms after transmitting HARQ message for SCell activation command.

During T2 the UE shall start sending PRACH preamble to TE and shall obtain the TA command from TA and shall be ready to send valid CSI report to the TE. CSI report shall be transmitted within 30ms + [X=0] + max ((TFirst\_available\_CSI + TCSI\_processing), (T1+T2+T3)) + TCSI\_reporting\_after from the transmission of HARQ feedback of SCell activation command as specified in the 8.3.12.

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 during SCell activation shall not happen outside the slot to , as defined in clause 8.3, where TX =20ms.

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.

The interruption of PCell due to activation of SCell shall not be more than the values specified for SA in Clause 8.2.2.2.7.

#### << End of Change #9>>

#### << Start of Change #10>>

#### A.7.5.3.x2 PUCCH SCell activation and deactivation delay requirements of FR2 unknown cell with FR1 PCell

##### A.7.5.3.x2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.x1 except the PUCCH SCell in FR2 is unknown.

The supported test configurations and the general test parameters are defined in Table A.7.5.3.x2.1-1 and Table A.7.5.3.x2.1-2, respectively. And cell specific test parameters are described in Tables A.7.5.3.x2.1-3. OTA related test parameters are defined in Table A.7.5.3.x2.1-4. In all test cases, two cells are used. Cell 1 is the FR1 PCell in the primary Timing Advance Group (pTAG) and cell 2 is the FR2 PUCCH SCell in the secondary Timing Advance Group (sTAG).

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 T1 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. At the time of T2, the UE does not have a valid TA for the SCell in sTAG. Immediately at the 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 result for the SCell reported on the PCell. 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 and PUCCH-SpatialRelation of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell. THARQ + Tactivation\_time after slot m, the UE shall be able to monitor PDCCH on the SCell that triggers PDCCH order-based contention-free PRACH. The test equipment receives the PRACH and sends random access response with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value estimated from the PRACH. The UE shall start reporting CSI of the SCell with non-zero CQI index via PUCCH on the SCell no later than slot m + (THARQ + Tdelay\_PUCCH\_SCell)/NR slot length. Here, Tactivation\_time is the SCell activation delay defined in 8.3.2 for FR2 unknown SCell with periodic CSI-RS used for CSI reporting, and Tdelay\_PUCCH\_SCell is the PUCCH SCell activation delay defined in 8.3.12 for an invalid TA scenario.

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 during the activation of the SCell.

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 on the SCell is discontinued.

Table A.7.5.3.x2.1-1: Supported test configurations for FR2 SCell activation case

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

Table A.7.5.3.x2.1-2: General test parameters for unknown FR2 PUCCH SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channel (1, 2) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated PUCCH SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | ≤25 | A random value from 0μs to 25μs |
| 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 | Config 1: 2  Config 2: 3  Config 3: 2.5 | 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] that will meet the timing constraints of this test case. |
| TCSI\_Reporting | ms | 15 | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] and TS 38.213 [3]. |

Table A.7.5.3.x2.1-3: Cell specific test parameters for FR2 PUCCH SCell activation case

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | | Unit | Cell 1 | | | | Cell 2 | | |
| T1 | T2 |  | |  | T1 | T2 |
| SSB ARFCN | |  | Freq1 | | | | Freq2 | | |
| Duplex mode | Config 1 |  | FDD | | | | TDD | | |
| Config 2,3 |  | TDD | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | TDDConf.3.1 | | | |
| Config 2 | TDDConf.1.1 | | |
| Config 3 | TDDConf.2.1 | | |
| Downlink initial BWP Configuration | Config 1,2,3 |  | DLBWP.0.1 | | | | | | |
| Downlink dedicated BWP Configuration | Config 1,2,3 |  | DLBWP.1.1 | | | | | | |
| Uplink initial BWP configuration | Config 1,2,3 |  | ULBWP.0.1 | | | | | | |
| Uplink dedicated BWP configuration | Config 1,2,3 |  | ULBWP.1.1 | | | | | | |
| TRS configuration | Config 1,2,3 |  | N/A | | | | TRS.2.1 TDD | | |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | | | | | |
| PUCCH Spatial Relation | Config 1,2,3 |  | N/A | | | | PUCCH.SRI.0 | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | 100: NRB,c = 66 | | |
| Config 3 | 40: NRB,c = 106 | | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.1.1 FDD | | | | SR.3.1 TDD | | |
| Config 2 |  | SR.1.1 TDD | | | |
| Config 3 |  | SR.2.1 TDD | | | |
| RMSI CORESET Parameters | Config 1 |  | CR.1.1 FDD | | | | - | | |
| Config 2 |  | CR.1.1 TDD | | | |
| Config 3 |  | CR.2.1 TDD | | | |
| Dedicated CORESET Parameters | Config 1 |  | CCR.1.1 FDD | | | | CCR.3.1 TDD | | |
| Config 2 | CCR.1.1 TDD | | | |
| Config 3 | CCR.2.1 TDD | | | |
| OCNG Patterns | |  | OP.1 | | | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | | | SSB.3 FR2 | | |
| Config 3 | SSB.2 FR1 | | | |
| CSI-RS configuration for CSI reporting | Config 1,2,3 |  | N/A | | | | N/A | CSI-RS.3.1 TDD Note 6 | CSI-RS.3.1 TDD |
| TimeAlignmentTimer for pTAG | Config 1,2,3 |  | ms500 | | | | N/A | | |
| TimeAlignmentTimer for sTAG | Config 1,2,3 |  | N/A | | | | ms500 | | |
| reportConfigType for CSI reporting |  |  | - | | | | Periodic | | |
| reportConfigType for L1-RSRP |  |  | periodic | | | | - | | |
| reportQuantity for CSI reporting |  |  | - | | | | cri-RI-PMI-CQI | | |
| reportQuantity for L1-RSRP |  |  | ssb-Index-RSRP | | | | - | | |
| CSI reporting periodicity | Config 1,2 | slot | - | | | | 40 | | |
| Config 3 | - | | | |
| L1-RSRP reporting periodicity Note 7 | Config 1,2 | slot | 5 | | | | - | | |
| Config 3 | 10 | | | |
| CSI reporting offset | Config 1,2 | slot | - | | | | 4 | | |
| Config 3 | - | | | |
| L1-RSRP reporting offset | Config 1,2 | slot | 2 | | | | - | | |
| Config 3 | 4 | | | |
| 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 | |  | 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: Void  Note 5: Void  Note 6: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | |

Table A.7.5.3.x2.1-4: OTA related test parameters for FR2 PUCCH SCell activation

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 | | | | |
| T1 | T2 | T3 | T1 | T2 | | T3 | |
| Angle of arrival configuration | |  | N/A | | | According to clause A.3.15.1 | | | | |
| Assumption for UE beams Note 7 | |  | N/A | | | Rough | | | | |
| Note 1 | Config 1,2,3 | dBm/15kHz | Link only, see clause A.3.7A | | | -104.7 | | | | |
| Note 1 | Config 1,2,3 | dBm/SCS | -95.7 | | | | |
|  | Config 1,2,3 | dB | -∞ | | 7 | | 7 |
|  | Config 1,2,3 | dB | -∞ | | 7 | | 7 |
| SSB\_RPNote 2, Note 4 | Config 1,2,3 | dBm/SCS | -∞ | | -88.7 | | -88.7 |
| IoNote 2, Note 4 | Config 1,2,3 | dBm/95.04 MHz | -66.68 | | -58.92 | | -58.92 |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  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 imit UE implementation or test system implementation. | | | | | | | | | | |

##### A.7.5.3.x2.2 Test Requirements

During T2 the UE shall start sending a valid L1-RSRP report of the SCell to the PCell 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.

During T2 the UE shall start sending CSI reports of the SCell with non-zero CQI index via PUCCH on the SCell in the configured slots for CSI reporting no later than slot as defined in clause 8.3.12.

During T3 the UE shall stop sending CSI reports on the SCell no later than slot , as defined in clause 8.3.14.

During T2 interruption of PCell during the SCell activation shall not happen outside the slot to , as defined in clause 8.3, where TX =20ms. If the UE is not capable of parallelTxPRACH-SRS-PUCCH-PUSCH additional interruption can be allowed as defined in Clause 8.2.2.2.18.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3.14.

The interruption of PCell due to activation of SCell shall not be more than the values specified for SA in Clause 8.2.2.2.18.

#### << End of Change #10>>

#### << Start of Change #11>>

#### A.7.5.3.x3 SCell Activation and deactivation for known PUCCH SCell in FR2 inter-band in non-DRX

##### A.7.5.3.x3.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements specified in clause 8.3, when PUCCH for a being activated SCell is configured on the SCell. The PCell and SCell are inter-band in FR2 and the SCell is known by a UE. The test shall be performed for the cases respectively where UE has valid TA and where UE does not have valid TA for an sTAG which the SCell belongs to at the time of activation.

The supported test configurations are shown in table A.7.5.3.X3.1-1 below. The general test parameters are described in Tables A.7.5.3.X3.1-2, and cell specific test parameters are described in Tables A.7.5.3.X3.1-3. OTA related test parameters are shown in table A.7.5.3.X3.1-4 below.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. The UE shall be continuously scheduled in the PCell (Cell 1) throughout the whole test.

Before the test starts, the UE is connected to the Cell 1 (PCell) on radio channel 1 but is not aware of Cell 2 (SCell) on radio channel 2. The PCell is in the pTAG and the SCell is in an sTAG. The UE is only monitoring the PCell.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured with PUCCH on radio channel 2. The UE now starts monitoring the Cell 2. During T1, Cell 2 should be detected and measured by the UE such that it meets the condition for known cell defined in clause 8.3.2 for SCell activation.

A MAC message for activation of SCell is sent by the test equipment in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2.

During T2,

* When the UE has a valid TA, the UE shall be able to report valid CSI for the activated SCell no later than in slot n+, as defined in clause 8.3.12.
* When the UE does not have a valid TA, the test equipment should send a PDCCH order to the UE to initiate RA procedure on the PUCCH SCell no later than in slot n+, and the UE shall be able to report valid CSI for the activated SCell no later than in slot , as defined in clause 8.3.12.

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

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

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

Table A.7.5.3.x3.1-1: Supported test configurations for FR2 PUCCH SCell activation in FR2 inter-band

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

Table A.7.5.3.x3.1-2: General test parameters for known PUCCH 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 |  | Cell1 | PCell on NR RF channel number 1. |
| Configured PUCCH SCell |  | Cell2 | Configured PUCCH SCell 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 | ≤8 | A random value from 0μs to 8μs |
| Filter coefficient |  | 0 | L3 filtering is not used |
| 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] |
| T1 | s | 7 | During this time the PUCCH SCell shall be configured and detected. |
| T2 | s | 2 | During this time the UE shall activate the PUCCH SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the PUCCH SCell. |
| TimeAlignmentTimer | ms | 1280 | Cell 1 in pTAG. |
| TimeAlignmentTimerSTAG | ms | [1280] | Cell 2 in sTAG. |

Table A.7.5.3.x3.1-3: Cell specific test parameters for FR2 PUCCH 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 | |
| Spatial Relation Configuration |  | PUCCH.SRI.0 | | PUCCH.SRI.0 | | PUCCH.SRI.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 |
| PRACH configuration |  | - | - | - | FR2 PRACH configuration 2 | - | FR2 PRACH configuration 2 |
| 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.x3.1-4: 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 |
| AoA setup |  | Setup 3 as specified in clause A.3.15 | | | | | |
| **AoA1** | | | **AoA2** | | |
| Assumption for UE beams Note 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -92.1 | | | -92.1 | | |
| Note1 | dBm/SCSNote3 | -83.1 | | | -83.1 | | |
|  | dB | 0 | | | 0 | | |
| SS-RSRPNote2 | dBm/SCS Note4 | -83.1 | | | -83.1 | | |
|  | dB | 0 | | | 0 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -51.1 | | | -51.1 | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  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  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.x3.2 Test Requirements

During T2, when the UE has valid TA, the UE shall start sending CSI report for the SCell with non-zero CQI index on the PUCCH SCell no later than in slot n+, where Tactivation\_time is max(Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay-THARQ) as defined in clause 8.3.2, which allows 5ms.

If the UE has a valid TA for transmitting on the SCell, during T2, the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting on PUCCH SCell no later than slot , where

- THARQ is defined in Table A.4.5.3.1.1-2

- Tactivation\_time = max(Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay-THARQ), which allows 5ms

- TCSI\_Reporting = 10ms

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

If the UE does not have a valid TA for transmitting on the SCell, 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.4.5.3.1.1-2

- Tdelay\_PUCCH\_SCell = Tactivation\_time + max ((TFirst\_available\_CSI + TCSI\_processing), (T1+T2+T3), [X]\*Ttarget\_PL-RS) + TCSI\_reporting\_after

- FFS the value of T1+T2+T3 and TCSI\_reporting\_after

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

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

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot n, 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 #11>>

#### << Start of Change #12>>

#### A.7.5.3.x4 PUCCH SCell Activation and deactivation of unknown SCell in FR2

##### A.7.5.3.x4.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation are done within the required time period defined in clause 8.3.12, when PUCCH for a being activated SCell is configured on the NR FR2 SCell. The PCell and SCell are in different FR2 band. The SCell is unknown by the UE and the UE does not have valid TA for a sTAG which the SCell belongs to at the time of activation. Supported test configurations are shown in table A.7.5.3.x4.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.74.5.3.x4.1-2 and A.7.5.3.x4.1-3 below. OTA related test parameters are shown in table A.7.5.3.x4.1-4 below.

In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is the PUCCH SCell being activated and deactivated. The test consists of three successive time periods with duration of T1, T2 and T3, respectively. The UE shall be continuously scheduled in Cell1 (PCell) throughout the test.

Before the test starts, the UE is connected to the PCell (Cell 1) on NR radio channel 1 (PCC), but is not aware of SCell (Cell2) on NR radio channel 2 (SCC). The PCell is in the pTAGs and the SCell is in a sTAG. The UE is only monitoring the PCC.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) gets configured with PUCCH on NR radio channel 2 (SCC). The UE now starts monitoring the SCC2 also. Test equipment sends a MAC message for activation of the SCell. The MAC message for the activation is received at the UE antenna connector at slot # denoted m, which is defined as 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 1. 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. During T2, the test equipment should send a PDCCH order to the UE to initiate RA procedure on the PUCCH SCell at slot (m+) after UE report on PCell.

Time period T3 starts when a MAC message for deactivation of the PUCCH 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 during activation and deactivation of SCell, respectively.

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

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

Table A.7.5.3.x4.1-1: PUCCH SCell Activation and deactivation test configurations in FR2 inter-band

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

Table A.7.5.3.x4.1-2: General test parameters for PUCCH SCell activation and deactivation 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 |  | Cell1 | PCell on NR RF channel number 1. |
| Configured PUCCH SCell |  | Cell2 | Configured PUCCH SCell 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. |
| *TimeAlignmentTimer* for sTAG | ms | 5120 | Set for UE has not valid TA at start of T2 based on T1 = 7s. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to Cell1 | μs | ≤ 8 | A random value from 0μs to 8μs |
| Filter coefficient |  | 0 | L3 filtering is not used |
| 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 k1 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] |
| T1 | s | 7 | During this time the PUCCH SCell shall be configured and detected. |
| T2 | s | 2 | During this time the UE shall activate the PUCCH SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the PUCCH SCell. |

Table A.7.5.3.x4.1-3: NR Cell specific test parameters for PUCCH SCell activation and deactivation in FR2 inter-band

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| SSB ARFCN |  | freq1 | | | freq2 | | |
| Duplex mode |  | TDD | | | | | |
| TDD configuration |  | TDDConf.3.1 | | | | | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | | | | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | | | | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | | | | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | | | | |
| TRS configuration |  | TRS.2.1 TDD | | | | | |
| TCI state |  | TCI.State.0 | | | | | |
| BWchannel | MHz | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | | | - | | |
| RMSI CORESET Parameters |  | CR.3.1 TDD | | | - | | |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | | | - | | |
| CSI-RS configuration |  | NA | | | NA | CSI-RS.3.1 TDD Note 2 | |
| CSI reporting periodicity Note 3 |  | NA | | | 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.x4.1-4: OTA related test parameters for PUCCH SCell activation and deactivation in FR2 inter-band

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 1 | | | Cell 2 | | |
| T1 | T2 | T3 | T1 | T2 | T3 |
| AoA setup |  | Setup 3 as specified in clause A.3.15 | | | | | |
| **AoA1** | | | **AoA2** | | |
| Assumption for UE beams Note 7 |  | Rough | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -92.1 | | | -92.1 | | |
| Note1 | dBm/SCSNote3 | -83.1 | | | -83.1 | | |
|  | dB | 0 | | | -infinite | 0 | |
| SS-RSRPNote2 | dBm/SCS Note4 | -83.1 | | | -infinite | -83.1 | |
|  | dB | 0 | | | -infinite | 0 | |
| IoNote2 | dBm/ 95.04 MHz Note4 | -51.1 | | | -54.1 | -51.1 | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  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  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.x4.2 Test Requirements

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 8.3.12. 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

- Tdelay\_PUCCH\_SCell = Tactivation\_time + max ((TFirst\_available\_CSI + TCSI\_processing), (T1+T2+T3), Tmeas) + TCSI\_reporting\_after

- 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

- Tmeas = 5\* Trs = 100ms

- 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 8.3.14.

During T3, the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to as defined in clause 8.3.14.

#### << End of Change #12>>

#### << Start of Change #13>>

#### A.7.5.3.x5 SCell Activation and deactivation of FR2 known PUCCH SCell and one FR2 unknown SCell with FR2 PCell

##### A.7.5.3.x5.1 Test Purpose and Environment

The purpose of this test is to verify that when a PUCCH SCell and DL SCell are activated using the same MAC CE command, the PUCCH SCell, and DL SCell activation and deactivation delays are within the requirements stated in clause 8.3.13 and 8.3.15. When UE receive the MAC CE activation command, PUCCH SCell in FR2 is known to UE and DL SCell in FR2 is unknown to the UE.

The supported test configurations are provided in table A.7.5.3.x5.1-1 below. The general test parameters are given in Tables A.7.5.3.x5.1-2 and cell-specific test parameters are given in A.7.5.3.x5.1-3. OTA related test parameters are given in A.7.5.3.x5.1-4.

The test consists of two sub tests, one with valid timing advance (TA), and other with invalid TA. The test consists of six successive time periods, with duration of T1, T2, and T3 respectively. There are two NR carriers, and PCC has two cell and SCC has one cells. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 but is not aware of Cell 2 (PUCCH SCell) and Cell 3 (DL SCell). Cell1 and Cell 3 are configured on primary timing advance group (pTAG). Cell2 is on different band than Cell1 and Cell3. For valid TA case, Cell1, Cell2 and Cell 3 are on same TAG. For invalid TA case Cell 2 is on different TAG than Cell1 and Cell3. At the start of the test, the UE is monitoring PCC and not SCC.

At the beginning of T1, the UE receives an RRC message by which the PUCCH SCell (Cell 2) and DL SCell (Cell 3) becomes configured on radio channel 2 and 1 respectively. In T1, the UE starts measuring PUCCH SCell 1 and DL SCell is not detectable. During the duration of T1, the time alignment timer is running on and pTAG, and the TA is maintained on PCell. At the end of T1, the test equipment sends a MAC CE message for activation of the PUCCH SCell and DL SCell simultaneously.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI for the activated PUCCH SCell at latest in slot*n1*+ , and report valid CSI for the activated DL SCell at latest in slot*n1*+, as defined in clause 8.3.13. In this test case, both valid TA and invalid TA cases shall be tested.

Test for case when UE has valid TA (i.e., the *TimeAlignmentTimer* [2] associated with the TAG containing the PUCCH SCell is running), 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

In case of valid TA, for Cell2 activation, the UE shall start reporting CSI in PUCCH SCell in slot and shall report CQI index 0 (out-of-range) until the PUCCH SCell activation has been completed.

For Cell3 activation, the UE shall start reporting CSI in PCell in slot and shall report CQI index 0 (out-of-range) until the DL SCell activation has been completed.

Any PCell interruption due to activation of PUCCH SCell or DL SCell shall occur in the slot to , as defined in clause 8.3.13, where is the interruption length given in clause 8.2.2.2.7.

Time period T3 starts when a MAC message for deactivation of PUCCH SCell and DL SCell, sent from the test equipment to the UE in a slot # denoted n2, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot , as defined in clause 8.3.15, and the starting point of any PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.15.

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 and DL SCell, respectively.

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

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

Table A.7.5.3.x5.1-1: Supported test configurations for FR2 SCell activation in FR2 inter-band

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode for PCell  NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode for PUCCH SCell and DL SCell |

Table A.7.5.3.x5.1-2: 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 PUCCH SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell 3 | 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 and Cell3 timing offset to cell1 | μs | ≤8 | A random value from 0μs to 8μs |
| T1 | s | 6 | During this time the PUCCH SCell shall be known and the DL 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. |
| T4 | s | 6 | During this time the PUCCH SCell shall be known and the DL SCell configured and detected. |
| T5 | s | 2 | During this time the UE shall activate the PUCCH SCell and DL SCell. |
| T6 | s | 1 | During this time the UE shall deactivate the PUCCH SCell and DL 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.x5.1-3: Cell specific test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | T1 | | | T2 | | | T3 | | |
| Cell 1 | Cell 2 | Cell3 | Cell 1 | Cell 2 | Cell3 | Cell 1 | Cell 2 | Cell3 |
| 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 |  | CSI-RS.3.1 TDD | NA | | CSI-RS.3.1 TDD | CSI-RS.3.1 TDD Note 2 | | CSI-RS.3.1 TDD | 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.x5.1-4: OTA related test parameters for FR2 SCell activation in FR2 inter-band

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 1 | | Cell3 | | Cell 2 | | |
| T1 | T2 | | T3 | T1 | T2 | T3 |
| AoA setup |  | Setup 3 as specified in clause A.3.15 | | | | | | |
| **AoA1** | | | | **AoA2** | | |
| Assumption for UE beams Note 7 |  | Rough | | | | Rough | | |
| Note1 | dBm/15kHzNote4 | -92.1 | | | | -92.1 | | |
| Note1 | dBm/SCSNote3 | -83.1 | | | | -83.1 | | |
|  | dB | 0 | | | | -∞ | | |
| SS-RSRPNote2 | dBm/SCS Note4 | -83.1 | | | | -83.1 | | |
|  | dB | 0 | | | | 0 | | |
| IoNote2 | dBm/95.04 MHz Note4 | -51.1 | | | | -51.1 | | |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  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  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.x5.2 Test Requirements

When UE receive SCell activation command at slot n1, 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\_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 SCell3 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.

Any PCell interruption due to activation of PUCCH SCell or DL SCell shall occur in the slot to , as defined in clause 8.3.13, where is the interruption length given in clause 8.2.2.2.7.

During T3, when UE receives deactivation MAC CE at n2 slot, the UE shall stop sending CSI reports for both PUCCH SCell and DL SCell no later than slot , as defined in clause 8.3. The starting point of any PCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3.15.

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 #13>>

#### << Start of Change #14>>

#### A.7.5.3.x6 PUCCH SCell activation and deactivation delay requirements of FR2 unknown cell with FR2 PCell

##### A.7.5.3.x6.1 PUCCH SCell activation with non-PUCCH SCell in a secondary PUCCH Group

##### A.7.5.3.x6.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.x5 except the PUCCH SCell in FR2 is unknown and another to-be-activated FR2 non-PUCCH SCell in parallel with the PUCCH SCell belongs to the secondary PUCCH group.

The supported test configurations and the general test parameters are defined in Table A.7.5.3.x6.1.1-1 and Table A.7.5.3.x6.1-2, respectively. And cell specific test parameters are described in Tables A.7.5.3.x6.1.1-3. OTA related test parameters are defined in Table A.7.5.3.x6.1.1-4. In all test cases, three cells are used. Cell 1 is the FR2 PCell, and Cell 2 and Cell 3 are SCells in a different band from Cell 1. Cell 2 is PUCCH SCell and Cell 3 is non-PUCCH SCell belonging to the secondary PUCCH group.

In the test configuration 1, the UE is configured with a single Timingi Advance Group (TAG) for all cells, whereas UE is configured with a primary TAG (pTAG) for Cell 1 and a secondary TAG (sTAG) for Cell 2 and Cell 3 in the test configuration 2. The test configuration 1 and 2 are to verify the UE performance for the case where the UE has a valid TA for the PUCCH SCell and the case where the UE does not have a valid TA for the PUCCH SCell, respectively.

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

A MAC message for activation of SCells is sent by the test equipment T1 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 the beginning of T2 the transmission power of Cell 2 is increased to same level as for cell 2 At the time of T2, the UE has a valid TA in the test configuration 1 while the UE does not have a valid TA for the SCell in sTAG in the test configuration 2. During the test for the test configuration 1, the UE needs to be provided with a new Timing Advance Command MAC control element at least once during each time alignment timer period.

During T2, the test equipment monitors the L1-RSRP measurement result for the PUCCH SCell reported on the PCell. 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 SCells and PUCCH-SpatialRelation of the PUCCH SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for the SCells.

During the test for the test configuration 1, the UE shall start reporting CSI of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the SCell no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for a valid TA scenario.

During the test for the test configuration 2, THARQ + Tactivation\_time after slot m, the UE shall be able to monitor PDCCH on the PUCCH SCell that triggers PDCCH order-based contention-free PRACH. The test equipment receives the PRACH and sends random access response with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value estimated from the PRACH. The UE shall start reporting CSI of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the SCell no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tactivation\_time is the SCell activation delay defined in 8.3.2 for FR2 unknown SCell with periodic CSI-RS used for CSI reporting, and Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for an invalid TA scenario.

Time period T3 starts when a MAC message for deactivation of the SCells, 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 during the activation of the SCells.

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 on the PUCCH SCell is discontinued.

Table A.7.5.3.x6.1.1-1: Supported test configurations for FR2 SCell activation case

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | PCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target SCells: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target SCells: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is required to pass both of the supported test configurations. The UE will be configured with a single Timing Advance Group (TAG) in the test configuration 1 whearas two TAGs are used in the test configuration 2. | |

Table A.7.5.3.x6.1.1-2: General test parameters for unknown FR2 PUCCH SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2,3 | Three NR radio channel (1, 2, 3) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated PUCCH SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2. The cell is in a different FR2 band from Cell 1. |
| Configured deactivated non-PUCCH SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3. The cell is intra-band contiguous to Cell 2. |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | ≤25 | A random value from 0μs to 25μs |
| Cell3 timing offset to cell1 | μs | ≤25 | A random value from 0μs to 25μs |
| Cell3 timing offset to cell2 | μs | 0 |  |
| T1 | s | 7 | During this time the PCell (Cell 1) shall be known and the SCells (Cell 2 and Cell 3) configured and detected. |
| T2 | s | 2 | During this time the UE shall activate the SCells. |
| T3 | s | 1 | During this time the UE shall deactivate the SCells. |
| THARQ | ms | Config 1: 2  Config 2: 3  Config 3: 2.5 | 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] that will meet the timing constraints of this test case. |
| TCSI\_Reporting | ms | 15 | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] and TS 38.213 [3]. |

Table A.7.5.3.x6.1.1-3: Cell specific test parameters for FR2 PUCCH SCell activation case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
| 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 | | | | | | | | |
| 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 | | | | | | | | |
| PUCCH Spatial Relation | Config 1,2 |  | PUCCH.SRI.0 | | | PUCCH.SRI.0 | | | N/A | | |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 | | | | | | | | |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.3.1 TDD | | | SR.3.1 TDD | | | - | | |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD | | | - | | | - | | |
| Dedicated CORESET Parameters | Config 1,2 |  | CCR.3.1 TDD | | | CCR.3.1 TDD | | | - | | |
| TimeAlignmentTimer for pTAG | Config 1,2 |  | ms500 | | | N/A | | | N/A | | |
| TimeAlignmentTimer for sTAG | Config 1 |  | N/A | | | N/A | | | N/A | | |
| Config 2 |  | N/A | | | ms500 | | | N/A | | |
| CSI-RS configuration for CSI reporting | Config 1,2 |  | - | | | N/A | CSI-RS.3.1 TDD  Note 6 | | N/A | CSI-RS.3.1 TDD  Note 6 | |
| SSB configuration | Config 1,2 |  | SSB.3 FR2 | | | N/A | SSB.3 FR2 | | N/A | SSB.3 FR2 | |
| CSI reporting periodicity | Config 1,2 | ms | 5 | | | 5 | | | N/A | | |
| reportConfigType for CSI reporting | Config 1,2 |  | - | | | Periodic | | | N/A | | |
| reportConfigType for L1-RSRP | Config 1,2 |  | periodic | | | - | | | N/A | | |
| reportQuantity for CSI reporting | Config 1,2 |  | - | | | cri-RI-PMI-CQI | | | - | | |
| reportQuantity for L1-RSRP | Config 1,2 |  | ssb-Index-RSRP | | | - | | | N/A | | |
| CSI reporting periodicity | Config 1,2 |  | - | | | 40 | | | 40 | | |
| L1-RSRP reporting periodicity Note 7 | Config 1,2 |  | 40 | | | - | | | N/A | | |
| CSI reporting offset | Config 1,2 |  | - | | | 4 | | | 4 | | |
| L1-RSRP reporting offset | Config 1,2 |  | 4 | | | - | | | N/A | | |
| OCNG Patterns | |  | OP.1 | | | | | | | | |
| 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) | |
| 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: Void  Note 3: Void  Note 4: Void  Note 5: Void  Note 6: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | | | |

Table A.7.5.3.x6.1.1-4: OTA related test parameters for FR2 PUCCH SCell activation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 2 | | | Cell 3 | | |
|  |  | 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 | 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.7.5.3.x6.1.2 Test Requirements

During T2 the UE shall start sending a valid L1-RSRP report of the SCell to the PCell 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.

During T2, if the test is based on the test configuration 1, the UE shall start sending CSI reports of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the SCell no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for a valid TA scenario.

During T2, if the test is based on the test configuration 2, the UE shall start sending CSI reports of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the SCell (Cell 2) no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for an invalid TA scenario.

During T3 the UE shall stop sending CSI reports on the PUCCH SCell no later than slot , as defined in clause 8.3.15.

During T2 interruption of PCell during the SCell activation shall not happen outside the slot to , as defined in clause 8.3, where TX =20ms. If the UE is not capable of parallelTxPRACH-SRS-PUCCH-PUSCH additional interruption can be allowed as defined in Clause 8.2.2.2.18.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3.15.

The interruption of PCell due to activation of SCells shall not be more than the values specified for SA in Clause 8.2.2.2.18.

##### A.7.5.3.x6.2 PUCCH SCell activation with non-PUCCH SCell in a primary PUCCH Group

##### A.7.5.3.x6.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.x5 except the PUCCH SCell in FR2 is unknown and another to-be-activated FR2 non-PUCCH SCell in parallel with the PUCCH SCell belongs to the primary PUCCH group.

The supported test configurations and the general test parameters are defined in Table A.7.5.3.x6.2.1-1 and Table A.7.5.3.x6.2-2, respectively. And cell specific test parameters are described in Tables A.7.5.3.x6.2.1-3. OTA related test parameters are defined in Table A.7.5.3.x6.2.1-4. In all test cases, three cells are used. Cell 1 and Cell 3 are FR2 PCell and FR2 non-PUCCH SCell in the same band, respectively, and Cell 2 is PUCCH SCells in a different band from Cell 1 and Cell 3. Cell 3 belongs to the primary PUCCH group.

In the test configuration 1, the UE is configured with a single Timingi Advance Group (TAG) for all cells, whereas UE is configured with a primary TAG (pTAG) for Cell 1 and a secondary TAG (sTAG) for Cell 2 and Cell 3 in the test configuration 2. The test configuration 1 and 2 are to verify the UE performance for the case where the UE has a valid TA for the PUCCH SCell and the case where the UE does not have a valid TA for the PUCCH SCell, respectively.

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

A MAC message for activation of SCells is sent by the test equipment T1 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 the beginning of T2 the transmission power of Cell 2 is increased to same level as for cell 2 At the time of T2, the UE has a valid TA in the test configuration 1 while the UE does not have a valid TA for the SCell in sTAG in the test configuration 2. During the test for the test configuration 1, the UE needs to be provided with a new Timing Advance Command MAC control element at least once during each time alignment timer period.

During T2, the test equipment monitors the L1-RSRP measurement result for the PUCCH SCell reported on the PCell. 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 SCells and PUCCH-SpatialRelation of the PUCCH SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for the SCells.

During the test for the test configuration 1, the UE shall start reporting CSI of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the PUCCH SCell (Cell 2) and PCell (Cell 1), respectively, no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for a valid TA scenario.

During the test for the test configuration 2, THARQ + Tactivation\_time after slot m, the UE shall be able to monitor PDCCH on the PUCCH SCell that triggers PDCCH order-based contention-free PRACH. The test equipment receives the PRACH and sends random access response with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value estimated from the PRACH. The UE shall start reporting CSI of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the PUCCH SCell (Cell 2) and PCell (Cell 1), respectively, no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tactivation\_time is the SCell activation delay defined in 8.3.2 for FR2 unknown SCell with periodic CSI-RS used for CSI reporting, and Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for an invalid TA scenario.

Time period T3 starts when a MAC message for deactivation of the SCells, 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 during the activation of the SCells.

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 on the PUCCH SCell is discontinued.

Table A.7.5.3.x6.2.1-1: Supported test configurations for FR2 SCell activation case

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | PCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target SCells: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target SCells: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is required to pass both of the supported test configurations. The UE will be configured with a single Timing Advance Group (TAG) in the test configuration 1 whearas two TAGs are used in the test configuration 2. | |

Table A.7.5.3.x6.2.1-2: General test parameters for unknown FR2 PUCCH SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2,3 | Three NR radio channel (1, 2, 3) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated PUCCH SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2. The cell is in a different FR2 band from Cell 1. |
| Configured deactivated non-PUCCH SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3. The cell is intra-band contiguous to Cell 1. |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | ≤25 | A random value from 0μs to 25μs |
| Cell3 timing offset to cell1 | μs | ≤25 | A random value from 0μs to 25μs |
| Cell3 timing offset to cell2 | μs | 0 |  |
| T1 | s | 7 | During this time the PCell (Cell 1) shall be known and the SCells (Cell 2 and Cell 3) configured and detected. |
| T2 | s | 2 | During this time the UE shall activate the SCells. |
| T3 | s | 1 | During this time the UE shall deactivate the SCells. |
| THARQ | ms | Config 1: 2  Config 2: 3  Config 3: 2.5 | 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] that will meet the timing constraints of this test case. |
| TCSI\_Reporting | ms | 15 | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] and TS 38.213 [3]. |

Table A.7.5.3.x6.2.1-3: Cell specific test parameters for FR2 PUCCH SCell activation case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
| 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 | | | | | | | | |
| 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 | | | | | | | | |
| PUCCH Spatial Relation | Config 1,2 |  | PUCCH.SRI.0 | | | PUCCH.SRI.0 | | | N/A | | |
| BWchannel | Config 1,2 | MHz | 100: NRB,c = 66 | | | | | | | | |
| PDSCH Reference measurement channel | Config 1,2 |  | SR.3.1 TDD | | | SR.3.1 TDD | | | - | | |
| RMSI CORESET Reference Channel | Config 1,2 |  | CR.3.1 TDD | | | - | | | - | | |
| Dedicated CORESET Parameters | Config 1,2 |  | CCR.3.1 TDD | | | CCR.3.1 TDD | | | - | | |
| TimeAlignmentTimer for pTAG | Config 1,2 |  | ms500 | | | N/A | | | N/A | | |
| TimeAlignmentTimer for sTAG | Config 1 |  | N/A | | | N/A | | | N/A | | |
| Config 2 |  | N/A | | | ms500 | | | N/A | | |
| CSI-RS configuration for CSI reporting | Config 1,2 |  | - | | | N/A | CSI-RS.3.1 TDD  Note 6 | | N/A | CSI-RS.3.1 TDD  Note 6 | |
| SSB configuration | Config 1,2 |  | SSB.3 FR2 | | | N/A | SSB.3 FR2 | | N/A | SSB.3 FR2 | |
| CSI reporting periodicity | Config 1,2 | ms | 5 | | | 5 | | | N/A | | |
| reportConfigType for CSI reporting | Config 1,2 |  | - | | | Periodic | | | N/A | | |
| reportConfigType for L1-RSRP | Config 1,2 |  | periodic | | | - | | | N/A | | |
| reportQuantity for CSI reporting | Config 1,2 |  | - | | | cri-RI-PMI-CQI | | | - | | |
| reportQuantity for L1-RSRP | Config 1,2 |  | ssb-Index-RSRP | | | - | | | N/A | | |
| CSI reporting periodicity | Config 1,2 |  | - | | | 40 | | | 40 | | |
| L1-RSRP reporting periodicity Note 7 | Config 1,2 |  | 40 | | | - | | | N/A | | |
| CSI reporting offset | Config 1,2 |  | - | | | 4 | | | 4 | | |
| L1-RSRP reporting offset | Config 1,2 |  | 4 | | | - | | | N/A | | |
| OCNG Patterns | |  | OP.1 | | | | | | | | |
| 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) | |
| 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: Void  Note 3: Void  Note 4: Void  Note 5: Void  Note 6: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+TL1-RSRP during T2.  Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1. | | | | | | | | | | | |

Table A.7.5.3.x6.2.1-4: OTA related test parameters for FR2 PUCCH SCell activation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 6 | Unit | Cell 2 | | | Cell 3 | | |
|  |  | 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 | 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.7.5.3.x6.2.2 Test Requirements

During T2 the UE shall start sending a valid L1-RSRP report of the SCell to the PCell 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.

During T2, if the test is based on the test configuration 1, the UE shall start sending CSI reports of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the PUCCH SCell (Cell 2) and PCell (Cell 1), respectively, no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for a valid TA scenario.

During T2, if the test is based on the test configuration 2, the UE shall start sending CSI reports of the PUCCH SCell (Cell 2) and the non-PUCCH SCell (Cell 3) with non-zero CQI index via PUCCH on the PUCCH SCell (Cell 2) and PCell (Cell 1), respectively, no later than slot m + (THARQ + Tdelay\_multiple\_SCells\_PUCCH\_SCell)/NR slot length and slot m + (THARQ + Tdelay\_multiple\_SCells\_other\_SCell)/NR slot length, respectively. Here, Tdelay\_multiple\_SCells\_PUCCH\_SCell and Tdelay\_multiple\_SCells\_other\_SCell are the PUCCH SCell activation delay and other SCell activation delay defined in 8.3.13 for an invalid TA scenario.

During T3 the UE shall stop sending CSI reports on the PUCCH SCell no later than slot , as defined in clause 8.3.15.

During T2 interruption of PCell during the SCell activation shall not happen outside the slot to , as defined in clause 8.3, where TX =20ms. If the UE is not capable of parallelTxPRACH-SRS-PUCCH-PUSCH additional interruption can be allowed as defined in Clause 8.2.2.2.18.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3.15.

The interruption of PCell due to activation of SCells shall not be more than the values specified for SA in Clause 8.2.2.2.18.

#### << End of Change #14>>