**3GPP TSG-RAN WG4 Meeting # 111R4-2408572**

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

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **Draft** | **rev** | **-** | **Current version:** | **18.5.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Draft CR on TC maintenance for R18 NES SSB-less | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | Netw\_Energy\_NR-Perf | | | | |  | ***Date:*** | | | 2024-05-01 |
|  |  | | | |  | |  | | |  |
| ***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 proposed changes are based on Big CR R4-2406520 with change mark “Huawei - RAN4#111”  EN-DC TRS-based TC:   * There is SCell monitoring related description and configurations * The reference Cell in the note about TCI should be Cell 2   EN-DC A-TRS based TC:   * There is SCell monitoring related description and configurations * The reference Cell in the note about TCI should be Cell 2 * Configuration of ES/Noc ES/Iot for Cell2 and Cell3 should be splited.   NR-SA TRS-based TC:   * There is SCell monitoring related description and configurations | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | EN-DC TRS-based TC:   * Remove SCell monitoring related description and configurations * Change the reference Cell in the note about TCI to Cell 2   EN-DC A-TRS based TC:   * Remove SCell monitoring related description and configurations * Change the reference Cell in the note about TCI to Cell 2 * Split the configuration of ES/Noc ES/Iot for Cell2 and Cell3   NR-SA TRS-based TC:   * Remove SCell monitoring related description and configurations | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The test cases for R18 NES SSB-less are not correct. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.4.5.3.X1, A.4.5.3.X2 and A.6.5.3.X1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.533 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

### <Start of Change 1>

A.4.5.3.X1 TRS-based SCell Activation of SSB-less SCell in FR1 collocated inter-band

A.4.5.3.X1.1 Test Purpose and Environment

The purpose of this test is to verify that the TRS based SCell activation times are within the requirements stated in clause 8.3.2, when the SCell is an SSB-less SCell on a FR1 band different from the reference cell (i.e., PCell). The SCell and PCell are collocated.

The supported test configurations are shown in table A.4.5.3.X1.1-1 below. The test parameters are given in Tables A.4.5.3.X1.1-2 and cell-specific parameters in A.4.5.3.X1.1-3 below. The test consists of two successive time periods, with duration of T1 and T2, respectively. There are three carriers, E-UTRA has one cell; NR has two cells, where each NR cell has one carrier and these two carriers are collocated and on different FR1 bands. SSB is not transmitted on the SCell hence the UE is not provided with SSB configuration (*absoluteFrequencySSB*) in the SCell (FrequencyInfoDL) nor SMTC configuration.. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRA and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. The test equipment sends a MAC message for activation of the SCell and triggering the periodic CSI-RS for TRS-based SCell activation.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted m, defines the start of time period T2. The UE shall be able to report valid CSI in PSCell for the activated SCell at latest in slot , as defined in clause 8.3.2, where in the case of SSB-less SCell is defined as if aperiodic CSI-RS resources are not configured for SCell activation or the UE does not support. 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.

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.

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.X1.1-1: TRS-based SCell activation of SSB-less SCell in FRI inter-band supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **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.X1.1-2: General test parameters for TRS-based SCell activation of SSB-less SCell in FR1 inter-band**

|  |  |  |  |
| --- | --- | --- | --- |
| **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. |
| Cell3 timing offset to cell2 | μs | Length of CP of Cell 3 |  |
| 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 | ms | 100 | During this time the PSCell shall be known and the SCell is configured but not detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| THARQ | ms | k1NR slot length | k1 is a number of slots indicated by the PDSCH-to-HARQ\_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3] |
| TCSI\_Reporting | ms | 15 | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |
| k | slot |  | As specified in clause 4.3 of TS 38.213 [3] |

**Table A.4.5.3.X1-3: Cell specific test parameters for TRS-based SCell activation of SSB-less SCell in FR1 inter-band**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | | **Cell 2** | | | **Cell 3** | |
|  | |  | | **T1** | **T2** | | **T1** | **T2** |
| **SSB ARFCN** | |  | | **freq1** | | | **freq2** | |
| 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 | | | | |
| gapBetweenBursts |  | Slot | | N/A | | | | |
| DRX Cycle | | ms | | Not Applicable | | | | |
| PDSCH Reference | Config 1,4 |  | | SR.1.1 FDD | | | SR.1.1 FDD | |
| measurement channel | Config 2,5 |  | | SR.1.1 TDD | | | SR.1.1 TDD | |
|  | Config 3,6 |  | | SR.2.1 TDD | | | SR.2.1 TDD | |
| RMSI CORESET | Config 1,4 |  | | CR.1.1 FDD | | | CR.1.1 FDD | |
| Reference Channel | Config 2,5 |  | | CR.1.1 TDD | | | CR.1.1 TDD | |
|  | Config 3,6 |  | | CR.2.1 TDD | | | CR.2.1 TDD | |
| RMC CORESET | Config 1,4 |  | | CCR.1.1 FDD | | | CCR.1.1 FDD | |
| Reference Channel | Config 2,5 |  | | CCR.1.1 TDD | | | CCR.1.1 TDD | |
|  | Config 3,6 |  | | CCR.2.1 TDD | | | CCR.2.1 TDD | |
| 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 | Config 1,2,4,5 |  | | OP.1 Note 5 | | | | |
| Config 3,6 |  | | OP.1 Note 6 | | | | |
|  | |  | |  | | | | |
| SMTC configuration | Config 1, 2, 3, 4, 5, 6 |  | | SMTC.1 | | Not Applicable | | |
| SSB configuration | Config 1,2,4,5 |  | | SSB.1 FR1 | | Not Applicable | | |
|  | Config 3,6 |  | | SSB.2 FR1 | | Not Applicable | | |
| 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 | Config 1,2,4,5 | kHz | | 15 | | | | |
| subcarrier spacing | 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 | | N/A | | |
| CSI reporting offset | Config 3,6 | slot | | 10 | | N/A | | |
| Config 1,2,4,5 | 2 | | N/A | | |
| Config 3,6 | 4 | | N/A | | |
| EPRE ratio of PSS to SSS | |  | | 0 | | N/A | | |
| EPRE ratio of PBCH DMRS to SSS | |  | | 0 | | N/A | | |
| EPRE ratio of PBCH to PBCH DMRS | |  | | 0 | | N/A | | |
| EPRE ratio of PDCCH DMRS to SSS | |  | | 0 | | N/A | | |
| EPRE ratio of PDCCH to PDCCH DMRS | | dB | | 0 | | N/A | | |
| EPRE ratio of PDSCH DMRS to SSS | |  | | 0 | | N/A | | |
| EPRE ratio of PDSCH to PDSCH | |  | | 0 | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  | | 0 | | N/A | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  | | 0 | | | | |
| Note2 | | dBm/15kHz | | -104 | |  | | |
| Note2 | Config 1,2,4,5 | dBm/SCS | | -104 | |  | | |
|  | Config 3,6 |  | | -101 | |  | | |
|  | | dB | | 10 | | [19] + [ΔEPRENote 9] | | |
|  | | dB | | 10 | | [19] + [ΔEPRENote 9] | | |
| SS-RSRPNote3 | Config 1,2,4,5 | dBm/SCS | | -87 | | NA | | |
|  | Config 3,6 |  | | -84 | | NA | | |
|  |  |  | |  | |  | | |
|  |  | |  | | |
| SCH\_RP Note 3 | | dBm/15 kHz | -87 | NA | | | | |
| Propagation condition | | - | | AWGN | | | | |
| IoNote3 | Config 1,2,4,5 | dBm/  9.36MHz | -58.96 | NA | | | | |
| Config 3,6 | dBm/  38.16MHz | -52.87 | NA | | | | |
| 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: The SSB in referenceSignal in the TCI state is configured as the SSB in Cell 2.  [Note 9: ΔEPRE is equal to 20\*log(f1/f2), where f1 and f2 are the frequency radio channel 1 and radio channel 2] | | | | | | | | |

A.4.5.3.X1.2 Test Requirements

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

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

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 8.3.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay to be counted as correct. The rate of correct observed SCell activation delay 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 1>

### <Start of Change 2>

Table A.4.5.3.X2.1-1: Inter-band SSB less SCell SCell activation in FR1 supported test configurations

|  |  |
| --- | --- |
| Configuration | 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.X2.1-2: General test parameters for Inter-band SSB less SCell SCell activation in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| 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. |
| Cell3 timing offset to cell2 | μs | Length of CP of Cell 3 |  |
| Time alignment error between cell3 and cell2 | μs | ≤ 3 | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 7 | During this time the PSCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| A3-offset | dB | -15 |  |
| THARQ | ms | k1 NR slot length | k1 is a number of slots indicated by the PDSCH-to-HARQ\_feedback timing indicator field in a corresponding DCI format or provided by *dl-DataToUL-ACK* if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3] |
| TCSI\_Reporting | ms | 15 | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |
| k | slot |  | As specified in clause 4.3 of TS 38.213 [3] |

Table A.4.5.3.X2-3: Cell specific test parameters for Inter-band SSB less SCell activation in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | | Cell 3 | | |
|  | |  | T1 | T2 | T1 | | T2 |
| SSB ARFCN | |  | freq1 | | Not applicable | | |
| 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 | | | | |
| Reference Channel |  |  | N/A | | | Cell 2 | |
| 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 | | | | |
| TCI state |  |  | TCI.State.0 | | | TCI.State.0 Note 8 | |
| Aperiodic CSI-RS for SCell activation | Config 1,4 |  | N/A | | | TRS.1.3 FDD | |
| Config 2,5 | N/A | | | TRS.1.3 TDD | |
| Config 3,6 | N/A | | | TRS.1.4 TDD | |
| gapBetweenBursts |  | Slot | N/A | | | | |
| DRX Cycle | | ms | Not Applicable | | | | |
| PDSCH Reference | Config 1,4 |  | SR.1.1 FDD | | SR.1.1 FDD | | |
| measurement channel | Config 2,5 |  | SR.1.1 TDD | | SR.1.1 TDD | | |
|  | Config 3,6 |  | SR.2.1 TDD | | SR.2.1 TDD | | |
| RMSI CORESET | Config 1,4 |  | CR.1.1 FDD | | CR.1.1 FDD | | |
| Reference Channel | Config 2,5 |  | CR.1.1 TDD | | CR.1.1 TDD | | |
|  | Config 3,6 |  | CR.2.1 TDD | | CR.2.1 TDD | | |
| RMC CORESET | Config 1,4 |  | CCR.1.1 FDD | | CCR.1.1 FDD | | |
| Reference Channel | Config 2,5 |  | CCR.1.1 TDD | | CCR.1.1 TDD | | |
|  | Config 3,6 |  | CCR.2.1 TDD | | CCR.2.1 TDD | | |
| 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 | Config 1,2,4,5 |  | OP.1 Note 5 | | | | |
| Config 3,6 |  | OP.1 Note 6 | | | | |
| SMTC configuration | |  | SMTC.1 | | | Not Applicable | |
| SSB configuration | Config 1,2,4,5 |  | SSB.1 FR1 | | | Not Applicable | |
|  | Config 3,6 |  | SSB.2 FR1 | | | Not Applicable | |
| 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 | Config 1,2,4,5 | kHz | 15 | | | | |
| subcarrier spacing | 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 | | | N/A | |
| CSI reporting offset | Config 3,6 | slot | 10 | | | N/A | |
| Config 1,2,4,5 | 2 | | | N/A | |
| Config 3,6 | 4 | | | N/A | |
| EPRE ratio of PSS to SSS | |  | 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 | | dB |  | | | | |
| EPRE ratio of PDSCH DMRS to SSS | |  |  | | | | |
| EPRE ratio of PDSCH to PDSCH | |  |  | | | | |
| EPRE ratio of OCNG DMRS to SSS(Note 1) | |  |  | | | | |
| EPRE ratio of OCNG to OCNG DMRS (Note 1) | |  |  | | | | |
| Note2 | Config 1,2,4,5 | dBm/SCS | -104 | | | | |
|  | Config 3,6 |  | -101 | | | | |
|  | | dB | 10 | | | [19] + [ΔEPRENote 9] | |
|  | | dB | 10 | | | [19] + [ΔEPRENote 9] | |
| SS-RSRPNote3 | Config 1,2,4,5 | dBm/SCS | -87 | | | NA | |
|  | Config 3,6 |  | -84 | | | NA | |
| SCH\_RP Note 3 | | dBm/15 kHz | -87 | | | Note 3 | |
| Propagation condition | | - | AWGN | | | | |
| IoNote3 | Config 1,2,4,5 | dBm/  9.36MHz | -58.96 | | | Note 3 | |
| Config 3,6 | dBm/  38.16MHz | -52.87 | | | Note 3 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: 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: The SSB in referenceSignal in the TCI state is configured as the SSB in Cell 2.  [Note 9: ΔEPRE is equal to 20\*log(f1/f2), where f1 and f2 are the frequency radio channel 1 and radio channel 2] | | | | | | | |

##### A.4.5.3.X2.2 Test Requirements

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

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

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

The interruption of PSCell shall not be more than the values specified for EN-DC in Clause 8.2.1.2.19.

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 2>

### <Start of Change 3>

#### A.6.5.3.X1 TRS based SCell Activation of SSB-less SCell in FR1 inter-band CA in non-DRX

##### A.6.5.3.X1.1 Test Purpose and Environment

The purpose of this test is to verify that the SSB-less SCell activation delay is within the requirements stated in clause 8.3.2, when the to be activated SCell in FR1 is provided with periodic CSI-RS for tracking instead of SSB. SCell does not provide neighther SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration.

The supported test configurations are shown in table A.6.5.3.X1.1-1A and A.6.5.3.X1.1-1B below. The test parameters are given in Tables A.6.5.3.X1.1-2 and cell-specific parameters in A.6.5.3.X1.1-3 and A.6.5.3.X1.1-4 below. The test consists of two successive time periods, with duration of T1 and T2, 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(PCell), but is not aware of Cell2(SCell). Cell 1 and Cell 2 are in different bands. 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. At the same time, UE also receives the indication of reference serving cell in the same RRC message. The Cell 1 is indicated as the reference cell of Cell 2. 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 (where n mode 20=1), 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. 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.

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.

Table A.6.5.3.X1.1-1A: FR1 inter-band SSB-less SCell activation based on TRS for NR PCell in non-DRX for 160ms SCell measurement cycle supported test configurations

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

Table A.6.5.3.X1.1-1B: FR1 inter-band SSB-less SCell activation based on TRS for NR SCell in non-DRX for 160ms SCell measurement cycle supported test configurations

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

Table A.6.5.3.X1.1-2: General test parameters for FR1 SSB-less SCell activation case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| RF Channel Number |  | 1,2 | Two NR radio channel (1, 2) are used for this test, where NR radio chanel 1 and 2 are in different NR bands. |
| 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. |
| Cell2 timing offset to cell1 | μs | Length of CP of Cell 2 |  |
| T1 | s | 7 | During this time the PSCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| THARQ | ms | Config 1: 2  Config 2: 3  Config 3: 2.5 | k1NR slot length  k1 is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by *dl-DataToUL-ACK*, the value of k should be the minimum value defined in TS 38.213 [3] that will meet the timing constraints of this test case. |
| TCSI\_Reporting | ms | 15 | the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] |

Table A.6.5.3.X1.1-3: Inter-band SSB-less SCell Activation based on A-TRS for NR PCell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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 | |
| Periodic 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 | 10 | |
|  | | dB | 10 | |
| SS-RSRPNote3 | Config 1,2 | dBm/SCS | -94 | |
| Config 3 | -91 | |
| SCH\_RP Note 3 | | dBm/15 kHz | -91 | |
| Io Note3 | Config 1,2 | dBm/  9.36MHz | -65.63 | |
| Config 3 | dBm/  38.16MHz | -59.54 | |
| 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: Io, 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.X1.1-4: Inter-band SSB-less SCell Activation based on A-TRS for NR SCell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Cell 2 | |
| T1 | T2 |
| 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 | |
| referenceCell | ConfigSCell 1,2,3 |  | Cell 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 Note 9 | |
| 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 |  | - | |
| ConfigSCell 2 | - | |
| ConfigSCell 3 | - | |
| Dedicated CORESET parameters | ConfigSCell 1 |  | - | |
| ConfigSCell 2 | - | |
| ConfigSCell 3 | - | |
| RMSI CORESET parameters | ConfigSCell 1 |  | - | |
| ConfigSCell 2 | - | |
| ConfigSCell 3 | - | |
| OCNG Patterns | ConfigSCell 1,2 |  | OP.1Note 5 | |
|  | ConfigSCell 3 |  | OP.1 Note 6 | |
| SSB Configuration | ConfigSCell 1,2,3 |  | Not provided | |
| Periodic 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 | |  | Not provided | |
| reportConfigType | |  | periodic | |
| reportQuantity | |  | cri-RI-PMI-CQI | |
| CSI reporting periodicity | ConfigSCell 1,2 | slot | - | |
| ConfigSCell 3 | - | |
| CSI reporting offset | ConfigSCell 1,2 | slot | - | |
| ConfigSCell 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 | |
| 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 | 19 + [ΔEPRENote 10] | |
|  | | dB | 19 + [ΔEPRENote 10] | |
| SS-RSRPNote3 | Config 1,2 | dBm/SCS | - | |
| Config 3 | - | |
| SCH\_RP Note 3 | | dBm/15 kHz | -85 + [ΔEPRENote 10] | |
| Io Note3 | Config 1,2 | dBm/  9.36MHz | Note 3 | |
| Config 3 | dBm/  38.16MHz | Note 3 | |
| 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: Io, 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.  Note 9: The SSB in referenceSignal in the TCI state is configured as the SSB in Cell 1.  [Note 10: ΔEPRE is equal to 20\*log(f1/f2), where f1 and f2 are the frequency radio channel 1 and radio channel 2] | | | | |

##### A.6.5.3.X1.2 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 , Tactivation\_time = Tfirst\_TRS + TTRS + 5 ms, as defined in clause 8.3.2.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot to , as defined in clause 8.3.2.

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 3>