3GPP TSG-RAN WG2 Meeting #131***R2-25xxxxx***

Bengaluru, India, August 25-29, 2025

**Agenda item:** 8.1.1

**Source:** Qualcomm Incorporated (Rapporteur)

**Title:** Summary of [POST130][025][AI PHY] 37.355 CR (Qualcomm)

**Document for:**  Discussion

# 1. Introduction

This document summarizes the LPP Running CR email discussion.

* [POST130][025][AI PHY] 37.355 CR (Qualcomm)

Intended outcome: agree to CR and open issues list and inputs

Deadline: long

Companies are invited to provide their comments on the running CR "R2-250xxxxx\_(Running CR 37355-i40)\_v02" located in the 'docs' sub-folder for this email discussion in the Table in Section 4 below.

Companies are invited to provide comments by **1st August 2025.**

NOTE: A parallel discussion is undertaken for the LPP open issues list in 'R2-25xxxxx\_([POST130][025][AI PHY] LPP Open issues Discussion)' which is in the same email discussion folder as this document.

# 2. Contact Information

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| --- | --- |
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# 3. Summary of updates in \_v02 of LPP Running CR

## 3.1 RAN2 Agreements

The RAN2 agreements from RAN2#130 are implemented in 'R2-250xxxxx\_(Running CR 37355-i40)\_v02' per the open issues list in 'R2-25xxxxx\_([POST130][025][AI PHY] LPP Open issues Discussion)':

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Issue | | RAN2 Agreement | Status | Action |
| LPP#1 | Applicability of *dl-PRS-ResourcePrioritySubset* | The field dl-PRS-ResourcePrioritySubset in IE NR-DL-PRS-Info should be ignored for NR AI/ML positioning. Remove corresponding 'Editor's Note' from the running CR. | Closed | Updated in \_v02 of running CR |
| LPP#5 | Applicability of NR-On-Demand-DL-PRS-Configurations-Selected-IndexList | The IE NR-On-Demand-DL-PRS-Configurations-Selected-IndexList is also applicable to NR AI/ML positioning Case 1. The corresponding Editor's Notes in clause 6.4.3, 6.5.10.1, and 6.5.11.1 can be removed. | Closed | Updated in \_v02 of running CR |
| LPP#6 | Applicability of *NR-PRU-DL-Info* | [LPP-6] The IE NR-PRU-DL-Info is also applicable to NR AI/ML positioning Case 1. The corresponding Editor's Notes in clause 6.4.3 can be removed. FFS if more PRUs are needed to be included for training purposes | Closed.  The FFS is captured as new issue #6a. | Updated in \_v02 of running CR |
| LPP#7 | Applicability of *NR-SelectedDL-PRS-IndexList* | NR-SelectedDL-PRS-IndexList is applicable to AI/ML positioning Case 1. | Closed | Updated in \_v02 of running CR |
| LPP#13 | Location server error causes | Reuse the existing NR-DL-TDOA-LocationServerErrorCauses structure for AI/ML positioning Case 1, and do not introduce additional error causes in NR-DL-AI-ML-LocationServerErrorCauses. | Closed | No additional LPP impacts. |
| LPP#14 | Target device error causes | Introduce ‘DL AIML positioning not available’ as new target device error cause for AI/ML positioning case 1, to indicate UE cannot perform positioning method (e.g. model not available and performance monitoring outcome not available). | Closed | Updated in \_v02 of running CR. |
| LPP#15 | Applicability of Positioning Integrity to AI/ML positioning | (LPP-15) positioning Integrity is supported for AI/ML positioning Case 1 | Closed | No additional LPP impacts. |
| LPP#16 | Signalling of Monitoring Outcome | No new LPP message is introduced for performance monitoring purposes | Closed | No additional LPP impacts. |
| LPP#17 | Signalling of "ground-truth label" information | (LPP-17): A target UE can obtain the "ground-truth label" information via existing MO-LR procedures. No additional RAN2 specification impacts are foreseen | Closed | No additional LPP impacts. |

## 3.2 RAN1 Agreements

At RAN1#121, additional agreements for Case 1 were made (see [R1-2504893](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_121/Docs/R1-2504893.zip), "Session notes for 9.1 (AI/ML for NR Air Interface)", Ad-Hoc Chair (CMCC)):

|  |
| --- |
| Working Assumption  For AI/ML based positioning Case 1, regarding info #7 in the assistance information from legacy UE-based DL-TDOA, it can be provided as in legacy UE-based DL-TDOA or implicitly.  Agreement  Above Working Assumption is confirmed. |

Since the current version of the running CR includes all assistance data from UE-based DL-TDOA (but still FFS (i.e., with Editor's Note)), the above agreement has no additional impacts to the LPP running CR.

For the "implicit" provisioning of info#7 in the agreement above, RAN1 made the following additional agreement:

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| --- |
| Agreement  For AI/ML based positioning Case 1, regarding Info #7 in the assistance information from legacy UE-based DL-TDOA,   * If implicitly provided, the implicit indication of Info #7 is via associated ID.   + For given TRP(s), same associated ID implies that geographical coordinates of the TRP(s) can be understood as consistent by the UE.   + The associated ID is not expected to provide the real value of Info #7 (i.e., geographical coordinates of the TRP(s) are not disclosed).   + an associated ID is configured per-cell (e.g., NCGI-r15)     - UE does not expect to receive different values of associated ID for TRPs belonging to the same NCGI-r15   + Associated ID can be realized by an identifier of N bits (e.g., 8 bits) |

An ASN.1 skeleton for the above agreement (which can be further completed when additional RAN1 input is received) is proposed in IE *NR-TRP-ImplicitLocationInfo*, which is included in IE *NR-PositionCalculationAssistance*. A corresponding bit is added in *NR-DL-AIML-RequestAssistanceData-r19* (*nr-PositionCalculationAssistanceReq-r19*) and *NR-DL-AIML-ProvideCapabilities-r19* (*nr-PosCalcAssistanceSupport-r19*).

# 4. Comments Collection on Running LPP CR

Please provide your comments on "R2-250xxxxx\_(Running CR 37355-i40)\_v02" located in the 'docs' sub-folder in the Table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Company | Clause/IE | Comments | Proposed Change (if any) | Rapporteur Comments |
| vivo | 6.4.3/*NR-TRP-ImplicitLocationInfo* | 1. RAN1 has agreed that “an associated ID is configured per-cell (e.g., *NCGI-r15*): UE does not expect to receive different values of associated ID for TRPs belonging to the same *NCGI-r15*”. In this sense, the implicit location info of involved TRPs is expected to be transferred per-cell granularity, i.e., within one cell, UE is not expected to receive different *nr-AIML-AssociatedID* associated to different dl-PRS-ID. 2. 2. From our understanding RAN1 agreement is not about how to identify TRP location, with no touch to ARP location. Whether to include the antenna reference points of the TRP may require some evaluation by RAN1. 3. 3. The last sentence seems to beyond RAN1 agreement. The restrictive condition of “only when” is not referred by RAN1. Keeping the wording of agreement is more preferable. | ***nr-AIML-AssociatedID***  This field provides an identity associated with the coordinates of the indicated TRP(s) from a cell. When the coordinates of the indicated TRP(s) has changed, the value of the *nr-AIML-AssociatedID* is being changed. |  |
| Huawei, HiSilicon | Clause 6.4.3  IE NR-TRP-ImplicitLocationInfo | NR-AIML-AssociatedID-r19 ::= SEQUENCE {  -- FFS  }  According to RAN1#121 minutes, RAN1 agreed that: Associated ID can be realized by an identifier of N bits (e.g. 8 bits). So the value can be 8 bits for now. | The value of the NR-AIML-AssociatedID-r19 IE can be: INTEGER (0..255) |  |
| Huawei, HiSilicon | Clause 6.4.3  IE NR-TRP-ImplicitLocationInfo | I am not sure about the need of the last sentence. It is up to UE implementation how to use this associated ID, so there is no strong need tomention each UE implementation.  ***nr-AIML-AssociatedID***  This field provides an identity associated with the coordinates of the indicated TRP and coordinates of all the antenna reference points of this TRP. When the coordinates of the indicated TRP and/or coordinates of any of the antenna reference points of this TRP has changed, the value of the *nr-AIML-AssociatedID* is being changed. A target device may use a trained AI/ML model for inference only when the value of the *nr-AIML-AssociatedID* of the provided *NR-DL-PRS-AssistanceData* is the same as the corresponding value used when training the AI/ML model. | Remove the following text from the field description of ***nr-AIML-AssociatedID***:  A target device may use a trained AI/ML model for inference only when the value of the *nr-AIML-AssociatedID* of the provided *NR-DL-PRS-AssistanceData* is the same as the corresponding value used when training the AI/ML model. |  |
| Ericsson | Clause 6.4.3  IE NR-TRP-ImplicitLocationInfo | ***nr-AIML-AssociatedID***  This field provides an identity associated with the coordinates of the indicated TRP and coordinates of all the antenna reference points of this TRP. When the coordinates of the indicated TRP and/or coordinates of any of the antenna reference points of this TRP has changed, the value of the *nr-AIML-AssociatedID* isupdated. | Agree with Huawei that above highlighted text is not needed. Also agree with vivo that we can limit it to how RAN1 has specified on TRP level and not on ARP level. |  |
| Ericsson | Clause 6.4.3  IE – NR-PositionCalculationAssistance | nr-TRP-ImplicitLocationInfo-r19 NR-TRP-ImplicitLocationInfo-r19 OPTIONAL -- Need ON | Field Description of nr-TRP-ImplicitLocationInfo-r19 is missing |  |
| Ericsson | Clause 6.4.3  IE – NR-PositionCalculationAssistance | | *NR-PositionCalculationAssistance* field descriptions | | --- | | ***nr-TRP-LocationInfo***  This field provides the location coordinates of the TRPs and location coordinates of antenna reference points for DL-PRS Resource Set(s) and DL-PRS Resources of the TRPs. | | We should add note in this field description to clarify that for AI/ML this field for inference purpose may not be provided and instead nr-TRP-ImplcitLocationInfo field may be provided. |  |
| Ericsson | Open Issue  RAN1 Agreements | Agreement  **(RAN#120)**   * For training data collection of AI/ML based positioning 3a/3b, if Part A and Part B are generated by different entities, for pairing between a Part A entry and a Part B entry, the following is needed: * The time stamp of Part A (if Part A is transmitted) and the time stamp of Part B (if Part B is transmitted). * FFS: other information is not precluded (e.g., if Part B is valid for a duration)   Note: Purpose such as “training data collection” will not necessarily be specified in RAN1 specifications. | We see that there are certain RAN1 agreements that needs discussion on whether there is further RAN2 spec impacts. One of the RAN1 agreement from RAN1#120 is provided here. |  |
| Ericsson | AI/ML capability discussion open issue | To speed up method selection; the capabilities are stored in AMF and retrieved by LMF. The AI/ML capability is associated with certain TRPs (implicit associate ID or explicit); this info should be part of capabilities as well and can be stored in AMF so that AI/ML method related AD can be provided efficiently. |  |  |
| CATT | Clause 6.4.3  IE NR-TRP-ImplicitLocationInfo | Agree with Vivo and Huawei that the last sentence of ***nr-AIML-AssociatedID*** field description should be removed since it is UE implementation.  But we do not think the “coordinates of all the antenna reference points of this TRP” should be removed. The description should be aligned with the limitation in legacy Info#7 to limit the change condition of associated ID(s):   |  | | --- | | Geographical coordinates of the TRPs served by the gNB (include a transmission reference location for each DL-PRS Resource ID, reference location for the transmitting antenna of the reference TRP, relative locations for transmitting antennas of other TRPs) |   Furthermore, the TRPs corresponding to the same cell could have the same associated ID. The associated ID should be changed if any of the coordinates of TRPs or antenna reference points changed. | ***nr-AIML-AssociatedID***  This field provides an identity associated with the coordinates of the indicated TRP(s) of a cell and coordinates of all the antenna reference points of ~~this TRP~~ these TRP(s). When the coordinates of the indicated TRP(s) and/or coordinates of any of the antenna reference points of ~~this TRP has~~ these TRP(s) have changed, the value of the *nr-AIML-AssociatedID* is being changed. ~~A target device may use a trained AI/ML model for inference only when the value of the~~ *~~nr-AIML-AssociatedID~~* ~~of the provided~~ *~~NR-DL-PRS-AssistanceData~~* ~~is the same as the corresponding value used when training the AI/ML model.~~ |  |
| CATT | Clause 6.5.13.1  IE NR-DL-AIML-ProvideAssistanceData | ***nr-AI-ML-Positioning-Error***  The field description should align with the field name “nr-DL-AIML-Positioning-Error” in ASN | ***nr-DL-AIML-Positioning-Error*** |  |
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| Apple | Clause 6.4.3  IE NR-TRP-ImplicitLocationInfo | 1. Similar view as CATT that RAN1 intention on associated ID is to cover same information as existing info#7, which already includes ARP location. So, we understand it is just RAN1 agreement wording issue to only use TRP. Thus, we support Rapp to keep the wording on ARP location. 2. We think there is still some misalignment from RAN1 agreement:    1. an associated ID is configured per-cell (e.g., NCGI-r15)       1. UE does not expect to receive different values of associated ID for TRPs belonging to the same NCGI-r15   In our understanding, the highlighted agreement is intended to avoid the case that on TRP is associated with different associated IDs in same cell (e.g. TRP 5 in below figure). Thus, it should be covered in the filed description. Otherwise, the UE behavior in this case is unspecified. | ***nr-AIML-AssociatedID***  This field provides an identity associated with the coordinates of the indicated TRP and coordinates of all the antenna reference points of this TRP. When the coordinates of the indicated TRP and/or coordinates of any of the antenna reference points of this TRP has changed, the value of the *nr-AIML-AssociatedID* is being changed. ~~A target device may use a trained AI/ML model for inference only when the value of the~~ *~~nr-AIML-AssociatedID~~* ~~of the provided~~ *~~NR-DL-PRS-AssistanceData~~* ~~is the same as the corresponding value used when training the AI/ML model.~~ One TRP can’t be configured with different values of *nr-AIML-AssociatedID* in the same cell. |  |
| Apple | Clause 6.4.3  IE NR-PositionCalculationAssistance | We think it is necessary to clarify that *nr-TRP-ImplicitLocationInfo-r19* can be present only when *nr-TRP-LocationInfo-r16* is absent. Otherwise, the UE behaviour is ambiguous with both explicit TRP location info and implicit TRP location are provided by NW. | Add below field description:  ***nr-TRP-ImplicitLocationInfo***  This field provides the implicit information on location coordinates of the TRPs and location coordinates of antenna reference points for DL-PRS Resource Set(s) and DL-PRS Resources of the TRPs. This field is present only when *nr-TRP-LocationInfo-r16* is absent. |  |
| Nokia | Clause 6.4.3  IE NR-PositionCalculationAssistance | *nr-TRP-ImplicitLocationInfo-r19* is AIML positioning specific and not used for other UE-based positioning methods. Also, agree with Apple’s comment that both explicit and implicit location info of TRPs is not expected to be signalled together. However, which one is used is a network implementation choice. | Either make *nr-TRP-ImplicitLocationInfo-r19* a conditional field for DL-AIML only or add a field description and put a restriction that in Rel-19 this field is applicable only for DL-AIML. Also, clarify that LMF only uses either explicit or implicit location info of TRPs either as guidance for NW implementation or as a UE assumption. |  |
| Nokia | Clause 6.4.3  IE NR-TRP-ImplicitLocationInfo | IE naming suggestion to keep a common prefix part for both explicit and implicit location info of TRP which comes in handy while searching for related information. | Prefer to rename NR-TRP-ImplicitLocationInfo to NR-TRP-LocationInfo-Implicit |  |
| Nokia | Clause 6.4.3  IE NR-TRP-ImplicitLocationInfo | The term “associated TRP” is already used in 37.355 but now it is also used in the context of AIML positioning which makes the term ambiguous. In the dl-PRS-ID field in IE NR-TRP-ImplicitLocationInfo, does associated TRP refer to the TRP associated between training and inference or what? Taken together with the associated-DL-PRS-ID, this term “associated TRP” is now more confusing! | Remove “associated” from field description. Otherwise, we need a description somewhere to say what associated TRP means. |  |
| Nokia | Clause 6.4.3  IE NR-TRP-ImplicitLocationInfo | In the field description of nr-AIML-AssociatedID:  The following sentence is not clear: “When the coordinates of the indicated TRP and/or coordinates of any of the antenna reference points of this TRP has changed, the value of the nr-AIML-AssociatedID is being changed” | Did you mean to say the following?  “The value of the nr-AIML-AssociatedID is changed if/when the coordinates of the TRP and/or coordinates of any of the antenna reference points of this TRP is changed”.  If my understanding is correct, please clarify the text further. |  |
| Nokia | Clause 6.4.3  IE NR-TRP-ImplicitLocationInfo | In the field description of nr-AIML-AssociatedID, the following sentence is difficult to comprehend:  “A target device may use a trained AI/ML model for inference only when the value of the nr-AIML-AssociatedID of the provided NR-DL-PRS-AssistanceData is the same as the corresponding value used when training the AI/ML model” | Suggest rephrasing the text as follows:  “A target device may use a trained AI/ML model for inference only when the value of the nr-AIML-AssociatedID of the TRPs provided in NR-DL-PRS-AssistanceData during training and inference phases have the same value.” |  |
| Nokia | Clause 6.5.13.1  IE NR-DL-AIML-ProvideAssistanceData | Field nr-PositionCalculationAssistance-r19 should be a conditional field used for UE-based positioning. | Add -- Cond UEB since Case 1 is UE-based. Maintain the order of appearance of fields as in legacy IE. |  |
| Nokia | Clause 6.5.13.2  IE NR-DL-AIML-RequestAssistanceData | Why is nr-AdType not included like for other UE-based methods? | Specify a bit string with only posCalc for case 1 in Rel-19 but allow future additions for UE-assisted methods. We prefer to following the existing ASN.1 structure for UE-based methods. |  |
| Nokia | Clause 6.5.13.2  IE NR-DL-AIML-RequestAssistanceData | For consistency reasons align the field names to match similar IE/fields for legacy methods. | Req’ should be expanded as ‘Request’. Also, the order of appearance of the fields in the IE should align with legacy IEs for consistency reasons. The field nr-DL-PRS-ExpectedAoD-or-AoA-Req -r19 should appear after nr-on-demand-DL-PRS-Req-r19.  nr-PositionCalculationAssistanceReq should be nr-PosCalcAssistanceRequest-r19. |  |
| Nokia | Clause 6.5.13.3  IE NR-DL-AIML-ProvideLocationInformation | Add a field description for nr-DL-AIML-LocationInformation -r19 and clarify that in Rel-19 this is just a position estimate and not measurements. |  |  |
| Nokia | Clause 6.5.13.4  IE NR-DL-AIML-LocationInformation | RAN2 agreement says the time stamp is to be included in the common IE for ProvideLocationInformation. |  |  |
| Nokia | Clause 6.5.13.6  IE NR-DL-AIML-ProvideCapabilities | For ten-ms-unit-ResponseTime-r19 and scheduledLocationRequestSupported-r19, in the future we may support other positioning modes for AIML positioning. | Define it for forward compatibility but clarify that in Rel-19 only UE-based mode is applicable for AIML positioning. |  |
| Nokia | Clause 6.5.13.6  IE NR-DL-AIML-ProvideCapabilities | nr-PosCalcAssistanceSupport-r19:  If UE supports explicit location info of TRPs (trpLocSup) the UE must also support implicit location info of TRPs because, whether TRP location info is revealed or not is a network implementation choice. NW assumes UE shall support implicit location info of TRPs if the UE indicated support for explicit location info of TRPs (trpLocSup) |  |  |
| Nokia | Clause 6.5.13.6  IE NR-DL-AIML-ProvideCapabilities | Field renaming suggestions. | Rename nr-On-Demand-DL-PRS-Support-r19 to nr-DL-AIML-On-Demand-DL-PRS-Support.  Rename nr-OnDemandPRS-ForBWA-Support-r19 to nr-DL-AIML-OnDemandPRS-ForBWA-Support. |  |
| Nokia | Clause 6.5.13.6  IE NR-DL-AIML-ProvideCapabilities | Field description for periodicalReporting requires clarifications. Current text is also ambiguous and can be interpreted to mean that the UE can signal the CommonIEsRequestLocationInformation. | Clarify as part of field description that in Rel-19 this capability indicates the UE capability for periodic reporting of position estimate only since Case 1 is about UE-based DL AI/ML positioning.  Change the second sentence as follows: “If this field is absent, the target device does not support periodicalReporting in CommonIEsRequestLocationInformation from the location server” |  |
| Nokia | Clause 6.5.13.6  IE NR-DL-AIML-ProvideCapabilities | Field description for periodicReportingIntervalMsSupport needs clarifications. | Add “from the location server” after the text “in IE CommonIEsRequestLocationInformation” |  |
| Nokia | Clause 6.5.13.6  IE NR-DL-AIML-ProvideCapabilities | Field description for nr-los-nlos-AssistanceDataSupport needs clarification. | Update the second bullet text as follows:  “granularity indicates whether the target device supports the granularity for nr-los-nlos-indicator in IE NR-DL-PRS-ExpectedLOS-NLOS-Assistance of 'per-trp', 'per-resource', or both”  Also, add an FFS to decide whether this capability is conditional upon other capabilities, similar to that shown for DL-TDOA and DL-AoD positioning. |  |
| Nokia | Clause 6.5.13.6  IE NR-DL-AIML-ProvideCapabilities | Field description for nr-On-Demand-DL-PRS-Support and nr-OnDemandPRS-ForBWA-Support needs clarification. | Change as follows:  “indicates that the target device supports on-demand DL-PRS requests for NR DL AI/ML positioning”  “indicates that the target device supports on-demand DL-PRS request for bandwidth aggregation for NR DL AI/ML positioning” |  |
| Nokia | Clause 6.5.13.7  IE NR-DL-AIML-RequestCapabilities | IE description could be improved. I know the text here is coming from existing descriptions in the spec. | TP suggestions:  “The IE NR-DL-AIML-RequestCapabilities is used by the location server to request the target device it’s capability to support NR DL AI/ML positioning and to request other NR DL AI/ML positioning capabilities from a target device”  OR  “The IE NR-DL-AIML-RequestCapabilities is used by the location server to request the capability of the target device to support NR DL AI/ML positioning method and to request other NR DL AI/ML positioning capabilities from a target device” |  |
| Nokia | Clause 6.5.13.7  IE NR-DL-AIML-RequestCapabilities | Why the Editor’s Note for FFS? Typically, none of the other method’s RequestCapabilities IE have any other information in it. |  |  |
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