**3GPP TSG-RN WG4 Meeting #96-e *R4-2017084***

Online, 02 – 13 November, 2020

|  |
| --- |
| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **1403** | **rev** | **1** | **Current version:** | **16.5.0** |  |
|  |
| *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)*.* |
|  |

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

|  |
| --- |
|  |
| ***Title:***  | Interruption windows and applicability of Scell activation/deactivation requirements for SCells operating with CCA |
|  |  |
| ***Source to WG:*** | Qualcomm Inc. |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_unlic-Core |  | ***Date:*** | 2020-10-23 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | The CR updates clause 8.3A based on agreements related to interruption windows and applicability of Scell activation/deactivation requirements.  |
|  |  |
| ***Summary of change:*** | 1. Updates related to interruption windows for intra-band and inter-band CA during Scell activation in NR-U
2. Removed editor’s notes related to applicability of Scell activation/deactivation requirements based on agreements
 |
|  |  |
| ***Consequences if not approved:*** | Incomplete specifications for NR-U |
|  |  |
| ***Clauses affected:*** | 8.3A |
|  |  |
|  | **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:*** |  |

**< Start of change >**

## 8.3A SCell Activation and Deactivation Delay in Carriers with CCA

### 8.3A.1 Introduction

This clause defines requirements for the delay within which the UE shall be able to activate a deactivated SCell operating with CCA and deactivate an activated SCell operating with CCA in EN-DC or in standalone NR carrier aggregation.

The requirements shall apply for EN-DC and standalone NR carrier aggregation.

### 8.3A.2 SCell Activation Delay Requirement for Deactivated SCell

The requirements in this clause shall apply for the UE configured with one downlink SCell operating with CCA in EN-DC or in standalone NR carrier aggregation and when one SCell operating with CCA is being activated.

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 + (THARQ + Tactivation\_time\_withCCA + TCSI\_reporting\_withCCA)/*NR\_slot\_length*, where:

- THARQ (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3]. In the event of UE not being able to transmit the acknowledgment due to UL CCA failures: THARQ is extended to also include the time to all next HARQ feedback transmission and retransmission opportunities, until the time of its successful transmission, as specified in TS 38.213 [3]; no extension of THARQ due to UL LBT failures is allowed for Type 2C UL channel access procedure as defined in TS 37.213 [57].

- Tactivation\_time\_withCCA is the SCell activation delay in millisecond.

- If the SCell is known, Tactivation\_time\_withCCA is:

- TFirstSSB + L1\*Trs + 5ms, if the SCell measurement cycle is equal to or smaller than 160ms.

- TFirstSSB\_MAX + L2,1\*TSMTC\_MAX + (1 +L2,2)\*Trs + 5ms, if the SCell measurement cycle is larger than 160ms.

- If the SCell is unknown, provided that the side condition Ês/Iot ≥ -2 dB is fulfilled and the SCell can be successfully detected in one attempt, Tactivation\_time\_withCCA is:

- TFirstSSB\_MAX + (1 + L3,1)\*TSMTC\_MAX + (2 + L3,2)\*Trs + 5ms.

 Where,

 TSMTC\_MAX:

- In case of intra-band SCell activation, TSMTC\_MAX is the longest SMTC periodicity between active serving cells and SCell being activated 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 is the SMTC periodicity of SCell being activated;

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

 Trs is the SMTC periodicity of the SCell being activated if the UE has been provided with an SMTC configuration for the SCell in SCell addition message, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement which involves Trs is applied with Trs = 5ms assuming the SSB transmission periodicity is 5ms. There are no requirements if the SSB transmission periodicity is not 5ms

 TFirstSSB: is the time to the end of the first complete configured SSB burst indicated by the SMTC after slot n + (THARQ+3ms)/*NR\_slot\_length*

 TFirstSSB\_MAX: is the time to the end of first complete configured SSB burst indicated by the SMTC after slot n + (THARQ+3ms)/*NR\_slot\_length* when all active serving cells and SCells being activated or released have configured SSB bursts in the same slot for intra-band scenario. In case of inter-band SCell activation, TFirstSSB\_MAX is the time to the end of the first complete configured SSB burst of the SCell being activated.

 L1 (L1 ≤ L1,max) is the number of configured SMTC occasions not available at the UE. L1,max = 2 if Trs ≤ 40 ms; otherwise L1,max = 1.

 L2,1 (L2,1 ≤ L2,1,max) and L3,1 (L3,1 ≤ L3,1,max) are the number of configured SMTC occasions not available at the UE

 in the SCell being activated, for inter-band scenario, or

 in any of the SCells already activated or being activated provided their cell specific reference signals are configured in the same slot, for intra-band scenario

 and L2,1,max = 2 if TSMTC\_MAX ≤ 40 ms; otherwise L2,1,max = 1. L3,1,max = 2 if TSMTC\_MAX ≤ 40 ms; otherwise L3,1,max = 1.

 L2,2 (L2,2 ≤ L2,2,max) and L3,2 (L3,2 ≤ L3,2,max)are the number of configured SMTC occasions not available at the UE in the SCell being activated. L2,2,max = 2 if Trs ≤ 40 ms; otherwise L2,2,max = 1. L3,2,max = 2 if Trs ≤ 40 ms; otherwise L3,2,max = 1.

 TCSI\_reporting\_withCCA 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] and additional delay in reception of CSI-RS due to unavailability of reference signal CCA and additional delay in transmission of CSI reporting due to CCA failure in UL. TCSI\_reporting\_withCCA = TCSI\_reporting + L4\*TCSI-RS + TCSI\_ReportingDelay , where

 TCSI\_reporting is defined in clause 8.3.2

 TCSI-RS is the periodicity of the configured CSI-RS

 TCSI\_ReportingDelay is the additional delay in transmission of CSI reporting due to CCA failure in UL. If there are no uplink resources for reporting the valid CSI, then the UE shall use the next available opportunities for reporting the corresponding valid CSI as specified in TS 38.213 [3].

 L4 (L4 ≤ L4,max) is the number of occasions the CSI-RS is not available. L4,max = 2 if TCSI-RS ≤ 40ms and L4,max = 1 otherwise.

If the unavailability of any of the corresponding reference signal exceeds L1,max, or L2,1,max, or L2,2,max, or L3,1,max, or L3,2,max, or L4,max , UE shall abandon the SCell activation procedure.

SCell operating with CCA is known if it has been meeting the following conditions:

- During the period equal to max(5 measCycleSCell,  5 DRX cycles) 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 9.2A and 9.3A.

- 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 9.2A and 9.3A.

Otherwise SCell operating with CCA is unknown.

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.

For intra-band CA, 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 n+1+$\frac{T\_{HARQ}+3+T\_{X}}{NR slot length}$ , where TX is:

- TFirstSSB, for known SCell activation when SCell measurement cycle is equal to or smaller than 160ms;

- TFirstSSB\_MAX + L2,1\* TSMTC\_MAX for known SCell activation when SCell measurement cycle is greater than 160ms;

- TFirstSSB\_MAX + L3,1\* TSMTC\_MAX for unknown SCell activation

For inter-band CA, 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 n+1+$\frac{T\_{HARQ}+3+T\_{X}}{NR slot length}$ , where TX is:

- TFirstSSB, for known SCell activation when SCell measurement cycle is equal to, or smaller than, 160ms.

For intra-band CA, while the SCell being activated is known with measurement cycle equal to or smaller than 160ms, no more than one interruption window is allowed during SCell activation, and while the SCell being activated is unknown or known with measurement cycle greater than 160ms, up to 1+L interruption windows are allowed during SCell activation, where L = L2,1 for known SCell and L = L3,1  for unknown SCell. For a single interruption (L=0), interruption window length at SCell activation does not depend on DL CCA failures.

For inter-band CA, no more than one interruption window is allowed during the SCell activation.

*Editor’s Note: Whether to differentiate between the cases when there is or isn’t an already active Scell in the same band as the Scell being activated is FFS.*

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. For a single interruption (L=0), the interruption window length at SCell activation does not depend on DL CCA failures.

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.

The SCell activation requirements for NR-U do not apply when the sCellDeactivationTimer is not configured.

*Editor’s Note: Applicability of SCell activation requirements for the case when sCellDeactivationTimer is not configured is FFS.*

*Editor’s Note: UE behavior with respect to a configured sCellDeactivationTimer in SCell activation is FFS.*

### 8.3A.3 SCell Deactivation Delay Requirement for Activated SCell

The requirements in this clause shall apply for the UE configured with one downlink SCell operating with CCA in EN-DC or in standalone NR carrier aggregation.

Upon receiving SCell deactivation command or upon expiry of the *sCellDeactivationTimer* in slot *n*, the UE shall accomplish the deactivation actions for the SCell being deactivated no later than in slot *n+*(THARQ +3ms)/*NR\_slot\_length*.

The interruption on SpCell or any activated SCell, as specified in clause 8.2, shall not occur before slot n+1+THARQ/*NR\_slot\_length* and not occur after slot n+1+(THARQ +3ms)/*NR\_slot\_length*.

*Editor’s Note: Applicability of SCell deactivation requirements for the case when sCellDeactivationTimer is not configured is FFS.*

*Editor’s Note: UE behavior with respect to a configured sCellDeactivationTimer in SCell deactivation is FFS.*

**< End of change >**