**3GPP TSG-RAN4 Meeting #112 *R4-2414068***

Maastricht, NL, Aug 19th – 23th, 2024

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** | **4951** | **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)*.* | | | | | | | | |
|  | | | | | | | | |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | MediaTek, CATT, CMCC, Ericsson, Huawei, HiSilicon, Nokia | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***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 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:*** | | 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. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Change 1: Follow an agreement from last meeting.  Change 2: Follow an agreement from last meeting. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The spec might not be accurate. | | | | | | | | |
|  | |  | | | | | | | | |
| ***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 ... | | |
|  | |  | | | | | | | | |
| ***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 Combination  Configuration 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)

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

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

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

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

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

The requirements in this clause apply for UE that supports *dynamicCollision-r18*.

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 8.19.2, 8.19.3 and 8.19.4.

* 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.

9.1.12.5 Pre-MG related requirements

A slot is interrupted by a Pre-MG if it overlaps with any occasion of the configured pre-MG, if the Pre-MG is activated and the Pre-MG occasion is not dropped.

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