3GPP TSG RAN WG4 Meeting #113 R4-2420160

Orlando, USA, 18 Nov. 2024 – 22 Nov. 2024

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** | **5189** | **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:***  | Test case maintenance to capture sub test using SR  |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | RAN4 |
|  |  |
| ***Work item code:*** | NR\_RRM\_enh3-Perf |  | ***Date:*** | 2024-11-22 |
|  |  |  |  |  |
| ***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 canbe 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:*** | Subtest using SR was agreed during last meeting |
|  |  |
| ***Summary of change:*** |  Subtest using SR for SCell activation delay reduction using L3 report is introduced |
|  |  |
| ***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.4.5.3.9, A.6.5.3.14 |
|  |  |
|  | **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:*** | R4-2419290 |

Start of Change 1

#### A.6.5.3.14 SCell Activation of unknown SCell with valid L3 measurement results in FR1 in non-DRX for 160ms SCell measurement cycle

##### A.6.5.3.14.1 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.6.5.3.14.1-1 below. Supported test configurations for NR SCell are shown in table A.6.5.3.14.1-1A. Test configuration for NR PCell and test configuration for NR SCell are chosen independently. The test parameters are given in Tables A.6.5.3.14.1-2 and cell-specific parameters in A.6.5.3.14.1-3 and A.6.5.3.14.1-4 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 three 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 + $\frac{T\_{HARQ}+7ms}{NR slot length}$. In Sub-test 2, TE shall schedule DCI format 0\_1 at slot n + $\frac{T\_{HARQ}+3ms+M-k2}{NR slot length}$, where M is defined in 8.3.17 and k2 = 1. In Sub-test 3, UE shall tranmsit scheduling request on the first SR resource by 7ms+ THARQ + TSR\_Periodicity to obtain the UL grant for L3 report transmission.

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 $n+\frac{T\_{HARQ}+T\_{activation\\_time}+T\_{CSI\\_Reporting}}{NR slot length}$, 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 $n+1+\frac{T\_{HARQ}}{NR slot length}$ to $n+1+\frac{T\_{HARQ}+3ms+T\_{X}}{NR slot length}+N\_{interruption}$, as defined in clause 8.3.17, where $N\_{interruption}$ 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.6.5.3.14.1-1: 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 configurationsNote 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.6.5.3.14.1-1A: 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 configurationsNote 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.6.5.3.14.1-2: 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-triggeredreportConfig = 1: reportOnScellActivation-r18 |  |
| THARQ | ms | Config 1: 2Config 2: 3Config 3: 2.5 | k1$×$NR slot lengthk1 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.6.5.3.14.1-3: 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.6.5.3.14.1-4: 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. |

Table A.6.5.3.14.1-5: Scheduling request parameters

|  |  |
| --- | --- |
| Parameter | Value |
| schedulingRequestId | 0 |
| sr-ProhibitTimer  | 16ms |
| sr-TransMax  | n4 |
| periodicityAndOffset | Sl2 |
| PUCCH resource ID | 0 |
| PUCCH resource | Starting PRB | To be determined by RAN5 |
| intraSlotFrequencyHopping | disabled |
| Format | format 2 |
| nrofPRBs | 2 |
| nrofSymbols | 1 |
| startingSymbolIndex | 0 |

##### A.6.5.3.14.2 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 ($n+1+\frac{T\_{HARQ}+3ms}{NR slot length}$). 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 $n+\frac{T\_{HARQ}+T\_{activtion\\_time}+T\_{CSI\\_Reporting}}{NR slot length}$.

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.

For Sub-test 3, [Tactivation\_time = 7ms + Tuncertainity\_ULgrant + max (THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay) as defined in clause 8.3.17. Where, Tuncertainity\_ULgrant is uncertainty in acquiring UL grant after sending scheduling request].

During T2, interruption of PCell during SCell activation shall not happen outside the slot $n+1+\frac{T\_{HARQ}}{NR slot length}$ to $n+1+\frac{T\_{HARQ}+3ms+T\_{X}}{NR slot length}+N\_{interruption}$, 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 $\frac{T\_{HARQ}+T\_{activtion\\_time}+T\_{CSI\\_Reporting}}{NR slot length}$ 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

#### A.4.5.3.9 SCell Activation of unknown SCell with valid L3 measurement results in FR1 for 160ms SCell measurement cycle

##### A.4.5.3.9.1 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.4.5.3.9.1-1 below. Supported test configurations for NR SCell are shown in table A.4.5.3.9.1-1A 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.4.5.3.9.1-2 and cell-specific parameters in A.4.5.3.9.1-3 and A.4.5.3.9.1-4 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, 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 three 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 + $\frac{T\_{HARQ}+7ms}{NR slot length}$. In Sub-test 2, TE shall schedule DCI format 0\_1 at slot n + $\frac{T\_{HARQ}+3ms+M-k2}{NR slot length}$, where M is defined in 8.3.17 and k2 = 1. In Sub-test 3, UE shall tranmsit scheduling request on the first SR resource by 7ms+ THARQ + TSR\_Periodicity to obtain the UL grant for L3 report transmission.

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 $m+\frac{T\_{HARQ}+T\_{activation\\_time}+T\_{CSI\\_Reporting}}{NR slot length}$, 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 $m+1+\frac{T\_{HARQ}}{NR slot length}$ to slot $m+1+\frac{T\_{HARQ}+3ms+T\_{X}}{NR slot length}+N\_{interruption}$, as defined in clause 8.3, where $N\_{interruption}$ is the interruption length given in clause 8.2. Any E-UTRA PCell interruption due to activation of SCell shall occur in the subframe $m\_{1}+1+\frac{T\_{HARQ}}{EUTRA slot length}$ to subframe $m\_{2}+1+\frac{T\_{HARQ}+3ms+T\_{X}}{EUTRA slot length}+N\_{interruption}$, where $m\_{1}$ and $m\_{2}$ are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m, and $N\_{interruption}$ 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.4.5.3.9.1-1: 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 configurationsNote 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.4.5.3.9.1-1A: 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 configurationsNote 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.4.5.3.9.1-2: 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-triggeredreportConfig = 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.4.5.3.9.1-3: 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.4.5.3.9.1-4: 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. |

Table A.4.5.3.9.1-5: Scheduling request parameters

|  |  |
| --- | --- |
| Parameter | Value |
| schedulingRequestId | 0 |
| sr-ProhibitTimer  | 16ms |
| sr-TransMax  | n4 |
| periodicityAndOffset | Sl2 |
| PUCCH resource ID | 0 |
| PUCCH resource | Starting PRB | To be determined by RAN5 |
| intraSlotFrequencyHopping | disabled |
| Format | format 2 |
| nrofPRBs | 2 |
| nrofSymbols | 1 |
| startingSymbolIndex | 0 |

##### A.4.5.3.9.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell in the first available uplink resource after slot ($m+1+\frac{T\_{HARQ}+3ms}{NR slot length}$). 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 $m+\frac{T\_{HARQ}+T\_{activtion\\_time}+T\_{CSI\\_Reporting}}{NR slot length}$,

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.

For Sub-test 3, [Tactivation\_time = 7ms + Tuncertainity\_ULgrant + max (THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay) as defined in clause 8.3.17. Where, Tuncertainity\_ULgrant is uncertainty in acquiring UL grant after sending scheduling request].

During T2, interruption of PSCell during SCell activation shall not happen outside the slot $m+1+\frac{T\_{HARQ}}{NR slot length}$ to $m+1+\frac{T\_{HARQ}+3ms+T\_{X}}{NR slot length}+N\_{interruption}$, and interruption of E-UTRA PCell during SCell activation shall not happen outside the subframe $m\_{1}+1+\frac{T\_{HARQ}}{EUTRA slot length}$ to subframe$ m\_{2}+1+\frac{T\_{HARQ}+3ms+T\_{X}}{EUTRA slot length}+N\_{interruption}$, 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 $m+\frac{T\_{HARQ}+T\_{activtion\\_time}+T\_{CSI\\_Reporting}}{NR slot length}$ 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