**3GPP T****SG-RAN WG2 Meeting #118-e R2-22xxxxx**

**Electronic, 9th – 20th May, 2022**

**Agenda item: 6.11.2.1**

**Source: ZTE, Sanechips**

**Title: Summary of AI 6.11.2.1 on latency**

**Document for: Discussion and Decision**

# Introduction

In this summary paper, the following contributions submitted to AI 6.11.2.1 are summarized:

|  |  |  |
| --- | --- | --- |
| TDoc | Title | Source |
| [R2-2204699](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2204699.zip) | Discussion on the positioning MG activation deactivation MAC CE | CATT |
| [R2-2204700](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2204700.zip) | Correction on the positioning MG activation deactivation MAC CE | CATT |
| [R2-2204701](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2204701.zip) | Discussion on the cancel conditions of the triggered UL positioning MG activation/deactivation MAC CE | CATT |
| [R2-2204702](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2204702.zip) | Correction on the cancel conditions of the triggered UL positioning MG activation/deactivation MAC CE | CATT |
| [R2-2204703](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2204703.zip) | Correction on the cancel conditions of the triggered UL positioning MG activation/deactivation MAC CE | CATT |
| R2-2204704 | Corrections on the TS38.305 | CATT |
| [R2-2204742](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2204742.zip) | Corrections on the TS38.321 | CATT |
| [R2-2204996](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2204996.zip) | Corrections on MAC CE for Positioning Measurement Gap | Huawei, HiSilicon |
| [R2-2205309](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205309.zip) | Correction on pre-configured MG procedure in 38.321 | ZTE, Sanechips |
| [R2-2205311](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205311.zip) | Discussion on the pre-configured MG signaling | ZTE, Sanechips |
| [R2-2205579](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205579.zip) | Discussion on the handling of pre-MG for positioning | vivo |
| [R2-2205656](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205656.zip) | Definition of positioning measurement gap activation/deactivation MAC CE | Apple |
| [R2-2205764](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205764.zip) | Issues with PRS Processing Window Procedures | Qualcomm Incorporated |
| [R2-2205766](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205766.zip) | Assistance Data Request for Multiple Area IDs | Qualcomm Incorporated |
| [R2-2205804](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205804.zip) | Text Proposal to address UE request of Area Info and Broadcast of Area | Ericsson, Fraunhofer IIS, Fraunhofer HHI, Lenovo, Motorola Mobility |
| [R2-2205808](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205808.zip) | Correction to activate pre-configured PPW Signaling | Ericsson |
| [R2-2205809](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205809.zip) | Correction of PPW Activation/Deactivation Command MAC CE size description | Ericsson |
| [R2-2205810](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205810.zip) | Clarification on PPW and MG configuration to the same UE and miscellaneous corrections | Ericsson |
| [R2-2205812](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205812.zip) | UL MAC CE for preconfigured MG | Ericsson |
| [R2-2205814](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_118-e/Docs/R2-2205814.zip) | On PPW Configuration Release assistance info | Ericsson |

In this summary paper, the following contributions submitted to AI 6.11.2.8 and related to latency enhancements are summarized:

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| R2-2204932 | I004 Validity area for preconfigured AD | Intel Corporation |
| R2-2205430 | Discussion of the need of the area ID for the pre-configured assistance data | OPPO |
| R2-2205583 | [V003] Discussion on the format of pre-configuration | vivo |

In this contribution, the following papers submitted to AI 6.11.2.9 and related to latency enhancements are summarized:

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| R2-2205000 | [H566][H567] Correction for Location Measurement Indication | Huawei, HiSilicon |
| R2-2205048 | [S854][S855][S856] Handling preconfigured gaps for POS upon a handover | Samsung |
| R2-2205049 | [S851][S852][S853] Type and priority configuration of PPW | Samsung |
| R2-2205310 | Correction on pre-configured MG procedure in 38.331 | ZTE, Sanechips |
| R2-2206330 | On Resolving PPW Capability discrepancy | Ericsson |

# Pre-configured MG

For pre-configured MG, companies provide following contributions to AI 6.11.2.1:

|  |
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| R2-2204699 Discussion on the positioning MG activation deactivation MAC CE CATT discussion Rel-17 NR\_pos\_enh-Core  R2-2204700 Correction on the positioning MG activation deactivation MAC CE CATT CR Rel-17 38.321 17.0.0 1229 - F NR\_pos\_enh-Core  R2-2204701 Discussion on the cancel conditions of the triggered UL positioning MG activation/deactivation MAC CE CATT discussion Rel-17 NR\_pos\_enh-Core  R2-2204702 Correction on the cancel conditions of the triggered UL positioning MG activation/deactivation MAC CE CATT CR Rel-17 38.321 17.0.0 1230 - F NR\_pos\_enh-Core  R2-2204703 Correction on the cancel conditions of the triggered UL positioning MG activation/deactivation MAC CE CATT CR Rel-17 38.331 17.0.0 2996 - F NR\_pos\_enh-Core  R2-2204996 Corrections on MAC CE for Positioning Measurement Gap Huawei, HiSilicon CR Rel-17 38.321 17.0.0 1244 - F NR\_pos\_enh-Core  R2-2205309 Correction on pre-configured MG procedure in 38.321 ZTE, Sanechips CR Rel-17 38.321 17.0.0 1271 - F NR\_pos\_enh-Core  R2-2205311 Discussion on the pre-configured MG signaling ZTE, Sanechips discussion Rel-17 NR\_pos\_enh-Core  R2-2205579 Discussion on the handling of pre-MG for positioning vivo discussion Rel-17 NR\_pos\_enh-Core  R2-2205656 Definition of positioning measurement gap activation/deactivation MAC CE Apple CR Rel-17 38.321 17.0.0 1278 - F NR\_pos\_enh-Core  R2-2205810 Clarification on PPW and MG configuration to the same UE and miscellaneous corrections Ericsson CR Rel-17 38.305 17.0.0 0098 - F NR\_pos\_enh-Core  R2-2205812 UL MAC CE for preconfigured MG Ericsson discussion Rel-17 |

Furthermore, companies provide following contributions related to pre-configured MG in AI 6.11.2.9:

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| --- |
| R2-2205000 [H566][H567] Correction for Location Measurement Indication Huawei, HiSilicon CR Rel-17 38.331 17.0.0 3027 - F NR\_pos\_enh-Core  R2-2205048 [S854][S855][S856] Handling preconfigured gaps for POS upon a handover Samsung discussion Rel-17 NR\_pos\_enh-Core  R2-2205310 Correction on pre-configured MG procedure in 38.331 ZTE, Sanechips CR Rel-17 38.331 17.0.0 3066 - F NR\_pos\_enh-Core |

From the above contributions, several aspects are discussed:

## **2.1 The format of MAC CE activation/deactivation request/command**

In the contribution R2-2204700, R2-2205656 and R2-2204996 (without 1 bit activation/deactivation indication), the Positioning Measurement Gap Activation/Deactivation Request MAC CE and Positioning Measurement Gap Activation/Deactivation Command MAC CE are designed as follows:

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| 6.1.3.40 Positioning Measurement Gap Activation/Deactivation Request MAC CE The Positioning Measurement Gap Activation/deactivation request MAC CE is identified by MAC subheader with eLCID as specified in Table 6.2.1-2b.  It has a fixed size and consists of one octet defined as follows (Figure 6.1.3.42-xx1):  - Gap ID: This field indicates the requested preconfigured measurement gap configuration ID. The length of the field is 4 bits;  - A/D: This field indicates the activation or deactivation of the preconfigured measurement gap configuration ID. The field is set to 1 to indicate activation, otherwise it indicates deactivation. The length of the field is 1 bit.  - R: Reserved bit, set to 0.    Figure 6.1.3.42-xx1: Positioning Measurement Gap Activation/Deactivation Request MAC CE 6.1.3.41 Positioning Measurement Gap Activation/Deactivation Command MAC CE The Positioning Measurement Gap Activation/Deactivation Command MAC CE is identified by MAC subheader with eLCID as specified in Table 6.2.1-1b.  It has a fixed size and consists of one octet defined as follows (Figure 6.1.3.42-xx2):  - Gap ID: This field indicates the preconfigured measurement gap configuration ID. The length of the field is 4 bits;  - A/D: This field indicates the activation or deactivation of the preconfigured measurement gap configuration ID. The field is set to 1 to indicate activation, otherwise it indicates deactivation. The length of the field is 1 bit.  - R: Reserved bit, set to 0.    Figure 6.1.3.42-xx2: Positioning Measurement Gap Activation/Deactivation Request MAC CE |

In R2-2205812, the above UL MAC CEs are designed as follows, with which UE can request more than one preferred MGs:



From rapporteur’s point of view, RAN1 has already made the agreement in RAN1#107[1] that ‘The information in the UL MAC CE for MG activation request by the UE can be one ID associated with the preconfiguration of the MG’. Therefore, rapporteur suggests to adopt the first kind of UL MAC CE design. Since R2-2204700 and R2-1105656 have almost the same wording, the two CRs can be both agreed.

***Proposal 1: RAN2 to agree the change in 38.321 draft CR R2-2204700 and R2-2205656 for pre-configured MG MAC CE activation/deactivation request/command design.***

R2-2205812 also proposed to use an RRC signalling to indicate UE which protocol layer is used for transmitting measurement gap request (RRC or MAC), and UE should send UL MAC CE together with BSR. However, since this meeting will concentrate on existing design and spec change, these proposals are some kind of optimization put up by only one company, rapporteur suggest to treat it as low priority.

***Proposal 2: Support to use a RRC signalling to indicate UE which protocol layer is used for transmitting measurement gap request (RRC or MAC).***

***Proposal 3: RAN2 to discuss UL MAC CE for pre-configured measurement gap has the provision to include BSR.***

## **2.2 Pre-configured MG during HO**

R2-2205048 put up with the pre-configured MG dealing when HO happens. It is proposed:

Proposal 1: Both UE and gNB deactivate any of the activated preconfigured measurement gaps for POS upon a handover. If agreed, the TP in Annex A.1 can be used as a baseline for the required corrections.

The draft TP is also given as follows:

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| 5.3.5.5.2 Reconfiguration with sync  The UE shall perform the following actions to execute a reconfiguration with sync.  1> if the AS security is not activated, perform the actions upon going to RRC\_IDLE as specified in 5.3.11 with the release cause '*other*' upon which the procedure ends;  1> if no DAPS bearer is configured:  2> stop timer T310 for the corresponding SpCell, if running;  1> if this procedure is executed for the MCG:  2> if timer T316 is running;  3> stop timer T316;  3> clear the information included in *VarRLF-Report*, if any;  2> resume MCG transmission, if suspended.  1> stop timer T312 for the corresponding SpCell, if running;  1> if *sl-PathSwitchConfig* is included:  2> consider the target L2 U2N Relay UE to be the one indicated by the *targetRelayUEIdentity* in the *sl-PathSwitchConfig*;  2> start timer T420 for the corresponding target L2 U2N Relay UE with the timer value set to *T420*, as included in the *sl-PathSwitchConfig*;  2> apply the value of the *newUE-Identity* as the C-RNTI;  2> perform the PC5-RRC connection establishment with the target L2 U2N Relay UE indicated by the *targetRelayUEIdentity*, if needed;  2> apply the default configuration of SL-RLC1 as defined in 9.2.4 for SRB1;  1> else (*sl-PathSwitchConfig* is not included):  2> if this procedure is executed for the MCG or if this procedure is executed for an SCG not indicated as deactivated in the E-UTRA or NR RRC message in which the *RRCReconfiguration* message is embedded:  3> start timer T304 for the corresponding SpCell with the timer value set to *t304*, as included in the *reconfigurationWithSync*;  2> if the *frequencyInfoDL* is included:  3> consider the target SpCell to be one on the SSB frequency indicated by the *frequencyInfoDL* with a physical cell identity indicated by the *physCellId*;  2> else:  3> consider the target SpCell to be one on the SSB frequency of the source SpCell with a physical cell identity indicated by the *physCellId*;  2> start synchronising to the DL of the target SpCell;  2> apply the specified BCCH configuration defined in 9.1.1.1 for the target SpCell;  2> acquire the *MIB* of the target SpCell, which is scheduled as specified in TS 38.213 [13];  NOTE 1: The UE should perform the reconfiguration with sync as soon as possible following the reception of the RRC message triggering the reconfiguration with sync, which could be before confirming successful reception (HARQ and ARQ) of this message.  NOTE 2: The UE may omit reading the *MIB* if the UE already has the required timing information, or the timing information is not needed for random access.  NOTE 2a: A UE with DAPS bearer does not monitor for system information updates in the source PCell.  2> If any DAPS bearer is configured:  3> create a MAC entity for the target cell group with the same configuration as the MAC entity for the source cell group;  3> consider the preconfigured measurement gaps, if activated by MAC CE for positioning measurement, to be deactivated state in both source cell group and target cell group;  3> for each DAPS bearer:  4> establish an RLC entity or entities for the target cell group, with the same configurations as for the source cell group;  4> establish the logical channel for the target cell group, with the same configurations as for the source cell group;  NOTE 2b: In order to understand if a DAPS bearer is configured, the UE needs to check the presence of the field *daps-Config* within the *RadioBearerConfig* IE received in *radioBearerConfig* or *radioBearerConfig2*.  3> for each SRB:  4> establish an RLC entity for the target cell group, with the same configurations as for the source cell group;  4> establish the logical channel for the target cell group, with the same configurations as for the source cell group;  3> suspend SRBs for the source cell group;  NOTE 3: Void  3> apply the value of the *newUE-Identity* as the C-RNTI in the target cell group;  3> configure lower layers for the target SpCell in accordance with the received s*pCellConfigCommon*;  3> configure lower layers for the target SpCell in accordance with any additional fields, not covered in the previous, if included in the received *reconfigurationWithSync.*  2> else:  3> reset the MAC entity of this cell group;  3> consider the preconfigured measurement gaps, if activated by MAC CE for positioning measurement, to be deactivated state;  3> consider the SCell(s) of this cell group, if configured, that are not included in the *SCellToAddModList* in the *RRCReconfiguration* message, to be in deactivated state;  3> apply the value of the *newUE-Identity* as the C-RNTI for this cell group;  3> configure lower layers in accordance with the received s*pCellConfigCommon*;  3> configure lower layers in accordance with any additional fields, not covered in the previous, if included in the received *reconfigurationWithSync.*  2> if the UE is connected with a L2 U2N Relay UE (i.e. the UE is a L2 U2N Remote UE at the source side):  3> perform the PC5-RRC connection release as specified in 5.8.9.5.  Upon L2 U2N Relay UE receiving *reconfigurationWithSync*, it either triggers PC5-S release or sends Notification message to the connected L2 U2N Remote UE(s) in accordance with 5.8.9.10. |

For the changes in section 5.3.5.5.2, it clarifies the RRC procedure of deactivating the activated MG when HO happens, which seems reasonable without complex interaction of MAC procedure(e.g., MAC will or will not reset during HO, the target cell does not know the UE’s (de)activation stage of pre-configured MG). Based on the above, rapporteur suggests to propose:

***Proposal 4: RAN2 to agree that UE considers the activated preconfigured measurement gaps to be in deactivated state when HO happens, and takes R2-2205048 TP of 38.331, section 5.3.5.5.2 as baseline.***

## **2.3 Activation/deactivation/Cancellation condition of UL MAC CE**

In RAN2#117, the following agreements are made by RAN2:

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| * For triggering condition for the UL MAC CE, reuse current RRC condition for Rel-16 PRS gap request, taking into account preconfigured MG. If the preconfigured MG is there and can satisfy the UE’s requirement, the UE uses MAC CE, otherwise RRC message as in Rel-16. The selection is specified in RRC. Reuse the “not configured or not sufficient” language from Rel-16. * UL MAC CE for MG activation and deactivation is triggered by upper layers. * the following options to cancel a triggered UL MAC CE for MG activation and deactivation should be captured in the spec; other options can be discussed in the running CR discussion.   • When the MAC CE is transmitted  • When a request from upper layers to transmit a new request to gNB for a new/modified gap configuration is received  • When an indication from upper layers that the gaps are not needed any more or a gap with a new id needs to be activated is received   * On MAC reset |

These agreements indicates UL MAC CE activation/deactivation/cancellation should follow upper layers indication. Therefore, the UE procedure of both RRC and MAC should be captured in the corresponding specs. However, current RRC and MAC spec has more or less omission on the agreements.

Regarding to the activation/deactivation/cancellation procedure of pre-configured MG for positioning in 38.331(related to *LocationMeasurementIndication* and cross-WI gap coordination), companies provides different views on the 38.331 change.

R2-2204703 provides draft CR of 38.331 as follows:

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| 5.5.6.2 Initiation The UE shall:  1> if and only if upper layers indicate to start performing location measurements towards E-UTRA or NR or start subframe and slot timing detection towards E-UTRA, and the UE requires measurement gaps for these operations while measurement gaps are either not configured or not sufficient:  2> if preconfigured measurement gaps are configured and the UE considers that at least one of the preconfigured gaps meets the measurement gap requirements:  Editor's Note: check if Reference for TS 38.133 on measurement gap requirements is needed.  3> trigger the lower layers to initiate the measurement gap activation request using UL MAC CE as specified in TS 38.321 [6];  2> else:  3> initiate the procedure to indicate start;  NOTE 1: The UE verifies the measurement gap situation only upon receiving the indication from upper layers. If at this point in time sufficient gaps are available, the UE does not initiate the procedure. Unless it receives a new indication from upper layers, the UE is only allowed to further repeat the procedure in the same PCell once per frequency of the target RAT if the provided measurement gaps are insufficient.  1> if and only if upper layers indicate to stop performing location measurements towards E-UTRA or NR or stop subframe and slot timing detection towards E-UTRA and *preConfigGapID* is not activated:  2> initiate the procedure to indicate stop.  NOTE 2: The UE may initiate the procedure to indicate stop even if it did not previously initiate the procedure to indicate start.  1> if *preConfigGapID* is activated:  2> if a request from upper layers to transmit either a new *preConfigGapID* or to modify the current *measGapConfig* is received; or  2> if a request from upper layers indicate that the current gap is not needed:  3> trigger the lower layers to deactivate the current active measurement gap as specified in TS 38.321 [6];  1> if the measurement gap activation request using UL MAC CE is triggered, and there is not activated preconfigured measurement gap for positioning:  2> if a request from upper layers to transmit either a new *preConfigGapID* or to modify the current *measGapConfig* is received:  3> indicate the lower layers to cancel the triggered Positioning Measurement Gap Activation Request as specified in TS 38.321 [6];  2> if a request from upper layers indicate that the current gap is not needed; or  2> if UE determines that measurement gaps are sufficient at this time:  3> indicate the lower layers to cancel the triggered Positioning Measurement Gap Activation Request as specified in TS 38.321 [6]; |

R2-2205000 provides draft CR of 38.331 as follows:

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| 5.5.6.2 Initiation The UE shall:  1> if and only if upper layers indicate to start performing location measurements towards E-UTRA or NR or start subframe and slot timing detection towards E-UTRA, and the UE requires measurement gaps for these operations while measurement gaps are either not configured or not sufficient:  2> if preconfigured measurement gaps are configured and the UE considers that at least one of the preconfigured gaps are sufficient for the location measurement when activated :  3> trigger the lower layers to initiate the measurement gap activation request using UL MAC CE as specified in TS 38.321 [6];  2> else:  3> initiate the procedure as specified in 5.5.6.3 to indicate start;  NOTE 1: The UE verifies the measurement gap situation only upon receiving the indication from upper layers. If at this point in time sufficient gaps are available, the UE does not initiate the procedure. Unless it receives a new indication from upper layers, the UE is only allowed to further repeat the procedure in the same PCell once per frequency of the target RAT if the provided measurement gaps are insufficient.  1> if and only if upper layers indicate to stop performing location measurements towards E-UTRA or NR or stop subframe and slot timing detection towards E-UTRA: and :  2> if there is no activated preconfigured measurement gap for positioning:  3> initiate the procedure as specified in 5.5.6.3 to indicate stop.  2> else if there is activated preconfigured measurement gap for positioning:  3> trigger the lower layer to deactivate all the activated measurement gap(s) for positioning as specified in TS 38.321 [6].  NOTE 2: The UE may initiate the procedure to indicate stop even if it did not previously initiate the procedure to indicate start. |

R2-2205579 provides TP on 38.331 as follows:

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| 5.5.6.2 Initiation  The UE shall:  1> if and only if upper layers indicate to start performing location measurements towards E-UTRA or NR or start subframe and slot timing detection towards E-UTRA, and the UE requires measurement gaps for these operations while the measurement gaps are not configured or the activated measurement gaps are not sufficient:  NOTE 1a: The UE treats the configured measurement gaps, the activated preconfigured measurement gaps, and preconfigured measurement gaps for positioning as activated measurement gaps.  2> if preconfigured measurement gaps for positioning are configured and the UE considers that at least one of the preconfigured measurement gaps for positioning meets the measurement gap requirements:  3> trigger the lower layers to initiate the measurement gap activation request using UL MAC CE as specified in TS 38.321 [6];  2> else:  3> initiate the procedure as specified in 5.5.6.3 to indicate start of location related measurements;  NOTE 1: The UE verifies the measurement gap situation only upon receiving the indication from upper layers. If at this point in time sufficient gaps are available, the UE does not initiate the procedure. Unless it receives a new indication from upper layers, the UE is only allowed to further repeat the procedure in the same PCell once per frequency of the target RAT if the provided measurement gaps are insufficient.  1> if and only if upper layers indicate to stop performing location measurements towards E-UTRA or NR or stop subframe and slot timing detection towards E-UTRA:  2> if there is an activated preconfigured measurement gap for positioning:  3> trigger the lower layers to initiate the measurement gap deactivation request using UL MAC CE as specified in TS 38.321 [6];  2> if the UE has initiated the procedure as specified in 5.5.6.3 to indicate the start of location related measurements:  3> initiate the procedure as specified in 5.5.6.3 to indicate stop of location related measurements.  NOTE 2: The UE may initiate the procedure to indicate stop even if it did not previously initiate the procedure to indicate start. |

R2-2205048 provides TP for 38.331, section 5.5.6.2 as follows:

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| 5.5.6.2 Initiation The UE shall:  1> if and only if upper layers indicate to start performing location measurements towards E-UTRA or NR or start subframe and slot timing detection towards E-UTRA, and the UE requires measurement gaps for these operations while measurement gaps are either not configured or not sufficient:  2> if preconfigured measurement gaps are configured and the UE considers that at least one of the preconfigured gaps meets the measurement gap requirements:  Editor's Note: check if Reference for TS 38.133 on measurement gap requirements is needed.  3> trigger the lower layers to initiate the measurement gap activation request using UL MAC CE as specified in TS 38.321 [6];  2> else:  3> initiate the procedure to indicate start;  NOTE 1: The UE verifies the measurement gap situation only upon receiving the indication from upper layers. If at this point in time sufficient gaps are available, the UE does not initiate the procedure. Unless it receives a new indication from upper layers, the UE is only allowed to further repeat the procedure in the same PCell once per frequency of the target RAT if the provided measurement gaps are insufficient.  1> if and only if upper layers indicate to stop performing location measurements towards E-UTRA or NR or stop subframe and slot timing detection towards E-UTRA and *preConfigGapID* is not activated:  2> initiate the procedure to indicate stop.  NOTE 2: The UE may initiate the procedure to indicate stop even if it did not previously initiate the procedure to indicate start.  1> if *preConfigGapID* is activated:  2> if a request from upper layers to transmit either a new *preConfigGapID* or to modify the current *measGapConfig* is received; or  2> if a request from upper layers indicate that the current gap is not needed:  3> trigger the lower layers to deactivate the current active measurement gap as specified in TS 38.321 [6];  1> If a *preconfigured positioning gap is deactivated* upon a handover, and the current *measGapConfig* is not modified and there is no request from upper layers to stop performing location measurements towards E-UTRA or NR or stop subframe and slot timing detection towards E-UTRA:  2> trigger the lower layers to initiate the measurement gap activation request for the previously activated gap using UL MAC CE as specified in TS 38.321 [6] after the handover; |

R2-2205310 provides draft CR on 38.331 as follows:

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| 5.5.2.X Positioning pre-configured measurement gap activation/deactivation/cancellation The UE shall:   1. If pre-configured MG(s) is configured:   2>If at least one of the pre-configured MG satisfies UE’s request:  3>Upper layer triggers the pre-configured MG activation.  3>UE sends the UL MAC CE activation request according to TS38.321[6].  2>else if the activated pre-configured MG no longer satisfies UE’s request:  3>upper layer triggers pre-configured MG deactivation.  3>UE sends the UL MAC CE deactivation request according to TS38.321[6].  2>else if when the activation/deactivation UL MAC CE is triggered by upper layer, but not transmitted yet:  3>If the pre-configured MG associated with the UL MAC CE needs to be changed, or  3>If the pre-configured MG is not needed anymore, or  3>If a pre-configured MG with a new id needs to be activated:  4>Upper layer indicates the UL MAC CE to be cancelled according to TS 38.321[6]. |

Comparison between R2-2204703, R2-2205000, R2-2205579, R2-2205048 and R2-2205310 are given as follows:

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| --- | --- | --- | --- | --- | --- |
|  | R2-2204703 | R2-2205000 | R2-2205579 | R2-2205048 | R2-2205310 |
| Activation/deactivation of UL MAC CE in section 5.5.6.2 | yes | yes | yes | Yes | No (new section is introduced) |
| Cancellation of UL MAC CE in section 5.5.6.2 | yes | No | No | No | No (new section is introduced) |
| Clarifications on ‘measurement gaps are either not configured or not sufficient’ in section 5.5.6.2 | No | No | yes | No | No |

There are two kinds of changes:

1. capture activation/deactivation/cancellation procedure of UL MAC CE triggered by RRC layer in 38.331 section 5.5.6.2, i.e. Location Measurement Indication initiation procedure.
   1. R2-2204703 should be merged with R2-2205000, R2-2205579 or R2-2205048. However in R2-2205579, the added note mentioned ‘UE treats preconfigured measurement gaps for positioning as activated measurement gaps’, and in the main bullet it says ‘the activated measurement gaps are not sufficient’, it should mean the pre-configured MGs are not sufficient. It is not aligned with the first sub-bullet that ‘UE considers one of the pre-configured MGs satisfies UE’s request’. Furthermore, R2-2205048 mentioned the UE should be able to re-request the previous activated MG after HO, and this procedure should be specified in section 5.5.6.2. Therefore, rapporteur suggest to merge R2-2204703 with R2-2205000, and discuss whether R2-2205048 can be supported.
2. Capture activation/deactivation/cancellation procedure of UL MAC CE triggered by RRC layer in a new section 5.5.2.x of 38.331, parallel to the section of measurement gap configuration.
   1. For this change, rapporteur thinks this solution is more clear than to capture them in section 5.5.6.2, because pre-configured MG is a new feature in Rel-17 and can work independently. The deactivation and cancellation of UL MAC CE has nothing to do with location measurement indication start/stop procedure.

Based on the above, the rapporteur suggests to propose:

***Proposal 5: RAN2 to discuss that after a positoning measurment gap is deactivated due to handover, RRC triggers the lower layer to send another request for MG activation. If agreed, adopt CR of R2-2205048, section 5.5.6.2 part as baseline.***

***Proposal 6: For pre-configured MG, the procedure of UL MAC CE activation/deactivation/cancellation triggered by upper layer should be captured in 38.331, specifically in:***

***Option 1: section 5.5.6.2, i.e., the initiation of Location Measurement Indication procedure.***

***FFS: whether to merge R2-2204703 and R2-2205000***

***Option 2: a new section, e.g, section 5.5.2.x parallel to the measurement gap configuration procedure.***

***FFS: whether R2-2205310 can be supported***

For the cancellation procedure of UL MAC CE in 38.321, R2-2204702 provides draft CR of 38.321 as follow:

|  |
| --- |
| 5.25 Positioning Measurement Gap Activation/Deactivation Request  If the UE is configured with pre-configured measurement gap, the UE may request the network to activate or deactivate the Positioning measurement gap with UL MAC CE for Positioning Measurement Gap Activation/Deactivation Request in clause 6.1.3.40.  The MAC entity shall, when triggered by the upper layer to send Positioning Measurement Gap Activation/Deactivation Request, cancel the triggered Positioning Measurement Gap Activation/Deactivation Request, if any and trigger another Positioning Measurement Gap Activation/Deactivation Request according to the upper layer's request.  The MAC entity shall, when received an indication that the gap is not needed or when received a DL positioning MG activation MAC CE to activate the pre-configured positioning MG, cancel the triggered Positioning Measurement Gap Activation Request, if any.  The MAC entity shall,  1>if Positioning Measurement Gap Activation/Deactivation Request MAC CE has been triggered, and not cancelled:  2> if UL-SCH resources are available for a new transmission and these UL-SCH resources can accommodate the Positioning Measurement Gap Activation/Deactivation Request MAC CE plus its subheader as a result of logical channel prioritization:  3> instruct the Multiplexing and Assembly procedure to generate the Positioning Measurement Gap Activation/Deactivation Request MAC CE according to the upper layer's request;  3> cancel triggered Positioning Measurement Gap Activation/Deactivation Request MAC CE.  2> else:  3> trigger a Scheduling Request for Positioning Measurement Gap Activation/Deactivation Request MAC CE. |

For the same issue of capturing the cancellation procedure, The R2-2205309 provides draft CR on 38.321 as follow:

|  |
| --- |
| 5.25 Positioning Measurement Gap Activation/Deactivation Request If the UE is configured with pre-configured measurement gap, the UE may request the network to activate or deactivate the Positioning measurement gap with UL MAC CE for Positioning Measurement Gap Activation/Deactivation Request in clause 6.1.3.40.  The MAC entity shall, when triggered by the upper layer to send Positioning Measurement Gap Activation/Deactivation Request, cancel the triggered Positioning Measurement Gap Activation/Deactivation Request, if any and trigger another Positioning Measurement Gap Activation/Deactivation Request according to the upper layer’s request.  The MAC entity shall,   1. if Positioning Measurement Gap Activation/Deactivation Request MAC CE has been triggered by upper layer:   2>If a request from upper layers to transmit a new request to gNB for a new/modified gap configuration is received, or  2>an indication from upper layers that the gaps are not needed any more is received, or  2>an indication from upper layers that a gap with a new id needs to be activated is received:  3>cancel triggered Positioning Measurement Gap Activation/Deactivation Request MAC CE.  2>else:  3>if UL-SCH resources are available for a new transmission and these UL-SCH resources can accommodate the Positioning Measurement Gap Activation/Deactivation Request MAC CE plus its subheader as a result of logical channel prioritization:  4> instruct the Multiplexing and Assembly procedure to generate the Positioning Measurement Gap Activation/Deactivation Request MAC CE according to the upper layer’s request;  4> cancel triggered Positioning Measurement Gap Activation/Deactivation Request MAC CE.  3> else:  4> trigger a Scheduling Request for Positioning Measurement Gap Activation/Deactivation Request MAC CE. |

From the rapporteur’s point of view, the first change is brief while the second change embeds the cancellation condition into the procedure, which is more readable. So the suggest proposal is:

***Proposal 7: RAN2 to agree the change in draft CR R2-2205309 for capturing the cancellation procedure of UL MAC CE for pre-configured MG in 38.321.***

## **2.4 Pre-configured MG/PPW CR for 38.305**

R2-2205810 provides a draft CR on 38.305 that a note has been added to clarify that NW does not provide configuration for preconfigured MG and preconfigured PPW for the same UE, also, added that UE request of both legacy and new pre-configured gap is possible. Rapporteur thinks this is not critical issue and can be treated as low priority for online discussion. 38.305 CRs can be treated together.

***Proposal 8: RAN2 to agree the changes in 38.305 draft CR R2-2205810 on pre-configured PPW and MG.***

# Pre-configured PPW

For pre-configured PPW, companies provide following contributions to AI 6.11.2.1:

|  |
| --- |
| R2-2204742 Corrections on the TS38.321 CATT CR Rel-17 38.321 17.0.0 1228 - F NR\_pos\_enh-Core  R2-2205764 Issues with PRS Processing Window Procedures Qualcomm Incorporated discussion  R2-2205808 Correction to activate pre-configured PPW Signaling Ericsson CR Rel-17 38.305 17.0.0 0097 - F NR\_pos\_enh-Core  R2-2205809 Correction of PPW Activation/Deactivation Command MAC CE size description Ericsson CR Rel-17 38.321 17.0.0 1285 - F NR\_pos\_enh-Core  R2-2205814 On PPW Configuration Release assistance info Ericsson discussion Rel-17  R2-2206330 On Resolving PPW Capability discrepancy Ericsson discussion Rel-17 Late |

In addition, companies provide following contribution related to pre-configured PPW in AI 6.11.2.9:

|  |
| --- |
| R2-2205049 [S851][S852][S853] Type and priority configuration of PPW Samsung discussion Rel-17 NR\_pos\_enh-Core |

R2-2205814 proposed to use UL RRC message(in UEPositioningAssistanceInfo) to deactivate PPW rather than DL MAC CE, and corresponding TPs are provided. Rapporteur understands there is no such agreement on deactivating PPW via UL RRC message, even if it is agreed, it is not the same procedure of pre-configured MG and increases the complexity. Last meeting of Rel-17 should devote to the previous agreements.

R2-2205049 proposed to Define ‘type-r17’ field to indicate PPW type in *DL-PRS-ProcessingWindowPreConfig-r17*; Rapporteur thinks this is already captured in the latest POS RRC running CR.

R2-2205764 proposed to adopt same procedure for pre-configured PPW and pre-configured MG, in which a new UL MAC CE for PPW activation/deactivation request should be designed. It also provides series of TPs including 38.305, 38.331, 38.321. Rapporteur understands it is a large change at this stage. If this issue is agreed by RAN2, suggest to send LS to RAN1 and RAN3 for confirmation.

R2-2206330 proposed to expose UE’s PPW capability to gNB via RRC. Rapporteur thinks this proposal can be discussed with proposals in R2-2205764; Also, it suggests to only tell LMF whether the PPW is supported or not.

R2-2205808 proposed 38.305 draft CR of deleting the step of ‘LMF request gNB to activate PPW’. rapporteur understands this addresses the same issue with R2-2205764, so the technical discussion is needed before we agree this CR.

R2-2204742 proposed 38.321 draft CR on deleting ‘consists of a single octet’ wording, clarify the UE behaviour when PPW is activated should follow the clause 5.24 and modify the numEntry field. Rapporteur understands these changes are agreeable.

R2-2205809 proposed 38.321 draft CR on deleting ‘consists of a single octet’ wording. Rapporteur understands it addresses the same issue with R2-2204742 and can be merged to agree.

***Proposal 9: RAN2 to agree the change in 38.321 draft CR R2-2204742 to delete ‘consists of a single octet’, clarify the UE behaviour when PPW is activated should follow the clause 5.24, and modify the numEntry field.***

***Proposal 10: Support to adopt the same procedure for pre-configured PPW and pre-configured MG. The RAN2 changes including:***

* ***Introduce a new UL MAC CE for PPW activation/deactivation request;***
* ***Add UE capabilities for UL/DL MAC-CE based PPW activation.***

***The RAN3 changes including:***

* ***Include the UE DL-PRS processing capability outside measurement gaps in the NRPPa MEASUREMENT PRECONFIGURATION REQUIRED message.***
* ***Include information on what has been preconfigured in the target device (MGs and/or PPW) in the NRPPa MEASUREMENT PRECONFIGURATION CONFIRM message.***
* ***Enable the NRPPa MEASUREMENT ACTIVATION message to activate/deactivate preconfigured PRS processing windows.***

***If agreed, adopt TPs of 38.305, 38.321, 38.331, 37.355 in R2-2205764 as baseline. Send LS to RAN1 and RAN3 for confirmation.***

***Proposal 11: Regarding UE capability of PPW, UE only needs to report whether PPW is supported or not to LMF.***

***Proposal 12: Support UE to deactivate PPW via UL RRC message, i.e., in UEPositioningAssistanceInfo.***

# Pre-configured AD

For pre-configured PPW, companies provide following contributions to AI 6.11.2.1:

|  |
| --- |
| R2-2205766 Assistance Data Request for Multiple Area IDs Qualcomm Incorporated discussion  R2-2205804 Text Proposal to address UE request of Area Info and Broadcast of Area Ericsson, Fraunhofer IIS, Fraunhofer HHI, Lenovo, Motorola Mobility discussion Rel-17 |

In addition, companies provide following contributions related to pre-configured AD in AI 6.11.2.8:

|  |
| --- |
| R2-2204932 I004 Validity area for preconfigured AD Intel Corporation discussion Rel-17 NR\_pos\_enh-Core  R2-2205430 Discussion of the need of the area ID for the pre-configured assistance data OPPO discussion Rel-17 NR\_pos\_enh-Core  R2-2205583 [V003] Discussion on the format of pre-configuration vivo discussion Rel-17 NR\_pos\_enh-Core |

R2-2205766 and R2-2205804 proposed to add a request for pre-configured assistance data with area validity in the method-RequestAssistanceData messages.

R2-2205804 proposed to add a new posSIB for area-based pre-configured AD.

R2-2204932, R2-2205430 and R2-2205583 proposed to delete the area ID in the original Area-ID-CellList. In which, R2-2204932 thinks the area ID as well as the associated cell list is unclear and proposed to discuss its feasibility, and R2-2205583 proposed to introduce a list of NR-DL-PRS-AssistanceData as pre-configuration.

From above, the main issues here are adding a request for area-based pre-configured AD, and whether to keep area ID and/or associated cell list. Since there are little amount of contributions, rapporteur would suggest to list the proposals for companies who does not provide related contributions to make comments.

***Proposal 13: Support to delete the area-id-r17 in current LPP spec. FFS whether the associated cell list is valid.***

***Proposal 14: Support UE to request pre-configured assistance data associated with area validity in each positioning method AD request.***

***Proposal 15: Support to introduce a new posSIB to include the area validity of pre-configured AD.***

# Conclusion

This section summarizes all the proposals for discussion according to the order (from high priority to low priority): ASN.1 issues - procedure issues- stage 2 issues.

ASN.1 issues:

***Proposal 13: Support to delete the area-id-r17 in current LPP spec. FFS whether the associated cell list is valid.***

***Proposal 14: Support UE to request pre-configured assistance data associated with area validity in each positioning method AD request.***

***Proposal 15: Support to introduce a new posSIB to include the area validity of pre-configured AD.***

Important procedure issues:

***Proposal 1: RAN2 to agree the change in 38.321 draft CR R2-2204700 and R2-2205656 for pre-configured MG MAC CE activation/deactivation request/command design.***

***Proposal 4: RAN2 to agree that UE considers the activated preconfigured measurement gaps to be in deactivated state when HO happens, and takes R2-2205048 TP of 38.331, section 5.3.5.5.2 as baseline.***

***Proposal 5: RAN2 to discuss that after a positoning measurment gap is deactivated due to handover, RRC triggers the lower layer to send another request for MG activation. If agreed, adopt CR of R2-2205048, section 5.5.6.2 part as baseline.***

***Proposal 6: For pre-configured MG, the procedure of UL MAC CE activation/deactivation/cancellation triggered by upper layer should be captured in 38.331, specifically in:***

***Option 1: section 5.5.6.2, i.e., the initiation of Location Measurement Indication procedure.***

***FFS: whether to merge R2-2204703 and R2-2205000***

***Option 2: a new section, e.g, section 5.5.2.x parallel to the measurement gap configuration procedure.***

***FFS: whether R2-2205310 can be supported***

***Proposal 7: RAN2 to agree the change in draft CR R2-2205309 for capturing the cancellation procedure of UL MAC CE for pre-configured MG in 38.321.***

***Proposal 9: RAN2 to agree the change in 38.321 draft CR R2-2204742 to delete ‘consists of a single octet’, clarify the UE behaviour when PPW is activated should follow the clause 5.24, and modify the numEntry field.***

***Proposal 10: Support to adopt the same procedure for pre-configured PPW and pre-configured MG. The RAN2 changes including:***

* ***Introduce a new UL MAC CE for PPW activation/deactivation request;***
* ***Add UE capabilities for UL/DL MAC-CE based PPW activation.***

***The RAN3 changes including:***

* ***Include the UE DL-PRS processing capability outside measurement gaps in the NRPPa MEASUREMENT PRECONFIGURATION REQUIRED message.***
* ***Include information on what has been preconfigured in the target device (MGs and/or PPW) in the NRPPa MEASUREMENT PRECONFIGURATION CONFIRM message.***
* ***Enable the NRPPa MEASUREMENT ACTIVATION message to activate/deactivate preconfigured PRS processing windows.***

***If agreed, adopt TPs of 38.305, 38.321, 38.331, 37.355 in R2-2205764 as baseline. Send LS to RAN1 and RAN3 for confirmation.***

***Proposal 11: Regarding UE capability of PPW, UE only needs to report whether PPW is supported or not to LMF.***

Other optimization/stage-2 changes:

***Proposal 2: Support to use a RRC signalling to indicate UE which protocol layer is used for transmitting measurement gap request (RRC or MAC).***

***Proposal 3: RAN2 to discuss UL MAC CE for pre-configured measurement gap has the provision to include BSR.***

***Proposal 8: RAN2 to agree the changes in 38.305 draft CR R2-2205810 on pre-configured PPW and MG.***

***Proposal 12: Support UE to deactivate PPW via UL RRC message, i.e., in UEPositioningAssistanceInfo.***

# References

[1] Chair's Notes RAN1#107-e v18, November 11th - 19th, 2021.