3GPP TSG-RAN WG4 Meeting # 112 R4-241XXXX

Maastricht, Netherlands, Aug. 19th – Aug. 23rd, 2024

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **4835** | **rev** | **1** | **Current version:** | **17.14.0** |  |
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| *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:***  | (NR\_MG\_enh-Core) CR on 38.133 MG enh on NCSG |
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| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** |   |
|  |  |
| ***Work item code:*** | NR\_MG\_enh-Core |  | ***Date:*** | 2024-08-09 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-17 |
|  | *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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | 1. In RAN4 #111 meeting, UE performs deactivated SCell measurement within NSCG are agreed as following.
	1. The Rel-17 UE behaviour is that when the SMTC of deactivated SCell is fully or partially overlapped with NCSG, the deactivated SCell is measured via NCSG regardless the UE capability report of *intraFreq-needForNCSG*. Otherwise, the UE performs the deactivated SCell measurements outside of NCSG.
	2. RAN4 not to consider a new UE capability for NCSG based deactivated SCell measurements in Rel-17
2. ‘measurements without measurement gaps’ is a general terminology. It unnecessary to clarify the gap type
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| ***Summary of change:*** | 1. Clarify that UE will perform measurement within NCSG regardless of the UE reporting of *intraFreq-needForNCSG*.
2. Remove ‘(either legacy measurement gap or NCSG)’
3. Update the wording serving cell -> SCell to align with other parts in the spec.
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| ***Consequences if not approved:*** | The spec. is unclear and incomplete. |
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| ***Clauses affected:*** | 9.1.5.3, 9.1.5.3.1, 9.2.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  |  |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

**----------------------NEXT CHANGE---------------------------**

#### 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.

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 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 by the NCSG;

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

- E-UTRA inter-RAT measurement object, when the measurement can be performed with no measurement gap but NCSG as defined in clause 9.4;

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.

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 CHANGES--------------------------**

**----------------------NEXT CHANGE---------------------------**

### 9.2.1 Introduction

A measurement is defined as a SSB based intra-frequency measurement provided the centre frequency of the SSB of the serving cell indicated for measurement and the centre frequency of the SSB of the neighbour cell are the same, and the subcarrier spacing of the two SSBs are also the same.

The UE shall be able to identify new intra-frequency cells and perform SS-RSRP, SS-RSRQ, and SS-SINR measurements of identified intra-frequency cells if carrier frequency information is provided by PCell or the PSCell, even if no explicit neighbour list with physical layer cell identities is provided.

The UE can perform intra-frequency SSB based measurements without measurement gaps if

- the UE indicates ‘no-gap’ via *intraFreq-needForGap* for intra-frequency measurement, or

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

- the active downlink BWP is initial BWP[3].

Besides the conditions listed above,

for UE supporting nr-NeedForGapNCSG-reporting-r17 and indicating NeedForGapNCSG-InfoNR for intra-frequency measurement,

- An intra-frequency SSB measurement is defined as measurement without gap if

- the UE indicates ‘nogap-noncsg’ via *NeedForGapNCSG-InfoNR* for the intra-frequency measurement, and

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

- the active downlink BWP is not an initial BWP [3].

 An intra-frequency SSB measurement is defined as measurement with NCSG if

- the UE indicates ‘ncsg’ via *NeedForGapNCSG-InfoNR* for the intra-frequency measurement, and

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

- the active downlink BWP is not an initial BWP [3]

- An intra-frequency SSB measurement is defined as measurement with gap if

- the UE indicates ‘gap’ via *NeedForGapNCSG-InfoNR* for the intra-frequency measurement, and

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

- the active downlink BWP is not an initial BWP [3]

- The UE can perform intra-frequency SSB based measurement corresponding to a deactivated SCell or dormant SCell with NCSG.

- For intra-frequency SSB based measurements with NCSG, UE may cause scheduling restriction as specified in clause 9.2.7.3.

For intra-frequency SSB based measurements without measurement gaps, UE may cause scheduling restriction as specified in clause 9.2.5.3.SSB based measurements are configured along with one or two measurement timing configuration(s) (SMTC(s)) which provides periodicity, duration and offset information on a window of up to 5ms where the measurements are to be performed. For intra-frequency connected mode measurements, up to two measurement window periodicities may be configured. A single measurement window offset and measurement duration are configured per intra-frequency measurement object.

When measurement gaps are needed, the UE is not expected to detect SSB and measure RSSI of RSRQ which start earlier than the gap starting time + switching time, nor detect SSB and measure RSSI of RSRQ which end later than the gap end – switching time. Switching time is 0.5ms for frequency range FR1 and 0.25ms for frequency range FR2.

The requirements in this clause shall also apply, when the UE is configured to perform SRS carrier based switching and using measurement gaps.

The measurement requirements defined for an activated SCell with a non-dormant active BWP defined in this clause shall also apply to an activated SCell with dormant BWP as active BWP.

*Editor Note: FFS the scenario when deactivated SCell measurement object is fully overlapping with measurement gap*

The intra-frequency measurement requirements in clause 9.2.5 applies for the following scenarios:

- SSB based intra-frequency measurements with no measurement gap,

- for a UE supporting concurrent gaps and when concurrent gaps are configured:

- When none of the SMTC occasions of this intra-frequency measurement object are overlapped by the union of concurrent measurement gaps.

- When part of the SMTC occasions of this intra-frequency measurement object are overlapped by the union of concurrent measurement gaps.

- otherwise, for a UE not supporting concurrent gaps or if concurrent gaps are not configured:

- when none of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.

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

The intra-frequency measurement requirements in clause 9.2.6 applies for the following scenarios:

- SSB based intra-frequency measurements with measurement gap,

- SSB based intra-frequency measurements with no measurement gap with the following condition,

- for a UE supporting concurrent gaps and when concurrent gaps are configured:

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

- when 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 measurement gaps.

- otherwise, for a UE not supporting concurrent gaps or if concurrent gaps are not configured:

- when all of the SMTC occasions of this intra-frequency measurement object are overlapped with the measurement gap.

- SSB-based intra-frequency measurement with NCSG, and measurement gap is configured.

The intra-frequency measurement requirements in clause 9.2.7 applies for the following scenarios:

* SSB based intra-frequency measurements without measurement gaps 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 corresponding to an activated serving cell (in non-dormancy) when UE supports nr-NeedForGapNCSG-reporting-r17 and indicates ‘ncsg’ in NeedForGapNCSG-InfoNR for intra-frequency measurement and 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.

**--------------------END OF CHANGES--------------------------**