**3GPP TSG-RAN WG2 Meeting #121 R2-230xxxx**

**Athens, Greece, Feb 27 – Mar 03, 2023**

**Agenda item:**  **6.7.1**

**Source: Intel Corporation**

**Title: [AT121][406][POS] Remaining Rel-17 stage 2 issues (Intel)**

**Document for: Discussion and Decision**

# Introduction

This is the report of following at meeting offline discussion:

[R2-2300415](file:///C:\Users\mtk16923\Documents\3GPP%20Meetings\202302-03%20-%20RAN2_121,%20Athens\Extracts\R2-2300415%20Positioning%20Stage2.docx) Miscellaneous corrections for Positioning Stage2 Intel Corporation discussion Rel-17 NR\_pos\_enh-Core

* Handled in offline discussion [406]

[R2-2300416](file:///C:\Users\mtk16923\Documents\3GPP%20Meetings\202302-03%20-%20RAN2_121,%20Athens\Extracts\38305_CRxxxx_(Rel-17)_R2-2300416%20Positioning%20stage%202.docx) Miscellaneous corrections for Positioning Stage2 Intel Corporation CR Rel-18 38.305 17.3.0 0119 - F NR\_pos\_enh-Core

* Handled in offline discussion [406]

[R2-2300673](file:///C:\Users\mtk16923\Documents\3GPP%20Meetings\202302-03%20-%20RAN2_121,%20Athens\Extracts\R2-2300673%20CR%20for%20miscellaneous%20corrections.docx) 38.305 CR for miscellaneous corrections vivo draftCR Rel-17 38.305 17.3.0 D NR\_pos\_enh-Core

* Handled in offline discussion [406]

[R2-2300933](file:///C:\Users\mtk16923\Documents\3GPP%20Meetings\202302-03%20-%20RAN2_121,%20Athens\Extracts\R2-2300933%20Correction%20on%20the%20gNB's%20behaviour%20for%20pre-configured%20MG.docx) Correction on the gNB's behaviour for pre-configured MG ZTE Corporation CR Rel-17 38.305 17.3.0 0120 - F NR\_pos\_enh-Core

* Handled in offline discussion [406]

[R2-2301619](file:///C:\Users\mtk16923\Documents\3GPP%20Meetings\202302-03%20-%20RAN2_121,%20Athens\Extracts\38305_CR0121_(Rel-17)_R2-2301619.docx) Corrections on TS38.305 CATT CR Rel-17 38.305 17.3.0 0121 - F NR\_pos\_enh-Core

* Handled in offline discussion [406]
* [AT121][406][POS] Remaining Rel-17 stage 2 issues (Intel)

Scope: Discuss the changes from R2-2300416, R2-2300673, R2-2300933, and R2-2301619 and converge on agreeable parts.

Intended outcome: Agreeable CRs

Deadline: Wednesday 2023-03-01 1900 EET

# Discussion on R2-2300416/R2-2300673

R2-2300415 tried to cover the stage 2 issues mentioned in previous meetings, also covered the changes in R2-2300673, and R2-2301619 (except change 1).

## Changes from R2-2211424/R2-2301619 Corrections on TS38.305 CATT

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| ***Reason for change:***   1. The request from the LMF to gNB may include not only for PRS transmission but also for change to the PRS transmission characteristics. The request from the LMF irrespective of whether the procedure is UE- or LMF-initiated should be clarified. (not covered in R2-2300415) 2. As for UE initiated on-demand PRS, not only LMF but also TRP can decide whether to follow (accept/reject/ignore) the PRS request, i.e., even LMF decide to accept the PRS request, TRP may also reject or ignore the request. 3. As for pre-configured MG or PPW, both activation or deactivation are supported. 4. As for pre-configured MG, the wrong step of the procedure is referred.   ***Summary of change:***:   1. Calrify the request from LMF to gNB in 7.6.1 General  * The request inlcudes for PRS transmission or change to the PRS transmission characteristics.. (not covered in R2-2300415)  1. On 7.6.2 On-Demand PRS transmission procedures  * Clarify that the TRP can also decide whether to follow (accept/reject/ignore) the UE initiated on-demand PRS request;  1. On 7.7.2 Pre-configured Measurement Gap procedures  * Correct the wrong step referred in step 5a; * Add the deactivate behaviour in step 5b;  1. On 7.8.1 General  * Clarify gNB can also support to deactivate the pre-configured PPW.   ***Consequences if not approved:***  NRPPa enhanements are not captured in the stage 2 specification. |

As described in R2-2300415:

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| **Running CR Rapporteur’s comments**:  1st change is incorrect since the TRP cannot receive UE-initiated On-Demand PRS request directly. The TRP can only receive the request from the LMF (the accept/reject/ignore were captured in NOTE 5 in TS38.305). Therefore nothing to be changed;  2nd change, looks reasonable, i.e. in 7.7.2 Pre-configured Measurement Gap procedures:   * *Correct the wrong step referred in step 5a;* * *Add the deactivate behaviour in step 5b;*   3rd change, looks reasonable, i.e. in 7.8.1 General:  - Clarify gNB can also support to deactivate the pre-configured PPW.  **Proposal 1: Agree the 2nd/3rd changes from R2-2211424, i.e.**  in 7.7.2 Pre-configured Measurement Gap procedures:   * *Correct the wrong step referred in step 5a;* * *Add the deactivate behaviour in step 5b;*   in 7.8.1 General:  - Clarify gNB can also support to deactivate the pre-configured PPW. |

Regarding the new change 1 in R2-2301619, Rapporteur do not see the strong need to have such clarification since “PRS change” covers the changes for both “PRS transmission” and “characteristics”.

Rapporteur would like to check companies’ view .

**Question 1: Do companies agree the following changes in R2-2301619 (except deactivation in 7.7.2):**

1. Calrify the request from LMF to gNB in 7.6.1 General

* The request inlcudes for PRS transmission or change to the PRS transmission characteristics.. (not covered in R2-2300415)

1. On 7.6.2 On-Demand PRS transmission procedures

* Clarify that the TRP can also decide whether to follow (accept/reject/ignore) the UE initiated on-demand PRS request;

1. On 7.7.2 Pre-configured Measurement Gap procedures

* Correct the wrong step referred in step 5a; covered in R2-2300416
* Add the deactivate behaviour in step 5b;

1. On 7.8.1 General

* Clarify gNB can also support to deactivate the pre-configured PPW. covered in R2-2300416

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| **Company** | **Yes/No for change 1-4** | **Remark** |
| Lenovo | No for change 1-4 | To change 1): Agree with rapporteur.  To change 2): Agree with rapporteur.  To change 3): Not needed. The wrong step in step 5a has been already covered by Lenovo CR in R2-2300217. The deactivation behaviour in step 5b does not apply since the procedure shows the successful preconfiguration and activation. During online discussion of Lenovo CR in R2-2300217 it was agreed that the deactivation aspect will be revisited in future.  To change 4): Not needed. The change has been already covered by Lenovo CR in R2-2300217. |
| ZTE | Yes for 1 3 4  No for 2 | The question just collect the view on changes **except deactivation in 7.7.2.** so first bullet of change 3 is correct |
|  |  | For the 1st change, the on-demand PRS include request for new PRS transmission or change the PRS configuration already configured, just as the current description from TS38.305.  ------------------------------------- from TS38.305------------------------  2a. In case of UE-initiated On-Demand PRS, the UE sends an On-Demand PRS request to the LMF via LPP Request Assistance Data message. The On-Demand PRS request can be a request for a pre-defined PRS configuration indicated with pre-defined PRS configuration ID or explicit parameter for PRS configuration and may be a request for PRS transmission or change to the PRS transmission characteristics for positioning measurements.  NOTE 1: The LPP Request Assistance Data message for On-Demand PRS may also be sent in an MO-LR location service request message.  NOTE 2: If the NW has provided the pre-defined On-Demand PRS configurations to the UE, the UE is allowed to request On-Demand PRS parameters based on pre-defined PRS configuration ID (index-based request) or explicit parameter requests that is within the scope of the received pre-defined On-Demand PRS configurations. Otherwise, the UE may blindly request On-Demand PRS parameters via an explicit request within the scope of the allowed parameter list, as specified in TS37.355 [42].  2b. In case of LMF-initiated On-Demand PRS, the LMF and the UE may exchange LPP messages e.g., to obtain UE measurements or the DL-PRS positioning capabilities of the UE, etc.  3. The LMF determines the need for PRS transmission or change to the transmission characteristics of an ongoing PRS transmission.  4. The LMF requests the serving and non-serving gNBs/TRPs for new PRS transmission or PRS transmission with changes to the PRS configuration via NRPPa PRS CONFIGURATION REQUEST message.  ------------------------------------ from TS38.305------------------------ |
| OPPO | Yes for 3,4  No for 1,2 | For change 2,3,4, we share the same views as Rapp.  For change 1, if needed, the better wording is that “The ~~actual PRS changes~~ need for PRS transmission or change to the PRS transmission characteristics are requested by the LMF irrespective of whether the procedure is UE- or LMF-initiated.” |
| Xiaomi | Yes for 1,3,4  No for 2 | The change 2 is not correct.  The first bullet of change 3 is essential.  The other changes are not essential but we could accept since it make the spec clearer. |
| Samsung | Yes for 3, 4  No for 1, 2 | \* Change 1: Not essential.  \* Change 2: Not correct. Share the view with rapporteur.  \* Change 3,4: Support. |
| Qualcomm | No for all. | #1: Not essential correction. Current text is not wrong.  #2: Does not look correct. The Note 4 is about the steps to follow "on receiving UE-initiated On-Demand PRS request". TRP does not receive such a request.  #3/#4: Discussed online in relation with Lenovo CR. Same understanding as Lenovo above. |
| vivo | Yes for 3, 4  No for 1, 2 | For Change 1, share the same view with rapporteur that it is not an essential correction.  For Change 2, agree with QC that NOTE 4 describes the operation right after “receiving UE-initiated On-Demand PRS request from the UE directly”, which is impossible for the gNB to get such request.  For Change 3 and 4, accept the changes though they coincides with Lenovo’s CR. |
| LG | Yes for 3, 4  No for 1, 2 |  |

## Changes from R2-2212356 Miscelenous corrections for stage2 Ericsson

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| ***Reason for change:***   * Addition of TEG exchange for UL-TDOA and Multi-RTT Positioning methods which are currently missing * To capture RRC Inactive Agreements Aperiodic UL-SRS is not supported in RRC Inactive * Additionally, RAN3 have added the UE Reporting Information from LMF to gNB in the POSITIONING INFORMATION REQUEST message, which is used for allocating CG-SDT proper resources when positioning a UE in RRC Inactive mode. * RAN3 have added the *SRS port index* IE to *SRS Resource type* IE in NRPPA following RAN1 agreement R1-2205602: Hnece, there is Missing SRS Port index signalled as part of the measurements with the SRS Resource Type when Release-15 SRS Resource is used.   RAN1 discussed the issue and agreed on the following: SRS port index can be optionally signaled to the LMF when SRS resource for MIMO is used. It is RAN1 understanding use of MIMO SRS in such a case is transparent to the UE and brings no specification impact in RAN1.  ***Summary of change:***:   * Relevant UE TxTEG association updates have been made for the UL-TDOA and Multi-RTT procedures * Adding missing impacts for RRC Inactive mode positioning in section 7.9   + Table has been added to reflect CG-SDT resource config based upon UE reporting intervals.   + Aperidoic UL-SRS not supported has been specified. * Correction for SRS Transmission Type   ***Consequences if not approved:***  Missing functional behaviour description. |

As described in R2-2300415:

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| **Running CR Rapporteur’s comments**:  All issues are related to RAN3 agreements except “• To capture RRC Inactive Agreements Aperiodic UL-SRS is not supported in RRC Inactive”. It would be good to let RAN3 capture their agreements in stage 2 directly.  Therefore only “o Aperidoic UL-SRS not supported has been specified.” Need to be captured from RAN2 perspective.  **Proposal 2: Agree the changes on “Aperidoic UL-SRS not supported” in section 7.9 from R2-2212356.** |

Rapporteur would like to check companies’ view .

**Question 2: Do companies agree the following change in R2-2300416 :**

the changes on “Aperidoic UL-SRS not supported” in section 7.9 .

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| **Company** | **Yes/No** | **Remark** |
| ZTE | Yes |  |
| CATT | Yes |  |
| OPPO | Yes but | The current wording has already stated that only P/SP UL-SRS is supported in RRC\_INACTIVE. Do we really need to capture all what we do not support in the spec? We can go for the majority’s view. |
| Xiaomi | Yes |  |
| Samsung | Yes |  |
| Qualcomm | No | Not essential. The current text is clear. We usually don't specify what is not supported. If companies think there can be an ambiguity, an informative Note may be O.K.  (Some other changes in R2-2212356 look also not correct. E.g., MIMO SRS can not be used for multi-RTT, etc.) |
| vivo | Yes |  |
| LG | Yes |  |

## R2-2212688 Correction on assistance data instances in 38.305 ZTE Corporation

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| ***Reason for change:***  The assistance data transfer procedure of different positioning methods have the description ‘One or more assistance data instances may be provided in one or more LPP Assistance Data messages.’ However in Rel-17, RAN2 does not agree on multiple assistance data instances containing in one LPP method-ProvideAssistanceData message, so this description is inaccurate.  ***Summary of change:***:  Change ‘One or more assistance data instances may be provided in one or more LPP Assistance Data messages’ to ‘Each assistance data instance is provided in one LPP ProvideAssistanceData message’.  ***Consequences if not approved:***  Inaccurate description of assistance data transfer will be presented in 38.305 |

As described in R2-2300415:

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| **Running CR Rapporteur’s comments**:  The observations from R2-2212688 are correct, i.e. currently multiple assistance data instances cannot be contained in the same LPP ProvideAssistanceData message. But the change is not aligned with original meaning. We may change it to “more assistance data instances may be provided in more LPP Assistance Data messages.”  **Proposal 3: Agree the intention of R2-2212688 , and in 8.10.3.1.2.1, 8.11.3.1.2 and 8.12.3.1.2, change “One or more assistance data instances may be provided in one or more LPP Assistance Data messages.” to “More assistance data instances may be provided in multiple LPP Assistance Data messages.” .** |

Rapporteur would like to check companies’ view .

**Question 3: Do companies agree the following changes in R2-2300416 :**

in 8.10.3.1.2.1, 8.11.3.1.2 and 8.12.3.1.2, change “One or more assistance data instances may be provided in one or more LPP Assistance Data messages.” to “More assistance data instances may be provided in multiple LPP Assistance Data messages.”.

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| **Company** | | **Yes/No** | **Remark** |
| ZTE | | No | We prefer the original CR wording for better align with Rel-17 agreement. What we want to emphasize for this sentence is: there is no such case that multiple AD instances containing in one LPP ProvideAssistanceData message.  The change of ‘more assistance data instances may be provided in multiple LPP ProvideAssistanceData message’ is already supported since Rel-15. We think this wording can not deliver the meaning of what we really agreed in Rel-17 |
| CATT | | Yes |  |
| OPPO | Yes with comments | | We agree the intention for this change. But, even though we apply the change above, it seems that we still do not exclude the case that multiple assistance data instances contain in one LPP method-ProvideAssistanceData message.  Therefore, we slightly prefer ZTE’s wording. |
| Xiaomi | | Yes |  |
| Samsung | | Yes with comment. | As a compromise, we would like to propose the following wording, which can also handle the concern from ZTE.  “Multiple assistance data instances may be provided in multiple LPP Assistance Data messages. Each instance is provided in one LPP Assistance Data messages separately.” |
| Qualcomm | | No | Existing text:  ‘One or more assistance data instances may be provided in one or more LPP Assistance Data messages’.  seems correct.  “More assistance data instances may be provided in multiple LPP Assistance Data messages.”  creates ambiguity/is unclear. I.e., can mean that multiple instances can be in one message (it only says that "are provided in multiple LPP Assistance Data messages", but not that one instance is in one message (which the existing specification text already correctly says). |
| vivo | | OK, but | The proposed wording does not address the concern well. We can go with the version that “One or more assistance data instances may be provided. Each instance is provided in one LPP Assistance Data messages.” |
| LG | | Yes, but | Agree with Samsung. |

## R2-2212929/R2-2300673 CR for miscellaneous corrections vivo

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| ***Reason for change:***   * RAN2#119bis-e meeting discussed about the issue about the achievable TIR and came to the following agreements:  |  | | --- | | Agreements  Proposal 1: No need to provide AL to UE to optionally obtain the achievable TIR.  Proposal 2: When the achievable TIR does not equal the requested TIR, how UE sets the value of achievableTargetIntegrityRisk is up to the UE implementation, i.e., the value can be larger or smaller than that of the requested TIR.  Can be considered next meeting if some impact to stage 2 is needed to reflect these agreements. |   Note that there exists a statement in current specification as “For the PL to be considered valid, it must simply satisfy the inequality above”, which contradicts the agreeable understanding that PL is not strictly calculated in a one-to-one mapping manner with required TIR. The value of PL is decided by UE based on implementation. Besides, if the TIR achieved by PL is not equal to the required TIR, the achievable TIR should be provided along with PL as specified in TS 37.355. Otherwise, the description is inaccurate without a supplementary condition.   * In the current specification, the term of “validity time” of the integrity bound shares the same understanding with “validity period”, which could cause unnecessary confusion. Besides, there already exists a “validity period” for the ciphering key in Section 7.5.2. * According to the current specification, Residual Risk is a probability defined for a time unit to represent the onset of the feared events. However, Equation 8.1.1a-3 suggests that, Residual Risk is a kind of probability that the feared events are present for some while. Besides, parallel to IRallocation, the dimension to depict such parameters should be the same, which is supposed to be the probability for a period of time. * UE-based integrity is supported for GNSS positioning method. However, when listed the possible information from UE to LMF in Section 8.1.2.2, the integrity information is not included.   LMF provides UE with PRS priority list in DL-AoD positioning, which is easy to understand but hard to correspond it into stage 3 ASN.1 syntax description.  ***Summary of change:***  In Section 3.1, revise the definition of Protection Level (PL), adding the condition to provide “achievable target integrity risk”.  In Section 8.1.1a, modify the term in a uniform way as “validity time”. Besides, rephrase the description of Residual Risk.  In Section 8.1.2.2, add the integrity information to Table 8.1.2.2-1.  In Section 8.11.2.1, revise the information “PRS priority list” according to IE *dl-*PRS-*ResourcePrioritySubset-r17*.  ***Consequences if not approved:***   * Inaccurate concept about integrity principle of operation * misunderstanding on the validity time for the integrity bound and the computation of Residual Risk * loss of integrity information transferred from UE to LMF in the GNSS positioning method   mismatch between Stage 2 description and ASN.1 information element |

As described in R2-2300415:

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| **Running CR Rapporteur’s comments**:  1st change in 3.1, seems align with agreements, i.e. in 3.1 to clarify the TIR may not be satisfied when calculate the PL.  2nd change in 8.1.1a, do not see the strong need to change “validity period” to “validity time”, and the rephrase the description of Residual Risk;  3rd change in 8.1.2.2, looks reasonable, i.e. add the integrity information to Table 8.1.2.2-1  4th change in 8.11.2.1, do not see the strong need to change “PRS priority list” to “DL-PRS resource priority subset ”  **Proposal 4: Agree the 1st /3rd changes from R2-2212929, i.e.**   * in 3.1 to clarify the TIR may not be satisfied when calculate the PL.   in 8.1.2.2 add the integrity information to Table 8.1.2.2-1 |

Rapporteur would like to check companies’ view .

**Question 4: Do companies agree changes in R2-2300673:**

-In Section 3.1, revise the definition of Protection Level (PL), adding the condition to provide “achievable target integrity risk”. (also captured in R2-2300416 )

In Section 8.1.1a, modify the term in a uniform way as “validity time”. Besides, rephrase the description of Residual Risk.

In Section 8.1.2.2, add the integrity information to Table 8.1.2.2-1. (also captured in R2-2300416 )

In Section 8.11.2.1, revise the information “PRS priority list” according to IE dl-PRS-ResourcePrioritySubset-r17.

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| **Company** | **Yes/No for change 1-4** | **Remark** |
| Swift Navigation | No | **PL:** we agree this topic would benefit from further clarification but have a different suggestion for how to achieve this rather than adding more description to the PL definition itself. This suggestion also clarifies that even if the TIR changes, the PL still needs to satisfy the PL inequality for a given TIR.  Suggestion:  --------------------------------  **Protection Level (PL):** A statistical upper-bound of the Positioning Error (PE) that ensures that, the probability per unit of time of the true error being greater than the AL and the PL being less than or equal to the AL, for longer than the TTA, is less than the TIR, i.e., the PL satisfies the following inequality:   *Prob per unit of time* [((*PE>AL*) & (*PL<=AL*)) *for longer than TTA*] *< TIR* When the PL bounds the positioning error in the horizontal plane or on the vertical axis then it is called Horizontal Protection Level (HPL) or Vertical Protection Level (VPL) respectively. A specific equation for the PL is not specified as this is implementation-defined. For the PL to be considered valid, it must simply satisfy the inequality above.  NOTE 1: the PL inequality is valid for all values of the AL.  NOTE 2: the TIR may correspond to the achievable TIR in the case that the requested TIR cannot be satisfied.  --------------------------------  **Validity Time:** ok to change this one instance of ‘validity period’ to ‘validity time’ for consistency (if other companies also prefer this).  **Residual Risk:** disagree with proposed text. The existing definition is correct, i.e. Residual risk is the probably of onset of the FE, which is multiplied by Mean Duration to obtain the probability of the FE occurring.  **Integrity reporting:** ok to add PL and achievable TIR to table 8.1.2.2-1. |
| ZTE | Yes for 1,2,3,4 |  |
| CATT | Yes for change 1/3  No strong view for change 2/4 |  |
| OPPO | Yes for 1/2/3 | For change 4, we also think we do not need to change “PRS priority list” to “DL-PRS resource priority subset”, since “PRS priority list” is a general description in stage-2, and we do not have to capture more stage-3 details in stage-2 spec. |
| Xiaomi | Yes for 1/3  No for 4 |  |
| Samsung | Yes for 1/2/3  No for 4 |  |
| Qualcomm | No | O.K. to add the Note as Proposed by Swift  NOTE 2: the TIR may correspond to the achievable TIR in the case that the requested TIR cannot be satisfied.  "validity period" to "validity time" is not essential, and may be confused with usage of "validity time" for non-periodic assistance data. "validity period" seems correct.  Current "Residual Risk" text is correct and aligned with Stage 3.  Table 8.1.2.2-1: Not essential. Stage 2 does not need to capture every Stage 3 detail. |
| vivo | Yes | For change 1, the version proposed by Swift is also acceptable.  For change 2, based on the following equation, the *Residual Risk* is the risk probability instead of the Probability of Onset which is defined per unit of time.  *P(Error > Bound for longer than TTA | NOT DNU) <= Residual Risk + IRallocation* (Equation 8.1.1a-1)  Besides, in the Table 8.1.2.1b-1: Mapping of Integrity Parameters, the Residual Risks includes both Probability of Onset and Mean Duration. |
| LG | Yes for 3  No for 2/4  Comment for 1 | For 1, fine to add note proposed by Swift Navigation.  For 3, integrity is needed to add on table.  For 2/4, they are not essential. |

# Discussion on R2-2300933

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| ***Reason for change:***  For pre-configured positioning measurement gap, the consensus is that gNB does not need to compulsively support the UL MAC CE to complete the feature, in addition, gNB can ignore the UL MAC CE that it does not support, so no explicit indication from gNB to UE on the support of UL MAC CE is needed. For a more clear view, the gNB’s behaviour on the pre-configured positioning MG should be captured as a note in the stage-2 specification.  ***Summary of change:***:  Add a note in Figure 7.7.2-1 step 6 to say that UL MAC CE is optionally supported by gNB, and if gNB does not support UL MAC CE, gNB should follow LMF-initiated pre-configured MG request.  ***Consequences if not approved:***  If the change is not approved, it is unclear of gNB’s behaviour in pre-configured measurement gap for positioning. |

The issue is related to the discussion on how to handle UL MAC CE request, which is discussed under at meeting offline discussion:

* [AT121][403][POS] Network control for MG activation/deactivation UL MAC CE (Ericsson)

Scope: Discuss the proposals in R2-2301303, R2-2301829, and R2-2301828 and conclude on the expected behaviour.

Intended outcome: Report and agreeable CR if necessary

Deadline: Wednesday 2023-03-01 1900 EET

And therefore no any proposal on this.

# Summary

Based on the input from companies, we have the following proposals: