**3GPP TSG-RAN4 Meeting #112 *R4-2413463***

Maastricht, NL, Aug 19th – 23th, 2024

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  |  | **CR** | **4951** | **rev** |  | **Current version:** |  |  |
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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 |  | Radio Access Network |  | Core Network |  |

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| ***Title:***  |  |
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| ***Source to WG:*** |  |
| ***Source to TSG:*** |  |
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| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** |  |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories 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:*** | In WF R4-2406439, the agreement is:* Dynamic collision means when the occasion of Pre-MG with higher priority is involved during the gap collision, where the occasion of other MG/Pre-MG has lower priority.
	+ With the main bullet, it includes the scenarios for higher priority Pre-MG activation/deactivation procedure colliding with other MG/Pre-MG instance within 4ms.
* Further refine the wording for the UE features.
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| ***Summary of change:*** | Change 1: Follow an agreement from last meeting. Change 2: Follow an agreement from last meeting. |
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| ***Consequences if not approved:*** | The spec might not be accurate. |
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| ***Clauses affected:*** | Clauses 9.1.12.2, 9.1.12.3, 9.1.12.4 |
|  |  |
|  | **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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

------------------------------ Start of Change 1 ------------------------------

9.1.12 Concurrent measurement gaps with Pre-MG

9.1.12.1 Introduction

When UE supports *concurrentMeasGapsPreMG-r18* capability, network can provide multiple measurement gap patterns with at least one of the measurement gaps is pre-configured measurement gap (Pre-MG) pattern configured by RRC message(s) as specified in TS 38.331 [2]. Requirements in this clause apply when the UE is in SA operation mode.

#### 9.1.12.2 Requirements

If the UE requires measurement gaps and/or Pre-MGs to identify and measure intra-frequency cells and/or inter-frequency cells and/or inter-RAT E-UTRAN cells, and the UE supports *concurrentMeasGapsPreMG-r18* but does not support independent measurement gap patterns for different frequency ranges as specified in Table 5.1-1 in [18, 19, 20], in order for the requirements in the following clauses to apply, the network can provide the UE with not more than two per-UE measurement gap patterns for monitoring all the frequency layers.

If the UE supports both *concurrentMeasGapsPreMG-r18* and independent measurement gap patterns for different frequency ranges as specified in Table 5.1-1 in [18, 19, 20], in order for the requirements defined for concurrent measurement gaps with Pre-MG to apply, the network can provide the measurement gap pattern combinations specified in Table 9.1.12.1 for monitoring of all frequency layers.

Table 9.1.12-1: The number of Gap Combination Configurations by UE supporting both *concurrentMeasGapsPreMG-r18* and independent measurement gap patterns

|  |  |
| --- | --- |
| Gap CombinationConfiguration Id  | The number of simultaneous configured measurement gap patterns |
| Per-FR1 measurement gap | Per-FR2 measurement gap | Per-UE measurement gap |
| 0 | 2 | 1 | 0 |
| 1 | 1 | 2 | 0 |
| 2 | 0 | 0 | 2 |
| 3Note 1 | 1 | 0 | 1 |
| 4Note 1 | 0 | 1 | 1 |
| 5Note 1 | 1 | 1 | 1 |
| 6 | 2 | 0 | 0 |
| 7 | 0 | 2 | 0 |
| Note 1: Gap Combination Configuration Id #3, #4, #5 are only applicable when the per-UE measurement gap is associated to measure PRS for any RSTD, PRS-RSRP, RSCP, RSCPD, UE Rx-Tx time difference measurement and PRS-RSRPP measurement defined in TS 38.215 [4].[Note 2]: For UE capable of *concurrentMeasGapsPreMG-r18*, up to 2 measurement gap patterns can be configured as Pre-MG in one FR, regardless of whether they are per-UE or per-FR configuration. Otherwise, the gaps can only be configured as Gap(s) configured via *GapConfig* without suffix or Gap(s) configured via *GapConfig-r17* without *preConfigInd-r17* or *ncsgInd-r17*.Note 3: In Gap Combination Configuration Id #0, #1, #6, #7, one per-FR measurement gap in an FR can be associated to measure PRS for any RSTD, PRS-RSRP, PRS-RSRPP, RSCP, RSCPD and UE Rx-Tx time difference measurement defined in TS 38.215 [4] provided that UE supports *independentGapConfigPRS-r17*. |

When the UE supports *concurrentMeasGapsPreMG-r18*, the gap association for a frequency layer is configured by the network via *associatedMeasGapSSB-r17* or *associatedMeasGapCSIRS-r17* in the corresponding MO(s) or via *gapAssociationPRS-r17* in *GapConfig-r17*. In this case the gap association rules in clause 9.1.8.2 shall also apply to either measurement gap or Pre-MG.

When autonomous mechanism [2] is used for activation/deactivation of Pre-MG pattern, the UE shall autonomously determine the Pre-MG status only based on the measurement objects associated with the concerned Pre-MG. The related Pre-MG autonomous activation/deactivation mechanism is specified in clause 9.1.7.3.1.

When network-controlled mechanism [2] is used for activation/deactivation, the requirements specified in clause 9.1.7.3.2 apply.

When UE supports *concurrentMeasGapsPreMG-r18*, where at least one of the concurrent gaps is Pre-MG, applicable measurement gap patterns are listed in Table 9.1.2-1, and their applicability based on measurement and serving cell configurations is specified in table 9.1.2-3.

The requirements in clause 9.1.2 are applicable for the UE, capable of *concurrentMeasGapsPreMG-r18* and configured with multiple concurrent measurement gap patterns, within each activated Pre-MG occasion.

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

Dynamic collision scenario: 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.

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. No collisions can occur between a per-FR Pre-MG and a per-FR measurement gap when they are configured in different FRs.
* Collisions between two Pre-MGs may occur only when both Pre-MGs are activated and satisfy the collision rule defined in clause 9.1.8.3. No collisions can occur between per-FR Pre-MGs when they are configured in different FRs.

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 status. No collisions can occur between per-FR Pre-MGs when they are configured in different FRs.
* Collisions between two Pre-MGs may occur when both Pre-MGs satisfy the collision rule defined in clause 9.1.8.3, regardless of whether both are activated, or both are deactivated, or one is activated and the other deactivated. No collisions can occur between per-FR Pre-MGs when they are configured in different FRs.

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

----------------------------- End of Change 1 -----------------------------

------------------------------ Start of Change 2 ------------------------------

#### 9.1.12.4 Collision between Pre-MG activation/deactivation and measurement gap

A measurement gap occasion and a Pre-MG activation/deactivation procedure collide when the ending point of the Pre-MG activation/deactivation procedure occurs anywhere within a time period starting 4ms before the starting point of the gap occasion and ending 4ms after the ending point of the gap occasion. The ending point of the Pre-MG activation/deactivation procedure in this collision case is defined in clause 8.19.5.3.

For a UE that supports *dynamicCollision-r18*:

* When a collision occurs between a measurement gap occasion and a Pre-MG activation procedure, and the Pre-MG is configured with higher priority, the UE shall perform measurements during the measurement gap occasion and the activation of the Pre-MG is delayed until 5ms after the ending point of the measurement gap occasion.
* When a collision occurs between a measurement gap occasion and a Pre-MG deactivation procedure, and the Pre-MG is configured with higher priority, the measurement gap occasion shall be dropped.

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

* The UE shall follow the Pre-MG activation/deactivation procedure delay defined in clause 8.19.5 regardless whether the Pre-MG activation/deactivation procedure is collided with a measurement gap occasion or a Pre-MG occasion.
* When a collision occurs between a measurement gap occasion and a Pre-MG activation procedure, and the Pre-MG is configured with higher priority, the measurement gap occasion shall be dropped and the requirements for the Pre-MG activation delay in clauses 8.19.2, 8.19.3 and 8.19.4 apply.
* When a collision occurs between a measurement gap occasion and a Pre-MG deactivation procedure, and the Pre-MG is configured with higher priority, the measurement gap occasion shall be dropped and the requirements for the Pre-MG deactivation delay in clauses 8.19.2, 8.19.3 and 8.19.4 apply.

When the activated Pre-MG and measurement gap satisfy the collision rule defined in clause 9.1.8.3 and the Pre-MG is configured with lower priority, the UE shall perform measurements in the occasion of the measurement gap regardless of whether it collides with the Pre-MG activation procedure or collides with the Pre-MG deactivation procedure.

The UE shall be able to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI in the corresponding NR serving cells in the slots of the dropped Pre-MG occasion, which are not interrupted according to the requirements in clause 9.1.8.4.

----------------------------- End of Change 2 -----------------------------