3GPP TSG-RAN WG4 Meeting #111 [R4-2410398](ftp://10.10.10.10/ftp/tsg_ran/WG4_Radio/TSGR4_111/Inbox/R4-2410398.zip)

Fukuoka City, Fukuoka , Japan, 20th – 24th May, 2024

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** | **4344** | **rev** | **1** | **Current version:** |  |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Big CR to TS 38.133 on performance requirements for Even Further RRM enhancement for NR and MR-DC | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Apple | | | | | | | | | |
| ***Source to TSG:*** | RAN4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_RRM\_enh3-Perf | | | | |  | ***Date:*** | | | 2024-03-16 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The performance requirements and test cases for R18 RRM enhancements in TS38.133 are missing and some of them need maintenance, including:   * SCell activation enhancements * FR1-FR1 NR-DC RRM | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Maintain/specify the requirements and test cases for R18 RRM enhancements in TS38.133, including:   * SCell activation enhancements * FR1-FR1 NR-DC RRM   The endorsed CR in RAN4#110bis are:   * R4-2406333 draftCR on TCs for FR2 unknown SCell activation with FG31-2 and FG31-3 * R4-2406334 [NR\_RRM\_enh3-Perf] Draft CR on TC for Multiple SCell activation delay with FR1 unknown SCell with L3 report * R4-2406335 DraftCR on TC2 for FR2 PUCCH SCell activation FG31-1 * R4-2406336 draft CR on test case for R18 FR2 SCell activation delay reduction * R4-2406337 DraftCR FR2 SCell activation with L3 reporting during activaiton * R4-2405965 draftCR on TC for SCell activation delay with shorter measurement interval enhancement * R4-2406325 Draft CR to TS 38.133 for NR-DC FR1-FR1 scg activation and deactivation test case * R4-2406326 Draft CR on performance requirements for FR1-FR1 NR-DC * R4-2405719 DraftCR HO with PSCell for FR1-FR1 to FR1-FR1   The endorsed CR in RAN4#111 are:   * R4-2410254 correction on TCs for FR2 unknown SCell activation with FG31-1 * R4-2410255 draft CR on test case for R18 FR2 SCell activation delay reduction * R4-2410424 [NR\_RRM\_enh3-Perf] Draft CR on TC for Multiple SCell activation delay with FR1 unknown SCell with L3 report * R4-2410257 DraftCR on TC maintenance for R18 eFeRRM SCell activation * R4-2408528 Draft CR to TS 38.133 for test case of SCG activation in FR1-FR1 NR-DC | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The performance requirements and test cases for R18 RRM enhancements in TS38.133 are missing and some of them need maintenance. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.5.5.3.x, A.7.5.3.y, A.7.5.3.z, A.6.5.3.x, A.4.5.3.x, A.5.5.3.X1, A.7.5.3.X1, A.7.5.3.X2, A.7.5.3.16, A.6.5.3.x, A.4.5.3.x, A.7.3.1.x, A.7.3.1.y, A.6.5.10, A.6.5.x, A.6.3.1.15 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS38.533 | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

Start of Change 1

#### A.5.5.3.x SCell Activation and deactivation of unknown SCell in FR2 for UE in DRX, capable of small beam sweeping factors and/or short measurement interval

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

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell is unknown in FR2 by the UE at the time of activation. The test will also verify that the SSB-based L1-RSRP measurement accuracy is within the specified limits as stated in clause 10.1.20.1.

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

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

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

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2.

During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+TL1-RSRP. In the next DL slot after slot m+TL1-RSRP, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

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

The test equipment verifies 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. In this test the allowed time for SCell activation depends on the UE reported capabilities regarding small beam sweeping factors (i.e. X1/X2 as indicated in beamSweepingFactorReduction-r18) and short measurement intervals (shortMeasInterval-r18).

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.

The test equipment verifies the absolute accuracy of SSB-based L1-RSRP measurements during T2 by using the parameters in Table A.5.5.3.x.1-3 and Table A.5.5.3.x.1-4.

**Table A.5.5.3.x.1-1: Supported test configurations for FR2 SCell activation case 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.x.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 |
| T1 | ms | 100 | During this time the PSCell shall be known and the SCell configured, but not detected. |
| T2 | s | 2 or 12 | During this time the UE shall activate the SCell. Depends on the UE capability, 2s for the case where DRX is not applicable and 12s for the case where DRX is applicable. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| X1 |  | 1,2,4,6 (Default 8) | Optionally signaled by the UE capabilities as part of beamSweepingFactorReduction-r18:  reduceForCellDetection |
| X2 |  | 0,1,2,3,4,5,6,7 (Default 8) | Optionally signaled by the UE capabilities as part of beamSweepingFactorReduction-r18:  reduceForSSB-L1-RSRP-Meas |

**Table A.5.5.3.x.1-3: Cell specific test parameters for FR2 SCell activation case with FR1 active 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 | DRX.8 | | | | | | |
| 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.3 | | | | | | |
| 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 |  | periodic | | | NA | | | |
| reportQuantity | Config 1~6 |  | cri-RI-PMI-CQI | | | NA | | | |
| CSI reporting periodicity Note 6 | Config 1~6 | slot | 40 | | | NA | | | |
| CSI reporting offset | Config 1~6 | slot | 4 | | | NA | | | |
| EPRE ratio of PSS to SSS | | 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.x.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 |
|  | | Config 3,6 |  | A.3.7A | | |
|  | Config 1,2,3,4,5,6 | | dB |  | | | -∞ | | 7 | | 7 |
|  | | | dB |  | | | -∞ | | 7 | | 7 |
| IoNote2, Note 4 | Config 1,2,4,5 | | dBm/95.04 MHz |  | | | -66.68 | | -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.x.2 Test Requirements

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

For UE capable of *beamSweepingFactorReduction-r18* and *shortMeasInterval-r18* capabilities:

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, enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report

as defined in clause 8.3.2. For this test case, TFirstSSB\_MAX, enhanced =TSMTC\_MAX, enhanced =Trs, enhanced = TSSB=20ms; TL1-RSRP, enhanced\_measure= (X2/8)\*480 ms and TL1-RSRP,reprt=5ms, which allows TL1-RSRP = 968ms if X1 and X2 use the default value. Value of TL1-RSRP for various X1/X2 capabilities is obtained from table A.5.5.3.x.1-5.

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

- Tactivation\_time = 3ms + TFirstSSB\_MAX, enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report + max{(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)} which allows 1000ms in case of no X1/X2 capability and a minimum of 380ms for the case with X1=1, X2=0 (for other values of X1/X2 capability corresponding value of TL1-RSRP shall be adopted from table A.5.5.3.x.1-5).

TL1-RSRP, enhanced\_measure is

- SSB based L1-RSRP measurement delay TL1-RSRP\_Measurement\_Period\_SSB ms based on applicability as defined in clause 9.5 assuming M=1 and TReport=0; N is equal to the value reported by the UE in *reduceForSSB-L1-RSRP-Meas i.e. X2*. Otherwise, if *reduceForSSB-L1-RSRP-Meas* is absent, N= 8.

- CSI-RS based L1-RSRP measurement delay TL1-RSRP\_Measurement\_Period\_CSI-RS ms based on applicability as defined in clause 9.5 assuming M=1 and TReport=0.

In case UE has signalled X1/X2 to be lower than 8 the following values are allowed for TL1-RSRP:

**Table A.5.5.3.x.2-1: TL1-RSRP for different X1/X2 capabilities (ms)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | X1=1 | X1=2 | X1=4 | X1=6 |
| X2=0 | 348 | 368 | 408 | 448 |
| X2=1 | 408 | 428 | 468 | 508 |
| X2=2 | 468 | 488 | 528 | 568 |
| X2=3 | 528 | 548 | 588 | 628 |
| X2=4 | 588 | 608 | 648 | 688 |
| X2=5 | 648 | 668 | 708 | 748 |
| X2=6 | 708 | 728 | 768 | 808 |
| X2=7 | 768 | 788 | 828 | 868 |

For UE capable of *beamSweepingFactorReduction-r18* but not *shortMeasInterval-r18* capabilities, and the cell specific test parameters are described in Table A.5.5.3.x.1-3 except that SMTC value is SMTC.1:

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, enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report

as defined in clause 8.3.2. For this test case, considering DRX, TFirstSSB\_MAX, enhanced =TSMTC\_MAX, enhanced =Trs, enhanced =20ms; from table 9.5.4.1-2 TL1-RSRP, enhanced\_measure= (X2/8)\*11520 ms and TL1-RSRP,report=5ms, which allows TL1-RSRP = 12008ms if X1 and X2 are absent. Value of TL1-RSRP for various X1/X2 capabilities is obtained from table A.5.5.3.x.1-6 assuming DRX cycle = 320ms.

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

- Tactivation\_time = 3ms + TFirstSSB\_MAX, enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report + max{(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)} which allows 12040ms in case of no X1/X2 capability and a minimum of 380 ms for the case with X1=1, X2=0 (for other values of X1/X2 capability corresponding value of TL1-RSRP shall be adopted from table A.5.5.3.x.1-6).

**Table A.5.5.3.x.1-6: TL1-RSRP for different X1/X2 capabilities with 320ms DRX cycle (ms)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | X1=1 | X1=2 | X1=4 | X1=6 |
| X2=0 | 348 | 368 | 408 | 448 |
| X2=1 | 1788 | 1808 | 1848 | 1888 |
| X2=2 | 3228 | 3248 | 3288 | 3328 |
| X2=3 | 4668 | 4688 | 4728 | 4768 |
| X2=4 | 6108 | 6128 | 6168 | 6208 |
| X2=5 | 7548 | 7568 | 7608 | 7648 |
| X2=6 | 8988 | 9008 | 9048 | 9088 |
| X2=7 | 10428 | 10448 | 10488 | 10528 |

For UE capable of *shortMeasInterval-r18* but not *beamSweepingFactorReduction-r18* capabilities, the general test parameters are described in Table A.5.5.3.x.1-2 except that the default value for X1=X2=8 is chosen.

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, enhanced + 15\*TSMTC\_MAX, enhanced + 8\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report

as defined in clause 8.3.2. For this test case, even with DRX, the UE treats the case as non-DRX, thus TFirstSSB\_MAX, enhanced =TSMTC\_MAX, enhanced =Trs, enhanced = TSSB=20ms; TL1-RSRP, measure= 480 ms and TL1-RSRP,report=5ms, which allows TL1-RSRP = 968ms.

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

- Tactivation\_time = 3ms + TFirstSSB\_MAX, enhanced + 15\*TSMTC\_MAX, enhanced + 8\*Trs, enhanced + TL1-RSRP, measure + TL1-RSRP, report + max{(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)} which allows 1000ms.

- TCSI\_Reporting = 10ms

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

The L1-RSRP measurement accuracy for SSB resource reported by UE in L1-RSRP report (SSB#0 or SSB#1) of Cell 3 shall fulfil the accuracy requirements in clauses 10.1.20.1 provided the side condition is -2dB as defined in clause 8.3.2.

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

End of Change 1

Start of Change 2

#### A.7.5.3.y SCell Activation and deactivation for SCell in FR2 inter-band in DRX for UE capable of small beam sweeping factors and/or short measurement interval

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

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell (Cell 1) and SCell (Cell 2) are in FR2 inter-band. The test will also verify that the SSB-based L1-RSRP measurement accuracy is within the specified limits as stated in clause 10.1.20.1.

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

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell. A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The UE shall be continuously scheduled within on-duration based on DRX configuration in the PCell throughout the whole test. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 is increased to same level as for Cell 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.

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 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. In this test the allowed time for SCell activation depends on the UE reported capabilities regarding small beam sweeping factors (beamSweepingFactorReduction-r18) and short measurement intervals (shortMeasInterval-r18).

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.

The test equipment verifies the absolute accuracy of SSB-based L1-RSRP measurements during T2 by using the parameters in Table A.7.5.3.y.1-3 and Table A.7.5.3.y.1-4.

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

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

**Table A.7.5.3.y.1-2: General test parameters for FR2 SCell activation in FR2 inter-band**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| RF Channel Number |  | 1,2 | Two NR radio channels are used for this test. RF channel number 1 is in band 1 and RF channel number 2 is in band 2, where bands 1 and 2 are inter-band CA operating bands in FR2 as specified in Table 5.2A.2-1 in TS38.101-2. |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2. |
| CP length |  | Normal |  |
| DRX |  | DRX.8 | DRX Configuration 8: DRX cycle = 320 ms and TAT = infinity as specified in A.3.3.8 |
| 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 | ms | ≤8 | A random value from 0ms to 8ms |
| T1 | ms | 100 | During this time the PCell shall be known and the SCell is configured but not detected. |
| T2 | s | 2 or 12 | During this time the UE shall activate the SCell. Depends on the UE capability, T2= 2s for the case where DRX is not applicable. T2= 12s for the case where DRX is applicable. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE’s capability |
| X1 |  | 1,2,4,6 (Default 8) | Optionally signaled by the UE capabilities as part of beamSweepingFactorReduction-r18: |
| X2 |  | 0,1,2,3,4,5,6,7 (Default 8) | Optionally signaled by the UE capabilities as part of beamSweepingFactorReduction-r18: |

**Table A.7.5.3.y.1-3: Cell specific test parameters for FR2 SCell activation in FR2 inter-band**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ParameterNote 5** | **Unit** | **T1** | | **T2** | | **T3** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| SSB ARFCN |  | freq1 | freq2 | freq1 | freq2 | freq1 | freq2 |
| Duplex mode |  | TDD | | TDD | | TDD | |
| TDD configuration |  | TDDConf.3.1 | | TDDConf.3.1 | | TDDConf.3.1 | |
| Downlink initial BWP Configuration |  | DLBWP.0.1 | | DLBWP.0.1 | | DLBWP.0.1 | |
| Downlink dedicated BWP Configuration |  | DLBWP.1.1 | | DLBWP.1.1 | | DLBWP.1.1 | |
| Uplink initial BWP configuration |  | ULBWP.0.1 | | ULBWP.0.1 | | ULBWP.0.1 | |
| Uplink dedicated BWP configuration |  | ULBWP.1.1 | | ULBWP.1.1 | | ULBWP.1.1 | |
| TRS configuration |  | TRS.2.1 TDD | | TRS.2.1 TDD | | TRS.2.1 TDD | |
| TCI state |  | TCI.State.0 | | TCI.State.0 | | TCI.State.0 | |
| BWchannel | MHz | 100: NRB,c = 66 | | 100: NRB,c = 66 | | 100: NRB,c = 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | - | SR.3.1 TDD | - | SR.3.1 TDD | - |
| RMSI CORESET Parameters |  | CR.3.1 TDD | - | CR.3.1 TDD | - | CR.3.1 TDD | - |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | - | CCR.3.1 TDD | - | CCR.3.1 TDD | - |
| CSI-RS configuration |  | NA | NA | NA | CSI-RS.3.1 TDD Note 2 | NA | CSI-RS.3.1 TDD |
| CSI reporting periodicity Note 3 |  | NA | 5 | NA | 5 | NA | 5 |
| OCNG Patterns |  | OP.1 | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | |
| SMTC Configuration |  | SMTC.3 | | | | | |
| 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.y.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.y.2 Test Requirements

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

For UE capable of *beamSweepingFactorReduction-r18* and *shortMeasInterval-r18* capabilities:

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, enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report

as defined in clause 8.3.2. For this test case, UE supports short measurement interval hence TFirstSSB\_MAX, enhanced =TSMTC\_MAX, enhanced =Trs, enhanced =TSSB=20ms; TL1-RSRP, enhanced measure=X2/8 \*480ms and TL1-RSRP, report=5ms, which allows TL1-RSRP according to table A.7.5.y.2-1. TL1-RSRP =968ms if X1 and X2 use the default value and a minimum of 348ms for the case with X1=1, X2=0 (for other values of X1/X2 capability corresponding value of TL1-RSRP shall be adopted from table A.7.5.y.2-1:

**Table A.7.5.3.y.2-1: TL1-RSRP for different X1/X2 capabilities (ms)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | X1=1 | X1=2 | X1=4 | X1=6 |
| X2=0 | 348 | 368 | 408 | 448 |
| X2=1 | 408 | 428 | 468 | 508 |
| X2=2 | 468 | 488 | 528 | 568 |
| X2=3 | 528 | 548 | 588 | 628 |
| X2=4 | 588 | 608 | 648 | 688 |
| X2=5 | 648 | 668 | 708 | 748 |
| X2=6 | 708 | 728 | 768 | 808 |
| X2=7 | 768 | 788 | 828 | 868 |

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

-THARQ is defined in Table A.7.5.3.3.1-2

-Tactivation\_time = 3ms TFirstSSB\_MAX, enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows 1000 ms in case of no X1/X2 capability and a minimum of 380ms for the case with X1=1, X2=0 (for other values of X1/X2 capability corresponding value of TL1-RSRP shall be adopted.

For UE capable of *beamSweepingFactorReduction-r18* but not *shortMeasInterval-r18* capabilities, the cell specific test parameters are described in Table A.7.5.3.x.1-3 except that SMTC value is SMTC.1:

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, enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report

as defined in clause 8.3.2. For this test case, UE supports short measurement interval hence TFirstSSB\_MAX, enhanced =TSMTC\_MAX, enhanced =Trs, enhanced =20ms; TL1-RSRP, enhanced measure=X2/8 \*11520ms and TL1-RSRP, report=5ms, which allows TL1-RSRP = 12008ms if X1 and X2 are absent. Value of TL1-RSRP for various X1/X2 capabilities is obtained from table A.7.5.y.2-2.

**Table A.7.5.3.y.2-2: TL1-RSRP for different X1/X2 capabilities (ms)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | X1=1 | X1=2 | X1=4 | X1=6 |
| X2=0 | 348 | 368 | 408 | 448 |
| X2=1 | 1788 | 1808 | 1848 | 1888 |
| X2=2 | 3228 | 3248 | 3288 | 3328 |
| X2=3 | 4668 | 4688 | 4728 | 4768 |
| X2=4 | 6108 | 6128 | 6168 | 6208 |
| X2=5 | 7548 | 7568 | 7608 | 7648 |
| X2=6 | 8988 | 9008 | 9048 | 9088 |
| X2=7 | 10428 | 10448 | 10488 | 10528 |

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

- THARQ is defined in Table A.7.5.3.3.1-2

- Tactivation\_time = 3ms TFirstSSB\_MAX, enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows 12040 ms in case of no X1/X2 capability and a minimum of 380ms for the case with X1=1, X2=0 (for other values of X1/X2 capability corresponding value of TL1-RSRP shall be adopted.

For UE capable of *shortMeasInterval-r18* but not *beamSweepingFactorReduction-r18* capabilities, the general test parameters are described in Table A.7.5.3.y.1-2, except that the default value for X1=X2=8 is chosen.

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, enhanced + 15\*TSMTC\_MAX, enhanced + 8\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report

as defined in clause 8.3.2. For this test case, UE supports short measurement interval hence TFirstSSB\_MAX, enhanced =TSMTC\_MAX, enhanced =Trs, enhanced =TSSB=20ms; TL1-RSRP, enhanced measure=480ms and TL1-RSRP, report=5ms, which allows TL1-RSRP =968ms.

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

-THARQ is defined in Table A.7.5.3.3.1-2

-Tactivation\_time = 3ms TFirstSSB\_MAX, enhanced + 15\*TSMTC\_MAX, enhanced + 8\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows 1000 ms.

-TCSI\_Reporting = 10ms

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

The L1-RSRP measurement accuracy for SSB resource reported by UE in L1-RSRP report (SSB#0 or SSB#1) of Cell 3 shall fulfil the accuracy requirements in clauses 10.1.20.1 provided the side condition is -2dB as defined in clause 8.3.2.

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

End of Change 2

Start of Change 3

A.7.5.3.z SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2, in DRX, for UE capable of small beam sweeping factors and/or short measurement interval

A.7.5.3.z.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell is in FR1 and SCell is in FR2.

The supported test configurations are defined in Table A.7.5.3.z.1-1. The general test parameters are the same as defined in Table A.7.5.3.z.1-2. And cell specific test parameters are described in Tables A.7.5.3.z.1-2. OTA related test parameters are defined in Table A.7.5.3.z.1-3. The test will also verify that the SSB-based L1-RSRP measurement accuracy is within the specified limits as stated in clause 10.1.20.1.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The UE shall be continuously scheduled within on-duration based on DRX configuration in the PCell throughout the whole test. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2.

During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot m+TL1-RSRP. In the next DL slot after slot m+TL1-RSRP, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

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

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

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

The test equipment verifies the absolute accuracy of SSB-based L1-RSRP measurements during T2 by using the parameters in Table A.7.5.3.z.1-3 and Table A.7.5.3.z.1-4.

**Table A.7.5.3.z.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.z.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 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 |  | DRX.8 | DRX Configuration 8: DRX cycle = 320 ms and TAT = infinity as specified in A.3.3.8 |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | ms | 100 | During this time the PSCell shall be known and the SCell configured and detected. |
| T2 | s | 5 | During this time the UE shall activate the SCell. Depends on the UE capability, T2= 2s for the case where DRX is not applicable. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| A3-offset | dB | -15 |  |
| 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. |

**Table A.7.5.3.z.1-3: Cell specific test parameters for FR2 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 | | | | | | |
| 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 1~3 |  | N/A | | | | N/A | CSI-RS.3.1 TDD Note 6 | CSI-RS.3.1 TDD |
| reportConfigType for CSI reporting |  |  | periodic | | | | N/A | | |
| reportConfigType for L1-RSRP |  |  | periodic | | | | N/A | | |
| reportQuantity for CSI reporting |  |  | cri-RI-PMI-CQI | | | | N/A | | |
| reportQuantity for L1-RSRP |  |  | ssb-Index-RSRP | | | | N/A | | |
| CSI reporting periodicity | Config 1,2 | slot | 5 | | | | N/A | | |
| Config 3 | 10 | | | |
| L1-RSRP reporting periodicity Note 7 | Config 1,2 | slot | 5 | | | | N/A | | |
| Config 3 | 10 | | | |
| CSI reporting offset | Config 1,2 | slot | 2 | | | | N/A | | |
| Config 3 | 4 | | | |
| L1-RSRP reporting offset | Config 1,2 | slot | 2 | | | | N/A | | |
| Config 3 | 4 | | | |
| SMTC configuration | |  | SMTC.3 | | | | | | |
| 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  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.z.1-4: OTA related test parameters for FR2 SCell activation case 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.z.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PCell in the slot.

For UE capable of *beamSweepingFactorReduction-r18* and *shortMeasInterval-r18* capabilities:

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, enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report

as defined in clause 8.3.2. For this test case, TFirstSSB\_MAX, enhanced =TSMTC\_MAX, enhanced =Trs, enhanced = TSSB=20ms; TL1-RSRP, enhanced\_measure= (X2/8)\*160 ms and TL1-RSRP,reprt=5ms, which allows TL1-RSRP = 680ms if X1 and X2 use the default value. Value of TL1-RSRP for various X1/X2 capabilities is obtained from table A.7.5.3.z.2-1.

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.z.1-2

- Tactivation\_time = 3ms TFirstSSB\_MAX, enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows 710 ms in case of no X1/X2 capability and a minimum of 380ms for the case with X1=1, X2=0 (for other values of X1/X2 capability corresponding value of TL1-RSRP shall be adopted from table A.7.5.z.2-1.

**Table A.7.5.3.z.2-1: TL1-RSRP for different X1/X2 capabilities (ms)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | X1=1 | X1=2 | X1=4 | X1=6 |
| X2=0 | 348 | 368 | 408 | 448 |
| X2=1 | 368 | 388 | 428 | 468 |
| X2=2 | 388 | 408 | 448 | 488 |
| X2=3 | 408 | 428 | 468 | 508 |
| X2=4 | 428 | 448 | 488 | 528 |
| X2=5 | 448 | 468 | 508 | 548 |
| X2=6 | 468 | 488 | 528 | 568 |
| X2=7 | 488 | 508 | 548 | 588 |

For UE capable of beamSweepingFactorReduction-r18 but not shortMeasInterval-r18 capabilities, the cell specific test parameters are described in Table A.7.5.3.z.1-3 except that SMTC value is SMTC.1:

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, enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report

as defined in clause 8.3.2. For this test case, TFirstSSB\_MAX, enhanced =TSMTC\_MAX, enhanced =Trs, enhanced = TSSB=20ms; TL1-RSRP, enhanced\_measure= (X2/8)\*3840 ms and TL1-RSRP,ctiva=5ms, which allows TL1-RSRP = 4328ms if X1 and X2 use the default value. Value of TL1-RSRP for various X1/X2 capabilities is obtained from table A.7.5.3.z.2-2.

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.5.5.3.1.1-2

- Tactivation\_time = 3ms TFirstSSB\_MAX, enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows 4360 ms in case of no X1/X2 capability and a minimum of 380ms for the case with X1=1, X2=0 (for other values of X1/X2 capability corresponding value of TL1-RSRP shall be adopted from table A.7.5.z.2-2.

**Table A.7.5.3.z.2-2: TL1-RSRP for different X1/X2 capabilities (ms)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | X1=1 | X1=2 | X1=4 | X1=6 |
| X2=0 | 348 | 368 | 408 | 448 |
| X2=1 | 828 | 848 | 888 | 928 |
| X2=2 | 1308 | 1328 | 1368 | 1408 |
| X2=3 | 1788 | 1808 | 1848 | 1888 |
| X2=4 | 2268 | 2288 | 2328 | 2368 |
| X2=5 | 2748 | 2768 | 2808 | 2848 |
| X2=6 | 3228 | 3248 | 3288 | 3328 |
| X2=7 | 3708 | 3728 | 3768 | 3808 |

For UE capable of *shortMeasInterval-r18* but not *beamSweepingFactorReduction-r18* capabilities, the general test parameters are described in Table A.7.5.3.z.1-2, except that the default value for X1=X2=8 is chosen.

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, enhanced + 15\*TSMTC\_MAX, enhanced + 8\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report

as defined in clause 8.3.2. For this test case, UE supports short measurement interval hence TFirstSSB\_MAX, enhanced =TSMTC\_MAX, enhanced =Trs, enhanced =TSSB=20ms; TL1-RSRP, enhanced measure=160ms and TL1-RSRP, report=5ms, which allows TL1-RSRP =680ms.

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

-THARQ is defined in Table A.7.5.3.3.1-2

-Tactivation\_time = 3ms TFirstSSB\_MAX, enhanced + 15\*TSMTC\_MAX, enhanced + 8\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, which allows 710 ms.

- TCSI\_Reporting = 10ms

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

The L1-RSRP measurement accuracy for SSB resource reported by UE in L1-RSRP report (SSB#0 or SSB#1) of Cell 3 shall fulfil the accuracy requirements in clauses 10.1.20.1 provided the side condition is -2dB as defined in clause 8.3.2.

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

End of Change 3

Start of Change 4

#### A.6.5.3.x SCell Activation of multiple unknown SCells in FR1 with L3 reporting with single activation/deactivation commandin non-DRX

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

The purpose of this test is to verify that the multiple SCells activation times are within the requirements stated in clause 8.3.18, when all the multiple SCells in the same FR1 band are unknown to the UE at the time of activation.

The supported test configurations are shown in table A.6.5.3.x.1-1 below. The test parameters are given in Tables A.6.5.3.x.1-2. The cell-specific parameters for NR PCell and NR SCell are given in Tables A.6.5.3.x.1-3 and A.6.5.3.x.1-4 below. The test consists of two successive time periods, with duration of T1 and T2, 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(PCell), but is not aware of Cell 2 (DL SCell) and Cell 3(DL SCell). The UE is only monitoring the PCC. TE continuously schedules the downlink data to UE on PCell throughout the whole test. PCC and SCC of Cell 2, Cell 3 are on different bands. SCC of Cell 2 and SCC of Cell 3 are on same band.

The test consists of two sub tests. The slot at which the MAC message is received at the UE antenna connector, is denoted slot #n.

At the beginning of T1 the UE receives an RRC message by which the Cell 2 and 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 Cell 2 and Cell 3 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.

In sub test 1, TE shall transmit DCI 0-1 on PCell to schedule the PUSCH at slot , and the UE shall be able to transmit L3 measurement report of SCells at slot , where k2 = 1.

In sub test 2, TE shall transmit DCI 0-1 on PCell to schedule the PUSCH at slot , where M is defined in 8.3.17 and k2 = 1, and the UE shall be able to transmit L3 measurement report of SCells at slot . For sub test 2, TE will send TCI activation command after receiving L3 measurement report of the SCell.

The UE shall be able to report valid CSI in PCell for the activated DL SCells at latest in slot as defined in clause 8.3.18.

The UE shall start reporting CSI in PCell for the activated SCells(Cell 2 and Cell 3) after at least one CSI-RS transmission occasion for channel measurement and reporting after slot and shall report CQI index 0 (out-of-range) until the multiple DL SCell activation has been completed.

Any PCell interruption due to activation DL SCell shall occur in the slot to , as defined in clause 8.3.18, where is the interruption length given in clause 8.2.2.2.2.

The test equipment verifies the activation time for Cell 2 by counting the slots from the time when the SCell activation command is sent until CSI report of acticated Cell 2 with other than CQI index 0 is received.

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

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation of multiple DL SCells.

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

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

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode, for all Cells |
| 2 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode, for all Cells |
| 3 | NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode, for all Cells |
| 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.x.1-2: General test parameters for multiple unknown FR1 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 DL SCell 1 |  | Cell 2 | Configured deactivated DL secondary cell on NR RF channel number 2 |
| Configured deactivated DL SCell 2 |  | 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 but not detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell 1 and SCell 2. |
| A2-threshold | dBm | -130 |  |
| ReportConfig |  | reportConfigId = 0: A2-event-triggered  reportConfig = 1: reportOnScellActivation-r18 |  |
| 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] |
| Tuncertainty\_RRC | ms | 0 | The CSI reporting for SCell being activated is provided during SCell addition. |

Table A.6.5.3.x.1-3: Cell specific test parameters for NR PCell for multiple unknown FR1 SCell activation case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | |
| T1 | T2 |
| 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.0.1 | |
| 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.1Note 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 | Config 1,2 | slot | 5 | |
| Config 3 | 10 | |
| CSI reporting offset | Config 1,2 | slot | 3 | |
| Config 3 | 5 | |
| 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 | |
| Correlation Matrix and Antenna Configuration | | - | 2x2 Low | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled within BWoccupied.  Note 3: SS-RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the 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. | | | | |

Table A.6.5.3.x.1-4: Cell specific test parameters for NR SCell for multiple unknown FR1 SCell activation case

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | | Cell 2 and Cell 3 | |
| T1 | T2 | T1 | T2 |
| 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.0.1 | | | |
| 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.3 FR1 | | | |
|  | Config 3 | SSB.4 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.x.2 Test Requirements

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 as defined in clause 8.3.18, in sub test 1, Tactivation\_time\_multiple\_scells = 7ms + + max (THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay), where = 1ms for Config 1 and 2, and 0.5ms for config 3.

In sub test 2, Tactivation\_time\_multiple\_scells = 3ms + M+ max (THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay).

End of Change 4

Start of Change 5

#### A.4.5.3.x SCell Activation of multiple unknown SCells in FR1 with L3 reporting with single activation/deactivation command in non-DRX

##### A.4.5.3.x.1 Test Purpose and Environment

The purpose of this test is to verify that the multiple SCell activation times are within the requirements stated in clause 8.3.18 when the two configured deactivated SCells in FR1 are unknown by the UE at the time of activation.

The supported test configurations for LTE PCell, NR PSCell and NR SCell are the same as defined in clause A.4.5.3.y.1. The test parameters are the same except those described in the following clause. The listed parameter values in Table A.4.5.3.x.1-1 will replace the values of corresponding parameters in Table A.4.5.3.y.1-2. The cell specific test parameter values in Table A.4.5.3.x.1-2 will replace the values of corresponding parameters in Table A.4.5.3.y.1-3.

The test consists of two successive time periods, with duration of T1 and T2, respectively. There are four carriers, E-UTRA has one cell, NR has three cells. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) and Cell 4(SCell) on NR. The UE is monitoring the PCell and PSCell. TE continuously schedules the downlink data to UE on PCell and PSCell throughout the whole test.

The test consists of two sub tests. The slot at which the MAC message is received at the UE antenna connector, is denoted slot #n.

At the beginning of T1 the UE receives an RRC message by which the Cell 3 and Cell 4 becomes configured on radio channel 3 and 4 respectively. During T1 the SCells (Cell 3 and Cell 4) are powered off and UE is not aware of SCells. The UE starts monitoring the SCC1(Cell 3 CC) and SCC2(Cell 4 CC). The test equipment sends a MAC message for activation of the Cell 3 and Cell 4 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.

In sub test 1,TE shall transmit DCI 0-1 on PCell to schedule the PUSCH at slot , and the UE shall be able to transmit L3 measurement report of SCells at slot , where k2 = 1.

In sub test 2, TE shall transmit DCI 0-1 on PCell to schedule the PUSCH at slot , where M is defined in 8.3.17 and k2 = 1, and the UE shall be able to transmit L3 measurement report of SCells at slot . For sub test 2, TE will send TCI activation command after receiving L3 measurement report of the SCell.

The UE shall be able to report valid CSI for the activated SCells (Cell3 and Cell 4) at latest in slot respectively as defined in clause 8.3.18 provided the SCells can be successfully detected on the first attempt.

The UE shall start reporting CSI for cell 3 and cell 4 after at least one CSI-RS transmission occasion for channel measurement and reporting after slot and shall report CQI index 0 (out-of-range) until the SCell activation for cell 3 and cell 4 has been completed, respectively. Any PSCell interruption due to activation of SCells shall occur in the slot to slot, as defined in clause 8.3.18, where is the interruption length given in section 8.2. Any E-UTRA PCell interruption due to activation of SCells shall occur in the subframe to subframe, where and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n, and is the interruption length given in TS 36.133 [14] clause 7.32.

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

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

Table A.4.5.3.x.1-1: General test parameters for multiple unknown FR1 SCell activation case with 2 deactivated SCells, 160ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Configured deactivated SCell 1 |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3 which is an intra-band contiguous CC to PSCC of Cell 2;  *ssb-PositionInBurst* of Cell 3 is same as the one for Cell 2 |
| Configured deactivated SCell 2 |  | Cell 4 | Configured deactivated secondary cell on NR RF channel number 4 which is an inter-band CC to PSCC of Cell 2 |
| Cell3 timing offset to cell2 | μs | 0 |  |
| Cell4 timing offset to cell2 | μs | 0 |  |
| Time alignment error between cell3 and cell2 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Time alignment error between cell4 and cell2 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | ms | 100 | During this time the PSCell shall be known and the SCell configured, but not detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell 1 and SCell 2. |
| A2-threshold | dBm | -130 |  |
| ReportConfig |  | reportConfigId = 0: A2-event-triggered  reportConfig = 1: reportOnScellActivation-r18 |  |
| 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] |
| Tuncertainty\_RRC | Tuncertainty\_RRC | Tuncertainty\_RRC | The CSI reporting for SCell being activated is provided during SCell addition. |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | Cell 3 | Cell 4 |
| T2 | T2 |
| 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.3 FR1 | |
| Config 3,6 | SSB.4 FR1 | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,4,5 | kHz | 15 kHz | |
| Config 3,6 | 30kHz | |
| EPRE ratio of PSS to SSS | | dB | 0 | |
| EPRE ratio of PBCH DMRS to SSS | |
| EPRE ratio of PBCH to PBCH DMRS | |
| EPRE ratio of PDCCH DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH DMRS | |
| EPRE ratio of PDSCH DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |
| Note2 | | dBm/15kHz | -104 | |
| Note2 | Config 1,2,4,5 | dBm/SCS | -104 | |
| Config 3,6 | -101 | |
|  | | dB | 17 | |
|  | | dB | 17 | |
| SS-RSRPNote3 | Config 1,2,4,5 | dBm/SCS | -87 | |
| Config 3,6 | -84 | |
| SCH\_RP Note 3 | | dBm/15 kHz | -87 | |
| Propagation condition | | - | AWGN | |

##### A.4.5.3.x.2 Test Requirements

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 as defined in clause 8.3.18, in sub test 1, Tactivation\_time\_multiple\_scells = 7ms + + max (THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay), where = 1ms for SCS of PSCell =15kHz, and 0.5 ms for SCS of PSCell = 30kHz,

In sub test 2, Tactivation\_time\_multiple\_scells = 3ms + M+ max (THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay).

End of Change 5

Start of Change 6

A.5.5.3.X1 PUCCH SCell activation and deactivation with FR1 PSCell based on L3 reporting after SCell activation command

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 8.3.12 for UE capable of l3-MeasUnknownSCellActivation-r18.

The supported test configurations are shown in table A.5.5.3.X1.1-1 below. The test parameters are given in Tables A.5.5.3.X1.1-2 and cell-specific parameters in A.5.5.3.X1.1-3 and 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 two NR carriers and one E-UTRA carrier, each with one cell. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. Before the test starts the UE is connected to Cell 1 and Cell 2 but is not aware of Cell3, and UE is configured with MeasObjectNR on carriers of Cell2 and Cell3. 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 3) becomes configured on radio channel 3, and one measID is associated with *reportOnActivation*. The UE now starts monitoring the Cell3. 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*+ , as defined in clause 8.3.12.

There are two sub-tests in the test. In sub-test 1, TE shall transmit DCI 0-1 to PSCell at slot , and the UE shall be able to send L3 measurements report of the SCell at slot , where k2 =1. In sub-test 2, TE shall transmit DCI 0-1 to PSCell at slot , where k2=1 and M is defined in 8.3.12. The UE shall be able to send L3 measurements report of the SCell at.

Any 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

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 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 PSCell 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.5.5.3.X1.1-1: Supported test configurations for FR2 SCell activation case**

|  |  |
| --- | --- |
| 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 |
| Note1: The UE is only required to be tested in one of the supported test configurations  Note 2: A UE which passes test case A.5.5.3.X1 can skip the test cases in TBD | |

Table A. A.5.5.3.X1.1-2: General test parameters for FR2 SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2,3 | One E-UTRA radio channel (1) and Two NR radio channel (2, 3) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on E-UTRA RF channel number 1. |
| Active PSCell |  | Cell 2 | Active Secondary cell on NR RF channel number 2 |
| Configured deactivated SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on 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 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. |
| T1 | s | 26 | During this time the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell.  PUSCH for L3 reporting is scheduled at the first UL slot after slot n + THARQ + 7 ms |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| A4-offset | dB | -15 |  |
| 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.5.5.3.X1.1-3: Cell specific test parameters for FR2 SCell activation case: Cell2**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 2** | | | | |
| **T1** | | **T2** | | **T3** |
| SSB ARFCN | |  | Freq1 | | | | |
| 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 | | | | |
| Downlink initial BWP Configuration | Config 1,2,3,4,5,6 |  | DLBWP.0.1 | | | | |
| Downlink dedicated BWP Configuration | Config 1,2,3,4,5,6 |  | DLBWP.1.1 | | | | |
| Uplink initial BWP configuration | Config 1,2,3,4,5,6 |  | ULBWP.0.1 | | | | |
| Uplink dedicated BWP configuration | Config 1,2,3,4,5,6 |  | ULBWP.1.1 | | | | |
| TRS configuration | Config 1,2,3,4,5,6 |  | N/A | | | | |
| TCI state | Config 1,2,3,4,5,6 |  | TCI.State.0 | | | | |
| BWchannel | Config 1,2,4,5 | MHz | 10: NRB,c = 52 | | | | |
| Config 3,6 | 40: NRB,c = 106 | | | | |
| Data RBs allocated | Config 1,2,4,5 |  | 52 | 52 | | 52 | |
| Config 3,6 | 106 | 106 | | 106 | |
| PDSCH Reference measurement channel | Config 1,4 |  | SR.1.1 FDD | | | | |
| Config 2,5 |  | SR.1.1 TDD | | | | |
| Config 3,6 |  | SR.2.1 TDD | | | | |
| RMSI CORESET Parameters | Config 1,4 |  | CR.1.1 FDD | | | | |
| Config 2,5 |  | CR.1.1 TDD | | | | |
| Config 3,6 |  | CR.2.1 TDD | | | | |
| Dedicated CORESET Parameters | Config 1,4 |  | CCR.1.1 FDD | | | | |
| Config 2,5 | CCR.1.1 TDD | | | | |
| Config 3,6 | CCR.2.1 TDD | | | | |
| OCNG Patterns | Config 1,2,3,4,5,6 |  | OP.1 | | | | |
| SSB configuration | Config 1,2,4,5 |  | SSB.1 FR1 | | | | |
| Config 3,6 | SSB.2 FR1 | | | | |
| SMTC configuration | |  | SMTC.1 | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | | |
| EPRE ratio of PBCH\_DMRS to SSS | |
| EPRE ratio of PBCH to PBCH\_DMRS | |
| EPRE ratio of PDCCH\_DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |
| EPRE ratio of PDSCH\_DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH\_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 | | | | |
| 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.X1.1-4: Cell specific test parameters for FR2 SCell activation case: Cell3**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter Note 5** | | **Unit** | **Cell 3** | | |
| **T1** | **T2** | **T3** |
| SSB ARFCN | |  | Freq3 | | |
| Duplex mode | Config 1,2,3,4,5,6 |  | TDD | | |
| TDD configuration | Config 1,2,3,4,5,6 |  | TDDConf.3.1 | | |
| Downlink initial BWP Configuration | Config 1,2,3,4,5,6 |  | DLBWP.0.1 | | |
| Downlink dedicated BWP Configuration | Config 1,2,3,4,5,6 |  | DLBWP.1.1 | | |
| Uplink initial BWP configuration | Config 1,2,3,4,5,6 |  | ULBWP.0.1 | | |
| Uplink dedicated BWP configuration | Config 1,2,3,4,5,6 |  | ULBWP.1.1 | | |
| TRS configuration | Config 1,2,3,4,5,6 |  | TRS.2.1 TDD | | |
| TCI state | Config 1,2,3,4,5,6 |  | TCI.State.0 | | |
| BWchannel | Config 1,2,3,4,5,6 | MHz | 100: NRB,c = 66 | | |
| Data RBs allocated | Config 1,2,3,4,5,6 |  | 66 | | |
| PDSCH Reference measurement channel | Config 1,2,3,4,5,6 |  | SR.3.1 TDD | | |
| RMSI CORESET Parameters | Config 1,2,3,4,5,6 |  | CR.3.1 TDD | | |
| Dedicated CORESET Parameters | Config 1,2,3,4,5,6 |  | CCR.3.1 TDD | | |
| OCNG Patterns | Config 1,2,3,4,5,6 |  | OP.1 | | |
| SSB configuration | Config 1,2,3,4,5,6 |  | SSB.1 FR2 | | |
| CSI-RS configuration for CSI reporting | Config 1,2,3,4,5,6 |  | CSI-RS.3.1 TDD | | |
| reportConfigType for CSI reporting | Config 1,2,3,4,5,6 |  | periodic | | |
| reportQuantity for CSI reporting | Config 1,2,3,4,5,6 |  | cri-RI-PMI-CQI | | |
| CSI reporting periodicity | Config 1,2,3,4,5,6 | slot | 40 | | |
| CSI reporting offset | Config 1,2,3,4,5,6 | slot | 4 | | |
| SMTC configuration | Config 1,2,3,4,5,6 |  | 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. | | | | | |

**Table A.5.5.3.X1.1-4: OTA related test parameters for FR2 SCell with FR1 PCell**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1 and Cell 2** | | | **Cell 3** | | |
| **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.5.5.3.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+ as defined in clause 8.3.12.

During T2 the UE shall start sending PRACH preamble to TE and shall obtain the TA command from TE and shall be ready to send valid CSI report to the TE. CSI report shall be transmitted within Tactivation\_time + 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.

In sub-test 1, Tactivation\_time = 7ms + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay) as defined in clause 8.3.12.

In sub-test 2, Tactivation\_time = 7ms + M+ max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay) as defined in clause 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 PSCell 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 PSCell during SCell deactivation shall not happen outside the slot to , as defined in clause 8.3.

The interruption of PSCell 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 6

Start of Change 7

A.7.5.3.X1 PUCCH SCell activation and deactivation with FR1 PCell based on L3 reporting after SCell activation command

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 for UE capable of l3-MeasUnknownSCellActivation-r18.

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.X1.1-2 and cell-specific parameters in A.7.5.3.X1.1-3 and A.7.5.3.X1.1-4 below. The test consists of Three successive time periods, with duration of T1, T2 and T3 respectively. There are three NR carriers, each with one cell. Before the test starts the UE is connected to Cell 1 and Cell 2 but is not aware of Cell3, and UE is configured with MeasObjectNR on carriers of Cell1 and Cell2. 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 3) becomes configured on radio channel 3, and one measID is associated with *reportOnActivation*. The UE now starts monitoring the Cell3. 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*+ , as defined in clause 8.3.12.

There are two sub-tests in the test. In sub-test 1, TE shall transmit DCI 0-1 to PSCell at slot , and the UE shall be able to send L3 measurements report of the SCell at slot , where k2 =1. In sub-test 2, TE shall transmit DCI 0-1 to PSCell at slot , where k2=1 and M is defined in 8.3.12. The UE shall be able to send L3 measurements report of the SCell at.

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 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  FR1 SCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode  FR2 Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode  FR1 SCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode  FR2 Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 3 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  FR1 SCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  FR2 Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to pass in one of the supported test configurations  Note 2: A UE which passes the requirements in test case 7.5.3.X1 can skip the test cases in 7.5.3.16 | |

Table A. A.7.5.3.X1.1-2: General test parameters for FR2 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. |
| Active SCell |  | Cell 2 | Active Secondary cell on NR RF channel number 2 |
| Configured deactivated SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on 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 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. |
| T1 | s | 26 | During this time the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell.  PUSCH for L3 reporting is scheduled at the first UL slot after slot n + THARQ + 7 ms |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| A4-offset | dB | -15 |  |
| 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.7.5.3.X1.1-3: Cell specific test parameters for FR2 SCell activation case: Cell1 and Cell2**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | | | | | | **Cell 2** | | | | |
| **T1** | | **T2** | | **T3** | | **T1** | | **T2** | | **T3** |
| SSB ARFCN | |  | Freq1 | | | | | | Freq2 | | | | |
| Duplex mode | Config 1 |  | FDD | | | | | | FDD | | | | |
| Config 2,3 |  | TDD | | | | | | | | | | |
| TDD configuration | Config 1 |  | Not Applicable | | | | | Not Applicable | | | | | |
| Config 2 | TDDConf.1.1 | | | | | TDDConf.1.1 | | | | | |
| Config 3 | TDDConf.2.1 | | | | | 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 | | | | | | N/A | | | | |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | | | | | | | | | |
| BWchannel | Config 1,2 | MHz | 10: NRB,c = 52 | | | | | | 10: NRB,c = 52 | | | | |
| Config 3 | 40: NRB,c = 106 | | | | | | 40: NRB,c = 106 | | | | |
| Data RBs allocated | Config 1,2 |  | 52 | 52 | | 52 | | | 52 | 52 | | 52 | |
| Config 3 | 106 | 106 | | 106 | | | 106 | 106 | | 106 | |
| 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 | | | | |
| RMSI CORESET Parameters | Config 1 |  | CR.1.1 FDD | | | | | | CR.1.1 FDD | | | | |
| Config 2 |  | CR.1.1 TDD | | | | | | CR.1.1 TDD | | | | |
| Config 3 |  | CR.2.1 TDD | | | | | | CR.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 | | | | |
| OCNG Patterns | |  | OP.1 | | | | | | | | | | |
| SSB configuration | Config 1,2 |  | SSB.1 FR1 | | | | | | SSB.1 FR1 | | | | |
| Config 3 | SSB.2 FR1 | | | | | | SSB.2 FR1 | | | | |
| SMTC configuration | |  | SMTC.1 | | | | | | | | | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | | | | | | | | |
| EPRE ratio of PBCH\_DMRS to SSS | |
| EPRE ratio of PBCH to PBCH\_DMRS | |
| EPRE ratio of PDCCH\_DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |
| EPRE ratio of PDSCH\_DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH\_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 | | | | | N/A  Link only, see clause A.3.7A | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | | | | | | | | |

**Table A.7.5.3.X1.1-4: Cell specific test parameters for FR2 SCell activation case: Cell3**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter Note 5** | | **Unit** | **Cell 3** | | |
| **T1** | **T2** | **T3** |
| SSB ARFCN | |  | Freq3 | | |
| Duplex mode | Config 1,2,3 |  | TDD | | |
| TDD configuration | Config 1,2,3 |  | TDDConf.3.1 | | |
| 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 |  | TRS.2.1 TDD | | |
| TCI state | Config 1,2,3 |  | TCI.State.0 | | |
| BWchannel | Config 1,2,3 | MHz | 100: NRB,c = 66 | | |
| Data RBs allocated | Config 1,2,3 |  | 66 | | |
| PDSCH Reference measurement channel | Config 1,2,3 |  | SR.3.1 TDD | | |
| RMSI CORESET Parameters | Config 1,2,3 |  | CR.3.1 TDD | | |
| Dedicated CORESET Parameters | Config 1,2,3 |  | CCR.3.1 TDD | | |
| OCNG Patterns | Config 1,2,3 |  | OP.1 | | |
| SSB configuration | Config 1,2,3 |  | SSB.1 FR2 | | |
| CSI-RS configuration for CSI reporting | Config 1,2,3 |  | CSI-RS.3.1 TDD | | |
| reportConfigType for CSI reporting | Config 1,2,3 |  | periodic | | |
| reportQuantity for CSI reporting | Config 1,2,3 |  | cri-RI-PMI-CQI | | |
| CSI reporting periodicity | Config 1,2,3 | slot | 40 | | |
| CSI reporting offset | Config 1,2,3 | slot | 4 | | |
| SMTC configuration | Config 1,2,3 |  | 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. | | | | | |

**Table A.7.5.3.X1.1-4: OTA related test parameters for FR2 SCell with FR1 PCell**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1 and Cell 2** | | | **Cell 3** | | |
| **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+ as defined in clause 8.3.12.

During T2 the UE shall start sending PRACH preamble to TE and shall obtain the TA command from TE and shall be ready to send valid CSI report to the TE. CSI report shall be transmitted within Tactivation\_time + 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.

In sub-test 1, Tactivation\_time = 7ms + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay) as defined in clause 8.3.12.

In sub-test 2, Tactivation\_time = 7ms + M+ max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay) as defined in clause 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 6

Start of Change 7

A.7.5.3.X2 PUCCH SCell activation and deactivation with FR2 PCell based on L3 reporting after SCell activation command

A.7.5.3.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 8.3.12 for UE capable of l3-MeasUnknownSCellActivation-r18.

The supported test configurations are shown in table A.7.5.3.X2.1-1 below. The test parameters are given in Tables A.7.5.3.X2.1-2 and cell-specific parameters in A.7.5.3.X2.1-3 below. The test consists of Three successive time periods, with duration of T1, T2 and T2 respectively. There are two NR carriers, each with one cell. Before the test starts the UE is connected to Cell 1 but is not aware of Cell2, and UE is configured with MeasObjectNR on carrier of Cell1 and Cell2. 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, and one measID is associated with *reportOnActivation*. The UE now starts monitoring the Cell2. 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*+ , as defined in clause 8.3.12.

There are two sub-tests in the test. In sub-test 1, TE shall transmit DCI 0-1 to PSCell at slot , and the UE shall be able to send L3 measurements report of the SCell at slot , where k2 =1. In sub-test 2, TE shall transmit DCI 0-1 to PSCell at slot , where k2=1 and M is defined in 8.3.12. The UE shall be able to send L3 measurements report of the SCell at.

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 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.X2.1-1: Supported test configurations for FR2 SCell activation case**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | PCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: A UE which passes the requirements in test case 7.5.3.X2 can skip the test cases in TBD. | |

Table A. A.7.5.3.X2.1-2: General test parameters for FR2 SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Three 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 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. |
| T1 | s | 26 | During this time the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell.  PUSCH for L3 reporting is scheduled at the first UL slot after slot n + THARQ + 7 ms |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| A4-offset | dB | -15 |  |
| THARQ | ms | 2 | 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.7.5.3.X2.1-2: Cell specific test parameters for FR2 SCell activation case: Cell1 and Cell2**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter Note 5** | | **Unit** | **Cell 1** | | | **Cell2** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| SSB ARFCN | |  | Freq1 | | | Freq2 | | |
| Duplex mode | Config 1 |  | TDD | | | TDD | | |
| TDD configuration | Config 1 |  | TDDConf.3.1 | | | TDDConf.3.1 | | |
| Downlink initial BWP Configuration | Config 1 |  | DLBWP.0.1 | | | DLBWP.0.1 | | |
| Downlink dedicated BWP Configuration | Config 1 |  | DLBWP.1.1 | | | DLBWP.1.1 | | |
| Uplink initial BWP configuration | Config 1 |  | ULBWP.0.1 | | | ULBWP.0.1 | | |
| Uplink dedicated BWP configuration | Config 1 |  | ULBWP.1.1 | | | ULBWP.1.1 | | |
| TRS configuration | Config 1 |  | TRS.2.1 TDD | | | TRS.2.1 TDD | | |
| TCI state | Config 1 |  | TCI.State.0 | | | TCI.State.0 | | |
| BWchannel | Config 1 | MHz | 100: NRB,c = 66 | | | 100: NRB,c = 66 | | |
| Data RBs allocated | Config 1 |  | 66 | | | 66 | | |
| PDSCH Reference measurement channel | Config 1 |  | SR.3.1 TDD | | | SR.3.1 TDD | | |
| RMSI CORESET Parameters | Config 1 |  | CR.3.1 TDD | | | CR.3.1 TDD | | |
| Dedicated CORESET Parameters | Config 1 |  | CCR.3.1 TDD | | | CCR.3.1 TDD | | |
| OCNG Patterns | Config 1 |  | OP.1 | | | OP.1 | | |
| SSB configuration | Config 1 |  | SSB.1 FR2 | | | SSB.1 FR2 | | |
| CSI-RS configuration for CSI reporting | Config 1 |  | CSI-RS.3.1 TDD | | | CSI-RS.3.1 TDD | | |
| reportConfigType for CSI reporting | Config 1 |  | periodic | | | periodic | | |
| reportQuantity for CSI reporting | Config 1 |  | cri-RI-PMI-CQI | | | cri-RI-PMI-CQI | | |
| CSI reporting periodicity | Config 1 | slot | 40 | | | 40 | | |
| CSI reporting offset | Config 1 | slot | 4 | | | 4 | | |
| SMTC configuration | Config 1 |  | SMTC.1 | | | SMTC.1 | | |
| EPRE ratio of PSS to SSS | | dB | 0 | | | 0 | | |
| EPRE ratio of PBCH\_DMRS to SSS | |
| EPRE ratio of PBCH to PBCH\_DMRS | |
| EPRE ratio of PDCCH\_DMRS to SSS | |
| EPRE ratio of PDCCH to PDCCH\_DMRS | |
| EPRE ratio of PDSCH\_DMRS to SSS | |
| EPRE ratio of PDSCH to PDSCH\_DMRS | |
| EPRE ratio of OCNG DMRS to SSSNote 1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| Propagation conditions | |  | AWGN | | | WGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | | | |

**Table A.7.5.3.X2.1-4: OTA related test parameters for FR2 SCell with FR2 PCell**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Cell 1** | | | **Cell 2** | | |
| **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| Angle of arrival configuration | |  | According to clause A.3.15.1 | | | According to clause A.3.15.1 | | |
| Assumption for UE beams Note 7 | |  | Rough | | | Rough | | |
| Note 1 | Config 1 | dBm/15kHz | -104.7 | | | -104.7 | | |
| Note 1 | Config 1 | dBm/SCS | -95.7 | | | -95.7 | | |
|  | Config 1 | dB | 7 | 7 | 7 | -∞ | 7 | 7 |
|  | Config 1 | dB | 7 | 7 | 7 | -∞ | 7 | 7 |
| SSB\_RPNote 2, Note 4 | Config 1 | dBm/SCS | -88.7 | -88.7 | -88.7 | -∞ | -88.7 | -88.7 |
| IoNote 2, Note 4 | Config 1 | dBm/95.04 MHz | -58.92 | -58.92 | -58.92 | -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

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+ as defined in clause 8.3.12.

During T2 the UE shall start sending PRACH preamble to TE and shall obtain the TA command from TE and shall be ready to send valid CSI report to the TE. CSI report shall be transmitted within Tactivation\_time + 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.

In sub-test 1, Tactivation\_time = 7ms + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay) as defined in clause 8.3.12.

In sub-test 2, Tactivation\_time = 7ms + M+ max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay) as defined in clause 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 7

Start of Change 8

#### A.6.5.3.X SCell Activation of unknown SCell with valid L3 measurement results in FR1 in non-DRX for 160ms SCell measurement cycle

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

The purpose of this test is to verify that the SCell activation time are within the requirements stated in clause 8.3.17, when the SCell in FR1 is unknown by the UE at the time of activation, but UE has valid L3 measurement results of the SCell.

The supported test configurations for NR PCell are shown in table A.6.5.3.X.1-1 below. Supported test configurations for NR SCell are shown in table A.6.5.3.X.1-1A. Test configuration for NR PCell and test configuration for NR SCell are chosen independently. The test parameters are given in Tables A.6.5.3.X.1-2 and cell-specific parameters in A.6.5.3.X.1-3 and A.6.5.3.X.1-4 below. The test consists of three successive time periods, with duration of T1, T2 and T3 respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC.

The test consists of two sub tests. The slot at which the MAC message is received at the UE antenna connector, is denoted slot #n. TE continuously schedules the downlink data to UE on PCell. In Sub-test 1, TE shall schedule DCI format 0\_1 at slot n + . In Sub-test 2, TE shall schedule DCI format 0\_1 at slot n + , where M is defined in 8.3.17 and k2 = 1.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. T1 is sufficiently long enough so that UE is able to complete the L3 detection and measurements on the SCell to be activated. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. UE is expected to report L3 measurement result at the first PUSCH scheduled by TE.

The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot , as defined in clause 8.3.17. TE also indicates the TCI, based on L3 report of the UE. The UE shall start reporting CSI in PCell after at least one CSI-RS transmission occasion for channel measurement and reporting after the slot that UE sends the L3 reports, and shall report CQI index 0 (out-of-range) until the SCell activation has been completed.

During T2, any PCell interruption due to activation of SCell shall occur in the slot to , as defined in clause 8.3.17, where is the interruption length given in clause 8.2.

At the beginning of T3, the SCell de-activation command is sent. T3 shall be long enough to ensure UE completes the SCell de-activation.

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

Table A.6.5.3.X.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations for NR PCell

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  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.X.1-1A: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations for NR SCell

|  |  |
| --- | --- |
| ConfigSCell | Description |
| 1 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only required to be tested in one of the supported test configurations  Note 2: 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.X.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channel (1, 2) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | [160] |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | ms | < 200ms | During this time the UE shall activate the SCell. |
| T3 | ms | 200ms |  |
| A2-threshold | dBm | -130 |  |
| ReportCofing |  | reportConfigId = 0: A2-event-triggered  reportConfig = 1: reportOnScellActivation-r18 |  |
| 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] |
| Tuncertainty\_RRC | ms | 0 | The CSI reporting for SCell being activated is provided during SCell addition. |

Table A.6.5.3.X.1-3: Cell specific test parameters for NR PCell for known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 1 | |
| T1-T3 | T4 |
| 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.0.1 | |
| 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.1Note 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 | Config 1,2 | slot | 5 | |
| Config 3 | 10 | |
| CSI reporting offset | Config 1,2 | slot | 3 | |
| Config 3 | 5 | |
| 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 | |
| Correlation Matrix and Antenna Configuration | | - | 2x2 Low | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled within BWoccupied.  Note 3: SS-RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the 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. | | | | |

Table A.6.5.3.X.1-4: Cell specific test parameters for NR SCell for known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | |
| T1-T3 | T4 |
| Duplex mode | ConfigSCell 1 |  | FDD | |
| ConfigSCell 2,3 | TDD | |
| TDD configuration | ConfigSCell 1 |  | Not applicable | |
| ConfigSCell 2 | TDDConf.1.1 | |
| ConfigSCell 3 | TDDConf.2.1 | |
| BWchannel | ConfigSCell 1,2 | MHz | Note 7 | |
| ConfigSCell 3 | Note 7 | |
| BWoccupied | ConfigSCell 1,2 | RB | 52 Note 5 | |
|  | ConfigSCell 3 |  | 106 Note 6 | |
| Initial BWP configuration | |  | DLBWP.0.1 | |
| TCI state | |  | TCI.State.0 | |
| TRS Configuration | ConfigSCell 1 |  | TRS.1.1 FDD | |
| ConfigSCell 2 | TRS.1.1 TDD | |
| ConfigSCell 3 | TRS.1.2 TDD | |
| PDSCH Reference measurement channel | ConfigSCell 1 |  | N/A | |
| ConfigSCell 2 | N/A | |
| ConfigSCell 3 | N/A | |
| Dedicated CORESET parameters | ConfigSCell 1 |  | N/A | |
| ConfigSCell 2 | N/A | |
| ConfigSCell 3 | N/A | |
| RMSI CORESET parameters | ConfigSCell 1 |  | N/A | |
| ConfigSCell 2 | N/A | |
| ConfigSCell 3 | N/A | |
| OCNG Patterns | ConfigSCell 1,2 |  | OP.1Note 5 | |
|  | ConfigSCell 3, |  | OP.1 Note 6 | |
| SSB Configuration | ConfigSCell 1,2 |  | SSB.3 FR1 | |
| ConfigSCell 3 | SSB.4 FR1 | |
| CSI-RS configuration for CSI reporting Note 8 | ConfigSCell 1 |  | CSI-RS.1.1 FDD | |
| ConfigSCell 2 |  | CSI-RS.1.1 TDD | |
| ConfigSCell 3 |  | CSI-RS.2.1 TDD | |
| SMTC configuration | |  | SMTC.1 | |
| reportConfigType | |  | N/A | |
| reportQuantity | |  | N/A | |
| CSI reporting periodicity | ConfigSCell 1,2 | slot | N/A | |
| ConfigSCell 3 | N/A | |
| CSI reporting offset | ConfigSCell 1,2 | slot | N/A | |
| ConfigSCell 3 | 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 | ConfigSCell 1,2 | dBm/SCS | -104 | |
| ConfigSCell 3 | -101 | |
|  | | dB | 17 | |
|  | | dB | 17 | |
| SS-RSRPNote3 | ConfigSCell 1,2 | dBm/SCS | -87 | |
| ConfigSCell 3 | -84 | |
| SCH\_RP Note 3 | | dBm/15 kHz | -87 | |
| Io Note3 | ConfigSCell 1,2 | dBm/  9.36MHz | -58.96 | |
| ConfigSCell 3 | dBm/  38.16MHz | -52.87 | |
| Propagation condition | | - | AWGN | |
| Correlation Matrix and Antenna Configuration | |  | 2x2 Low | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled within BWoccupied.  Note 3: SS-RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the 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.X.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell in the first available uplink resource after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot .

For Sub-test 1, Tactivation\_time = 7ms + k2/SCS + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay) as defined in clause 8.3.17, where k2/SCS is 1ms for config 1,2 and 0.5ms for config 3.

For Sub-test 2, Tactivation\_time = 3ms + M + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay) as defined in clause 8.3.17.

During T2, interruption of PCell during SCell activation shall not happen outside the slot to , as defined in clause 8.3.17.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and L3 measurement reporting to be counted as correct. The rate of correct observed SCell activation delay and L3 measurement reporting during repeated tests shall be at least 90%.

NOTE: During T2, if there are no uplink resources for reporting the valid CSI in a slot as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

End of Change 8

Start of Change 9

#### A.4.5.3.X SCell Activation of unknown SCell with valid L3 measurement results in FR1 for 160ms SCell measurement cycle

##### A.4.5.3.X.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation time are within the requirements stated in clause 8.3.17, when the SCell in FR1 is unknown by the UE at the time of activation, but UE has valid L3 measurement results of the SCell.

The supported test configurations for LTE PCell and NR PSCell are shown in table A.4.5.3.X.1-1 below. Supported test configurations for NR SCell are shown in table A.4.5.3.X.1-1A below. Test configuration for LTE PCell and NR PSCell and test configuration for NR SCell are chosen independently. The test parameters are given in Tables A.4.5.3.X.1-2 and cell-specific parameters in A.4.5.3.X.1-3 and A.4.5.3.X.1-4 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRA and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell.

The test consists of two sub tests. The slot at which the MAC message is received at the UE antenna connector, is denoted slot #n. TE continuously schedules the downlink data to UE on PCell and PSCell. TE shall schedule DCI format 0\_1 at slot n + . In Sub-test 2, TE shall schedule DCI format 0\_1 at slot n + , where M is defined in 8.3.17 and k2 = 1.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. The UE now starts monitoring the SCell. T1 is sufficiently long enough so that UE is able to complete the L3 detection and measurements on the SCell to be activated. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted m, defines the start of time period T2. UE is expected to report L3 measurement result at the first PUSCH scheduled by TE.

The UE shall be able to report valid CSI in PSCell for the activated SCell at latest in slot , as defined in clause 8.3. TE shall also indicate the TCI based on L3 report of the UE. The UE shall start reporting CSI in PSCell after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed.

During T2, any PSCell interruption due to activation of SCell shall occur in the slot to slot , as defined in clause 8.3, where is the interruption length given in clause 8.2. Any E-UTRA PCell interruption due to activation of SCell shall occur in the subframe to subframe , where and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m, and is the interruption length given in TS 36.133 [14] clause 7.32.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment. T3 shall be long enough to ensure UE completes the SCell de-activation.

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

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.

Table A.4.5.3.X.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations for LTE PCell and NR PSCell

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 2 | LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 3 | LTE FDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| 4 | LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 5 | LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 6 | LTE TDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only 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.4.5.3.X.1-1A: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations for NR SCell

|  |  |
| --- | --- |
| ConfigSCell | Description |
| 1 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode |
| Note 1: The UE is only 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.4.5.3.X.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2,3 | One E-UTRAN radio channel (1) and two NR radio channel (2,3) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on E-UTRAN RF channel number 1.  As specified in clause A.3.7.2.1 |
| Active PSCell |  | Cell 2 | Primary secondary cell on NR RF channel number 2. |
| Configured deactivated SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on E-UTRA RF channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on secondary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell3 timing offset to cell2 | μs | 0 |  |
| Time alignment error between cell3 and cell2 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 7 | During this time the PSCell shall be known and the SCell configured and detected. |
| T2 | ms | <200ms |  |
| T3 | ms | 200ms |  |
| A2-threshold | dBm | -130 |  |
| ReportCofing |  | reportConfigId = 0: A2-event-triggered  reportConfig = 1: reportOnScellActivation-r18 |  |
| 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] |
| Tuncertainty\_RRC | ms | 0 | The CSI reporting for SCell being activated is provided during SCell addition. |

Table A.4.5.3.X.1-3: Cell specific test parameters for NR PSCell for known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | | |
| T1 | T2-T3 | T4 |
| SSB ARFCN | |  | freq1 | | |
| 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 | Note 7 | | |
| Config 2,5 | Note 7 | | |
| Config 3,6 | Note 7 | | |
| BWoccupied | Config 1,4 | RB | 52 Note 5 | | |
|  | Config 2,5 |  | 52 Note 5 | | |
|  | Config 3,6 |  | 106 Note 6 | | |
| DL initial BWP 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 | | |
| 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 | | |
| 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 | | |
| Config 2,5 |  | CCR.1.1 TDD | | |
| Config 3,6 |  | CCR.2.1 TDD | | |
| TRS configuration | Config 1,4 |  | TRS.1.1 FDD | | |
| Config 2,5 |  | TRS.1.1 TDD | | |
| Config 3,6 |  | TRS.1.2 TDD | | |
| OCNG Patterns | Config 1,2,4,5 |  | OP.1 Note 5 | | |
|  | Config 3,6 |  | OP.1 Note 6 | | |
| SMTC configuration | |  | SMTC.1 | | |
| SSB configuration | Config 1,2,4,5 |  | SSB.1 FR1 | | |
| Config 3,6 | SSB.2 FR1 | | |
| 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 | | |
| PDSCH/PDCCH subcarrier spacing | Config 1,2,4,5 | kHz | 15 | | |
| Config 3,6 | 30 | | |
| reportConfigType | Config 1-6 |  | periodic | | |
| reportQuantity | Config 1-6 |  | cri-RI-PMI-CQI | | |
| CSI reporting periodicity | Config 1,2,4,5 | slot | 5 | | |
|  | Config 3,6 |  | 10 | | |
| CSI reporting offset | Config 1,2,4,5 | slot | 2 | | |
|  | Config 3,6 |  | 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 | | dBm/15kHz | -104 | | |
| Note2 | Config 1,2,4,5 | dBm/SCS | -104 | | |
| Config 3,6 | -101 | | |
|  | | dB | 17 | | |
|  | | dB | 17 | | |
| SS-RSRP Note3 | Config 1,2,4,5 | dBm/SCS | -87 | | |
| Config 3,6 | -84 | | |
| SCH\_RP Note 3 | | dBm/15 kHz | -87 | | |
| IoNote3 | Config 1,2,4,5 | dBm/9.36MHz | -58.96 | | |
| Config 3,6 | dBm/38.16MHz | -52.87 | | |
| Propagation condition | | - | AWGN | | |
| Correlation Matrix and Antenna Configuration | | - | 2x2 Low | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  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 BWchannel\_actual-occupied (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 BWchannel\_actual-occupied (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. | | | | | |

Table A.4.5.3.X.1-4: Cell specific test parameters for NR SCell for known FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 3 | | |
| T1 | T2-T3 | T4 |
| SSB ARFCN | |  | freq2 | | |
| Duplex mode | ConfigSCell 1 |  | FDD | | |
| ConfigSCell 2,3 | TDD | | |
| TDD configuration | ConfigSCell 1 |  | Not Applicable | | |
| ConfigSCell 2 | TDDConf.1.1 | | |
| ConfigSCell 3 | TDDConf.2.1 | | |
| BWchannel | ConfigSCell 1 | MHz | Note 7 | | |
| ConfigSCell 2 | Note 7 | | |
| ConfigSCell 3 | Note 7 | | |
| BWoccupied | ConfigSCell 1 | RB | 52 Note 5 | | |
|  | ConfigSCell 2 |  | 52 Note 5 | | |
|  | ConfigSCell 3 |  | 106 Note 6 | | |
| DL initial BWP configuration | ConfigSCell 1-3 |  | DLBWP.0.1 | | |
| DL dedicated BWP configuration | ConfigSCell 1-3 |  | DLBWP.1.1 | | |
| UL initial BWP configuration | ConfigSCell 1-3 |  | ULBWP.0.1 | | |
| UL dedicated BWP configuration | ConfigSCell 1-3 |  | ULBWP.1.1 | | |
| DRX Cycle | | ms | Not Applicable | | |
| PDSCH Reference measurement channel | ConfigSCell 1 |  | SR.1.1 FDD | | |
| ConfigSCell 2 | SR.1.1 TDD | | |
| ConfigSCell 3 | SR.2.1 TDD | | |
| RMSI CORESET Reference Channel | ConfigSCell 1 |  | CR.1.1 FDD | | |
| ConfigSCell 2 | CR.1.1 TDD | | |
| ConfigSCell 3 | CR.2.1 TDD | | |
| RMC CORESET Reference Channel | ConfigSCell 1 |  | CCR.1.1 FDD | | |
| ConfigSCell 2 |  | CCR.1.1 TDD | | |
| ConfigSCell 3 |  | CCR.2.1 TDD | | |
| TRS configuration | ConfigSCell 1 |  | TRS.1.1 FDD | | |
| ConfigSCell 2 |  | TRS.1.1 TDD | | |
| ConfigSCell 3 |  | TRS.1.2 TDD | | |
| OCNG Patterns | ConfigSCell 1,2 |  | OP.1 Note 5 | | |
|  | ConfigSCell 3 |  | OP.1 Note 6 | | |
| SMTC configuration | |  | SMTC.1 | | |
| SSB configuration | ConfigSCell 1,2 |  | SSB.3 FR1 | | |
| ConfigSCell 3 | SSB.4 FR1 | | |
| CSI-RS configuration for CSI reporting | ConfigSCell 1 |  | CSI-RS.1.1 FDD | | |
| ConfigSCell 2 |  | CSI-RS.1.1 TDD | | |
| ConfigSCell 3 |  | CSI-RS.2.1 TDD | | |
| PDSCH/PDCCH subcarrier spacing | ConfigSCell 1,2 | kHz | 15 | | |
| ConfigSCell 3 | 30 | | |
| reportConfigType | ConfigSCell 1-3 |  | periodic | | |
| reportQuantity | ConfigSCell 1-3 |  | cri-RI-PMI-CQI | | |
| CSI reporting periodicity | ConfigSCell 1,2 | slot | 5 | | |
|  | ConfigSCell 3 |  | 10 | | |
| CSI reporting offset | ConfigSCell 1,2 | slot | 2 | | |
|  | ConfigSCell 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 Note1 | |
| EPRE ratio of OCNG to OCNG DMRS Note 1 | |
| Note2 | | dBm/15kHz | -104 | | |
| Note2 | ConfigSCell 1,2 | dBm/SCS | -104 | | |
| ConfigSCell 3 | -101 | | |
|  | | dB | 17 | | |
|  | | dB | 17 | | |
| SS-RSRPNote3 | ConfigSCell 1,2 | dBm/SCS | -87 | | |
| ConfigSCell 3 | -84 | | |
| SCH\_RP Note 3 | | dBm/15 kHz | -87 | | |
| IoNote3 | ConfigSCell 1,2 | dBm/9.36MHz | -58.96 | | |
| ConfigSCell 3 | dBm/38.16MHz | -52.87 | | |
| Propagation condition | | - | AWGN | | |
| Correlation Matrix and Antenna Configuration | | - | 2x2 Low | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  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 BWchannel\_actual-occupied (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 BWchannel\_actual-occupied (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.4.5.3.X.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell in the first available uplink resource after slot (). UE is allowed to postpone CSI report to next available uplink resource if an available uplink resource is subject to interruption.

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot ,

For Sub-test 1, Tactivation\_time = 7ms + k2/SCS + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay) as defined in clause 8.3.17, where k2/SCS is 1ms for config 1,2 and 0.5ms for config 3.

For Sub-test 2, Tactivation\_time = 3ms + M + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay) as defined in clause 8.3.17.

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

The interruption of PSCell shall not be more than the values specified for EN-DC in Clause 8.2.1.2.4.

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

NOTE: During T2, if there are no uplink resources for reporting the valid CSI in a slot 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 9

Start of Change 10

#### A.5.5.3.x SCell Activation of unknown SCell in FR2 in non-DRX for 160ms SCell measurement cycle with the L3 reporting during activation

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

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3.17, when the SCell in FR2 is unknown by the UE at the time of activation. In this test, UE shall perform two sub-tests where two different UL resource locations are configured.

The supported test configurations are shown in table A.5.5.3.x.1-1 below. The test parameters are given in Tables A.5.5.3.x.1-2 and cell-specific parameters in A.5.5.3.x.1-1 below. OTA related test parameters are shown in table A.5.5.3.x.1-3. The test consists of three successive time periods, with duration of T1, T2, and T3, respectively. There are three carriers and each with one cell. E-UTRA has one cell (Cell 1), NR has two cells, PSCell (Cell 2) in FR1 and SCell (Cell 3) in FR2. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR but is not aware of Cell 3 (SCell) on NR. The UE is only monitoring the Pcell and PSCell. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on radio channel 2. In the measurement control information for Cell 3, it is indicated to the UE that event-triggered reporting with Event A2 and reportOnActivation is used. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the SCell activation.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n (where n mode 20=1), defines the start of time period T2. The UE shall be able to report valid CSI in PSCell for the activated SCell at latest in slot , as defined in clause 8.3.

In sub-test1, TE shall transmit DCI 0-1 to PSCell at slot . The UE shall be able to send L3 measurements report of the SCell at slot for sub-test 1.  
In sub-test2, TE shall transmit DCI 0-1 to PSCell at slot , The UE shall be able to send L3 measurements report of the SCell at slot for sub-test 2. TE will send TCI activation command after receiving L3 measurement report of the SCell.

The UE shall start reporting CSI in PSCell after at least one CSI-RS transmission occasion for channel measurement and reporting after slot and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot 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 the SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation and deactivation of 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.x.1-1: Supported test configurations for FR2 SCell activation case

|  |  |
| --- | --- |
| **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.x.1-2: General test parameters for FR2 SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| LTE RF Channel Number |  | 1 | Cell 1 use LTE RF channel 1 |
| NR RF Channel Number |  | 2,3 | Cell2 and Cell 3 use NR RF channel 2 and 3, respectively. |
| Active PCell |  | Cell 1 | Primary cell on LTE RF channel number 1. |
| Configured deactivated SCell |  | Cell 3 | Configured deactivated secondary cell on NR RF channel number 3 |
| CP length |  | Normal |  |
| DRX |  | OFF | Continuous monitoring of primary cell |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 16 | During this time SCell is 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. |
| Hysteresis | dB | 0 |  |
| a2-Threshold | dBm | -100 |  |
| 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 | 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.5.5.3.x.1-3: Cell specific test parameters for FR2 SCell activation case

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | Unit | Cell 2 | | | Cell 3 | | |
| 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 | | | | | |
| Data RBs allocated |  | 66 | | 66 | | 66 | |
| PDSCH Reference measurement channel |  | SR.3.1 TDD | | | - | | |
| RMSI CORESET Parameters |  | CR.3.1 TDD | | | - | | |
| Dedicated CORESET Parameters |  | CCR.3.1 TDD | | | - | | |
| OCNG Patterns |  | OP.1 | | | | | |
| SSB Configuration |  | SSB.1 FR2 | | | | | |
| SMTC Configuration |  | SMTC.1 | | | | | |
| CSI-RS configuration for CSI reporting |  | CSI-RS.3.1 TDD | | | | | |
| reportConfigType |  | periodic | | | N/A | | |
| reportQuantity |  | cri-RI-PMI-CQI | | | N/A | | |
| CSI reporting periodicity | slot | N/A | | | 10 | | |
| CSI reporting offset | slot | N/A | | | 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\_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: Void  Note 3: Void  Note 4: Void  Note 5: Void |  |  | | | | | |

Table A.5.5.3.x.1-4: OTA related test parameters for FR2 SCell activation case

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit |  | | | Cell 3 | | |
|  |  |  |  |  | T1 | T2 | T3 |
| Angle of arrival configuration |  |  | | | Setup 1 according to table A.3.15.1 | | |
| Assumption for UE beams Note 7 |  |  | | | Rough | | |
| Note1 | dBm/15kHzNote4 |  | | | -104.7 | | |
| Note1 | dBm/SCSNote3 |  | | | -95.7 | | |
|  | dB |  | | | 7 | | |
| SSB\_RPNote2 | dBm/SCS Note4 |  | | | -88.7 | | |
|  | dB |  | | | 7 | | |
| IoNote2 | dBm/95.04 MHz Note4 |  | | | -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 limit UE implementation or test system implementation. | | | | | | | |

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

During T2, the UE shall be able to send a valid L3-RSRP report for the SCell in the configured slots for CSI reporting at slot for sub-test 1. For sub-test2, the UE shall be able to send a valid L3-RSRP for the SCell at slot . The UE is not required to send L3-RSRP report after slot , where M is defined in 8.3.17.

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 and TCSI\_Reporting are defined in Table A.7.5.3.16.1-2.

- In this case, TSSB=TSMTC = 20ms and TL1-RSRP,report = 5ms.

- For sub-test1, Tactivation\_time = 7ms + 0.125ms + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay).

- For sub-test2, Tactivation\_time = 3ms + M+ max (THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay)

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

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

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot to , as defined in clause 8.3, where TX =20ms.

During T3 interruption of PCell / PSCell during SCell activation 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 8.2.2.2.2.

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

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

End of Change 10

Start of Change 11

#### A.6.5.3.x SCell Activation and deactivation of unknown SCell in FR1 in DRX for UE capable of short measurement interval

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

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clauses 8.3.2 and 8.3.3, respectively, when the SCell in FR1 is unknown by the UE at the time of activation and when UE supports *shortMeasInterval-r18* capability.

The supported test configurations are shown in table A.6.5.3.x.1-1 below. The test parameters are given in Table A.6.5.3.x.1-2 and cell-specific parameters in Table A.6.5.3.x.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. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

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

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot , as defined in clause 8.3.2. The UE shall start reporting CSI in PCell after at least one CSI-RS transmission occasion for channel measurement and reporting after slot and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot 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 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, 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 SCell, respectively.

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

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

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

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channel (1, 2) are used for this test |
| Active PCell |  | Cell 1 | Primary cell on NR RF channel number 1. |
| Configured deactivated SCell |  | Cell 2 | Configured deactivated secondary cell on NR RF channel number 2 |
| CP length |  | Normal |  |
| DRX |  | DRX.8 | DRX cycle = 320 ms and TAT = Infinity |
| Cell-individual offset for cells on NR channel number | dB | 0 | Individual offset for cells on primary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 160 |  |
| Cell2 timing offset to cell1 | μs | 0 |  |
| Time alignment error between cell2 and cell1 | μs | ≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | ms | 100 | During this time the PCell 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 | 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.x.1-3: Cell specific test parameters for unknown FR1 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.3 | | | | | |
| reportConfigType | |  | periodic | | | | | |
| reportQuantity | |  | cri-RI-PMI-CQI | | | | | |
| CSI reporting (CQI index non 0) periodicity for SCell | Config 1,2 | slot | 5 | | | N/A | | |
| Config 3 | 10 | | | N/A | | |
| CSI reporting (CQI index non 0) offset for SCell | Config 1,2 | slot | 4 | | | N/A | | |
| Config 3 | 6 | | | 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 | 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.x.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except Tactivation\_time will be replaced with the value below as defined in clause 8.3.2 when UE supports *shortMeasInterval-r18* capability:

Tactivation\_time = 3ms + TFirstSSB\_MAX, enhanced + TSMTC\_MAX, enhanced + Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP ,report + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay), for which TFirstSSB\_MAX, enhanced = TSMTC\_MAX, enhanced = Trs, enhanced =20ms; TL1-RSRP, enhanced\_measure = 60ms and TL1-RSRP, report=5ms.

End of Change 11

Start of Change 12

#### A.4.5.3.x SCell Activation and deactivation of unknown SCell in FR1 for UE capable of short measurement interval

##### A.4.5.3.x.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is unknown by the UE at the time of activation and when UE supports *shortMeasInterval-r18* capability.

The supported test configurations are defined in clause A.4.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.4.5.3.x.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

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

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

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell at latest in slot as defined in clause 8.3. The starting point of any PSCell interruption due to the deactivation shall occur in the slot to , as defined in clause 8.3. The starting point of any E-UTRA PCell interruption due to the deactivation shall occur in the subframe to subframe , where and are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

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

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

Table A.4.5.3.x.1-1: General test parameters for unknown FR1 SCell activation case, 160ms SCell measurement cycle

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| DRX |  | DRX.8 | DRX cycle = 320 ms and TAT = Infinity |
| 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. |

##### A.4.5.3.x.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, except Tactivation\_time will be replaced with the value below as defined in clause 8.3.2 when UE supports *shortMeasInterval-r18* capability:

Tactivation\_time = 3ms + TFirstSSB\_MAX, enhanced + TSMTC\_MAX, enhanced + Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP ,report + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay), for which TFirstSSB\_MAX, enhanced = TSMTC\_MAX, enhanced = Trs, enhanced =20ms; TL1-RSRP, enhanced\_measure = 60ms and TL1-RSRP, report=5ms.

End of Change 12

Start of Change 13

### A.7.5.16 SCG Activation and deactivation for FR1+FR1 inter-band with target PSCell in FR1

##### A.7.5.16.1 Test Purpose and Environment

The purpose of this test case is to test the activation PSCell delay for a UE configured with one deactivated SCG in NR-DC and when PSCell in one SCG is being activated. The test also tests the deactivation delay. The test case tests the requirements within which the UE shall be able to activate the deactivated SCG in section 8.17.2 for when PSCell is known and TCI state is known. The PCell is in NR FR1 and the PSCell is in NR FR1.

The supported test configurations are defined in Table A.7.5.16.1-1. The test parameters for NR cell are given in Tables A.7.5.16.1-2. And cell specific test parameters are described in Tables A.7.5.16.1-3.

During T1 the PSCell is configured in deactivated state. The TE ensures that the deactivated PSCell remain known until the PSCell is activated.

At T2 an RRC message for activation of PSCell is sent by the test equipment.The point in time at which the RRC message, for activating of the PScell , is received at the UE in slot n defines as the starting point of T2

During T2, the test equipment monitors for PRACH preamble from the UE on the PSCell. The time when TE receives a preamble from the UE is denoted as starting point of T3.

During T3 the TE monitoris the msg3,and after sending the msg4, the TE sends the RRC deactivation command to the UE. The point in time at which the RRC message for deactivating the PSCell is received at the UE in slot n defines the starting time of T4.

During the time period T4, the UE is configured with measCyclePscell , *bfd-and-RLM* with value true . And the TE sends the 2nd RRC activation command.

The time when UE receives the 2nd RRC activation command in slot n , defines as the starting time of T5.

During T5, the test equipment monitors for SR from the UE on the PSCell. The time when test equipment receives a scheduling request from the UE is denoted as the ending point of the test.

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 the PSCell, respectively.

For 1st time activation during T2, the test equipment verifies the activation time by when the Random Access preamble from the UE is received in the activated PSCell.

During T4 and T5 the TE ensures that that TCI state is known.

For the 2nd time activation during T5, the test equipment verifies the activation time by when the SR from the UE is received in the activated PSCell. The TE verifies the deactivation time by counting the slots from the time when the PSCell deactivation command is sent until UL transmission from the PSCell is discontinued.

**Table A.7.5.16.1-1: Supported test configurations for FR1 PSCell activation case**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode  Target PSCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode  Target PSCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 3 | PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode  Target PSCell: 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.7.5.16.1-2: General Test Parameters for FR1FR1 PSCell activation and deactivation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2 | Two NR radio channels are used for this test, cell 1 and cell2 use RF channel 1 and 2, respectively. |
| Initial | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Deactivated PScell |  | Cell2 | To be activated PSCell on RF channel number 2. |
| Final | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Activated PScell |  | Cell2 | PSCell activated on RF channel number 2. |
| DRX | |  | OFF | Continuous monitoring of primary cell |
| Scheduling request resource priodicity | |  | 20ms | At the starting of period T6, UE sends a SR on PUCCH for PSCell |
| T1 | | s | [1] | During this time the PScell is deactivated |
| T2 | | s | [1] | During this time the TE activated the PScell |
| T3 | | s | [0.5] | During this time the PScell is activated |
| T4 | | s | [0.5] | During this time the TE deactivate the PScell |
| T5 | | s | [1] | During this time, PScell and TCI state shall be known the TE activate the Pscell |

Table A.7.5.16.1-3: Cell specific test parameters for FR1-FR1 PSCell activation case

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ParameterNote 5 | | | Unit | Cell 1 | | | | | | | Cell 2 | | | | | | |
| T1 | T2 | T3 | T4 | | T5 | T6 | T1 | T2 | | T3 | T4 | T5 | T6 |
| 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 | | | | | | |
| 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 FR1 | | | | | | |
| Config 3 | SSB.2 FR1 | | | | | | |
| CSI-RS configuration for CSI reporting | | Config 1~3 |  | N/A | | | | | | | CSI-RS.3.1 TDD | | | | | | |
| reportConfigType for CSI reporting | |  |  | periodic | | | | | | | N/A | | | | | | |
| reportConfigType for L1-RSRP | |  |  | periodic | | | | | | | N/A | | | | | | |
| reportQuantity for CSI reporting | |  |  | cri-RI-PMI-CQI | | | | | | | N/A | | | | | | |
| reportQuantity for L1-RSRP | |  |  | ssb-Index-RSRP | | | | | | | N/A | | | | | | |
| CSI reporting periodicity | | Config 1,2 | slot | 5 | | | | | | | N/A | | | | | | |
| Config 3 | 10 | | | | | | |
| L1-RSRP reporting periodicity Note 7 | | Config 1,2 | slot | 5 | | | | | | | N/A | | | | | | |
| Config 3 | 10 | | | | | | |
| CSI reporting offset | | Config 1,2 | slot | 2 | | | | | | | N/A | | | | | | |
| Config 3 | 4 | | | | | | |
| L1-RSRP reporting offset | | Config 1,2 | slot | 2 | | | | | | | N/A | | | | | | |
| Config 3 | 4 | | | | | | |
| SMTC configuration | | |  | SMTC.1 | | | | | | | | | | | | | |
| TimeAlignmentTimer | | |  | [Infinity] | | | | | | | | | | | | | |
| 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 | | | | | | | AWGN | | | | | | |
| Scheduling request resource priodicity | | | ms | N/A | | | | | | | 20 | | | | | | |
| Note2 | | | dBm/15kHz | -98 | | | | | | | -98 | | | | | | |
| Note2 | Config 1,2 | | dBm/SCS | -98 | | | | | | | -98 | | | | | | |
|  | Config 3 | |  | -95 | | | | | | | -95 | | | | | | |
|  | | | dB | 4 | | | | 4 | | | -Infinity | | 5 | | | | |
|  | | | dB | 4 | | | | 4 | | | -Infinity | | 5 | | | | |
| SSB\_RP | Config 1,2 | | dBm/SCS | -94 | | | | -94 | | | -Infinity | | -90 | | | | |
|  | Config 3 | | dBm/SCS | -91 | | | | -91 | | | -Infinity | | -63.85 | | | | |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz | -64.59 | | | | -64.59 | | | -70.05 | | -57.75 | | | | |
|  | Config 3 | | dBm/  38.16MHz | -58.49 | | | | -58.49 | | | -63.94 | | -57.75 | | | | |
| Propagation condition | | | - | AWGN | | | | | | | AWGN | | | | | | |
|  | | | | | | | | | | | | | | | | | |

##### A.7.5.16.2 Test Requirements

RRC message for activation of the PSCell is received in slot *n* at the UE and denotes the starting point of T2. During T2 the UE shall send the first preamble on PSCell in the first available PRACH occation no later than:

Tactivation\_time = TRRC\_delay + Tprocessing + Tsearch + T∆ + TIU + 2 ms

After T2 as defined on section 8.17.2.

In this test case:

Tprocessing = 5 ms

Tsearch = 0ms PSCell and TCI state are known, and

T∆ = 20ms.

Tiu = 10ms.

This allows T2 of [Tactivation\_time = TRRC\_delay + 37]ms

The UE shall stop all transmissions on the PSCell no later than in slot n + after T4, as defined in 8.17.3.

The 2nd RRC activation command is received in slot *n* at the UE as the starting time of T5. During T5 the UE shall send the first SR on PScell in the first available uplink SR resource no later than T5 which is :

Tactivation\_time = TRRC\_delay + Tprocessing + Tsearch + T∆ + TIU + 2 ms

as defined on section 8.17.2. In this test case:

Tprocessing = 5ms (no RRC parameter has been modified)

Tsearch = 0ms (RACH-less activation PScell and TCI state are known), and

T∆ = 20ms.

Tiu = 10ms.

This allows T5 PSCell activation time of [Tactivation\_time = TRRC\_delay + 37 ]ms

During T2 and T5 the interruption of PCell during PSCell activation shall not happen outside the slot *m + TRRC\_delay*.

During T4 the interruption of PCell during PSCell deactivation shall not happen outside the slot *n + TRRC\_delay*.

The interruption duration on PCell due to activation and deactivation of PSCell shall not be more than the values specified for in Clause 8.17.2 and 8.17.3.

End of Change 13

Start of Change 14

### A.7.3.1.x Handover with PSCell from FR1-FR2 NR-DC to FR1-FR1 NR-DC with target PSCell in FR1

##### A.7.3.1.x.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell change delay requirements in HO with PSCell in parellal processing from FR1-FR2 NR-DC to FR1-FR1 NR-DC defined in clauses 6.1.5.4.2. The requirements are applicable to NR FR1-FR2 inter-frequency PCell handover and NR FR1-FR1 inter-frequency PSCell change.

The supported test configurations are given in Table A.7.3.1.x.1-1. The test scenario comprises four NR cells, source PCell (Cell 1) and source PSCell (Cell 2), target PCell (Cell 3), target PSCell (Cell 4).

Cell 1, Cell 3 and Cell 4 are on radio channel 1 in FR1.Cell 2 are on radio channel 2 in FR2. Test parameters are given in Tables A.7.3.1.x.1-2, A.7.3.1.x.1-3, A.7.3.1x.1-4 and A.7.3.1.x.1-5 below. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of T1, the UE shall be connected to Cell 1 on radio channel 1 and Cell 2 on radio channel 2. UE is not aware of Cell 3 and Cell 4. Starting T2, cell 3 and Cell 4 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.x.1-1: Supported test configurations for HO with PSCell from FR1-FR2 NR-DC to FR1-FR1 NR-DC

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Source PSCell: FR2 NR 120kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target PSCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | Source PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Source PSCell: FR2 NR 120kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target PSCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | Source PCell: FR1 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target PCell: FR1 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Source PSCell: FR2 NR 120kHz SSB SCS, 100MHz bandwidth, TDD duplex mode  Target PSCell: FR1 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.1.x.1-2: General test parameters for PCell FR1-FR1 Inter frequency handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 3 |  |
| Final condition | Active cell |  | Cell 3 |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |

Table A.7.3.1.x.1-3: Cell specific test parameters for PCell FR1-FR1 Inter frequency handover

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | | | Cell 3 | | |
|  | | |  | T1 | | T2 | | T1 | | T2 |
| NR RF Channel Number | | |  | 1 | | | | 1 | | |
| Duplex mode | | Config 1 |  | FDD | | | | | | |
|  | | Config 2,3 |  | TDD | | | | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | | | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | | | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | | | | | | |
|  | | Config 2 |  | TRS.1.1 TDD | | | | | | |
|  | | Config 3 |  | TRS.1.2 TDD | | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | | | | | |
|  | | Config 2 |  | SR.1.1 TDD | | | | | | |
|  | | Config 3 |  | SR2.1 TDD | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | | | | | | |
|  | | Config 2 |  | CR.1.1 TDD | | | | | | |
|  | | Config 3 |  | CR2.1 TDD | | | | | | |
| OCNG Patterns | | |  | OP.1 | | | | | | |
| SMTC Configuration | | |  | SMTC.1 | | | | | | |
| SSB Configuration | | Config 1,2 |  | SSB.1 FR1 | | | | | | |
|  | | Config 3 |  | SSB.2 FR1 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | | | |
|  | | Config 3 |  | 30 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | | | |
|  | | Config 3 |  | 30 kHz | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | | | | |
| BWP | | Initial DL BWP |  | DLBWP.0.1 | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | |
| EPRE ratio of PSS to 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 | -98 | | | -98 | | | |
| Note2 | Config 1,2 | | dBm/SCS | -98 | | | -98 | | | |
|  | Config 3 | |  | -95 | | | -95 | | | |
|  | | | dB | 4 | 4 | | -Infinity | | 5 | |
|  | | | dB | 4 | 4 | | -Infinity | | 5 | |
| SSB\_RP | Config 1,2 | | dBm/SCS | -94 | -94 | | -Infinity | | -93 | |
|  | Config 3 | | dBm/SCS | -91 | -91 | | -Infinity | | -90 | |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz | -64.59 | -64.59 | | -70.05 | | -63.85 | |
|  | Config 3 | | dBm/  38.16MHz | -58.49 | -58.49 | | -63.94 | | -57.75 | |
| Propagation condition | | | - | AWGN | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | |

Table A.7.3.1.x.1-4: General test parameters FR2-FR1 PSCell change

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 2 |  |
|  | Neighbouring cell |  | Cell 4 |  |
| Final condition | Active cell |  | Cell 4 |  |
| A4-Offset | | dBm | -120 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤10 |  |

Table A.7.3.1.x.1-5: Cell specific test parameters for FR2-FR1 PSCell change

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 | | | Cell 4 | |
|  | | |  | T1 | T2 | | T1 | T2 |
| Assumption for UE beamsNote 6 | | |  | Rough | | | N/A | |
| AoA setup | | |  | Setup 1  as defined in A.3.15 | | | NA | |
| NR RF Channel Number | | |  | 2 | | | 1 | |
| Duplex mode | | Config 1 |  | TDD | | | FDD | |
|  | | Config 2,3 |  | TDD | | | TDD | |
| TDD configuration | | Config 1 |  | TDDConf.3.1 | | | Not Applicable | |
|  | | Config 2 |  | TDDConf.3.1 | | | TDDConf.1.1 | |
|  | | Config 3 |  | TDDConf.3.1 | | | TDDConf.2.1 | |
| BWchannel | | Config 1 | MHz | 100: NRB,c = 66 | | | 10: NRB,c = 52 | |
|  | | Config 2 |  | 100: NRB,c = 66 | | | 10: NRB,c = 52 | |
|  | | Config 3 |  | 100: NRB,c = 66 | | | 40: NRB,c = 106 | |
| BWP BW | | Config 1 | MHz | 100: NRB,c = 66 | | | 10: NRB,c = 52 | |
|  | | Config 2 |  | 100: NRB,c = 66 | | | 10: NRB,c = 52 | |
|  | | Config 3 |  | 100: NRB,c = 66 | | | 40: NRB,c = 106 | |
| Data RBs allocated | | Config 1 |  | 66 | | | 52 | |
| Config 2 | 66 | | | 52 | |
| Config 3 | 66 | | | 106 | |
| DRX Cycle | | | ms | Not Applicable | | | Not Applicable | |
| PDSCH Reference measurement channel | | Config 1 |  | SR3.1 TDD | | | SR.1.1 FDD | |
|  | | Config 2 |  | SR3.1 TDD | | | SR.1.1 TDD | |
|  | | Config 3 |  | SR3.1 TDD | | | SR2.1 TDD | |
| RMSI CORESET Reference Channel | | Config 1 |  | CR3.1 TDD | | | CR.1.1 FDD | |
|  | | Config 2 |  | CR3.1 TDD | | | CR.1.1 TDD | |
|  | | Config 3 |  | CR3.1 TDD | | | CR2.1 TDD | |
| Control Channel RMC | | Config 1 |  | CCR.3.1 TDD | | | CCR.1.1 FDD | |
| Config 2 | CCR.3.1 TDD | | | CCR.1.1 TDD | |
| Config 3 | CCR.3.1 TDD | | | CCR.2.1 TDD | |
| OCNG Patterns | | |  | OP 1 | | | OP 1 | |
| SSB configuration | | Config 1,2 |  | SSB. 3 FR2 | | | SSB.1 FR1 | |
|  | | Config 3 |  | SSB. 3 FR2 | | | SSB.2 FR1 | |
| SMTC configuration | | Config 1,2 |  | SMTC.1 | | | SMTC.1 | |
|  | | Config 3 |  | SMTC.2 | | | SMTC.2 | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 120 kHz | | | 15 kHz | |
|  | | Config 3 |  | 120 kHz | | | 30 kHz | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 120 kHz | | | 15 kHz | |
|  | | Config 3 |  | 120 kHz | | | 30 kHz | |
| PRACH configuration | | |  | FR2 PRACH configuration 1 | | | FR1 PRACH configuration 1 | |
| TRS configuration | | Config 1 |  | TRS.2.1 TDD | | | TRS.1.1 FDD DD | |
|  | | Config 2 |  | TRS.2.1 TDD | | | TRS.1.1 TDD | |
|  | | Config 3 |  | TRS.2.1 TDD | | | TRS.1.2 TDD | |
| PDSCH/PDCCH TCI state | | |  | TCI.State.2 | | | N/A | |
| BWP configuraiton | | Initial DL BWP |  | DLBWP.0.1 | | | DLBWP.0.1 | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | DLBWP.1.1 | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | ULBWP.0.1 | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | ULBWP.1.1 | |
| EPRE ratio of PSS to SSS | | | dB | 0 | | | 0 | |
| EPRE ratio of PBCH DMRS to SSS | | |
| EPRE ratio of PBCH to PBCH DMRS | | |
| EPRE ratio of PDCCH DMRS to SSS | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | |
| EPRE ratio of PDSCH DMRS to SSS | | |
| EPRE ratio of PDSCH to PDSCH | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | | |
| Note2 | | | dBm/15kHz | -104.7 | | | -98 | |
| Note2 | Config 1,2 | | dBm/SCS | -95.7 | | | -98 | |
|  | Config 3 | |  | -95 | |
| SSB\_RP Note 3 | Config 1,2 | | dBm/SCS Note5 | -95.0 | | -95.0 | -Infinity | -93 |
| Config 3 | |  | -Infinity | -90 |
|  | | | dB | 7 | | 7 | -Infinity | 5 |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz | N/A | | | -70.05 | -63.85 |
| Config 3 | | dBm/  38.16MHz | -63.94 | -57.75 |
| Config 1,2,3 | | dBm/95.04 MHz Note5 | -66.7 | | -66.7 | N/A | |
| Propagation condition | | | - | AWGN | | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | | | |

##### A.7.3.1.x.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 3 less than 77 ms from the beginning of time period T2.

The UE shall transmit the PRACH preamble to Cell 4 less than 107 ms from the beginning of time period T2.

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

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

NOTE: The handover requirements for handover with PSCell is defined in clause 6.1.5.4 in [15] as:

DHOwithPSCel\_PSCell = TRRC\_delay + Tsearch + TIU + Tprocessing+ T∆ + Tmargin

Where:

TRRC\_delay = 20 ms for ‘RRC connection reconfiguration (NR SCG establishment/ /modification/release)’.

Tsearch = 0 ms for known cell.

TIU = 15 ms in the test configuration.

Tprocessing = 20ms.

T∆ = 20ms.

Tmargin = 2ms.

This gives a total of 77ms for handover delay.

NOTE: The PSCell change delay for handover with PSCell for NR-DC is defined in clause 6.1.5.4.2 in [15] as:

DHOwithPSCel\_PSCell = TRRC\_delay + Tprocessing + Tsearch + T∆ + TPSCell\_ DU + TPCell\_DU + 2 ms

Where:

TRRC\_delay = 20 ms for ‘RRC connection reconfiguration (NR SCG establishment/ /modification/release)’.

Tprocessing = 45ms for source Cell and target Cell are in the different FR.

Tsearch = 0 ms for known cell.

T∆ = 20 ms for fine time tracking and acquiring full timing information of the target cell.

TPSCell\_ DU = 20 ms.

TPCell\_ DU = 0 ms,.

This gives a total of 107ms for handover delay.

End of Change 14

Start of Change 15

### A.7.3.1.y HO with PSCell from FR1-FR1 NR-DC to FR1-FR2 NR-DC

A.7.3.1.y.1 Test Purpose and Environment

The purpose of this test is to verify the Handover with PSCell change delay requirements from FR1-FR1 NR-DC to FR1-FR2 NR-DC defined in clauses 6.1.5.4.2. The requirements are applicable to NR FR1-FR1 intra-frequency PCell handover and NR FR1-FR2 inter-frequency PSCell change.

The supported test configurations are given in Table A.7.3.1.y.1-1. The test scenario comprises four NR cells, source PCell(Cell 1) and source PSCell(Cell 2), target PCell(Cell 3), target PSCell(Cell 4).

Cell 1 and Cell 3 are on radio channel 1 in FR1.Cell 2 is on radio channel 2 in FR1. Cell 4 is on radio channel 3 in FR2. Test parameters are given in Tables A.7.3.1.y.1-2, A.7.3.1.y.1-3, A.7.3.1.y.1-4, A.7.3.1.y.1-5 and A.7.3.1.y.1-6 below. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of T1, the UE shall be connected to Cell 1 on radio channel 1 and Cell 2 on radio channel 2. UE is not aware of Cell 3 and Cell 4. Starting T2, cell 3 and Cell 4 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The SMTC of Cell 4 is provided in *targetcellSMTC-SCG-r16* but not configured in *reconfigurationWithSync*.

**Table A.7.3.1.y.1-1: Supported test configurations for HO with PSCell from NR-DC to NR-DC**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | Source PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Source PSCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target PSCell: FR2 NR 120kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 2 | Source PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Source PSCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target PSCell: FR2 NR 120kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| 3 | Source PCell: FR1 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target PCell: FR1 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Source PSCell: FR1 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target PSCell: FR2 NR 120kHz SSB SCS, 100MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

**Table A.7.3.1.y.1-2: General test parameters for PCell FR1-FR1 Inter frequency handover**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| **Initial conditions** | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 3 |  |
| Final condition | Active cell |  | Cell 3 |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |

**Table A.7.3.1.y.1-3: Cell specific test parameters for PCell FR1-FR1 Inter frequency handover**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 1** | | | | **Cell 3** | | |
|  | | |  | **T1** | | **T2** | | **T1** | | **T2** |
| NR RF Channel Number | | |  | 1 | | | | 1 | | |
| Duplex mode | | Config 1 |  | FDD | | | | | | |
|  | | Config 2,3 |  | TDD | | | | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | | | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | | | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | | | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | | | | | | |
|  | | Config 2 |  | TRS.1.1 TDD | | | | | | |
|  | | Config 3 |  | TRS.1.2 TDD | | | | | | |
| DRx Cycle | | | ms | Not Applicable | | | | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | | | | | |
|  | | Config 2 |  | SR.1.1 TDD | | | | | | |
|  | | Config 3 |  | SR2.1 TDD | | | | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | | | | | | |
|  | | Config 2 |  | CR.1.1 TDD | | | | | | |
|  | | Config 3 |  | CR2.1 TDD | | | | | | |
| OCNG Patterns | | |  | OP.1 | | | | | | |
| SMTC Configuration | | |  | SMTC.1 | | | | | | |
| SSB Configuration | | Config 1,2 |  | SSB.1 FR1 | | | | | | |
|  | | Config 3 |  | SSB.2 FR1 | | | | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | | | |
|  | | Config 3 |  | 30 kHz | | | | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | | | | |
|  | | Config 3 |  | 30 kHz | | | | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | | | | |
| BWP | | Initial DL BWP |  | DLBWP.0.1 | | | | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | | | | |
| EPRE ratio of PSS to 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 | -98 | | | -98 | | | |
| Note2 | Config 1,2 | | dBm/SCS | -98 | | | -98 | | | |
|  | Config 3 | |  | -95 | | | -95 | | | |
|  | | | dB | 4 | 4 | | -Infinity | | 5 | |
|  | | | dB | 4 | 4 | | -Infinity | | 5 | |
| SSB\_RP | Config 1,2 | | dBm/SCS | -94 | -94 | | -Infinity | | -93 | |
|  | Config 3 | | dBm/SCS | -91 | -91 | | -Infinity | | -90 | |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz | -64.59 | -64.59 | | -70.05 | | -63.85 | |
|  | Config 3 | | dBm/  38.16MHz | -58.49 | -58.49 | | -63.94 | | -57.75 | |
| Propagation condition | | | - | AWGN | | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | | |

**Table A.7.3.1.y.1-4: General test parameters Inter-frequency FR1-FR2 PSCell change**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 2 |  |
|  | Neighbouring cell |  | Cell 4 |  |
| Final condition | Active cell |  | Cell 4 |  |
| A4-Offset | | dBm | -120 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤10 |  |

**Table A.7.3.1.y.1-5: Cell specific test parameters for Inter-frequency FR1-FR2 PSCell change (Cell 2)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 2** | |
|  | | |  | **T1** | **T2** |
| NR RF Channel Number | | |  | 2 | |
| Duplex mode | | Config 1 |  | FDD | |
|  | | Config 2,3 |  | TDD | |
| TDD configuration | | Config 1 |  | Not Applicable | |
|  | | Config 2 |  | TDDConf.1.1 | |
|  | | Config 3 |  | TDDConf.2.1 | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | |
|  | | Config 2 |  | 10: NRB,c = 52 | |
|  | | Config 3 |  | 40: NRB,c = 106 | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | |
|  | | Config 2 |  | 10: NRB,c = 52 | |
|  | | Config 3 |  | 40: NRB,c = 106 | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | |
|  | | Config 2 |  | TRS.1.1 TDD | |
|  | | Config 3 |  | TRS.1.2 TDD | |
| DRx Cycle | | | ms | Not Applicable | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | |
|  | | Config 2 |  | SR.1.1 TDD | |
|  | | Config 3 |  | SR2.1 TDD | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | |
|  | | Config 2 |  | CR.1.1 TDD | |
|  | | Config 3 |  | CR2.1 TDD | |
| OCNG Patterns | | |  | OP.1 | |
| SMTC Configuration | | |  | SMTC.1 | |
| SSB Configuration | | Config 1,2 |  | SSB.1 FR1 | |
|  | | Config 3 |  | SSB.2 FR1 | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | |
|  | | Config 3 |  | 30 kHz | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | |
|  | | Config 3 |  | 30 kHz | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | |
| BWP | | Initial DL BWP |  | DLBWP.0.1 | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | |
|  | | Initial UL BWP |  | ULBWP.0.1 | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | |
| EPRE ratio of PSS to 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 | N/A  Link only, see clause A.3.7A | |
| Note2 | Config 1,2 | |  |
|  | Config 3 | |  |
|  | | | dB |
|  | | | dB |
| SSB\_RP | Config 1,2 | | dBm/SCS |
|  | Config 3 | | dBm/SCS |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz |
|  | Config 3 | | dBm/  38.16MHz |
| Propagation condition | | | - |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

**Table A.7.3.1.y.1-6: Cell specific test parameters for Inter-frequency FR1-FR2 PSCell change (Cell 4)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Cell 4** | | |
|  | | |  | **T1** | | **T2** |
| Assumption for UE beamsNote 6 | | |  | Rough | | |
| AoA setup | | |  | Setup 1 as defined in A.3.15 | | |
| NR RF Channel Number | | |  | 3 | | |
| Duplex mode | | |  | TDD | | |
| TDD configuration | | |  | TDDConf.3.1 | | |
| BWchannel | | | MHz | 100: NRB,c = 66 | | |
| BWP BW | | | MHz | 100: NRB,c = 66 | | |
| Data RBs allocated | | |  | 66 | | |
| DRx Cycle | | | ms | Not Applicable | | |
| PDSCH Reference measurement channel | | |  | SR3.1 TDD | | |
| RMSI CORESET Reference Channel | | |  | CR3.1 TDD | | |
| Control Channel RMC | | |  | CCR.3.1 TDD | | |
| OCNG Patterns | | |  | O P. 1 | | |
| SMTC Configuration | | |  | SMTC pattern 1 | | |
| SSB Configuration | | |  | SSB. 3 FR2 | | |
| PDSCH/PDCCH subcarrier spacing | | | kHz | 120 kHz | | |
| PUCCH/PUSCH subcarrier spacing | | | kHz | 120 kHz | | |
| PRACH configuration | | |  | FR2 PRACH configuration 1 | | |
| TRS configuration | | |  | TRS.2.1 TDD | | |
| PDSCH/PDCCH TCI state | | |  | TCI.State.2 | | |
| BWP configuraiton | | Initial DL BWP |  | DLBWP.0.1 | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | |
| EPRE ratio of PSS to 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 | -104.7 | | |
| Note2 |  | | dBm/SCS | -95.7 | | |
|  | | | dB | -Infinity | 0 | |
|  | | | dB | -Infinity | 7 | |
| IoNote3 |  | | -59.7 | -59.7 | -56.7 | |
| Propagation condition | | | - | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone  Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation | | | | | | |

A.7.3.1.y.2 Test Requirements

The UE shall start to transmit the PRACH to target PSCell (Cell 4) less than 636 ms from the beginning of time period T2.

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

NOTE: The handover with PSCell delay can be expressed as: DHOwithPSCell\_PSCell = TRRC\_delay + Tprocessing + Tsearch\_HO + Tsearch\_PSCell + T∆ + TPSCell\_ DU + 2 ms, where:

RRC procedure delay = 16 ms and is specified in clause 12 in TS 38.331 [2].

Tprocessing is as defined as 50ms in the test.

Tsearch\_HO is as defined as 60ms in the test.

Tsearch\_PSCell is as defined as 480ms in the test.

T∆ is defined as 20ms in the test.

TPSCell\_ DU is defined as 10ms in the test.

This gives a total of 636 ms.

End of Change 15

Start of Change 16

### A.6.5.10 Conditional PSCell addition and release delay (FR1 NR-DC)

#### A.6.5.10.1 Conditional PSCell Addition and Release Delay

##### A.6.5.10.1.1 Test purpose and environment

The purpose of this test is to verify that the NR conditional PSCell addition and release delay under NR-DC is within the requirements stated in clause 8.9A.2.

##### A.6.5.10.1.2 Test Parameters

Supported test configurations are shown in A.6.5.10.1.2-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR1, respectively. Test parameters are given in Tables A.6.5.10.1.2-2 below.

The test parameters for NR cell are given in Tables A.6.5.10.1.2-2 and cell-specific parameters in A.6.5.10.1.2-3 below. The test consists of four successive time periods with duration of T1, T2, T3 and T4 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (NR PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

At the start of time duration T1, the UE does not have any timing information of Cell 2. The network shall configure a condition and the target PSCell configuration implying addition to cell 2 during T1, at a time earlier than TRRC\_delay before the beginning of T2.

At the start of T2, cell 2 becomes detectable and meets the addition condition. UE shall be able to measure and detect that the condition is fulfilled during time Tmeasure. After which it will transmit the PRACH preamble. Reception by the test system of the PRACH preamble defines the start of T3.

During T3, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send an RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T4.

During T4, the UE shall release the PSCell.

Table A.6.5.10.1.2-1: Supported test configurations for FR1 PSCell

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

Table A.6.5.10.1.2-2: General Test Parameters for Conditional PSCell Addition and Release

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2 | Two radio channels are used for this test. One for PCell and second for NR PSCell |
| Initial | Active PCell |  | Cell1 | PCell on RF channel number 1. |
|  | Neighbour cell |  | Cell2 | Neighbour cell on RF channel number 1. |
| Final | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Neighbour Cell |  | Cell2 | PSCell released on RF channel number 1. |
| A4 | Hysteresis | dB | 0 | Hysteresis for event A4 |
|  | Threshold RSRP | dBm | -118 | Threshold for event A4 |
|  | Time to Trigger | S | 0 | Time to trigger for event A4 |
| DRX | |  | OFF | Continuous monitoring of primary cell |
| Measurement gap pattern Id | |  | 0 | Gaps are configured before T2 and released before T3. |
| PRACH configuration on cell2 | |  | FR1 PRACH configuration 1 | Captured in A.3.8.2.1 |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of cell2. |
| T1 | | s | 5 | During this time the PCell is known and Cell 2 is unknown. |
| T2 | | s | ≤7 | During this time Cell 2 meets the addition condition and UE adds this PSCell. |
| T3 | | s | 1 | During this time the UE sends CSI reports for Cell 2. And the test system shall send an RRC message instructing the UE to release the PSCell. |
| T4 | | s | 1 | During this time the UE releases the Cell 2. |

Table A.6.5.10.1.2-3: Cell Specific Parameters for Conditional PSCell Addition and Release

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test | | | | |
|  |  |  | T1 | | T2 | T3 | T4 |
| NR RF Channel Number |  | 1,2,3,4,5,6 | 1 | | | | |
| NR RF Channel Number |  | 1,2,3,4,5,6 | 1 | | | | |
| TDD |  | 1,4 | Not Applicable | | | | |
| configuration |  | 2,5 | TDDConf.1.1 | | | | |
|  |  | 3,6 | TDDConf.2.1 | | | | |
| BWchannel | MHz | 1,4 | 10: NRB,c = 52 | | | | |
|  |  | 2,5 | 10: NRB,c = 52 | | | | |
|  |  | 3,6 | 40: NRB,c = 106 | | | | |
| Initial BWP Configuration |  | 1,2,3 | DLBWP.0.1  ULBWP.0.1 | | | | |
| Dedicated BWP Configuration |  | 1,2,3 | DLBWP.1.1  ULBWP.1.1 | | | | |
| PDSCH Reference |  | 1,4 | SR.1.1 FDD | | | | |
| measurement |  | 2,5 | SR.1.1 TDD | | | | |
| channel |  | 3,6 | SR.2.1 TDD | | | | |
| RMSI CORESET Reference |  | 1,4 | CR.1.1 FDD | | | | |
| Channel |  | 2,5 | CR.1.1 TDD | | | | |
|  |  | 3,6 | CR.2.1 TDD | | | | |
| Dedicated CORESET Reference |  | 1,4 | CCR.1.1 FDD | | | | |
| Channel |  | 2,5 | CCR.1.1 TDD | | | | |
|  |  | 3,6 | CCR.2.1 TDD | | | | |
| OCNG Patterns |  | 1,2,3,4,5,6 | OP.1 | | | | |
| SSB configuration |  | 1,2,4,5 | SSB.1 FR1 | | | | |
|  |  | 3,6 | SSB.2 FR1 | | | | |
| SMTC configuration |  | 1,2,4,5 | SMTC.1 | | | | |
|  |  | 3,6 | SMTC.1 | | | | |
| TRS Configuration |  | 1,4 | TRS.1.1 FDD | | | | |
|  |  | 2,5 | TRS.1.1 TDD | | | | |
|  |  | 3,6 | TRS.1.2 TDD | | | | |
| CSI-RS configuration for CSI reporting |  | 1,4 | CSI-RS.1.1 FDD | | | | |
| 2,5 | CSI-RS.1.1 TDD | | | | |
| 3,6 | CSI-RS.2.1 TDD | | | | |
| reportConfigType |  | 1,2,3,4,5,6 | periodic | | | | |
| reportQuantity |  | 1,2,3,4,5,6 | cri-RI-PMI-CQI | | | | |
| CSI reporting periodicity | slot | 1,2,4,5 | 5 | | | | |
| 3,6 | 10 | | | | |
| CSI reporting offset | slot | 1,2,4,5 | 2 | | | | |
| 3,6 | 4 | | | | |
| EPRE ratio of PSS to SSS |  |  |  | | | | |
| EPRE ratio of PBCH DMRS to SSS |  |  |  | | | | |
| EPRE ratio of PBCH to PBCH DMRS |  |  |  | | | | |
| EPRE ratio of PDCCH DMRS to SSS |  |  |  | | | | |
| EPRE ratio of PDCCH to PDCCH DMRS | dB | 1,2,3,4,5,6 | 0 | | | | |
| EPRE ratio of PDSCH DMRS to SSS |  |  |  | | | | |
| EPRE ratio of PDSCH to PDSCH |  |  |  | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) |  |  |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) |  |  |  | | | | |
| Note2 | dBm/15 kHz | 1,2,3,4,5,6 | N/A | -85 | | | |
| Note2 | dBm/SCS | 1,2,4,5 | N/A | -85 | | | |
|  |  | 3,6 | N/A | -82 | | | |
|  |  | 1,2,3,4,5,6 | -infinity | 0 | | | |
|  |  | 1,2,3,4,5,6 | -infinity | 0 | | | |
| SS-RSRPNote3 | dBm/SCS | 1,2,4,5 | -infinity | -85 | | | |
|  |  | 3,6 | -infinity | -82 | | | |
| IoNote3 | dBm/9.36MHz | 1,2,4,5 | N/A | -57 | | | |
|  | dBm/38.1MHz | 3,6 | N/A | -51 | | | |
| Propagation condition |  | 1,2,3,4,5,6 | AWGN | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | |

##### A.6.5.10.1.3 Test Requirements

TRRC\_delay + TEvent\_DU occurs during T1 as the addition condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than Tmeasure + TUE\_preparation + Tprocessing + T∆ + TPSCell\_ DU + 2 ms = 920+10+20+20+20+2ms=992 ms from the start of T2.

The UE shall transmit at least one periodic CSI report for PSCell during T3.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T4.

All of the above test requirements shall be fulfilled in order for the observed conditional PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

End of Change 16

Start of Change 17

A.6.5.x PSCell addition and release delay

A.6.5.x.1 Addition and Release Delay of unknown NR FR1 PSCell

A.6.5.x.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delay requirements under NR-DC defined in clauses 8.9.2 and 8.9.3 respectively, for the case where the PSCell is unknown to the UE at the time of addition.

The supported test configurations are shown in A.6.5.x.1.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 and radio channel 2 in FR1, respectively. Test parameters are given in Tables A.6.5.x.1.1-2 and A.6.5.x.1.1-3 below. The test consists of six successive time periods with duration of T1, T2, T3 and T4 respectively. Cell 1 is the NR PCell, Cell 2 is an NR neighbour cell. The Cell 1 once set up is not changed across time.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. the UE does not have any timing information of Cell 2. At the end of T1, the test system shall send a RRC message instructing the UE to add PSCell (Cell 2), and further instructing the UE to report CSI periodically in the PSCell once it has been added. Reception by the UE of this RRC message defines the start of T2.

During T2, the UE shall identify PSCell (Cell 2) and carry out random access towards the PSCell (Cell 2). Reception by the test system of the PRACH preamble defines the start of T3.

During T3, the UE shall send periodic CSI reports in PSCell (Cell 2). After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell (Cell 2). Reception by the UE of the RRC message defines the start of T4.

During T4, the UE shall release the PSCell (Cell 2).

**Table A.6.5.x.1.1-1: Supported test configurations for FR1 PSCell Addition and Release**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | NR SCS 15 kHz, BW 10 MHz, FDD |
| 2 | NR SCS 15 kHz, BW 10 MHz, TDD |
| 3 | NR SCS 30 kHz, BW 40 MHz, TDD |
| Note: The UE is only required to pass in one of the supported test configurations in FR1 | |

**Table A.6.5.x.1.1-2: General Test Parameters for FR1 PSCell Addition and Release**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| RF Channel Number | |  | 1, 2 | Two NR FR1 radio channels are used in this test. |
| Initial Condition | Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Neighbour cell | Cell 2 | Neighbour cell on RF channel number 2. |
| Final  Condition | Active PCell |  | Cell 1 | PCell on RF channel number 1. |
| Neighbour Cell | Cell 2 | PSCell released on RF channel number 2. |
| DRX | |  | OFF | Continuous monitoring of primary cell |
| PRACH configuration on Cell 2 | |  | FR1 PRACH configuration 1 | Captured in A.3.8.2.1 |
| CSI reporting periodicity and offset configuration for Cell 2 | | ms | 2 |  |
| T1 | | s | 5 | During this time the PCell shall be known and Cell 2 shall be unknown. |
| T2 | | s | 0.5 | During this time the UE adds the PSCell. |
| T3 | | s | 0.5 | During this time the UE sends CSI reports for PSCell. |
| T4 | | s | 0.5 | During this time the UE releases the PSCell. |

**Table A.6.5.x.1.1-3: Cell Specific Parameters for FR1 PSCell Addition and Release**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Config** | **Cell 1** | **Cell 2** | | | | |
| **T1** | **T2** | | **T3** | **T4** |
| Frequency Range |  | 1,2,3 | FR1 | | | | | |
| Duplex mode |  | 1 | FDD | | | | | |
| 2,3 | TDD | | | | | |
| TDD configuration |  | 1 | Not Applicable | | | | | |
| 2 | TDDConf.1.1 | | | | | |
| 3 | TDDConf.2.1 | | | | | |
| BWchannel | MHz | 1,2 | 10: NRB,c = 52 | | | | | |
| 3 | 40: NRB,c = 106 | | | | | |
| Data RBs allocated |  | 1,2 | 52 | | | | | |
| 3 | 106 | | | | | |
| Initial Downlink BWP configuration |  | 1,2,3 | DLBWP.0.1 | | | | | |
| Initial Uplink BWP configuration |  | 1,2,3 | ULBWP.0.1 | | | | | |
| Dedicated Downlink BWP configuration |  | 1,2,3 | DLBWP.1.1 | | | | | |
| Dedicated Uplink BWP configuration |  | 1,2,3 | ULBWP.1.1 | | | | | |
| PDSCH Reference Measurement Channel |  | 1 | SR.1.1 FDD | | | | | |
| 2 | SR.1.1 TDD | | | | | |
| 3 | SR.2.1 TDD | | | | | |
| RMSI CORESET parameters |  | 1 | CR.1.1 FDD | | | | | |
| 2 | CR.1.1 TDD | | | | | |
| 3 | CR.2.1 TDD | | | | | |
| Dedicated CORESET parameters |  | 1 | CCR.1.1 FDD | | | | | |
| 2 | CCR.1.1 TDD | | | | | |
| 3 | CCR.2.1 TDD | | | | | |
| OCNG PatternsNote1 |  | 1,2,3 | OP.1 | | | | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 15 | | | | | |
| 3 | 30 | | | | | |
| SSB configuration |  | 1,2 | SSB.1 FR1 | | | | | |
| 3 | SSB.2 FR1 | | | | | |
| SMTC configuration |  | 1,2,3 | SMTC.1 | | | | | |
| TRS Configuration |  | 1 | TRS.1.1 FDD | | | | | |
| 2 | TRS.1.1 TDD | | | | | |
| 3 | TRS.1.2 TDD | | | | | |
| CSI-RS configuration for CSI reporting |  | 1 | CSI-RS.1.1 FDD | | | | | |
| 2 | CSI-RS.1.1 TDD | | | | | |
| 3 | CSI-RS.2.1 TDD | | | | | |
| reportConfigType |  | 1,2,3 | periodic | | | | | |
| reportQuantity |  | 1,2,3 | cri-RI-PMI-CQI | | | | | |
| CSI reporting periodicity | slot | 1,2 | 5 | | | | | |
| 3 | 10 | | | | | |
| CSI reporting offset | slot | 1,2 | 2 | | | | | |
| 3 | 4 | | | | | |
| EPRE ratio of PSS to SSS | dB | 1,2,3 | 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 |
| EPRE ratio of OCNG to OCNG DMRS |
| Note2 | dBm/15 kHz | 1,2,3 | -100 | N/A | | -85 | | |
| Note2 | dBm/SCS | 1,2 | -100 | N/A | | -85 | | |
| 3 | -97 | N/A | | -82 | | |
|  |  | 1,2,3 | 12 | -infinity | | 0 | | |
|  |  | 1,2,3 | 12 | -infinity | | 0 | | |
| SS-RSRPNote3 | dBm/SCS | 1,2 | -88 | -infinity | | -85 | | |
| 3 | -85 | -infinity | | -82 | | |
| IoNote3 | dBm/9.36MHz | 1,2 | -59.78 | N/A | | -57 | | |
| dBm/38.1MHz | 3 | -53.68 | N/A | | -51 | | |
| Propagation Condition |  | 1,2,3 | AWGN | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | | | | | | | |

A.6.5.x.1.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell no later than 172 msNote1 from the start of T2.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T3.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T3.

The UE shall stop sending CSI reports for PSCell no later than 20ms from the start of T4.

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

Note1: The PSCell addition delay can be expressed as follows as specified in clause 8.9.2:

Tconfig\_PSCell = TRRC\_delay + Tprocessing + Tsearch + T∆ + TPSCell\_ DU + 2ms

Where:

TRRC\_delay = 50ms

Tprocessing = 20ms

Tsearch = 60ms

T∆ = 20ms

TPSCell\_ DU = 1\*10+10 = 20ms

End of Change 17

Start of Change 18

#### A.6.3.1.15 Handover with PSCell change delay from NR-DC (FR1-FR1) to NR-DC (FR1-FR1)

##### A.6.3.1.15.1 Test Purpose and Environment

The purpose of this test is to verify the handover delay requirements and PSCell change delay requirements in HO with PSCell from NR-DC (FR1-FR1) to NR-DC (FR1-FR1) defined in clauses 6.1.5.4. The requirements are applicable to NR FR1-FR1 intra-frequency PCell handover and NR FR1-FR1 intra-frequency PSCell change.

The supported test configurations are given in Table A.6.3.1.15.1-1. The test scenario comprises four NR cells, source PCell(Cell 1) and source PSCell(Cell 2), target PCell(Cell 3), target PSCell(Cell 4).

Cell 1 and Cell 3 are on radio channel 1 in FR1. Cell 2 and Cell 4 are on radio channel 2 in FR1. Test parameters are given in Tables A.6.3.1.15.1-2, A.6.3.1.15.1-3, A.6.3.1.15.1-4 and A.7.3.1.8.1 A.6.3.1.15.1-5 below. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of T1, the UE shall be connected to Cell 1 on radio channel 1 and Cell 2 on radio channel 2. UE is not aware of Cell 3 and Cell 4. Starting T2, cell 3 and Cell 4 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.6.3.1.15.1-1: Supported test configurations for HO with PSCell from NR-DC to NR-DC

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Source PSCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target PSCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | Source PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target PCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Source PSCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target PSCell: FR1 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | Source PCell: FR1 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target PCell: FR1 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Source PSCell: FR1 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target PSCell: FR1 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.6.3.1.15.1-2: General test parameters for PCell FR1-FR1 Intra frequency handover

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
|  | Neighbouring cell |  | Cell 3 |  |
| Final condition | Active cell |  | Cell 3 |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |

Table A.6.3.1.15.1-3: Cell specific test parameters for PCell FR1-FR1 Inter frequency handover

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | Cell 3 | |
|  | | |  | T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | 1 | | 2 | |
| Duplex mode | | Config 1 |  | FDD | | | |
|  | | Config 2,3 |  | TDD | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | | | |
|  | | Config 2 |  | TRS.1.1 TDD | | | |
|  | | Config 3 |  | TRS.1.2 TDD | | | |
| DRx Cycle | | | ms | Not Applicable | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | | |
|  | | Config 2 |  | SR.1.1 TDD | | | |
|  | | Config 3 |  | SR2.1 TDD | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | | | |
|  | | Config 2 |  | CR.1.1 TDD | | | |
|  | | Config 3 |  | CR2.1 TDD | | | |
| OCNG Patterns | | |  | OP.1 | | | |
| SMTC Configuration | | |  | SMTC.1 | | | |
| SSB Configuration | | Config 1,2 |  | SSB.1 FR1 | | | |
|  | | Config 3 |  | SSB.2 FR1 | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | |
|  | | Config 3 |  | 30 kHz | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | |
|  | | Config 3 |  | 30 kHz | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | |
| BWP | | Initial DL BWP |  | DLBWP.0.1 | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | |
| EPRE ratio of PSS to 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 | -98 | | | |
| Note2 | Config 1,2 | | dBm/SCS | -98 | | | |
|  | Config 3 | |  | -95 | | | |
|  | | | dB | 8 | 8 | -Infinity | 12 |
|  | | | dB | 8 | 8 | -Infinity | 12 |
| SSB\_RP | Config 1,2 | | dBm/SCS | -90 | -90 | - Infinity | -93 |
|  | Config 3 | | dBm/SCS | -87 | -87 | - Infinity | -90 |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz | -61.41 | -61.41 | - Infinity | -57.78 |
|  | Config 3 | | dBm/  38.16MHz | -55.31 | -55.31 | - Infinity | -51.68 |
| Propagation condition | | | - | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

Table A.6.3.1.15.1-4: General test parameters Intra-frequency FR1-FR1 PSCell change

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 2 |  |
|  | Neighbouring cell |  | Cell 4 |  |
| Final condition | Active cell |  | Cell 4 |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |

Table A.6.3.1.15.1-5: Cell specific test parameters for Intra-frequency FR1-FR1 PSCell change

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 | | Cell 4 | |
|  | | |  | T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | 1 | | 2 | |
| Duplex mode | | Config 1 |  | FDD | | | |
|  | | Config 2,3 |  | TDD | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | | | |
|  | | Config 2 |  | TRS.1.1 TDD | | | |
|  | | Config 3 |  | TRS.1.2 TDD | | | |
| DRx Cycle | | | ms | Not Applicable | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | | |
|  | | Config 2 |  | SR.1.1 TDD | | | |
|  | | Config 3 |  | SR2.1 TDD | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | | | |
|  | | Config 2 |  | CR.1.1 TDD | | | |
|  | | Config 3 |  | CR2.1 TDD | | | |
| OCNG Patterns | | |  | OP.1 | | | |
| SMTC Configuration | | |  | SMTC.1 | | | |
| SSB Configuration | | Config 1,2 |  | SSB.1 FR1 | | | |
|  | | Config 3 |  | SSB.2 FR1 | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | |
|  | | Config 3 |  | 30 kHz | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | |
|  | | Config 3 |  | 30 kHz | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | |
| BWP | | Initial DL BWP |  | DLBWP.0.1 | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | |
| EPRE ratio of PSS to 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 | -98 | | | |
| Note2 | Config 1,2 | | dBm/SCS | -98 | | | |
|  | Config 3 | |  | -95 | | | |
|  | | | dB | 8 | 8 | -Infinity | 12 |
|  | | | dB | 8 | 8 | -Infinity | 12 |
| SSB\_RP | Config 1,2 | | dBm/SCS | -90 | -90 | - Infinity | -93 |
|  | Config 3 | | dBm/SCS | -87 | -87 | - Infinity | -90 |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz | -61.41 | -61.41 | - Infinity | -57.78 |
|  | Config 3 | | dBm/  38.16MHz | -55.31 | -55.31 | - Infinity | -51.68 |
| Propagation condition | | | - | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

##### A.6.3.1.15.2 Test Requirements

In this test, the UE shall start to transmit the PRACH to target PCell (Cell 3) less than 93 msfrom the beginning of time period T2.

The UE shall transmit the PRACH to target PSCell (Cell 4) no later than 103 msfrom the beginning of time period T2.

The rate of correct handovers and correct PSCell change delay during repeated tests shall be at least 90%.

NOTE : The handover with PSCell change delay is defined in clause 6.1.5.4.1 as

DHOwithPSCell\_PCell = RRC procedure delay + Tinterrupt, where  
  
Tinterrupt = Tsearch + TIU + Tprocessing + T∆ + Tmargin

PSCell change delay during handover is defined in clause 6.1.5.4.2 as

DHOwithPSCell\_PSCell = TRRC\_delay + Tprocessing + Tsearch\_HO + Tsearch\_PSCell + T∆ + TPSCell\_ DU + 2 ms.

In this test the definition of each components are specified as followings :

TRRC\_delay = 16 ms and is specified in clause 12 in TS 38.331 [2],

Tprocessing = 25 ms,

Tsearch = 20 ms,

Tsearch\_HO = 0,

Tsearch\_PSCell = 20 ms,

TIU = 10 ms,

T∆ = 20 ms,

Tmargin = 2 ms,

TPSCell\_ DU = 1\*10+10 = 20 ms

End of Change 18