**3GPP TSG- Meeting #5R4-2009097**

**, May -**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** | **0625** | **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)*.* | | | | | | | | |
|  | | | | | | | | |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | CR on multiple SCell activation/deactivation requirement for R16 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Apple | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_RRM\_Enh-Core | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***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 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The requirement of multiple SCell activation is missing | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Speficy the requirement of multiple SCell activation in R16 TS38.133 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The requirement of multiple SCell activation is missing | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | New section 8.3.7, 8.3.8 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

Start of Change 1

### 8.3.7 SCell Activation Delay Requirement for Deactivated SCell with Multiple Downlink SCells

The requirements in this section shall apply for the UE configured with the following number of SCells:

* up to 7 downlink SCells in standalone NR with NR PCell
* up to 6 downlink SCells in EN-DC operation of E-UTRA and NR with E-UTRA PCell and NR PSCell
* up to 6 downlink SCells in NE-DC operation of NR and E-UTRA with NR PCell and E-UTRA PSCell
* up to 1 SCell in FR1 and up to 7 SCell in FR2 in NR-DC

In EN-DC, NE-DC, standalone NR, or in one CG of NR-DC, the requirements in this section shall apply when the following conditions are met:

* UE only receives one single MAC command for multiple SCell activation within the activation period defined in this section
* in each single CG, there are no other SCell activation, deactivation, addition or release before activation is completed for all the SCells activated by the single MAC CE in this section, and
* in EN-DC and NE-DC, there are no E-UTRAN SCell activation, deactivation, addition or release before multiple SCell activation is completed in this section, and
* any to-be-activated unknown SCell has active serving cell(s) or known to-be-activated SCell(s) on the same band

In two CGs of NR-DC, the requirements in this section shall apply when the following conditions are met:

* UE receives one MAC command per CG for multiple SCell activation within the activation period defined in this section, and
* UE supports per-FR measurement gap capability, and
* any to-be-activated unknown SCell has active serving cell(s) or known to-be-activated SCell(s) on the same band

The delay within which the UE shall be able to activate the deactivated SCell with other downlink to-be-activated SCell(s) depends upon the specified conditions.

Upon receiving SCell activation command in slot *n* and more than one SCell, 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 , where:

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

Tactivation\_time\_multiple\_scells is the target SCell activation delay in millisecond in multiple SCell activation scenario.

If the SCell is known and belongs to FR1 and the SCell measurement cycle is equal to or smaller than 160ms, Tactivation\_time\_multiple\_scells is:

- TFirstSSB\_MAX\_multiple\_scells + Trs + 5ms, if on the same band UE also has at least one parallel to-be-activated SCell which is FR1 known Scell with the SCell measurement cycle larger than 160ms but does not have any parallel to-be-activated SCell which is FR1 unknown SCell.

- TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells + Trs + 5ms, if on the same band UE also has at least one parallel to-be-activated SCell which is FR1 unknown Scell

- otherwise, TFirstSSB\_MAX+ 5ms.

If the SCell is known and belongs to FR1 and the SCell measurement cycle is larger than 160ms, Tactivation\_time\_multiple\_scells is:

- TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells + Trs + 5ms, if on the same band UE also has at least one parallel to-be-activated SCell which is FR1 unknown Scell

- otherwise, TFirstSSB\_MAX\_multiple\_scells + Trs + 5ms

If the SCell is unknown and belongs to FR1, provided that the side condition Ês/Iot ≥ [-2]dB is fulfilled, Tactivation\_time\_multiple\_scells is:

- (TFirstSSB\_MAX\_multiple\_scells + TSMTC\_MAX\_multiple\_scells)+Trs\*N1 +Trs +5ms

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, then Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in section 8.3.2.

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, if the UE is not provided with any SMTC for the target SCell, Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in section 8.3.2

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

If the target SCell is known to UE and semi-persistent CSI-RS is used for CSI reporting, then Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in section 8.3.2.

If the target SCell is known to UE and periodic CSI-RS is used for CSI reporting, then Tactivation\_time\_multiple\_scells is same as single SCell activation delay requirement as defined in section 8.3.2.

If the target SCell is unknown to UE and semi-persistent CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ [-2]dB is fulfilled, then Tactivation\_time\_multiple\_scells is:

- 3 ms + max(Tuncertainty\_MAC +TFineTiming + 2ms, Tuncertainty\_SP), if on the same band UE also has at least one parallel to-be-activated SCell which is FR2 known Scell. Tuncertainty\_MAC=0 if UE receives the SCell activation command and TCI state activation commands at the same time

If the target SCell is unknown to UE and periodic CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ [-2]dB is fulfilled, then Tactivation\_time\_multiple\_scells is:

- max(Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay-THARQ), if on the same band UE also has at least one parallel to-be-activated SCell which is FR2 known Scell . Tuncertainty\_MAC=0 if UE receives the SCell activation command and TCI state activation commands at the same time

Where,

N1 is the number counting for parallel FR1 unknown to-be-activated SCell(s) only except the ones which fulfilled the following conditions:

* + contiguous to an active serving cell, or to a known SCell being activated by the same MAC PDU, and
  + A single SSB is used in the unknown SCell; or multiple SSBs are used in the unknown 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 FR1 known cell or FR1 active serving cell, and
  + its SSB DL Tx beam is same as the corresponding SSB DL Tx beam at the same SSB position of FR1 known cell or FR1 active serving cell, and
  + its SMTC offset is same as the one of FR1 known cell or FR1 active serving cell
  + ~~Otherwise the FR1 unknown SCell is accounted for in, and scaled by, N~~~~1~~~~.~~

~~N~~~~1~~ ~~is the number of parallel to-be-activated SCell(s) which is FR1 unknown cell. However, an unknown SCell in FR1 that is contiguous to an active serving cell, or to a known SCell being activated by the same MAC PDU, is not accounted for in, or scaled by, N~~~~1~~~~, when the following conditions are fulfilled:~~

* + ~~A single SSB is used in the unknown SCell; or multiple SSBs are used in the unknown 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 FR1 known cell or FR1 active serving cell, and~~
  + ~~its SSB DL Tx beam is same as the corresponding SSB DL Tx beam at the same SSB position of FR1 known cell or FR1 active serving cell, and~~
  + ~~its SMTC offset is same as the one of FR1 known cell or FR1 active serving cell~~
  + ~~Otherwise the FR1 unknown SCell is accounted for in, and scaled by, N~~~~1~~~~.~~

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

* + - A single SSB is used in the unknown SCell; or multiple SSBs are used in the unknown 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 FR1 known cell or FR1 active serving cell, and
    - its SSB DL Tx beam is different from the corresponding SSB DL Tx beam at the same SSB position of FR1 known cell or FR1 active serving cell, and
    - its SMTC offset is same as the one of FR1 known cell or FR1 active serving cell

N2 is the the number of FR2 bands on which all the parallel to-be-activated SCell(s) is unknown and there is no any active serving cell.

TSMTC\_MAX\_multiple\_scells:

- In FR1, in case of intra-band SCell activation, TSMTC\_MAX\_multiple\_scells is the longest SMTC periodicity between active serving cells and SCells being activated on the same band provided the cell specific reference signals from the active serving cells and the SCells being activated or released are available in the same slot; in case of inter-band SCell activation, TSMTC\_MAX\_multiple\_scells is the longest SMTC periodicity of SCells being activated on the same band.

- In FR2, TSMTC\_MAX\_multiple\_scells is the longest SMTC periodicity between active serving cells and SCell(s) being activated in FR2 intra-band CA.

- TSMTC\_MAX\_multiple\_scells is bounded to a minimum value of 10ms.

TFirstSSB\_MAX\_multiple\_scells: is the time to the end of the first complete SSB burst indicated by the SMTC after slot n + THARQ+3ms, further fulfilling:

- In FR1, in case of intra-band SCell activation, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot; in case of inter-band SCell activation, the first occasion when the SCells being activated are transmitting SSB burst.

- In FR2, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot.

Trs, TFirstSSB\_MAX, TFineTiming, TL1-RSRP, measure, TL1-RSRP, report, Tuncertainty\_MAC, Tuncertainty\_RRC, TRRC\_delay, TCSI\_reporting and Tuncertainty\_SP is defined in section 8.3.2.

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

The condition of known SCell in FR1 or FR2 is defined in section 8.3.2.

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\_multiple\_scell follows *smtc1* or *smtc2* according to the physical cell IDs of the target cells being activated and the active serving cells.

The starting point and the end-point of an interruption window on PCell or any activated SCell in MCG for NR standalone mode, or on PSCell or any activated SCell in SCG for EN-DC mode is same as single SCell activation requirement in section 8.3.2.

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.

### 8.3.8 SCell Deactivation Delay Requirement for Activated SCell with Multiple Downlink SCells

The requirements in this clause shall apply for the UE configured with multiple downlink SCells in EN-DC, or in standalone NR carrier aggregation, or in NE-DC, or in NR-DC, provided that,

* in each single CG, there are no other SCell activation, deactivation, addition or release before deactivation is completed for all the SCells deactivated by the single MAC CE in this section, and
* in EN-DC and NE-DC, there are no E-UTRAN SCell activation, deactivation, addition or release before multiple SCell deactivation is completed in this section, and
* in EN-DC, NE-DC, NR-DC and standalone NR, UE only receives one single MAC command for multiple SCell deactivation within the deactivation period defined in this section, or, in NR-DC, per-FR measurement gap capable UE receives one MAC command per CG for multiple SCell deactivation within the deactivation period defined in this section

Upon receiving SCell deactivation command in slot *n*, the UE shall accomplish the deactivation actions for the SCell being deactivated within the same delay as specified in section 8.3.3.

The starting point and the end-point of an interruption window on PCell or any activated SCell in MCG for NR standalone mode, or on PSCell or any activated SCell in SCG for EN-DC mode is same as single SCell activation requirement in section 8.3.3.

End of Change 1