3GPP TSG-RAN WG4 Meeting #111 R4-2410397

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

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** | **4343** | **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:*** | Big CR to TS 38.133 on core requirement maintenance for Even Further RRM enhancemen for NR and MR-DC | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Apple | | | | | | | | | |
| ***Source to TSG:*** | RAN4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_RRM\_enh3-Core | | | | |  | ***Date:*** | | | 2024-03-16 |
|  |  | | | |  | |  | | |  |
| ***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 requirements for R18 RRM enhancements in TS38.133 need maintenance, including:   * SCell activation enhancements * FR1-FR1 NR-DC RRM | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Maintain the requirements for R18 RRM enhancements in TS38.133, including:   * SCell activation enhancements * FR1-FR1 NR-DC RRM   The endorsed CR in RAN4#110bis are:   * R4-2406331 (NR\_RRM\_enh3-Core) draft CR on R18 RRM enhancement core maintenance * R4-2406426 FR1-FR1 SCG activation   The endorsed CR in RAN4#111 are:   * R4-2410251 draft CR on R18 FR2 SCell activation delay reduction * R4-2410252 [NR\_RRM\_enh3-Core] Draft CR on SCell activation enhancement of R18 RRM enhancement core maintenance * R4-2410253 DraftCR on maintenance for R18 eFeRRM SCell activation | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The requirements for R18 RRM enhancements in TS38.133 need maintenance. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 9.2.4.4; 8.3.17; 8.17; 8.3.2; 8.3.18 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

Start of Change 1

#### 9.2.4.4 SCell activation Triggered Reporting

The requirements in this clause shall apply for the UE supporting *l3-MeasUnknownSCellActivation-r18* and reporting valid L3 measurement results after receiving the SCell activation command for unknown SCell.

Reported RSRP, RSRQ, and RS-SINR measurements contained in SCell activation triggered measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).

The measurement reporting delay is defined as the time between the SCell activation command that will trigger a measurement report and the point when the UE starts to transmit the valid measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTIDCCH. This measurement reporting delay excludes a delay which caused by no UL resources being available for UE to send the measurement report on.

The SCell activation triggered measurement reporting delay shall be no larger than THARQ + 3ms + 4ms, where

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

- 3ms is the MAC CE decoding time.

- 4ms is the processing time for preparing L3 report triggered by MAC CE.

- UE is expected to report the L3 results no earlier than 3ms + THARQ after receiving the SCell activation command.

The SCell activation triggered report is considered as valid if it fulfils the measurement requirements for a deactivated SCell as specified in Table 9.2.5.2-3 (for FR1) and Table 9.2.5.2-4 (for FR2).

A cell is detectable only if at least one SSBs measured from the SCell being configured remains detectable during the time period Tidentify\_intra\_without\_index or Tidentify\_intra\_with\_index as defined in clause 9.2.5.1. If a SCell which has been detectable at least for the time period Tidentify intra without index or Tidentify intra with index defined in clause 9.2.5.1 becomes undetectable for a period ≤ 5 seconds and then the SCell becomes detectable again with the same spatial reception parameter, this cell is considered as detected provided the timing to that cell has not changed more than ± 3200/ Tc while the measurement gap has not been available and L3 filtering has not been used, where *µ* is the SCS configuration as defined in clause 4.2 of TS 38.211 [3].

End of Change 1

Start of Change 2

### 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 , 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,

Editor’s Note: FFS How to define TL3,report and Tuncertainty\_MAC for the case UE reports both L1-RSRP and L3-RSRP, and L1-RSRP is reported before L3-RSRP, and TCI activation command is received before L3-RSRP is reported.

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, when UE reports valid L3-RSRP

- First valid L1-RSRP reporting for unknown case, when UE does not report L3-RSRP results

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, when UE reports valid L3-RSRP

- First valid L1-RSRP reporting for unknown case, when UE does not report L3-RSRP results

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, when UE reports valid L3-RSRP

- First valid L1-RSRP reporting for unknown case, when UE does not report L3-RSRP results

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+ and not occur after slot slot n+1+, 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.

End of Change 2

Start of Change 3

8.17 SCG Activation and Deactivation Delay

8.17.1 Introduction

This clause defines requirements for the delay within which the UE shall be able to activate one SCG and deactivate on SCG.

The requirements shall apply for NR-DC with an NR PCell, PSCell or SCell.

8.17.2 SCG Activation Delay Requirement

The requirements in this clause shall apply for the UE configured with one deactivated SCG in NR-DC and when PScell in one SCG is being activated.

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

Upon receiving SCG activation command in slot *n*, the UE shall be capable to transmit PRACH preamble or PUCCH or PUSCH towards PSCell no later than in slot ,

where:

Tactivation\_time = TRRC\_delay + Tprocessing + Tsearch + T∆ + TIU + 2 ms

TRRC\_delay is the RRC procedure delay as specified in TS 38.331 [2].

Tprocessing is the SW processing time needed by UE, including RF warm up period. When PSCell is activated from deactivated state, if any PSCell parameter is modified, Tprocessing = 20ms. Otherwise, Tprocessing = 5 ms.

Tsearch is the time for AGC settling and PSS/SSS detection.

For RACH based PSCell activation, if the FR1 or FR2 PSCell is known, Tsearch = 0 ms. If the FR2 PSCell is unknown and Es/Iot ≥ -2 dB, then Tsearch = 24\* Trs ms. If the target cell is an unknown FR1 PSCell and Es/Iot ≥ -2 dB, then Tsearch =3\* Trs ms.

For RACH-less based PSCell activation, if *bfd-and-RLM* is configured and TCI state is known, Tsearch = 0 ms. There are no requirements if TCI state is unknown.

T∆ is time for fine time tracking and acquiring full timing information of the target PSCell. T∆ = 1\*Trs ms.

TIU: When RACH based PSCell activation is configured, it is the delay uncertainty in acquiring the first available PRACH occasion in the PSCell. TIU is up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in Table 8.1-1 of TS 38.213 [3].

When RACH-less based PSCell activation is configured, it is the uncertainty in acquiring the first PUSCH transmission occasion [or SR on PUCCH].

Trs is the SMTC periodicity of the PSCell if the UE has been provided with an SMTC configuration for the target cell in SCG activation command, 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 in this clause is applied with Trs = 5 ms assuming the SSB transmission periodicity is 5 ms. There is no requirement if the SSB transmission periodicity is not 5.

In FR1 and FR2, the PSCell is known if it has been meeting the following conditions:

- During the last 5 seconds before the reception of the SCG activation command:

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

- One of the SSBs measured from the PSCell being activated remains detectable according to the cell identification conditions specified in clause 9.2.

- One of the SSBs measured from PSCell being activated also remains detectable during the PSCell activation delay Tactivation\_time according to the cell identification conditions specified in clause 9.2.

otherwise it is unknown.

If the UE is configured to perform *bfd-and-RLM* while the SCG is deactivated:

- The TCI state is known if all the following conditions are met:

- During the period from the reception of the RRC-based SCG deactivation command deactivating the PSCell to the first transmission towards PSCell on PUCCH or PUSCH:

- UE has not detected beam failure

- The side condition Ês/Iot ≥ -3dB is fulfilled for the RSs configured for *bfd-and-RLM* for the PSCell being activated

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

- Otherwise, the TCI state is unknown.

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.17.3 SCG Deactivation Delay Requirement

The requirements in this clause shall apply for a UE which is configured with at least PCell and PScell.

Upon receiving RRC-based SCG deactivation command in subframe *n*, the UE shall accomplish the deactivationactions specified in TS 38.331 [2] no later than in slot :

where

TRRC\_delay is the RRC procedure delay as specified in TS 38.331 [2].

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

End of Change 3

Start of Change 4

### 8.3.2 SCell Activation Delay Requirement for Deactivated SCell

The requirements in this clause shall apply for the UE configured with at least 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.

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 , 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.

If the SCell is known and belongs to FR1, Tactivation\_time is:

- TFirstSSB+ 5ms, if the measurement period of the SCell being activated is equal to or smaller than 2400ms.

- TFirstSSB\_MAX + Trs + 5ms, if the measurement period of the SCell being activated is larger than 2400ms.

If the SCell is unknown and belongs to FR1, and if one 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,

provided that the side condition Ês/Iot ≥ -2dB is fulfilled, Tactivation\_time is:

- If UE supports *shortMeasInterval-r18*, then

- TFirstSSB\_MAX, enhanced + TSMTC\_MAX, enhanced + Trs, enhanced + 5ms, if the following conditions are met,

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

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

- TFirstSSB\_MAX, enhanced + TSMTC\_MAX, enhanced + 2\*Trs, enhanced + 5ms, otherwise.

- Otherwise

- TFirstSSB\_MAX + TSMTC\_MAX + Trs + 5ms, if the following conditions are met,

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

- its RTD with contiguous FR1 active serving cell is smaller than or equal to 260ns, and its reception power difference with contiguous FR1 active serving cell is smaller than or equal to 6dB;

- TFirstSSB\_MAX + TSMTC\_MAX + 2\*Trs + 5ms, otherwise.

otherwise, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, Tactivation\_time is:

- If UE supports *shortMeasInterval-r18*, then

- 6ms + TFirstSSB\_MAX, enhanced + TSMTC\_MAX, enhanced + Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report + THARQ + max(Tuncertainty\_MAC + TFineTiming + 2ms, Tuncertainty\_SP), if semi-persistent CSI-RS is used for CSI reporting,

- 3ms + TFirstSSB\_MAX, enhanced + TSMTC\_MAX, enhanced + Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP ,report + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay), if periodic CSI-RS is used for CSI reporting.

- Otherwise

- 6ms + TFirstSSB\_MAX + TSMTC\_MAX + Trs + TL1-RSRP, measure + TL1-RSRP,report + THARQ + max(Tuncertainty\_MAC + TFineTiming + 2ms, Tuncertainty\_SP), if semi-persistent CSI-RS is used for CSI reporting,

- 3ms + TFirstSSB\_MAX + TSMTC\_MAX + Trs + TL1-RSRP, measure + TL1-RSRP,report + max(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay), if periodic CSI-RS is used for CSI reporting.

- 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, or its reception power difference with contiguous FR1 active serving cell is larger than 6dB;

If the SCell being activated belongs to FR1 and if there is at least one active serving cell contiguous to the SCell on that FR1 band, if the UE is not provided with SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration for the target SCell, Tactivation\_time is 3 ms for UE supporting *scellWithoutSSB*, provided

- The RTD between the target SCell and the contiguous active serving cell is within within ±260ns, and

- The difference of the reception power with the contiguous active serving cell is <= 6dB, and

- The RS(s) of SCell being activated is (are) QCL-TypeA with TRS(s) of the SCell being activated, and the TRS(s) of the SCell being activated is (are) further QCL-TypeC with SSB(s) of any active serving cell that is contiguous to the SCell being activated on that FR1 band.

For a UE supporting [*scellWithoutSSB-interband*], if the SCell being activated belongs to FR1 and if the UE is not provided with SSB configuration (*absoluteFrequencySSB*) in the target SCell (FrequencyInfoDL) nor SMTC configuration for the target SCell, and if there is one collocated active reference serving cell on different FR1 band, when the following conditions are fulfilled,

- The RTD between the target SCell and the collocated reference serving cell is within CP where CP is corresponding to the SCS of SSB-less SCell, and

- The [EPRE] difference at the UE is smaller than or equal to [9] dB, where, [EPRE] difference is the power difference between TRS/A-TRS symbol on the SSB-less SCell and SSB symbol on the reference serving cell [after the compensation for AGC], and

- The RS(s) of the SSB-less SCell being activated is (are) QCL-TypeA with TRS(s) of the SSB-less SCell being activated, and the TRS(s) of the SSB-less SCell being activated is (are) further QCL-TypeC with SSB(s) of an inter-band active serving cell, and the inter-band active serving cell shall be same as the reference serving cell.

where the reference serving cell can be indicated by higherlayer parameter [*SSB-less-Referencecell*]. If UE is not indicated with [*SSB-less-Referencecell*], the reference serving cell is assumed to be the QCL-typeC source cell if there is only one active QCL-typeC source cell configured.

*Editor notes: FFS whether and how to capture if there are more than one QCL source cell.*

*Editor notes: FFS whether and how to capture the wording “*after the compensation for AGC*”.*

Tactivation\_time is

- Tfirst\_TRS + TTRS +5 ms, [if aperiodic CSI-RS resources are not configured for SCell activation or UE do not support [*ATRS based SSB-less operation*]]

- Tfirst\_ATRS + Tgap + TATRS + 5 ms [if aperiodic CSI-RS resources are configured for Scell activation for UE supporting [*ATRS based SSB-less operation*]]

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 is TFirstSSB+ 5ms provided:

- The UE is provided with SMTC for the target SCell, and

- The SSBs in the serving cell(s) and the SSBs in the SCell fulfil the condition defined in clause 3.6.3, and

- The parameter ssb-PositionsInBurst is same for the serving cell(s) and the Scell, and

- SSB is in the same half-frame on the SCell and the contiguous FR2 active serving cell.

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 supporting *scellWithoutSSB* is not provided with any SMTC for the target SCell, Tactivation\_time is 3 ms, provided

- the RS (s) of SCell being activated is (are) QCL-TypeD with RS (s) of one active serving cell on that FR2 band.

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, if the FR2 power class 6 UE supporting *scellWithoutSSB* and [*Enhanced FR2 HST RRM requirements for intra-band CA and inter-frequency measurements in connected mode*] is configured with *highSpeedMeasFlagFR2-r17*, Tactivation\_time is 3 ms , provided

- the RS (s) of SCell being activated is (are) QCL-TypeD with RS (s) of one active serving cell on that FR2 band.

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 in FR1 or in FR2:

If the target SCell is known to UE and semi-persistent CSI-RS is used for CSI reporting, then Tactivation\_time is:

- 3ms + max(Tuncertainty\_MAC + TFineTiming + 2ms, Tuncertainty\_SP), where Tuncertainty\_MAC=0 and Tuncertainty\_SP=0 if UE receives the SCell activation command, semi-persistent CSI-RS activation command and TCI state activation command at the same time.

If the target SCell is known to UE and periodic CSI-RS is used for CSI reporting, then Tactivation\_time is:

- max(Tuncertainty\_MAC + 5ms + TFineTiming, Tuncertainty\_RRC + TRRC\_delay-THARQ), where Tuncertainty\_MAC=0 if UE receives the SCell activation command and TCI state activation commands at the same time.

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 and semi-persistent CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, then Tactivation\_time is:

- 6ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report + THARQ + max(Tuncertainty\_MAC + TFineTiming + 2ms, Tuncertainty\_SP), or

- 6ms + TFirstSSB\_MAX,enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report + THARQ + max(Tuncertainty\_MAC + TFineTiming + 2ms, Tuncertainty\_SP) if UE supports *reduceForCellDetection* and/or *reduceForSSB-L1-RSRP-Meas* and/or *shortMeasInterval-r18* capabilities, and when SCell activation triggered L3 report is not configured or SCell activation triggered L3 report is configured but not reported.

If the PCell/PSCell and the target SCell are configured as FR1-FR2-2 CA or if the PCell/PSCell and the target SCell are in a FR2-2 band pair with independent beam management, and the target SCell is unknown to UE and semi-persistent CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, then Tactivation\_time is:

- 6ms + TFirstSSB\_MAX + 23\*TSMTC\_MAX + 12\*Trs + TL1-RSRP, measure + TL1-RSRP, report + THARQ + max(Tuncertainty\_MAC + TFineTiming + 2ms, Tuncertainty\_SP).

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 and periodic CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, then Tactivation\_time is:

- 3ms + TFirstSSB\_MAX + 15\*TSMTC\_MAX + 8\*Trs + TL1-RSRP, measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}, or

- 3ms + TFirstSSB\_MAX, enhanced + 15\*TSMTC\_MAX, enhanced + X1\*Trs, enhanced + TL1-RSRP, enhanced\_measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)} if UE supports *reduceForCellDetection* and/or *reduceForSSB-L1-RSRP-Meas* and/or *shortMeasInterval-r18* capabilities, and when SCell activation triggered L3 report is not configured or SCell activation triggered L3 report is configured but not reported.

If the PCell/PSCell and the target SCell are configured as FR1-FR2-2 CA or if the PCell/PSCell and the target SCell are in a FR2-2 band pair with independent beam management, and the target SCell is unknown to UE and periodic CSI-RS is used for CSI reporting, provided that the side condition Ês/Iot ≥ -2dB is fulfilled, then Tactivation\_time is:

- 3ms + TFirstSSB\_MAX + 23\*TSMTC\_MAX + 12\*Trs + TL1-RSRP, measure + TL1-RSRP, report + max {(THARQ + Tuncertainty\_MAC + 5ms + TFineTiming), (Tuncertainty\_RRC + TRRC\_delay)}.

where,

TSMTC\_MAX:

- In FR1, in case of intra-band contiguous SCell activation or in case of intra-band non-contiguous SCell activation for UE not capable of *intraBandNR-CA-non-collocated-r18* or UE is capable of *intraBandNR-CA-non-collocated-r18* and *nonCollocatedTypeNR-CA-r18* is provided, TSMTC\_MAX is the longer 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 intra-band non-contiguous SCell activation for UE capable of *intraBandNR-CA-non-collocated-r18* and *nonCollocatedTypeNR-CA-r18* is not provided or in case of inter-band SCell activation, TSMTC\_MAX is the SMTC periodicity of SCell being activated. TSMTC\_MAX is the SMTC periodicity of SCell being activated.

- In FR2, in case of intra-band SCell activation, TSMTC\_MAX is the longer SMTC periodicity between active serving cells and SCell being activated provided that in Rel-15 only support FR2 intra-band CA; in case of FR2 inter-band SCell activation, TSMTC\_MAX is the SMTC periodicity of SCell being activated.

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

TSMTC\_MAX, enhanced:

- In FR1 or FR2-1, a UE supporting *shortMeasInterval-r18* if the SMTC for SCell being activated is only configured in measObjectNR, TSMTC\_MAX, enhanced is the SSB periodicity of SCell being activated. Otherwise, TSMTC\_MAX, enhanced = TSMTC\_MAX.

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 measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. 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.

Trs, enhanced is the SSB periodicity of the SCell being activated for a UE supporting *shortMeasInterval-r18* in FR1 or FR2-1, if the SMTC for SCell being activated is only configured in the *measObjectNR*. Otherwise, Trs, enhanced = Trs

TFirstSSB: is the time to the end of the first complete SSB burst indicated by the SMTC, or within 5ms if SMTC is not configured, after slot n + .

TFirstSSB\_MAX: Is the time to the end of the first complete SSB burst indicated by the SMTC, or within 5ms if SMTC is not configured, after slot n + , further fulfilling:

- In FR1, in case of intra-band contiguous SCell activation or in case of intra-band non-contiguous SCell activation for UE not capable of *intraBandNR-CA-non-collocated-r18*, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot; in case of intra-band non-contiguous SCell activation for UE capable of *intraBandNR-CA-non-collocated-r18* or in case of inter-band SCell activation, the first occasion when the SCell being activated is 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.

TFirstSSB\_MAX, enhanced: For a UE supporting *shortMeasInterval-r18* in FR1 or FR2-1, if the SMTC for SCell being activated is only configured in the measObjectNR, TFirstSSB\_MAX, enhanced is the time to the end of the first complete SSB burst indicated by the SSB periodicity of the SCell being activated, after slot n + . Otherwise, TFirstSSB\_MAX, enhanced = TFirstSSB\_MAX

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.

X1 is equal to the reported value in *reduceForCellDetection* in FR2-1. Otherwise, if *reduceForCellDetection* is absent, X1 is 8.

TL1-RSRP, measure is L1-RSRP measurement delay TL1-RSRP\_Measurement\_Period\_SSB msor TL1-RSRP\_Measurement\_Period\_CSI-RS based on applicability as defined in clause 9.5 assuming M=1 and TReport=0.

TL1-RSRP, enhanced\_measure is

- SSB based L1-RSRP measurement delay TL1-RSRP\_Measurement\_Period\_SSB msbased on applicability as defined in clause 9.5 assuming M=1 and TReport=0; N is equal to the value reported by the UE in *reduceForSSB-L1-RSRP-Meas*. Otherwise, if *reduceForSSB-L1-RSRP-Meas* is absent, N= 8. Or,

- CSI-RS based L1-RSRP measurement delay TL1-RSRP\_Measurement\_Period\_CSI-RS ms based on applicability as defined in clause 9.5 assuming M=1 and TReport=0.

- If UE supports *shortMeasInterval-r18* capability, L1-RSRP measurement for TL1-RSRP, enhanced\_measure can be performed based on non-DRX mode even if DRX is configured.

TL1-RSRP, report is delay of acquiring CSI reporting resources.

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

- SCell activation command for known case;

- First valid L1-RSRP reporting for unknown case.

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

- SCell activation command for known case;

- First valid L1-RSRP reporting for unknown case.

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

- SCell activation command for known case;

- First valid L1-RSRP reporting for unknown case.

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

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].

TFirstTRS: is the time to the end of the first complete periodic CSI-RS burst for SCell activation after slot n + .

TTRS is the periodicity of periodic CSI-RS burst for SCell activation.

TFirstATRS: is the time to the end of the first complete CSI-RS burst for SCell activation after slot n + , where the CSI-RS burst is defined as four CSI-RS resources in two consecutive slots.

TATRS is the CSI-RS burst for SCell activation where the CSI-RS burst is defined as four CSI-RS resources in two consecutive slots.

Tgap is a gap length between two aperiodic CSI-RS bursts,

- at least 2 slots for 15kHz and 30kHz

- at least 3 slots for 60kHz

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 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 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 L1-RSRP reporting.

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+ and not occur after slot slot n+1+, where NR slot length is with respect to the numerology used in the SCell being activated, and TX is:

- 0, if Tactivation\_time is 3ms;

- TFirstSSB, for any scenario where Tactivation\_time includes TFirstSSB;

- TFirstSSB\_MAX, for any scenario where Tactivation\_time includes TFirstSSB\_MAX;

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

- [Tfirst\_TRS, for FR1 inter-band SSB-less SCell activation scenario where Tactivation\_time includes Tfirst\_TRS];

- [Tfirst\_ATRS, for FR1 inter-band SSB-less SCell activation scenario where Tactivation\_time includes Tfirst\_ATRS].

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.

End of Change 4

Start of Change 5

### 8.3.18 SCell Activation Delay Requirement for Deactivated SCell with Multiple Downlink SCells with L3 reporting

The requirements in this clause shall apply for the UE configured with more than one SCells and supporting *l3-MeasUnknownSCellActivation-r18*.

In EN-DC, NE-DC, standalone NR, or in one CG of NR-DC, the requirements in this clause 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 clause, and

- 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 clause, 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 clause, and

- all to-be-activated SCells are unknown on the same FR2 band, and there is neither active serving cell(s) nor known SCell(s) on the same band, or,

- all to-be-activated SCells are unknown on the same FR1 band, and there is neither active serving cell contiguous to the SCell nor known SCell(s) contiguous to the to-be-activated SCell on the same band, and

- the UE reports valid L3 measurement results after receiving the SCell activation command for the to-be-activated SCell in FR1, or at least one unknown SCell in the same FR2 band

In two CGs of NR-DC, the requirements in this clause 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 clause, and

- UE supports per-FR measurement gap capability, and

- all to-be-activated SCells are unknown on the same FR2 band, and there is neither active serving cell(s) nor known SCell(s) on the same band, or,

- all to-be-activated SCells are unknown on the same FR1 band, and there is neither active serving cell contiguous to the SCell nor known SCell(s) contiguous to the to-be-activated SCell on the same band, and

- the UE reports valid L3 measurement results after receiving the SCell activation command for the to-be-activated SCell in FR1, or at least one unknown SCell in the same FR2 band

Otherwise, Clause 8.3.7 is applied.

Upon receiving SCell activation command in slot *n* for more than one SCell, for each of the to-be-activated 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.

Tactivation\_time\_multiple\_scells is:

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

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

When the following conditions are met:

If the SCell being activated belongs to FR1 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 and the PCell or PSCell is in FR1 provided that the side condition Ês/Iot ≥ -2dB is fulfilled.

Otherwise, Tactivation\_time\_multiple\_scells in clause 8.3.7 is applied.

where,

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

- The L3 reporting requirement is defined at clause 9.2.4

- 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 measurement 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 capability as reported in FG 31-2.

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

- SCell activation command for known case;

- First valid L3 report for unknown case, when UE reports valid L3 report and L3 report is earlier than TCI command

- First valid L1-RSRP reporting for unknown case, when UE does not report L3 measurement results

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

- SCell activation command for known case;

- First valid L1-RSRP reporting for unknown case, when UE does not report L3 measurement results

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

- SCell activation command for known case;

- First valid L3 reporting for unknown case, when UE reports valid L3 report

- First valid L1-RSRP reporting for unknown case, when UE does not report L3 measurement results]

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

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].

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

Upon receiving SCell activation command in slot *n,* if the start of the first complete SSB used in the *TX* in the different bands which have SCells being activated after *n*+ are not aligned on time domain among

- SCells in different bands being activated by the same MAC CE if UE does not support per FR gap, or

- SCells in different FR1 bands being activated by the same MAC CE if UE supports per FR gap,

additional interruptions may be expected for the activated serving cells, where

- The number of additional interruptions is no more than the number of FR1 bands which have both SCell being activated for which the activation requirements involve *TFirstSSB\_MAX* *multiple\_scells* with *Trs* and the active serving cell, and

- In each interruption occasion, the interruption length is defined in clause 8.2.2.2.2, and

- Longer activation delay may be expected for multiple SCell activation under one MAC CE with multiple interruptions, and

- *TX* is:

- TFirstSSB, for any scenario where Tactivation\_time multiple\_scells includes TFirstSSB;

- TFirstSSB\_MAX multiple\_scells, for any scenario where Tactivation\_time multiple\_scells includes TFirstSSB\_MAX multiple\_scells;

- Tuncertainty\_MAC+TFineTiming or Tuncertainty\_MAC multiple\_scells+TFineTiming, for any scenario where Tactivation\_time multiple\_scells includes TFineTiming.

Otherwise, no additional interruption is expected due to activation of multiple SCells.

Starting from slot *n* + THARQ + 3 ms where slot *n* is the slot where SCell activation command is received (as specified in clause 4.3 of TS 38.213 [3]) and until the SCell activation completion at UE, after at least one CSI-RS transmission occasion for the channel measurement and reporting (specified in clause 5.2.2.5 of TS 38.214 [26]), 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.

End of Change 5