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

Elbonia, 17 – 26 April 2023

**Agenda item: 6.7.1**

**Source: Nokia (Rapporteur)**

**Title: Offline [AT121bis-e][411] on Rel-17 Positioning Stage-2 CRs**

**WID/SID: NR\_pos\_enh-Core - Release 17**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report of the following email discussion:

* [AT121bis-e][411][POS] Rel-17 positioning stage 2 CRs (Nokia)

      Scope: Check the CRs from agenda item 6.7.1: R2-2302637 / R2-2302744 / R2-2302993 / R2-2304052 / R2-2304053 / R2-2304054.

      Intended outcome: Report and agreed CRs (without CB if possible)

      Deadline: Monday 2023-04-24 2359 UTC

Phase 1 deadline of Thursday 2023-04-20 12:00 PM UTC for all company comments.

Phase 2 deadline of Monday 2023-04-24 2359 UTC for final agreed CRs.

This offline email discussion covers the following Rel-17 positioning stage-2 CRs submitted to RAN2#121bis-e under agenda item 6.7.1:

1. R2-2302637 Miscellaneous corrections on 38.305 CATT CR Rel-17 38.305 17.4.0 0123 - F NR\_pos\_enh-Core
2. R2-2302744 Stage 2 procedure for deactivation of MG gap and PPW Intel Corporation draftCR Rel-17 38.305 17.4.0 F NR\_pos\_enh-Core
3. R2-2302993 Correction to UEPositioningAssistanceInformation Huawei, HiSilicon CR Rel-17 38.305 17.4.0 0124 - F NR\_pos\_enh-Core
4. R2-2304052 Update of information transfer from gNB to LMF Ericsson CR Rel-17 38.305 17.4.0 0125 - F NR\_pos\_enh-Core
5. R2-2304053 Measurements and Assistance Data Transfer Nokia, Nokia Shanghai Bell CR Rel-17 38.305 17.4.0 0126 - F NR\_pos\_enh-Core
6. R2-2304054 Protection Level and Target Integrity Risk Nokia, Nokia Shanghai Bell CR Rel-17 38.305 17.4.0 0127 - F NR\_pos\_enh-Core

# 2 Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| Nokia (Rapporteur) | Mani Thyagaraja | mani.thyagarajan@nokia.com |
| Swift Navigation | Grant Hausler | grant@swiftnav.com |
| Huawei, HiSilicon | Yinghao Guo | yinghaoguo@huawei.com |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

# 3 Discussion

CR in R2-2302637 [1] proposes two changes to TS 38.305:

1) A clarification that the UE can request the activation of pre-configured measurement gaps for DL-TDOA positioning, which is currently missing in the specification, and

2) An editorial correction to fix an incorrect figure number reference in clause 8.9.3.3.1.

The following shows the reason for change, summary of change and consequences if not approved from R2-2302637:

|  |  |
| --- | --- |
| ***Reason for change:*** | 1. For DL-TDOA positioning, UE can request to activate pre-configured measurement gaps, which is missed in the current spec.2. Wrong figure number in section 8.9.3.3.1. |
|  |  |
| ***Summary of change:*** | 1. Add the sentence “The UE may also request to activate pre-configured measurement gaps as described in clause 7.7.2.” in section 8.12.1.2. Modify the figure number 8.9.3.3-1 as 8.9.3.3.1-1. |
|  |  |
| ***Consequences if not approved:*** | The stage 2 description is unclear. |

**Question 1**: Do you agree with the two changes in the CR in R2-2302637? Please indicate in the Technical Arguments column any comments you may have. If you only partially or conditionally agree with the CR, please elaborate.

|  |
| --- |
| Answers to Question 1 |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSilicon | Yes | OK to have, but not quite essential |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Summary 1**: TBD.

**Proposal 1**: TBD.

CR in R2-2302744 [2] introduces two new procedures in TS 38.305 viz. Deactivation of Pre-configured Measurement Gap procedure and Deactivation of PRS Processing Window procedure.

The following shows the reason for change, summary of change and consequences if not approved from R2-2302744:

|  |  |
| --- | --- |
| ***Reason for change:*** | Currently for Pre-configured Measurement Gap (Clause 7.7) and Pre-configured PRS processing window (Clause 7.8), the procedure for deactivation is missing. In RAN2#121, RAN2 discussed whether a separate deactivation procedure should be added or we add deactivation together with activation procedure. Separate deactivation procedure is cleaner than combining the procedures. Therefore the CR is based on separate deactivation procedure.  |
|  |  |
| ***Summary of change:*** | 1 in 7.7 Add deactivation procedure for Pre-configured Measurement Gap. 2 in 7.8 Add deactivation procedure for PRS processing window.  |
|  |  |
| ***Consequences if not approved:*** | Missing functional behaviour description in stage 2.  |

**Question 2**: Do you agree with the changes in the CR in R2-2302744? Please indicate in the Technical Arguments column any comments you may have. If you only partially or conditionally agree with the CR, please elaborate.

|  |
| --- |
| Answers to Question 2 |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSIlicon | Yes | OK to add the description to make it complete |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Summary 2**: TBD.

**Proposal 2**: TBD.

CR in R2-2302993 [3] updates the UE Positioning Assistance Information procedure to clarify that the timing error margin value for UE Tx TEGs is also reported in the RRC UE Positioning Assistance Info message but only one timing error margin value is reported in each instance of the message.

The following shows the reason for change, summary of change and consequences if not approved from R2-2302993:

|  |  |
| --- | --- |
| ***Reason for change:*** | Apart from the associate between the UL-SRS resources for positioning and the UE Tx TEG ID, the margin values can also be reported via Positioning Assitance Information message. This information should be added to clause 7.4.11.2 of TS 38.305.The reason is that the margin value for UE Tx TEG may affect the reporting of Positioning Assitance Information message. Since each message can only report a single margin value, multiple Positioning Assitance Information messages may be required for each reporting when there are different margin values for the UE Tx TEGs.  |
|  |  |
| ***Summary of change:*** | Add in the UE Positioning Assistance Information procedure that the margin values for UE Tx TEGs can be reported, and each message can only report a single margin value.  |
|  |  |
| ***Consequences if not approved:*** | The description for UEPositioningAssistanceInformation is incomplete. |

**Question 3**: Do you agree with the changes in the CR in R2-2302993? Please indicate in the Technical Arguments column any comments you may have. If you only partially or conditionally agree with the CR, please elaborate.

|  |
| --- |
| Answers to Question 3 |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSilicon | Yes |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Summary 3**: TBD.

**Proposal 3**: TBD.

CR in R2-2304052 [4] proposes two changes to TS 38.305:

1) Adds “SRS Transmission Status” to the table containing UE configuration data, that may be transferred from serving gNB to the LMF for Multi-RTT, UL-TDOA and UL-AoA positioning. This is to align TS 38.305 with TS 38.455.

2) Corrects the UL information Delivery operation from the serving gNB to the LMF, for Multi-RTT, UL-TDOA and UL-AoA positioning to show that the POSITIONING INFORMATION UPDATE message provides an update in SRS transmission status rather than an indication that the SRS configuration has been released.

The following shows the reason for change, summary of change and consequences if not approved from R2-2304052:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Reason for change:*** | Currently TS 38.305 mentions that gNB informs to LMF regarding the UE UL SRS configuration release. However, the stage3 TS 38.455 does not support such configuration release information from gNB to LMF. Hence, this needs to be corrected.However, TS 38.455 in v17.4.0 the below information has been added If the *SRS Transmission Status* IE is included in the POSITIONING INFORMATION UPDATE message and set to "stopped", the LMF shall consider that the SRS transmission has stopped.

|  |  |  |  |
| --- | --- | --- | --- |
| SRS Transmission Status | O |  | ENUMERATED (stopped, ...) |

 |
|  |  |
| ***Summary of change:*** | The information transfer from gNB to LMF has been updated to include*SRS Transmission Status* and positioning information update from gNB to LMF has been corrected. |
|  |  |
| ***Consequences if not approved:*** | Incomplete and Incorrect specification |

**Question 4**: Do you agree with the two changes in the CR in R2-2304052? Please indicate in the Technical Arguments column any comments you may have. If you only partially or conditionally agree with the CR, please elaborate.

|  |
| --- |
| Answers to Question 4 |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSiicon | Yes | OK to have since R3 has already agreed on this |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Summary 4**: TBD.

**Proposal 4**: TBD.

CR in R2-2304053 [5] proposes the following changes to TS 38.305:

1) Change 1: Clarifies that for UL-AoA positioning, either A-AoA or Z-AoA or both can be used.

2) Changes 2 and 3: Updates step 2 of the LMF-initiated Location Information Transfer procedure, for both DL-AoD and DL-TDOA positioning, and generalize the measurements used as DL-AoD measurements and DL-TDOA measurements, instead of listing all individual measurements that are used.

3) Change 4: Clarifies the Assistance Data Transfer procedure for Multi-RTT, DL-AoD and DL-TDOA positioning, the UE behaviour when the received TRP assistance data is not already stored in the UE.

The following shows the reason for change, summary of change and consequences if not approved from R2-2304053:

|  |  |
| --- | --- |
| ***Reason for change:*** | **Measurements related:**1. For UL-AoA positioning, the measurements listed in Section 4.3.15 and Section 8.14.1 are not aligned. Also, in 4.3.15, it indicates that both A-AoA and Z-AoA must be used while in Table 8.14.2.2-1, azimuth and zenith (aka, elevation) angle of arrival is mentioned as an either or both possibilities.
2. For DL-AoD positioning, in step 2 of the LMF-initiated Location Information Transfer procedure in 8.11.3.1.3.1, only the DL-PRS-RSRP measurement is mentioned. DL-PRS-RSRPP measurement is also possible as shown in Table 8.11.2.2-1, but it is not mentioned. For ease of specification maintenance it is better to generalize the measurement used in the procedure section (and keep the list of measurements in the information transfer tables), as it is done for multi-RTT Location Information Transfer procedure.
3. For DL-TDOA positioning, in step 2 of the LMF-initiated Location Information Transfer procedure in 8.12.3.1.3.1, only DL RSTD and DL-PRS-RSRP measurements are mentioned but DL-PRS-RSRPP measurement is also possible as shown in Table 8.12.2.2-1, but it is not mentioned. For ease of specification maintenance it is better to generalize the measurement used in the procedure section (and keep the list of measurements in the information transfer tables), as it is done for multi-RTT Location Information Transfer procedure.

**Assistance Data Transfer for Multi-RTT, DL-AoD, DL-TDOA:**1. In the Assistance Data Transfer procedure for Multi-RTT, DL-AoD and DL-TDOA positioning, UE behaviour is unclear when it receives assistance data for a TRP for which the UE has no stored assistance data.
 |
|  |  |
| ***Summary of change:*** | 1. Section 4.3.15: Clarified that either A-AoA or Z-AoA or both can be used for UL-AoA positoning. Added UL-SRS-RSRP to align with Section 8.14.1. Clarified that zenith vertical angle is sometimes referred to as elevation.
2. Section 8.11.3.1.3.1: Updated step 2 to generalize the measurements as DL-AoD measurements (since Table 8.11.2.2-1 has the specific measurements listed in it).
3. Section 8.12.3.1.3.1: Updated step 2 to generalize the measurements as DL-TDOA measurements (since Table 8.12.2.2-1 has the specific measurements listed in it).
4. In Sections 8.10.3.1.2.1, 8.11.3.1.2 and 8.12.3.1.2 clarified that the UE stores the assistance data for the TRP for which it does not have stored information but continues to maintain the stored assistance data for other TRPs for which it already has information stored in the UE.
 |
|  |  |
| ***Consequences if not approved:*** | 1. Contradicting information remains in the specification about the angle measurement usage for UL-AoA positioning
2. Incomplete and contradicting information remains in the specification about the measurements to be used for DL-AoD positioning
3. Incomplete and contradicting information remains in the specification about the measurements to be used for DL-TDOA positioning
4. UE behaviour when it receives assistance data for a TRP for which the UE has no stored assistance data will remain ambiguous in the specification
 |

**Question 5**: Do you agree with the two changes in the CR in R2-2304053? Please indicate in the Technical Arguments column any comments you may have. If you only partially or conditionally agree with the CR, please elaborate.

|  |
| --- |
| Answers to Question 5 |
| Company | Yes/No | Technical Arguments |
| Huawei, HiSilicon | Yes, but | Not sure if there is definition of DL-AOD/DL-TDOA measurement.OK with the change on pre-configured PRS |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Summary 5**: TBD.

**Proposal 5**: TBD.

CR in R2-2304054 [6] proposes the following changes to TS 38.305:

1) Updates the definition of Protection Level a) by using the Bound term instead of Alert Limit (AL), b) simplifies the definition by removing the equation from the definition and c) corrects an error in the NOTE 2.

2) Adds a definition for Target Integrity Risk (TIR).

The following shows the reason for change, summary of change and consequences if not approved from R2-2304054:

|  |  |
| --- | --- |
| ***Reason for change:*** | 1. The definition for Protection Level (PL) references AL and TIR but there is no definition of AL or TIR in any normative specifications. AL can be described in terms of Bound which is a well defined term in 38.305. So, AL should be replaced by a generic text using the Bound terminology. There is also a sentence in the current definition of PL which says a specific equation for PL is not specified as it is implementation defined but the normative defintion of PL itself specifies an equation. The NOTE 2 needs a correction to say the PL, not the TIR, corresponds to the achievable TIR.
2. TIR is used in 37.355 and in the definition of PL and hence a definition for TIR must be added.
 |
|  |  |
| ***Summary of change:*** | 1. Removed reference to AL from the definition of PL and clarified the definition of PL by using the Bound terminology. Removed the equation from the definition of PL and removed the last sentence which talks about specific equation being implementation defined. NOTE 1 is removed for this reason and the NOTE 2 was renumbered and the error in the note was corrected.
2. Added a definition for TIR in the integrity principle of operation clause and described TIR using the terms ‘Error’, ‘Bound’, ‘DNU flag’ and ‘TTA’.
 |
|  |  |
| ***Consequences if not approved:*** | Definition of Protection Level will remain ambiguous. Lack of definition for Target Integrity Risk. |

**Question 6**: Do you agree with the two changes in the CR in R2-2304054? Please indicate in the Technical Arguments column any comments you may have. If you only partially or conditionally agree with the CR, please elaborate.

|  |
| --- |
| Answers to Question 6 |
| Company | Yes/No | Technical Arguments |
| Swift Navigation | No | **PL:** the proposed changes fundamentally misinterpret the Integrity Principle of Operation. Bounds and PL are different concepts - PL covers the overall positioning error; Bounds are for individual errors components (as defined in 8.1.1a). Equations/algorithms for quantifying the PL from the Bounds are implementation-defined. Furthermore, the PL (as defined in Stage 2) is an inequality showing the relationship between parameters, it is not an algorithm for solving the inequality. NOTE 1 clarifies how to interpret the PL inequality if no AL information is provided. PL inequality has been agreed ever since the study phase.**TIR:** In NOTE 2, this is mostly semantics. TIR and PL can be used interchangeably within the context of this NOTE but we prefer to use TIR for consistency with the field definition for *integrityInfo* in 37.355: OK to add the TIR definition but it needs to be per unit of time, i.e:**Target Integrity Risk (TIR):** The probability per unit of time that the Error exceeds the Bound without issuing a DNU flag within the TTA. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Summary 6**: TBD.

**Proposal 6**: TBD.

# 4 Conclusion

TBD.