**3GPP TSG RAN WG4 Meeting #101-bis-e** [R4-220xxxx](http://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_101-e/Docs/R4-2115398.zip)

**Electronic Meeting, Feb.21th-March 5th, 2022**

**Agenda Item: 10.11.2.1**

**Source: Intel**

**Title: WF on R17 NR MG enhancements – Pre-configured MG**

**Document for: Approval**

# **Introduction**

This WF is to capture all agreements and open issues for Pre-configured MG in RAN4#102e meeting based on email discussion [102-e][218] NR\_MG\_enh\_2.

# **Sub-topic 1: Pre-MG configuration**

#### **Issue 1-1: The exact configuration of Pre-MG used for PRS measurement**

Tentative agreement in the 1st round:

* UE shall inform the network about UE is going to perform/stop PRS with the configured Pre-MG only if UE has not informed NW before Pre-MG configuration. And it is also up to the network decide to activate/deactivate the current Pre-MG or configure other legacy MG to UE.
* RAN4 can inform this agreement to RAN2

Recommendation WF: Check the tentative agreements.

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| **Company** | **Comments in the 2nd round** |
| Apple | Support the tentative agreement. |
| Xiaomi | Support the tentative agreement |
| Huawei | Already resolved in the LS discussion. |
| MTK | We can follow LS conclusion. No need to discuss this here. |

# **Sub-topic 2 Pre-MG activation/deactivation**

#### **Issue 2-1 Additional trigger events for pre-MG activation/deactivation**

GTW agreements:

* + For UE autonomous pre-MG activation/deactivation the following trigger events may change the pre-MG activation status
    - BWP switching by DCI/Timer based
    - Activation/de-activation of SCell(s)
    - Addition/removal of any measurement object(s)
    - Addition/release/change of a SCell under CA
    - BWP switching by RRC
    - FFS: LPP positioning request”

Candidate options:

* Option 1: “LPP positioning request” event is supported
* Option 2: “LPP positioning request” event is NOT supported

Recommendation WF: Companies can provide the views whether “LPP positioning request” event can be taken counted as one of additional trigger events for UE autonomous pre-MG activation/deactivation.

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| **Company** | **Comments in the 2nd round** |
| Apple | Support option 1. We understand concern from proponents of option 2 that LPP is transparent to NW. however, it doesn’t mean this LPP cannot change the status of Pre-MG. One example, UE which is only capable of autonomous Pre-MG activation is operating with Pre-MG OFF. Then UE receives LPP and needs to perform PRS measurement. According to issue 1-1, UE shall indicate NW that it is going to perform PRS measurement and expect the Pre-MG to be ON. Since the UE is only capable of autonomous Pre-MG then NW doesn’t need to reconfigure anything (assuming the Pre-MG can cover PRS). Both NW and UE shall consider the Pre-MG to be ON until PRS measurement is done. Thus, in our view LPP indeed can change the status of Pre-MG. |
| CMCC | On one hand, we understand that LPP is transparent to NW. On the other hand, according to the tentative agreement issue 1-1, UE shall inform the network about UE is going to perform/stop PRS with the configured Pre-MG if UE has not informed NW before Pre-MG configuration, which means NW is formed whether there is PRS measurement.  Taking above into account, we are OK with Option 1, or one possible way to move forward is to update the wording like “UE inform the network about the start/stop of PRS measurement with the configured Pre-MG” as the trigger event. |
| Xiaomi | Support option 1, as agreed in issue 1-1, NW shall be informed with LPP measurement request if UE has not been informed NW before Pre-MG configuration. |
| Huawei | We have similar view CMCC, and we suggest an update to option 1 (option 1a):  *“Initiation of LocationMeasurementIndication procedure” is supported as a trigger event.*  We agree with companies’ views that LPP is transparent to the serving cell, so it is more proper to use the RRC procedure as the trigger event. |
| MTK | Support Option 1.  Issue 1-1 can be considered together with Option 1. |

#### **Issue 2-2: Pre-MG activation/deactivation criteria**

Agreement in the 1st round:

* No need to define reference table to clarify the bridge between pre-MG activation/deactivation rules to the existing generic rules for gap-less or gap based measurement in TS38.133 in the clause to define these criteria (9.1.2A )

# **Sub-topic 3 Pre-MG activation/deactivation under CA**

#### **Issue 3-1: Criteria for the signaling-based Pre-MG (de)activation under CA (How to combine the individual per-BWP pre-MG status)**

Agreement in the 1st round (the revision text from draft LS):

* An additional ON/OFF indication for each SCell is needed to indicate the Pre-configured MG status when the SCell is de-activated.
* For per-UE Pre-configured MG,
  + the UE determines that the Pre-configured MG is ON (activated) if the Pre-configured MG status indication for the active DL BWP for any of the activated CCs is ON, or if the additional status indication for any of the deactivated SCCs is ON,
  + otherwise, the UE determines that the Pre-configured MG is OFF (deactivated)
* For per-FR Pre-configured MG,
  + the UE determines that the Pre-configured MG is ON (activated) if the Pre-configured MG status indication for the active DL BWP for any of the activated CCs is ON, or if the additional status indication for any of the deactivated SCCs in the corresponding FR is ON,
  + otherwise, the UE determines that the Pre-configured MG is OFF (deactivated)

#### **Issue 3-2: How to determine pre-MG (de)activation status when multiple trigger events happened**

Tentative agreements in 1st round:

* How NW determine the gap status the is up to NW implementation itself.
* When RAN4 define the pre-configured MG activation/deactivation trigger conditions, all the events shall be taken count into by UE together.
* For RAN4 requirements perspective, UE behavior under multiple trigger events happened can be FFS in the 2nd round discussion.

*Recommendations for 2nd round:* Check the tentative agreements

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| **Company** | **Comments** |
| Apple | In our view, if multiple events occur at the same time, UE can NW need to determine the Pre-MG status after the procedure is complete. For example, if multiple SCells are being activated simultaneously, Pre-MG status shall be determined according to the status (of each CC, MO and etc) after multiple SCells activation delay. |
| CMCC | For the tentative agreements, for the third bullet “from RAN4 requirements perspective, UE behavior under multiple trigger events happened can be FFS”, we would like to hear companies’ views on the UE behavior for this case. |
| Huawei | We assume the pre-MG status should be determined based on the status of all serving cells and all MOs **after all the concurrent trigger events finish**.  We understand this is already the case by following existing requirements, so we do not see clear need to define additional requirements or UE behaviour, but we are open to hear other views. |
| MTK | We agree with Huawei’s comment that the existing agreement (e.g., UE checks all CCs and all MOs) has already address the case of simultaneous multiple triggering evens. No more discussion seems needed. |

# **Sub-topic 4 RRM requirements**

#### **Issue 4-1-1: Start point of Activation/Deactivation delay triggered by events other than DCI-based/timer BWP switching**

Agreements in the 1st round:

* In case of pre-MG activation/deactivation triggered by events other than DCI-based/timer BWP switching, the starting time of the gap status changing delay is the slot that UE receives the network command which leads to gap status change.

#### **Issue 4-1-2: Start point of Activation/Deactivation delay triggered by timer BWP switching**

Tentative agreements in 1st round:

* For timer based BWP switching, the pre-MG activation/deactivation delay starts from the first slot of a DL subframe (FR1) or DL half-subframe (FR2) immediately after a BWP-inactivity timer bwp-InactivityTimer expires on a serving cell.

*Recommendations for 2nd round:* Check the tentative agreements

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| **Company** | **Comments** |
| Apple | No objection ot the tentative agreement. Please companies check if this can be covered the following wording in the CR (yellow highlighted is newly added in this meeting, others were endorsed in last meeting):   |  | | --- | | The requirements in this clause only apply to the case that the DCI/timer-based BWP switch is performed on a single CC with more than one BWP configurations configured.  When BWP switch occurs, which results in status change of pre-configured measurement gap according to clause [9.1.2A], UE shall be able to finish pre-configured activation or deactivation within [5] ms after the completion of the active BWP switch. | |
| Huawei | After clarification with CATT, we are fine with the tentative agreement.  We are also fine with Apple’s suggestion on how to capture it in the spec. |
| MTK | Fine with both the tentative agreement and Apple’s text proposal |

**Issue 4-1-3: Pre-MG Activation/Deactivation Delay trigged by SCell activation/deactivation**

Agreements in the 1st round:

* If the Pre-MG activation/deactivation is triggered by MAC-CE, the overall delay is SCell activation/deactivation delay +ΔT (5ms).

**Issue 4-1-3a: Pre-MG Activation/Deactivation Delay trigged by RRC**

Agreements in the 1st round:

* If the Pre-MG activation/deactivation is triggered by RRC, the overall delay is RRC processing delay +ΔT (5ms).

**Issue 4-1-4: Pre-MG Activation/deactivation delay under CA**

Agreements in the 1st round:

* When DCI/timer-based BWP switching triggered pre-MG activation/deactivation, the Pre-MG activation/deactivation delay for CA shall be the same as for single CC

**Issue 4-2-1: UE behavior when pre-MG status changed**

Tentative agreements in 1st round:

* Define UE behaviour for the measurement with pre-MG if there is pre-MG status switching as follows:
  + For measurements that can be performed both out of and within MG, the UE shall restart the measurement performed with pre-MG if there is pre-MG status switching during the measurement period.
  + For measurements can only be performed within MG( e.g. NR positioning measurements and CSI-RS inter-frequency measurements), measurement requirements would NOT apply if the pre-MG status changed (activated 🡪deactivated) during the measurement period

*Recommendations for 2nd round:* Check the tentative agreements

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| **Company** | **Comments** |
| Apple | Ok with the tentative agreements. |
| CMCC | For the 1st sub-bullet, it seems that the UE behaviour is mandate to restart the measurement if there is pre-MG status switching during the measurement period, we are not sure about this. Considering it is more like a UE implementation issue, we would like to hear UE vendors’ views.  On the other hand, it is related with issue 4-2-2. If the tentative agreement in Issue 4-2-2 is acceptable by the group, it seems that there is no need to specify the UE behaviour for this case. I mean the 1st sub-bullet in Issue 4-2-1can be removed if tentative agreements in Issue 4-2-2 is agreeable. |
| Xiaomi | Fine with the tentative agreement |
| Huawei | We have similar concern as CMCC on the first bullet. In our view, there is no need to mandate UE to restart since some UE may choose to continue the discussion. Our suggestion would be   * + For measurements that can be performed both out of and within MG, the UE may (or is allowed to) restart the measurement performed with pre-MG if there is pre-MG status switching during the measurement period. |
| MTK | For 1st bullet, we can say “UE is allowed”.  The 2nd bullet is straightforward. Nothing else UE can do. |

**Issue 4-2-2: General principle to define the requirements of measurement period with pre-MG measurements**

Tentative agreements in 1st round:

* RAN4 does not specify measurement period requirements for scenarios in which there are changes in the activation/deactivation status of the pre-configured MG during the measurement period.

*Recommendations for 2nd round:* Check the tentative agreements

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| **Company** | **Comments** |
| Apple | Ok with the tentative agreements. |
| CMCC | Ok with the recommended WF. |
| Xiaomi | Fine with the recommended WF |
| Huawei | We are fine with the tentative agreement. |
| MTK | Support the tentative agreement. |