**3GPP TSG-RAN4 Meeting #113 *R4-2419280***

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

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.133** | **CR** | **5185** | **rev** |  | **Current version:** | **18.7.0** |  |
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| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)*** *on using this form: comprehensive instructions can be found at  <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:*** | CR on CSSF of R18 Concurrent MGs | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | ZTE Corporation, Sanechips | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_MG\_enh2-Core | | | | |  | ***Date:*** | | | 2024-11-08 |
|  |  | | | |  | |  | | |  |
| ***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)* | |
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| ***Reason for change:*** | | 1st Change: Some referred chapter number is not correct, we revise them.  2nd Change: The UE capability can not be used as feature name, we revise it.  3rd Change: Multiple UE capabilities/signallings are not aligned with 38.331, we revise them.  4th Change: The FFS note can be removed based on the agreements:   * **Agreement from RAN4#111 meeting:**    + ‘For UE not supporting dynamic collision, the MG will be drop if overlapped with Pre-MG, regardless whether Pre-MG (with higher priority) is activated or deactivated, including the case when the MG overlaps with the Pre-MG activation/deactivation procedure.’   5th Change: To follow the principle as below, the FFS note can be removed.   * For UE configured with one NCSG and one Type 1/2 MG: All deactivated SCells are measured within NCSG, regardless of the reported UE capabilities and gap association.   6th Change: There is clear definition on inter-RAT measurement with NCSG in Clause 9.4.1, so we refine the wording “the measurement can be performed with no measurement gap but NCSG”. | | | | | | | | |
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| ***Summary of change:*** | | 1st Change: Revise the wrongly referred chapter number.  2nd Change: The UE capability can not be used as feature name, we revise it.  3rd Change: Revise the wrongly UE capabilities/signallings.  4th Change: Remove the FFS note.  5th Change: Remove the FFS note.  6th Change: Refine the wording to align with the definition for inter-RAT measurement with NCSG in clause 9.4.1. | | | | | | | | |
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| ***Consequences if not approved:*** | | The spec is not complete and accurate enough. | | | | | | | | |
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| ***Clauses affected:*** | |  | | | | | | | | |
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|  | | **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:*** | | 9.1.5.1, 9.1.5.2, 9.1.5.3, 9.1.5.3.1, 9.1.12.3 | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

# <Start of Change #1>

#### 9.1.5.1 Monitoring of multiple layers outside gaps

For a UE supporting concurrent gaps or *concurrentMeasGapsPreMG-r18* or *concurrentMeasGapsNCSG-r18*, and when concurrent [gaps] are configured the carrier-specific scaling factor CSSFoutside\_gap,i for measurement object *i* derived in this chapter is applied to following measurement types :

- SSB-based intra-frequency measurement without measurement gap as defined in clause 9.2.1 and 9.2A.1, when none of the SMTC occasions of this intra-frequency measurement object are overlapped by the union of concurrent [GAPs].

- SSB-based intra-frequency measurement without measurement gap in clause 9.2.1 and 9.2A.1, when part of the SMTC occasions of this intra-frequency measurement object are overlapped by the union of concurrent [GAPs].

- CSI-RS based intra-frequency measurement in clause 9.10.2, when none of CSI-RS resources for L3 measurement of this intra-frequency measurement object are overlapped by the union of concurrent [GAPs].

- CSI-RS based intra-frequency measurement in clause 9.10.2, when all CSI-RS resources for L3 measurement of this intra-frequency measurement object are partially overlapped by the union of concurrent [GAPs].

- SSB-based inter-frequency measurement without measurement gap as defined in clause 9.3.1, when none of the SMTC occasions of this inter-frequency measurement object are overlapped by the union of concurrent [GAPs], if UE supports *interFrequencyMeas-NoGap-r16* and the flag *interFrequencyConfig-NoGap-r16* is configured by the Network.

- SSB-based inter-frequency measurement without measurement gap as defined in clause 9.3.1, when part of the SMTC occasions of this inter-frequency measurement object are overlapped by the union of concurrent [GAPs], if UE supports *interFrequencyMeas-NoGap-r16* and the flag *interFrequencyConfig-NoGap-r16* is configured by the Network.

Editor’s note: whether rel-17 concurrent gaps is considered with NFG in this work item is not discussed yet.

For a UE supporting MUSIM gaps or both concurrent measurement gaps and MUSIM gaps, and when periodic MUSIM gaps or both concurrent and periodic MUSIM gaps are configured the carrier-specific scaling factor CSSFoutside\_gap,i for measurement object *i* derived in this chapter is applied to following measurement types :

- SSB-based intra-frequency measurement without measurement gap as defined in clause 9.2.1 and 9.2A.1, when none of the SMTC occasions of this intra-frequency measurement object are overlapped by MUSIM gaps or the union of concurrent measurement gaps and MUSIM gaps.

- SSB-based intra-frequency measurement without measurement gap as defined in clause 9.2.1 and 9.2A.1, when part of the SMTC occasions of this intra-frequency measurement object are overlapped by MUSIM gaps or the union of concurrent measurement gaps and MUSIM gaps.

- CSI-RS based intra-frequency measurement in clause 9.10.2, when none of CSI-RS resources for L3 measurement of this intra-frequency measurement object are overlapped by MUSIM gaps or the union of concurrent measurement gaps and MUSIM gaps.

- CSI-RS based intra-frequency measurement in clause 9.10.2, when all CSI-RS resources for L3 measurement of this intra-frequency measurement object are partially overlapped by MUSIM gaps or the union of concurrent measurement gaps and MUSIM gaps.

- SSB-based inter-frequency measurement without measurement gap as defined in clause 9.3.1, when none of the SMTC occasions of this inter-frequency measurement object are overlapped by MUSIM gaps or the union of concurrent measurement gaps and MUSIM gaps, if UE supports *interFrequencyMeas-NoGap-r16* and the flag *interFrequencyConfig-NoGap-r16* is configured by the Network.

- SSB-based inter-frequency measurement without measurement gap as defined in clause 9.31, when part of the SMTC occasions of this inter-frequency measurement object are overlapped by MUSIM gaps or the union of concurrent measurement gaps and MUSIM gaps, if UE supports *interFrequencyMeas-NoGap-r16* and the flag *interFrequencyConfig-NoGap-r16* is configured by the Network.

Otherwise, the carrier-specific scaling factor CSSFoutside\_gap,i for measurement object *i* derived in this chapter is applied to following measurement types:

- SSB-based intra-frequency measurement without measurement gap as defined in clause 9.2.1 and 9.2A.1, when none of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.

- SSB-based intra-frequency measurement without measurement gap as defined in clause 9.2.1 and 9.2A.1, when part of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.

- CSI-RS based intra-frequency measurement in clause 9.10.2, when none of CSI-RS resources for L3 measurement of this intra-frequency measurement object are overlapped by the measurement gap.

- CSI-RS based intra-frequency measurement in clause 9.10.2, when all CSI-RS resources for L3 measurement of this intra-frequency measurement object are partially overlapped by the measurement gap.

- SSB-based inter-frequency measurement without measurement gap as defined in clause 9.3.1, when none of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap.

- SSB-based inter-frequency measurement without measurement gap as defined in clause 9.3.1, when part of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap.

- SSB-based intra-frequency measurement in clause 9.2.5 for UE supporting *nr-NeedForInterruptionReport-r18* and reporting *no-gap-with-interruption* for this intra-frequency layer via *NeedForInterruptionInfoNR-r18*, when

- no measuremeng gap is configured by NW, or

- measurement gap is configured by the NW and none of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap

- SSB-based intra-frequency measurement in clause 9.2.5 for UE supporting *nr-NeedForInterruptionReport-r18* and reporting *no-gap-no-interruption* for this intra-frequency layer via *NeedForInterruptionInfoNR-r18*, when

- no measuremeng gap is configured by NW, or

- none of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap, or

- part of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap

- SSB-based inter-frequency measurement in clause 9.3.9 for UE supporting *nr-NeedForInterruptionReport-r18* and within the band reporting *no-gap-with-interruption* via *NeedForInterruptionInfoNR-r18*, when

- no [GAP] is configured by NW, or

- measurement gap is configured by the NW and none of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap

- SSB-based inter-frequency measurement in clause 9.3.9 for UE supporting *nr-NeedForInterruptionReport-r18* reporting *no-gap-no-interruption* for this inter-frequency layer via *NeedForInterruptionInfoNR-r18*, when

- no measuremeng gap is configured by NW, or

- none of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap, or

- part of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap

- For a UE in E-UTRA-NR dual connectivity operation, NR SSB-based inter-RAT measurement object configured by the E-UTRAN PCell on an NR serving carrier

- the SSB is completely contained in the active BWP of the UE, and

- none or part of the SMTC occasions of this inter-RAT measurement object are overlapped by the measurement gap;

- Intra-frequency RSSI and channel occupancy measurement with no measurement gap on a carrier subject to CCA when SMTC and RMTC are overlapping and RMTCs are not fully overlapped with measurement gap(s).

- E-UTRA inter-RAT measurement object without measurement gap as defined in clauses 9.4.1, when

- no measuremeng gap is configured by NW, or

- none of the EMW occasions of this inter-RAT measurement object are overlapped by the measurement gap, or

- part of the EMW occasions of this inter-RAT measurement object are overlapped by the measurement gap

Editor’s note: the scaling factor when the MG is not configured is still under discussion.

The UE is expected to conduct the measurement of this measurement object *i* only outside the measurement gaps.

For a UE in E-UTRA-NR dual connectivity operation, if a measurement object configured by PSCell and an NR inter-RAT measurment object configured by E-UTRAN PCell are on the same serving carrier, they shall be counted as one intra-frequency measurement object, provided that they meet the measurement object merging conditions in clause 9.1.3.2.

The number of frequency layers for SSB measurements shall include the total number of MOs with

- *ssb-ConfigMobility* configured, or

- *ssb-ConfigMobility* not configured but *csi-rs-ResourceConfigMobility* configured with *associatedSSB*.

If *ssbfrequency, smtc1, smtc2* and *ssbSubcarrierSpacing* are same in multiple MOs, the multiple MOs are counted as one SSB frequency layer.

If the higher layer signaling in TS 38.331 [2] of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSFoutside\_gap,i and requirements derived from CSSFoutside\_gap,i are not specified.

The UE cell identification and measurement periods derived based on CSSFoutside\_gap,i in clauses 9.2.5.1, 9.2.5.2 and 9.10.2 may be extended for measurement objects of which the cell identification and measurement periods are overlapped with Tmeasure\_SFTD1 specified in clause 9.3.8 when no measurement gaps are provided.

The requirements in this clause apply provided that

- The SMTC on all CCs and inter-frequency layers without measurement gap in FR2 have the same offset, and one of following conditions is met

- If *smtc2* is configured on any FR2 CC,

- All CCs have the same configuration for *smtc1*, and

- All CCs configured with *smtc2* have the same configuration for *smtc2*

- If *smtc2* is not configured on any FR2 CC,

- The total number of different SMTC periodicities on all serving CCs and inter-frequency layers without measurement gap does not exceed 4

- The starting point of the first 5ms window for CSI-RS measurement as defined in clause 9.10.1 on all CCs in FR2 is same and one of following conditions is met

- If any CSI-RS resource is configured in the second 5ms window for CSI-RS measurement as defined in clause 9.10.1 on any FR2 CC,

- All CCs with CSI-RS resources only in the first 5ms window have the same CSI-RS resource periodcity, and

- All CCs with CSI-RS resources both in the first and the second 5ms window have the same CSI-RS resource periodcity

- If no CSI-RS resource is configured in the second 5ms window for CSI-RS measurement as defined in clause 9.10.1 on any FR2 CC,

- The total number of different CSI-RS resources periodicities on all serving CCs does not exceed 3Note: Longer delays for cell identification and measurement periods derived based on CSSFoutside\_gap,i in clauses 9.2.5.1, 9.2.5.2, can be expected, if the UE is configured with more than 4 different SMTC periodicities on FR2 serving carriers. The longer delay applies for the FR2 intra-frequency measurement objects with the longest SMTC periodicity/periodicities.

# <End of Change #1>

# <Start of Change #2>

#### 9.1.5.2 Monitoring of multiple layers within gaps

For a UE supporting concurrent gaps or *concurrentMeasGapsPreMG-r18* or *concurrentMeasGapsNCSG-r18*, and when concurrent gaps are configured, the carrier-specific scaling factor CSSFwithin\_gap,i for a measurement object *i* derived in this chapter is applied to following measurement types for the associated measurement gap:

- SSB-based intra-frequency measurement object without measurement gap as defined in clause 9.2.1 and 9.2A.1, when

- all of the SMTC occasions of this intra-frequency measurement object are overlapped with the associated measurement gap in concurrent [GAPs], or

- part of the SMTC occasions of this intra-frequency measurement object are overlapped with the associated measurement gap and all the SMTC occasions of this intra-frequency measurement object are overlapped with the union of concurrent [GAPs].

- part of the SMTC occasions of this intra-frequency measurement object are overlapped with the associated measurement gap and all the SMTC occasions of this intra-frequency measurement object are overlapped with the union of concurrent [GAPs] or with the union of concurrent concurrent [GAPs] and MUSIM gaps if MUSIM gaps are configured.

- SSB-based intra-frequency measurement object with measurement gap as defined in clause 9.2.1 and 9.2A.1.

- CSI-RS based inter-frequency measurement in clause 9.10.3, when CSI-RS resources for L3 measurement of this inter-frequency measurement object are overlapped by the measurement gap or the associated measurement gap in concurrent [GAPs].

- CSI-RS based inter-frequency measurement in clause 9.10.3, when CSI-RS resources for L3 measurement of this inter-frequency measurement object are partially overlapped by the measurement gap or the associated measurement gap in concurrent [GAPs].

- CSI-RS based intra-frequency measurement in clause 9.10.2, when all CSI-RS resources for L3 measurement of this intra-frequency measurement object are partially overlapped with the associated measurement gap and all CSI-RS resources for L3 measurement of this intra-frequency measurement object are overlapped with the union of the configured concurrent [GAPs].

- SSB-based inter-frequency measurement object with measurement gap as defined in clause 9.3.1.

- SSB-based inter-frequency measurement object without measurement gap for UE capable of *interFrequencyMeas-NoGap as defined* in clause 9.3.1, when

- all of the SMTC occasions of this inter-frequency measurement object are overlapped with the measurement gap or associated measurement gap in concurrent [GAPs], or

- part of the SMTC occasions of this inter-frequency measurement object are overlapped with the associated measurement gap and all the SMTC occasions of this inter-frequency measurement object are overlapped with the union of concurrent [GAPs], or

- part of the SMTC occasions of this inter-frequency measurement object are overlapped with the measurement gap or associated measurement gap in concurrent [GAPs] and the flag *interFrequencyConfig-NoGap-r16* is not configured by the Network.

- NR PRS-based measurements for positioning in clause 9.9.

- E-UTRA Inter-RAT measurement object in clauses 9.4.2 and 9.4.3.

Editor’s note: whether rel-17 concurrent gaps is considered with NFG in this work item is not discussed yet.

Editor’s note: when a UE supporting [concurrent gaps with Pre-MG] is configured with [concurrent gaps with Pre-MG], for a MO associated with another deactivated Pre-MG1 but is fully overlapped with [GAP2], whether this MO should be counted when determing CSSF for [GAP2] is under discussion.

Otherwise, the carrier-specific scaling factor CSSFwithin\_gap,i for a measurement object *i* derived in this chapter is applied to following measurement types:

- SSB-based intra-frequency measurement object without measurement gap as defined in clause 9.2.1 and 9.2A.1, when all of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.

- SSB-based intra-frequency measurement object without measurement gap as defined in clause 9.2.1 and 9.2A.1, when all of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap or the union of measurement gaps and MUSIM gaps.

- SSB-based intra-frequency measurement object with measurement gap as defined in clause 9.2.1 and 9.2A.1.

- SSB-based intra-frequency measurement as defined in clause 9.2.1 for UE supporting *nr-NeedForInterruptionReport-r18*, and reporting *no-gap-no-interruption* for this intra-frequency layer via *NeedForInterruptionInfoNR-r18*, when all of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.

- SSB-based intra-frequency measurement as defined in clause 9.2.1 for UE supporting *nr-NeedForInterruptionReport-r18* and reporting *no-gap-with-interruption* for this intra-frequency layer via *NeedForInterruptionInfoNR-r18*, when

- all of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap, or

- part of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.

- CSI-RS based inter-frequency measurement in clause 9.10.3, when CSI-RS resources for L3 measurement of this inter-frequency measurement object are overlapped by the measurement gap.

- CSI-RS based inter-frequency measurement in clause 9.10.3, when CSI-RS resources for L3 measurement of this inter-frequency measurement object are partially overlapped by the measurement gap.

- SSB-based inter-frequency measurement object with measurement gap as defined in clause 9.3.1.

- SSB-based inter-frequency measurement object without measurement gap for UE capable of *interFrequencyMeas-NoGap* as defined in clause 9.3.1, when

- all of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap, or

- part of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap, but the flag *interFrequencyConfig-NoGap-r16* is not configured by the Network.

- SSB-based inter-frequency measurement as defined in clause 9.3.1 for UE supporting *nr-NeedForInterruptionReport-r18* and reporting *no-gap-no-interruption*for this inter-frequency layer via *NeedForInterruptionInfoNR-r18*, when all of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap.

- SSB-based inter-frequency measurement as defined in clause 9.3.1 for UE supporting *nr-NeedForInterruptionReport-r18* and reporting *no-gap-with-interruption* for this inter-frequency layer via *NeedForInterruptionInfoNR-r18*, when

- all of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap, or

- part of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap.

- Intra-frequency RSSI/CO measurement with measurement gap in clause 9.2A.7.

- Intra-frequency RSSI/CO measurement without measurement gap in clause 9.2A.7 when all of the RMTC occasions of this intra-frequency RSSI/CO measurement are overlapped by the measurement gap(s).

- Inter-frequency RSSI/CO measurement in clause 9.3A.8 and 9.3A.9.

- E-UTRA inter-RAT measurement object causing scheduling restriction in clauses 9.4.8, when

- EMW is configured and fully overlapped with measurement gap, and the periodicity of measurement gap and EMW is the same, or

- EMW is not configured.

[- *FFS: E-UTRA inter-RAT measurement object without measurement gap in clauses 9.4.8 when EMW is configured and fully overlapped with measurement gap, but the periodicity of MG is smaller than EMW.]*

- *E-*UTRA Inter-RAT measurement object in clauses 9.4.2 and 9.4.3.

- NR PRS-based measurements for positioning in clause 9.9.

- E-UTRA Inter-RAT RSTD and E-CID measurements in clauses 9.4.4 and 9.4.5.

- For a UE in E-UTRA-NR dual connectivity operation, NR SSB-based Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.4) on an NR serving carrier

- the SSB is not completely contained in the active BWP of the UE, or

- all of the SMTC occasions of this inter-RAT measurement object are overlapped by the measurement gap;

- NR SSB-based Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.4) on an NR non-serving carrier.

- E-UTRAN Inter-frequency measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.3) and by the E-UTRAN PSCell (TS 36.133 [15] clause 8.19.3).

- E-UTRAN Inter-frequency RSTD measurement configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.15).

- UTRA Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.5 to 8.17.12).

- GSM Inter-RAT measurements configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.13 and 8.17.14).

- Note: The derivation of CSSFwithin\_gap,i additionally considers the impact of SSB-based inter-frequency L1-RSRP measurement with measurement gap in clause 9.15.5.

The UE is expected to conduct the measurement of this measurement object *i* only within the measurement gap or the associated measurement gap if concurrent measurement gaps are configured. If UE is configured with concurrent measurement gaps and an association between measurement object i and certain measurement gap is provided, the requirements are defined assuming the UE shall conduct the measurement of this measurement object *i* within the associated measurement gap.

If the higher layer signaling in TS 38.331 [2] of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSFwithin\_gap,i and requirements derived from CSSFoutside\_gap,i are not specified.

Number of SSB layers shall include SSB for mobility and associated SSB for CSI-RS mobility. The ssbfrequency is counted only once if the ssbfrequency for mobility and associated SSB are the same, or ssbfrequency and smtc in multiple MOs are the same.

SSB-based measurement and CSI-RS based measurement for mobility configured in the same measurement object are considered as different layers.

# <End of Change #2>

# <Start of Change #3>

#### 9.1.5.3 Monitoring of multiple layers within NCSG

The measurement requirements derived from CSSFwithin\_ncsg,i defined in this clause are applicable provided that network provides NCSG pattern for measurement.

For a UE supporting *concurrentMeasGapsNCSG-r18* and when a gap combination including one or more NCSGs is configured, the carrier-specific scaling factor CSSFwithin\_ncsg,i derived in this chapter for a measurement object *i* associated with an NCSG is applied to following measurement types:

- SSB-based intra-frequency measurement object without measurement gap as defined in clause 9.2.1 corresponding to an activated serving cell, when

- all of the SMTC occasions of this intra-frequency measurement object are overlapped with associated NCSG in [concurrent gaps], or

- part of the SMTC occasions of this intra-frequency measurement object are overlapped with the associated NCSG and all the SMTC occasions of this intra-frequency measurement object are overlapped with the union of all the [GAPs].

- SSB-based intra-frequency measurement object with NCSG as defined in clause 9.2.1 corresponding to an activated serving cell (in non-dormancy);

- SSB-based intra-frequency measurement object corresponding to a deactivated Serving cell or to an activated Serving cell in dormancy, when all or part of the SMTC occasions of this intra-frequency measurement object are overlapped by the NCSG regardless of the UE capability reporting of *intraFreq-needForNCSG*.

- SSB-based inter-frequency measurement object without measurement gap as defined in clause 9.3.1, when

- all of the SMTC occasions of this inter-frequency measurement object are overlapped with associated NCSG in [concurrent gaps], or

- part of the SMTC occasions of this inter-frequency measurement object are overlapped with the associated NCSG and all the SMTC occasions of this inter-frequency measurement object are overlapped with the union of all the [GAPs], or

- SSB-based inter-frequency measurement object with NCSG as defined in clause 9.3.1;

- E-UTRA inter-RAT measurement object with NCSG as defined in clause *9.4.1*;

Otherwise, the carrier-specific scaling factor CSSFwithin\_ncsg,i for a measurement object *i* derived in this clause is applied to following measurement types:

- SSB-based intra-frequency measurement object without measurement gap as defined in clause 9.2.1 corresponding to an activated serving cell, when all of the SMTC occasions of this intra-frequency measurement object are overlapped by the NCSG;

- SSB-based intra-frequency measurement object with NCSG as defined in clause 9.2.1 corresponding to an activated serving cell (in non-dormancy) , when all or part of the SMTC occasions of this intra-frequency measurement object are overlapped by the NCSG;

- SSB-based intra-frequency measurement object corresponding to a deactivated serving cell or to an activated serving cell in dormancy, when all or part of the SMTC occasions of this intra-frequency measurement object are overlapped by the NCSG;

- SSB-based inter-frequency measurement object without measurement gap as defined in clause 9.3.1, when all of the SMTC occasions of this inter-frequency measurement object are overlapped by the NCSG;

- SSB-based inter-frequency measurement object with NCSG as defined in clause 9.3.1;

- E-UTRA inter-RAT measurement object with NCSG as defined in clause 9.4.1;

UE is expected to conduct the measurement of this measurement object *i* only within the NCSG.

If the higher layer signaling in TS 38.331 [2] of *smtc2* is present for an intra-frequency measurement object, and *smtc1* is fully overlapping with NCSG and *smtc2* is partially overlapping with NCSG, requirements derived from CSSFwithin\_ncsg,i and CSSFoutside\_gap,i are not applicable.

##### 9.1.5.3.1 SA mode: carrier-specific scaling factor for measurements performed within NCSG

When one or more measurement objects are monitored within NCSG, the carrier specific scaling factor for a target measurement object with index *i* is designated as CSSFwithin\_ncsg,i and is derived as described in this clause.

If a UE capable of *concurrentMeasGapsNCSG-r18* is configured with a gap combination including one or more NCSGs, the carrier specific scaling factor is calculated separately for each gap pattern, [provided that the association between measurement objects and gap pattern is configured by network. Only the measurement objects associated to the same NCSG pattern are counted when deriving CSSFwithin\_ncsg,i for a target measurement object with index *i*.]. In case of collision between concurrent [measurement gaps], some NCSG occasions may be dropped according to clause 9.1.13.3. The dropped NCSG occasions will not be used in deriving CSSFwithin\_ncsg,i.

Editor’s note: FFS whether to remove [ ] or revise the sentence in [ ] after RAN2 concludes the implementation on RRC association.

For each NCSG occasion *j*, count the total number of intra-frequency measurement objects and inter-frequency/inter-RAT measurement objects which are candidates to be measured within the occaison *j*.

- An NR measurement object with SSB measurement configured is a candidate to be measured in an NCSG occasion if its SMTC duration is fully covered by the ML. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

- An inter-RAT E-UTRA measurement object configured is a candidate to be measured in all NCSG occasions.

- Mintra,i,j: Number of intra-frequency measurement objects which are candidates to be measured in NCSG occasion *j* where the measurement object *i* is also a candidate. Otherwise Mintra,i,j equals 0.

- Minter,i,j : Number of NR inter-frequency measurement objects and E-UTRA inter-RAT measurement objects which are candidates to be measured in NCSG occasion *j* where the measurement object *i* is also a candidate. Otherwise Minter,i,j equals 0.

- Mtot,i,j = Mintra,i,j + Minter,i,j : Total number of intra-frequency, inter-frequency and inter-RAT measurement objects which are candidates to be measured in NCSG occasion *j* where the measurement object *i* is also a candidate. Otherwise Mtot,i,j equals 0.

For UEs which support and are configured with per FR NCSG, the above counting is done on a per FR basis, and for UEs which are configured with per UE NCSG the counting is done on a per UE basis.

The carrier specific scaling factor CSSFwithin\_ncsg,i is given by:

If *measGapSharingScheme* is equal sharing, CSSFwithin\_ncsg,i= max(Mtot,i,j), where *j*=0…(160/VIRP)-1

If *measGapSharingScheme* is not equal sharing and

- measurement object *i* is an intra-frequency measurement object, CSSFwithin\_ncsg,i is the maximum among

- ceil(Kintra×Mintra,i,j) in NCSG occasions where Minter,i,j≠0, where *j*=0…(160/VIRP)-1

- Mintra,i,j in NCSG occasions where Minter,i,j=0, where *j*=0…(160/VIRP)-1

- measurement object *i* is an inter-frequency or inter-RAT measurement object, CSSFwithin\_ncsg,i is the maximum among

- ceil(Kinter×Minter,i,j) in NCSG occasions where Mintra,i,j ≠0, where *j*=0…(160/VIRP)-1

- Minter,i,j in NCSG occasions where Mintra,i,j=0, where *j*=0…(160/VIRP)-1

# <End of Change #3>

# <Start of Change #4>

#### 9.1.12.3 Collisions involving Pre-MG(s)

A collision between occasions of two measurement gaps where the higher priority gap is a Pre-MG and the lower priority gap may or may not be a Pre-MG is called as dynamic collision.

For a UE that supports *dynamicCollision-r18*:

- Collisions between a Pre-MG and a measurement gap may occur only when the Pre-MG is activated.

- Collisions between two Pre-MGs may occur only when both Pre-MGs are activated.

When the collision between a Pre-MG and a measurement gap or two Pre-MGs satisfy the collision rule defined in clause 9.1.8.3, the UE shall perform measurements in the occasion of the non-dropped gap except the scenario specified in clause 9.1.12.5.

For a UE that does not support *dynamicCollision-r18*:

- Collisions between a Pre-MG and a measurement gap or two Pre-MGs may occur when the collision rule defined in clause 9.1.8.3 is satisfied, regardless of the Pre-MG activation status. .

When the collision between a Pre-MG and a measurement gap or two Pre-MGs satisfy the collision rule defined in clause 9.1.8.3, the UE shall perform measurements in the occasion of the non-dropped gap regardless of whether it collides with the Pre-MG activation or deactivation procedure.

The requirements for the UE capable of *concurrentMeasGapsPreMG-r18* apply provided that the two measurement gaps colliding with each other are configured with different priorities.

No collisions can occur between a per-FR Pre-MG and a per-FR measurement gap when they are configured in different FRs.

No collisions can occur between per-FR Pre-MGs when they are configured in different FRs.

# <End of Change #4>