**3GPP TSG-RAN WG4 Meeting #113 R4-24xxxxx**

Orlando, US, 18th – 22nd November, 2024

|  |
| --- |
| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** | **5156** | **rev** | **1** | **Current version:** | **18.7.0** |  |
|  |
| *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)*.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

|  |
| --- |
|  |
| ***Title:***  | CR on R18 FR2 SCell activation delay reduction |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_RRM\_enh3-Core |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** |  |
|  | *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-16 (Release 17)Rel-17 (Release 18)Rel-18 (Release 19)Rel-19 (Release 20)* |
|  |  |
| ***Reason for change:*** | As discussed in R4-2419094, clarify the requirements for unknown SCell activation with L3 reporting |
|  |  |
| ***Summary of change:*** | As discussed in R4-2419094, clarify the requirements for unknown SCell activation with L3 reporting |
|  |  |
| ***Consequences if not approved:*** | The requirements are not clear. |
|  |  |
| ***Clauses affected:*** | 8.3.17 |
|  |  |
|  | **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>

### 8.3.17 SCell Activation Delay Requirement for Deactivated SCell with the L3 reporting during activation.

The requirements in this clause shall apply for UE supporting *l3-MeasUnknownSCellActivation-r18* and reporting valid L3 measurement results after receiving the SCell activation command for unknown SCell. The requirements in this clause shall apply for the UE configured with one downlink SCell in EN-DC, or in standalone NR carrier aggregation or in NE-DC or in NR-DC and when one SCell is being activated. Clause 8.3.2 is applied for UE who does not report L3 measurement results after receiving SCell activation command for unknown SCell.

The delay within which the UE shall be able to activate the deactivated SCell depends upon the specified conditions.

Upon receiving SCell activation command in slot *n*, the UE shall be capable to transmit valid CSI report and apply actions related to the activation command for the SCell being activated no later than in slot $n+\frac{T\_{HARQ}+T\_{activation\\_time}+T\_{CSI\\_Reporting}}{NR slot length}$ , where:

 THARQ (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3]

 Tactivation\_time is the SCell activation delay in millisecond.

- Tactivation\_time is:

- 10ms + TL3,report+ THARQ + max(Tuncertainty\_MAC + TFineTiming + 2ms, Tuncertainty\_SP), if semi-persistent CSI-RS is used for CSI reporting,

- 7ms + TL3,report+ max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay), if periodic CSI-RS is used for CSI reporting,

If the following conditions are met:

 If the SCell being activated belongs to FR1 and if there is no active serving cell contiguous to the SCell on that FR1 band provided that the side condition Ês/Iot ≥ -2dB is fulfilled:

If the target SCell belongs to FR1 and none of the following conditions is met

- ‘ssb-PositionInBurst’ indicates only one SSB is being actually transmitted, or

- ‘ssb-PositionInBurst’ indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation;

 If the SCell being activated belongs to FR2-1 and if there is no active serving cell on that FR2-1 band provided that PCell or PSCell is in FR1 or in FR2-1:

 If the PCell/PSCell and the target SCell are configured as FR1-FR2-1 CA or if the PCell/PSCell and the target SCell are in a FR2-1 band pair with independent beam management, and the target SCell is unknown to UE provided that the side condition Ês/Iot ≥ -2dB is fulfilled.

Otherwise, Tactivation\_time in clause 8.3.2 is applied for unknown SCell activation.

However, when the following conditions are fulfilled, no activation requirement will be applied for this unknown SCell:

- the SCell is contiguous to an active serving cell in the same band, and

- a single SSB is used in the unknown SCell; or multiple SSBs are used in the SCell and TCI state indication for PDCCH is provided by the same MAC PDU used for SCell activation; and

- its *ssb-PositionInBurst* is same as the one of contiguous FR1 active serving cell, and

- its SMTC offset is same as the one of contiguous FR1 active serving cell

- its RTD with contiguous FR1 active serving cell is larger than 260ns with respect to the to-be-activated SCell’s SSB numerology, or its reception power difference with contiguous FR1 active serving cell is larger than 6dB;

where,

TL3, report is delay of acquiring the first available UL resource for L3 reporting from 7ms +THARQ after receiving SCell activation command.

- The L3 measurement reporting requirement is defined in clause 9.2.4.4

- UE is ready to report the L3 measurement result no later than 7ms + THARQ ms from receiving the SCell activation command.

UE is not required to report the L3 results after 3ms + THARQ+ M ms from receiving the SCell activation command where

- For FR1,

- M=2\*TSSB + TL1-RSRP,report for UE supporting *shortMeasInterval-r18* capability,

- Otherwise, M =TSMTC +TSSB + TL1-RSRP,report

- For FR2-1,

- M=(X1+X2)\*TSSB + TL1-RSRP,report for UE supporting *reduceForCellDetection* and/or *reduceForSSB-L1-RSRP-Meas* and *shortMeasInterval-r18* capability,

- M =X1\*TSMTC +X2\*TSSB + TL1-RSRP,report for UE supporting *reduceForCellDetection* and/or *reduceForSSB-L1-RSRP-Meas* without supporting *shortMeasInterval-r18* capability,

- M =16\*TSSB + TL1-RSRP,report for UE supporting *shortMeasInterval-r18*without supporting *reduceForCellDetection* and *reduceForSSB-L1-RSRP-Meas* capability,

- Otherwise,M=8\*TSMTC +8\*TSSB + TL1-RSRP,report

 Where, X1 and X2 are UE capabilities as reported in *reduceForCellDetection* and *reduceForSSB-L1-RSRP-Meas* respectively.

 TFineTiming is the time period between UE finish processing the last activation command for PDCCH TCI, PDSCH TCI (when applicable) and the timing of first complete available SSB corresponding to the TCI state.

 Tuncertainty\_MAC is the time period between reception of the last activation command for PDCCH TCI, PDSCH TCI (when applicable) relative to

- First valid L3-RSRP reporting for unknown case, if UE reports valid L3-RSRP before receiving TCI activation command

- First valid L1-RSRP reporting for unknown case, if UE reports valid L3-RSRP after receiving TCI activation command

 Tuncertainty\_RRC is the time period between reception of the RRC configuration message for TCI of periodic CSI-RS for CQI reporting (when applicable) relative to

- First valid L3-RSRP reporting for unknown case, if UE reports valid L3-RSRP before receiving TCI activation command

- First valid L1-RSRP reporting for unknown case, if UE reports valid L3-RSRP after receiving TCI activation command

 Tuncertainty\_SP is the time period between reception of the activation command for semi-persistent CSI-RS resource set for CQI reporting relative to

- First valid L3-RSRP reporting for unknown case, if UE reports valid L3-RSRP before receiving TCI activation command

- First valid L1-RSRP reporting for unknown case, if UE reports valid L3-RSRP after receiving TCI activation command

 TRRC\_delay is the RRC procedure delay as specified in TS38.331 [2].

 Longer delays for RRM measurement requirements, and in case of FR2-1 also SSB based RLM/BFD/CBD/L1-RSRP measurement requirements, can be expected during the cell detection time for unknown SCell activation.

 When *absoluteFrequencySSB* is not configured in *DownlinkConfigCommon* for target SCell but SMTC for target SCell is configured, no requirement would be applied.

 TCSI\_reporting is the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2].

SCell in FR1 is known if it has been meeting the following conditions:

- During the period equal to max(5\*measCycleSCell,  5\*DRX cycles) for FR1 before the reception of the SCell activation command:

- the UE has sent a valid measurement report for the SCell being activated and

- the SSB measured remains detectable according to the cell identification conditions specified in clause 9.2 and 9.3.

- the SSB measured during the period equal to max(5\*measCycleSCell, 5\*DRX cycles) also remains detectable during the SCell activation delay according to the cell identification conditions specified in clause 9.2 and 9.3.

Otherwise SCell in FR1 is unknown.

For the first SCell activation in FR2-1 bands, the SCell is known if it has been meeting the following conditions:

- During the period equal to 4s for UE supporting power class 1/5 and 3s for UE supporting power class 2/3/4 before UE receives the last activation command for PDCCH TCI, PDSCH TCI (when applicable) and semi-persistent CSI-RS for CQI reporting (when applicable):

- the UE has sent a valid L3-RSRP measurement report with SSB index, and

- SCell activation command is received after L3-RSRP reporting and no later than the time when UE receives MAC-CE command for TCI activation

- During the period from L3-RSRP reporting to the valid CQI reporting, the reported SSBs with indexes remain detectable according to the cell identification conditions specified in clauses 9.2 and 9.3, and the TCI state is selected based on one of the latest reported SSB indexes.

Otherwise, the first SCell in FR2-1 band is unknown.

The requirement for unknown SCell applies provided that the activation commands for PDCCH TCI, PDSCH TCI (when applicable), semi-persistent CSI-RS for CQI reporting (when applicable), and configuration message for TCI of periodic CSI-RS for CQI reporting (when applicable) are based on the latest valid L3-RSRP reporting or either L1-RSRP reporting or L3-RSRP reporting when UE report both L3-RSRP reporting and L1-RSRP reporting before receiving TCI activation command.

If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2*prior to the activation command, TSMTC\_Scell follows *smtc1* or *smtc2* according to the physical cell ID of the target cell being activated. TSMTC\_MAX follows *smtc1* or *smtc2* according to the physical cell IDs of the target cells being activated and the active serving cells.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation command specified in TS 38.331 [2] for a SCell at the first opportunities for the corresponding actions once the SCell is activated.

The starting point of an interruption window on spCell or any activated SCell, as specified in clause 8.2, shall not occur before slot n+1+$\frac{T\_{HARQ}}{NR slot length}$ and not occur after slot slot n+1+$\frac{T\_{HARQ}+3ms+T\_{X}}{NR slot length}$, where NR slot length is with respect to the numerology used in the SCell being activated, and TX is:

- Tuncertainty\_MAC +TFineTiming, for any scenario where Tactivation\_time includes only TFineTiming and no TFirstSSB\_MAX.

The length of the interruption window may be different for different victim cells, and depends on the applicable scenario and on the frequency band relation between the aggressor cell and the victim cell.

The requirements in this clause and requriements on interruption due to SCell activation in clause 8.2 apply provided that the SSB of the to-be-activated SCell is within the first active DL BWP of the Scell.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed a first L1-RSRP measurement, the UE shall report lowest valid L1 SS-RSRP range if the UE has available uplink resources to report L1-RSRP for the SCell.