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

Electronic Meeting, May 9th – 20th, 2022

**Agenda item:** 6.11.2.6

**Source:** CATT

**Title:** [Pre118-e][607][POS] Summary of AI 6.11.2.6 on accuracy (CATT)

**Document for:**  Discussion

# 0. Introduction

This document provides a summary of contributions [1] – [22] submitted to AI 6.11.2.6 "Accuracy enhancements".

1. R2-2204696 Discussion on R17 positioning enhancement impacts on stage-2 specification CATT discussion Rel-17 NR\_pos\_enh-Core
2. R2-2204697 Introduction of R17 NRPPa related positioning enhancement to TS38.305 CATT CR Rel-17 38.305 17.0.0 0091 - F NR\_pos\_enh-Core
3. R2-2204698 [Draft] LS to RAN3 on introduction of R17 NRPPa related positioning enhancement to TS38.305 CATT LS out Rel-17 To:RAN3
4. R2-2204705 Discussion on the LS on the framework of UE/TRP Rx TEG CATT discussion Rel-17
5. R2-2204706 Discussion on the left issues on UE TxTEG report in RRC and LPP protocols CATT discussion
6. R2-2204707 [C243] Correction on the UE TxTEG report in TS 38.331 CATT CR Rel-17 38.331 17.0.0 2994 - F NR\_pos\_enh-Core
7. R2-2204708 [C013][C014][C015][C016][C017]Corrections on the UE TxTEG report in TS 37.355 CATT CR Rel-17 37.355 17.0.0 0335 - F NR\_pos\_enh-Core
8. R2-2204987 [C011] Correction on the beam antenna information for DL-AoD CATT CR Rel-17 37.355 17.0.0 0336 - F NR\_pos\_enh-Core
9. R2-2205003 [H028] Correction to measurement with multiple TEGs Huawei, HiSilicon CR Rel-17 37.355 17.0.0 0338 - F NR\_pos\_enh-Core
10. R2-2205004 [H026][H027][H029][H030] Correction to LOS-NLOS indication Huawei, HiSilicon CR Rel-17 37.355 17.0.0 0339 - F NR\_pos\_enh-Core
11. R2-2205005 [H006][H040] Correction to adjacent beam assistance data Huawei, HiSilicon CR Rel-17 37.355 17.0.0 0340 - F NR\_pos\_enh-Core
12. R2-2205008 [H013] Correction to TRP beam antenna info Huawei, HiSilicon CR Rel-17 37.355 17.0.0 0343 - F NR\_pos\_enh-Core
13. R2-2205016 [H060] Correction on DL-AoD additional measurement Huawei, HiSilicon CR Rel-17 38.331 17.0.0 3033 - F NR\_pos\_enh-Core
14. R2-2205307 [H026][H029][Z004]Discussion on LOS NLOS indicator in LPP spec ZTE, Sanechips CR Rel-17 37.355 17.0.0 0344 - F NR\_pos\_enh-Core
15. R2-2205308 [Z003][H025]Signaling of measurement instances ZTE, Sanechips CR Rel-17 37.355 17.0.0 0345 - F NR\_pos\_enh-Core
16. R2-2205369 Discussion on the Periodic Tx TEG reporting and preconfigured MG Xiaomi discussion
17. R2-2205370 Remaining issues on positioning reference unit Xiaomi discussion
18. R2-2205582 Discussion on remaining issue about accuracy enhancements vivo discussion Rel-17 NR\_pos\_enh-Core
19. R2-2205654 On periodic UE Tx TEG reporting Apple discussion Rel-17 NR\_pos\_enh-Core
20. R2-2205730 Discussion on UE TX TEG association reporting InterDigital, Inc. discussion Rel-17
21. R2-2205806 Remaining Issues on TEG reporting; failure Handling Ericsson discussion Rel-17
22. R2-2205807 Update of signalling in stage 2 to align with NRPPa Ericsson CR Rel-17 38.305 17.0.0 0096 - B NR\_pos\_enh-Core
23. R2-2206051 [H026][H029][Z004]Discussion on LOS NLOS indicator in LPP spec ZTE, Sanechips CR Rel-17 37.355 17.0.0 0344 1 F NR\_pos\_enh-Core

The topics in this summary are organized as follows:

1. TxTEG report in RRC and LPP
2. DL-AoD related enhancement
3. LOS/NLOS related enhancement
4. Measurement report in LPP
5. Align the stage-2 specification to introduce the NRPPa enhancement

(6) PRU

# 1. TxTEG report in RRC and LPP

A UE may have multiple Tx/Rx RF chains (e.g., multiple Tx/Rx antenna panels):

* Different UE Tx/Rx RF chains may have different Tx/Rx timing errors
* Differentiation of the timing measurements from different Tx/Rx RF chains does not eliminate the impact of Tx/Rx timing errors

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| CATTR2-2204706 | Proposal 1: RAN2 to agree that the volume of UE TxTEG IDs report is designed as 64, i.e. the IE of maxNrOfTEG-ID-r17 in RRC message and maxTxTEG-Sets-r17 in LPP message is 64. And send the agreement to RAN1 and RAN4 for double confirming.Proposal 2: RAN2 to agree: - Delete the condition in nr-SRS-TxTEG-Set-r17 - Change the structure of NR-UE-RxTx-TEG-Info-r17 from choice to sequence- Delete the FFSs in NR-UE-RxTx-TEG-Info-r17 |
| CATTR2-2204707 | Correction on the UE TxTEG report in TS 38.331 |
| CATTR2-2204708  | Corrections on the UE TxTEG report in TS 37.355 |
| XiaomiR2-2205369  | Proposal 1: Keep the periodicity reporting of UE Tx TEG association for the SRS resources for positioning in the current TS 38.331 and no changes are needed. |
| vivoR2-2205582 | Proposal 1: Add an unchanged indication in UEPositioningAssistanceInfo to indicate that the Tx TEG association has not changed during the configured period. |
| AppleR2-2205654 | Observation 1: periodic UE Tx TEG association reporting signalling design is extremely inefficient. Observation 1: in their LS [1], RAN1 have confirmed that there is no need for periodic UE Tx TEG association reporting.Proposal 1: to remove the periodic UE Tx TEG association reporting and to introduce change-triggered reporting instead.Proposal 2: to remove timestamp from the UE Tx TEG association report. |
| InterDigitalR2-2205730  | Observation 1: By allowing the UE to report the association between UE Tx TEG and SRSp resources only when an event associated with the change of Tx TEG association is identified, signalling overhead can be reduced significantly Proposal 1: Support configuring event triggered reporting for UL-TDOA to enable reporting of the association between UE Tx TEG ID and SRSp resources when a change in the association is identified Proposal 2: Support configuring of reportAmount of 1 and infinity for event triggered reporting of UE Tx TEG association Observation 2: For event-triggered reporting, it is possible that the UE may report the Tx TEG association too frequently (e.g. due to frequent movement/changes at UE), which may result in difficulty at network for controlling the resources for reportingProposal 3: Support configuring reportInterval for event-triggered reporting of UE Tx TEG association. Proposal 4: The configurable reportInterval values for event-triggered reporting are reused from periodic reporting (e.g. ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240) |
| EricssonR2-2205806 | Proposal 1 Failure to provide (periodic) Rx/Tx TEG association does not result in termination of UL SRS Tx or DL-PRS MeasurementsProposal 2 UE provides the failure report on the corresponding Rx/Tx TEG association and continue with the positioning procedureProposal 3 Below TP on ASN.1 for RRC and LPP is agreed for TEG failure ReportingfailureIndication-r17 ENUMERATED {state-transition, lowpowerstate, unknown, spare1} OPTIONAL, |

Summary:

TxTEG report mechanism in RRC:

* InterDigital and Apple support configuring event triggered reporting to enable reporting of the association between UE Tx TEG ID and SRSp resources when a change in the association is identified. Furthermore, InterDigital supports configuring reportInterval for event-triggered reporting of UE Tx TEG association.
* Xiaomi support to keep the periodicity reporting of UE Tx TEG association as it is in TS38.331.
* vivo suggest to add an unchanged indication in UEPositioningAssistanceInfo to indicate that the Tx TEG association has not changed during the configured period.

Rapporteur’s comments:

* Event-triggered report or periodic report were discussed in[Pre117-e][611][POS] Open issues on positioning accuracy enhancements (CATT) but the periodic report gets more support.
* LMF actually may update the periodicRreporting Interval if there is no TxTEG change during the reporting, so there is no big signalling issue observed in the existing periodic reporting.

TxTEG report on asn.1 issues in RRC and LPP:

* CATT suggests the volume of UE TxTEG IDs report is designed as 64 in RRC and LPP and send an LS to RAN1 and RAN4 for confirm.
* CATT suggests deleting the condition of TxTEG, changing the structure of *NR-UE-RxTx-TEG-Info-r17* from choice to sequence, and deleting the FFSs in *NR-UE-RxTx-TEG-Info-r17* in LPP in CR R2-2204708.

Failure report mechanism Tx/Rx TEG in RRC and LPP:

* Ericsson introduces the failure report mechanism on the corresponding Rx/Tx TEG association in LPP and RRC.

**Proposals for discussion:**

*TxTEG report mechanism in RRC aspect:*

**Proposal 1a: RAN2 to agree configuring event triggered reporting for UL-TDOA to enable reporting of the association between UE Tx TEG ID and SRSp resources when a change in the association is identified.**

**Proposal 1b: RAN2 to agree update the asn.1 of UE-TxTEG-RequestUL-TDOA-Config-r17 as event triggered reporting in RRC as below:**

EventTriggerConfig-r17::= SEQUENCE {

 reportInterval-r7 ENUMERATED {ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240}

 reportAmount-r17 ENUMERATED {1, infinity},

 ...

}

*TxTEG report of asn.1 issues in RRC and LPP:*

**Proposal 1c: RAN2 to agree the max numbers of TEG-IDs in one RRC message and maxTxTEG-Sets-r17 in LPP message is 64. And send the agreement to RAN1 and RAN4 for confirmation.**

**Proposal 1d: RAN2 to agree the asn.1 update in LPP on UE TxTEG:**

**- Delete the condition in *nr-SRS-TxTEG-Set-r17***

**- Change the structure of *NR-UE-RxTx-TEG-Info-r17* from choice to sequence**

**- Delete the FFSs in *NR-UE-RxTx-TEG-Info-r17***

*Failure report mechanism Tx/Rx TEG in RRC and LPP:*

**Proposal 1e: RAN2 to discuss whether the failure report mechanism Tx/Rx TEG in RRC and LPP is essential correction and discuss the CR[R2-2205806] in detail via offline.**

# 2. DL-AoD related enhancement

2.1 beam antenna information for UE-based DL-AoD

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| CATTR2-2204987 | - Adding the reference TRP information within the TRP beam antenna information;- Change the presence of TRP beam antenna information to be optional present. |
| Huawei, HiSilicon R2-2205008 | 1/Remove FFS. Change the relative power value to align with RAN1 agreement: Introduce the new IE dBpowerValue to specify the relative power of the DL-PRS resource with a scale factor o f 1 and range from -30 to 0 dB. Introduce the new IE dBpowerValueFine to give a finer granularity of the relative power of the DL-PRS resource with a scale factor of 0.1 and range from 0 to 0.9 dB. 2/ Change the presence of nr-dl-prs-RelativePower from mandatory to optional, and add need code. 3/ Remove Editor’s Note. 4/ Clarify in the field description that in the first item of the list, the field relativePower should be absent. For the other items, the field is mandatory present |

Summary:

- CATT points out that in NRPPa, the reference TRP is defined within the beam antenna information provided from NG-RAN to LMF, which is used to identify the ID of the associated TRP from which the beam antenna information are adopted. And they propose that the LPP signalling should align with the NRPPa.

- Huawei, HiSilicon propose to update the power granularity of the relative power of the DL-PRS resource to align with RAN1 agreement. And they also point out that the first element in the *beamPowerList* is the (reference) peak power of the angle, which is defined as 0 dB and the relative power value is absent for this element.

Rapporteur’s comments:

- Reference TRP has already been introduced by RAN3 for signalling overhead, RAN2 should align with it.

- The current power granularity of the relative power of the DL-PRS resource in the LPP is not consistent with what has been agreed by RAN1, and RAN2 should update so as to align with the RAN1’s agreement.

- The LPP specification has updated by the rapporteur based on ASN.1 review of LPP in R2-2205829, and the corrections proposed by CATT and HW (except the correction that “in the field description that in the first item of the list, the field relativePower should be absent. For the other items, the field is mandatory present”) has already been captured correspondingly. Although the proposed changes are not the same, both work.

– *NR-TRP-BeamAntennaInfo*

The IE *NR-TRP-BeamAntennaInfo* is used by the location server to provide beam antenna information of the TRP.

-- ASN1START

NR-TRP-BeamAntennaInfo-r17 ::= SEQUENCE (SIZE (1..nrMaxFreqLayers-r16)) OF

 NR-TRP-BeamAntennaInfoPerFreqLayer-r17

NR-TRP-BeamAntennaInfoPerFreqLayer-r17 ::= SEQUENCE (SIZE (1..nrMaxTRPsPerFreq-r16)) OF

 NR-TRP-BeamAntennaInfoPerTRP-r17

NR-TRP-BeamAntennaInfoPerTRP-r17 ::= SEQUENCE {

 dl-PRS-ID-r17 INTEGER (0..255),

 nr-PhysCellID-r17 NR-PhysCellID-r16 OPTIONAL, -- Need ON

 nr-CellGlobalID-r17 NCGI-r15 OPTIONAL, -- Need ON

 nr-ARFCN-r17 ARFCN-ValueNR-r15 OPTIONAL, -- Need ON

 associated-DL-PRS-ID-r17 INTEGER (0..255) OPTIONAL, -- Need OP

 lcs-GCS-TranslationParameter-r17 LCS-GCS-TranslationParameter-r16 OPTIONAL, -- Need OP

 nr-TRP-BeamAntennaAngles-r17 NR-TRP-BeamAntennaAngles-r17 OPTIONAL, -- Need OP

 ...

}

NR-TRP-BeamAntennaAngles-r17 ::= SEQUENCE (SIZE(1..3600)) OF

 NR-TRP-BeamAntennaInfoAzimuthElevation-r17

NR-TRP-BeamAntennaInfoAzimuthElevation-r17 ::= SEQUENCE {

 azimuth-r17 INTEGER (0..359) OPTIONAL, -- Cond Az

 azimuth-fine-r16 INTEGER (0..9) OPTIONAL, -- Need ON

 elevationList-r17 SEQUENCE (SIZE(1..1801)) OF ElevationElement-R17,

 ...

}

ElevationElement-R17 ::= SEQUENCE {

 elevation-r17 INTEGER (0..180) OPTIONAL, -- Cond El

 elevation-fine-r17 INTEGER (0..9) OPTIONAL, -- Need ON

 beamPowerList-r17 SEQUENCE (SIZE (2..maxNumResourcesPerAngle-r17)) OF

 BeamPowerElement-r17,

 ...

}

BeamPowerElement-r17 ::= SEQUENCE {

 nr-dl-prs-ResourceSetID-r17 NR-DL-PRS-ResourceSetID-r16 OPTIONAL, -- Need OP

 nr-dl-prs-ResourceID-r17 NR-DL-PRS-ResourceID-r16,

 nr-dl-prs-RelativePower-r17 INTEGER (0..30),

 nr-dl-prs-RelativePowerFine-r17 INTEGER (0..9) OPTIONAL, -- Need ON

 ...

}

-- ASN1STOP

**Proposals for discussion:**

**Proposal 2a: RAN2 to agree merge the CR [R2-2204987] and parts of CR[R2-2205008] to the LPP CR, i.e., add the reference TRP which shall be absent in case that the nr-TRP-BeamAntennaAngles is present, and update the power granularity of the relative power of the DL-PRS resource to align with RAN1 agreement.**

**Proposal 2b: RAN2 to agree the CR [R2-2205008] to clarify that the relative power value is absent for the first element in the beamPowerList.**

2.2 Adjacent beam assistance data for UE-assisted DL-AOD

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| Huawei, HiSilicon R2-2205005 | 1/ Remove the field. Add beam information to NR-DL-PRS-Info side-by-side with the field dl-PRS-ResourcePrioritySubset. Use a CHOICE to select between the two.2/ Clarify in the conditional presence tag that this field is only needed for DL-AoD. Clarify in the field description that, if the UE receives it for the other positioning method via indexing to the PRS configuration in DL-AoD, the UE should ignore the field. |

Summary:

- Huawei, HiSilicon propose to clarify that the PRS subset and PRS boresight information is only needed for UE-assisted DL-AoD, and include these information in the nr-DL-PRS-AssistanceData for the signalling overhead.

Rapporteur’s comments:

- Although the information of the TRP/PRS resource set/PRS resource can be reused, the boresight information will be repeated provided even such information is same across different TRPs. Thus from this perspective, the signalling benefit are not clear enough on the CR [11] to include the PRS boresight information within the nr-DL-PRS-AssistanceData.

- According to the CR, the PRS subset and PRS boresight cannot be present at the same time. But this seems to be conflicted with RAN1’s agreement.

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| **Agreement** For UE-assisted DL-AOD positioning method, to enhance the signaling to the UE for the purpose of PRS resource(s) reporting, the LMF may indicate in the assistance data (AD), one or both the following: * option 1: subject to UE capability, for each PRS resource, a subset of PRS resources for the purpose of prioritization of DL-AOD reporting:
	+ a UE may include the requested PRS measurement for the subset of the PRS in the DL-AoD additional measurements if the requested PRS measurement of the associated PRS is reported
		- The requested PRS measurement can be DL PRS RSRP and/or path PRS RSRP.
	+ UE may report PRS measurements only for the subset of PRS resources.
	+ Note: The subset associated with a PRS resource can be in a same or different PRS resource set than the PRS resource
* option 2: subject to UE capability, for each PRS resource, the boresight direction information.
* Note: Either case does not imply any restriction on UE measurement
* FFS: prioritization of the PRS resources and resource subsets to be measured
 |

**Proposals for discussion:**

**Proposal 2c: RAN2 to further discuss the CR [R2-2205005] with consideration on RAN1’s agreement that the PRS subset and PRS boresight can be configured at the same time for UE-assisted DL-AoD.**

2.3 Additional Measurement for DL-AoD

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| Huawei, HiSiliconR2-2205016 | 1. Introduce a new IE structure NR-DL-AoD-AdditionalMeasurementElement-r17 for the additional measurements for DL-AoD, so that both DL-PRS-RSRP and DL-PRS-RSRPP can be optional.2. Removed the fields with –r17 suffix from additional measurements corresponding to the Rel-16 IE.3. Added restriction that the additional measurements shall only be reported via either NR-DL-AoD-AdditionalMeasurementElement-r16 or NR-DL-AoD-AdditionalMeasurementElement-r17.4. Fixed the value of the constant maxAddMeasAoD-r17. |

Summary:

- Huawei, HiSilicon propose to update the measurement report information for DL-AoD according to LS R2-2204420 (issue 6).

Rapporteur’s comments:

- The CR aims to align with the RAN1’s agreement, i.e., for Rel-17 DL-AoD, the first RSRP measurement is mandatory, while the additional RSRP measurements and all the RSRPP measurements can be optional.

**Proposals for discussion:**

**Proposal 2d: RAN2 to agree the CR [R2-2205016] to update the measurement report information for DL-AoD according to LS R2-2204420 (issue 6), i.e., for Rel-17 DL-AoD, the first RSRP measurement is mandatory, while the additional RSRP measurements and all the RSRPP measurements are optional.**

# 3. LOS/NLOS related enhancement

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| Huawei, HiSiliconR2-2205004 | 1/ Use a choice structure to indicate whether the report is per TRP or per resource. When the CHOICE points to per TRP, all the measurements in the NR-DL-TDOA-AdditionalMeasurements should not include per resource measurement. when the CHOICE points to per resource, the nr-los-nlos-Indicator in NR-DL-TDOA-AdditionalMeasurements are optional2/ Add in the field descritpion that in spite of the request from the network in RLI, the UE can choose its LOS-NLOS reporting by TRP or by resource.3/ Change the name to nr-LOS-NLOS-IndicatorPerResource to differentiate it with the per TRP/perResource Indication4/ Remove the reference TRP in the field description. If clarification is needed from R1, send an LS. |
| ZTE, Sanechips R2-2205307R2-2206051 | 1/ Complete the LOS/NLOS indicator and its corresponding field description, including TRP specific/resource specific into it;2/ Delete the TRP specific/resource specific related signaling in the assistance data;3/ Add in the reporting field description that ‘a single value is reported when both multi-RTT and DL-TDOA are supported’. |

Summary:

* Huawei suggest updating to indicate whether the LOS-NLOS report is per TRP or per resource.
* Huawei suggest UE should be allowed to choose its own reporting mode of per TRP or pre resource report and does not have to follow the LMF’s request.
* Huawei suggest removing the reference TRP from the description of *nr-los-nlos-Indicator*.
* ZTE suggest completing the LOS/NLOS indicator and its corresponding field description, including TRP specific/resource specific.

Rapporteur’s comments:

* The existing data structure of measurement report already has supported per resource report. Because each measurement report is associated with DL-PRS resource id, and the additional measurement is also associated with DL-PRS resource id.
* The agreement in RAN1 parameter [R1-2202759] says:

• For DL-TDOA one LoS/NLoS indicator can be associated with each RSTD measurement performed with a target TRP and one LoS/NLoS indicator is associated with the RSTD measurement performed with a reference TRP

• For DL-TDOA one LoS/NLoS indicator can be associated with each target TRP and one LoS/NLoS indicator can be associated with the reference TRP in the measurement report

**Proposals for discussion:**

**Proposal 3a: RAN2 to discuss if the los/nlos indicator is designed as choice of per TRP or per resource in measurement report.**

NR-DL-TDOA-MeasElement-r16 ::= SEQUENCE {

nr-LOS-NLOS-Indicator-r17 CHOICE {

 perTRP LOS-NLOS-Indicator-r17,

 perResource LOS-NLOS-Indicator-r17

 } OPTIONAL,

**Proposal 3b: RAN2 to further discuss if the corrections in R2-2205004 and R2-2205307 are essential corrections via offline.**

# 4. Measurement report in LPP

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| CATTR2-2204705 | Proposal 1: The values of UE Rx TEG/ RxTx TEG wait for further LS from RAN4 in the potential impact on TS 37.355.Proposal 2: RAN2 reply an LS to RAN4 to notice that RAN2 wait for further notice of TEG exact values from RAN4. |
| Huawei, HiSilicon R[2-2205003](file:///E%3A%5CWORK%5C1%203GPP%5CMeeting%5CRAN2%20118-e%5C2%20During%5CDocs%5CR2-2205003.zip) | [H028] Correction to measurement with multiple TEGs:1/ Add TEG measurments for a single resource in the per resource measurement. |
| ZTE, Sanechips R2-2205308 | 1) Introduce measurement instance in the measurement report for DL-TDOA2) Introduce measurement instance in the measurement report for DL-AoD3) Introduce measurement instance in the measurement report for multi-RTT4) clarify that the reference TRP in DL-TDOA remains the same among all the measurement instances in a measurement report. |
| vivoR2-2205582 | Proposal 3: RAN2 to support the signalling for multiple measurement instances for each indicated positioning method in a measurement report. |

Summary:

* CATT suggests sending a reply LS to RAN4 to notice that RAN2 wait for further notice of TEG exact values from RAN4.
* Huawei suggest adding TEG measurements for a single resource in the per resource measurement.
* ZTE and vivo suggest the signalling for multiple measurement instances for each indicated positioning method in a measurement report which has been updated based on ASN.1 review of LPP in R2-2205829 by the LPP rapporteur.

Rapporteur’s comments:

* The structure of report of multi-RSTD per RxTEG in DL-TDOA analysis is:
	+ R16: Max 4 RSTD Per TRP

R17: Max 4 RSTD Per UERxTEG Per TRP

* + Note: the number of reported UERxTEG is required with the value [2, 3, 4, 6, 8] in MeasPRSwithDiffRxTEGs\_Request\_RSTD from LMF
	+ Note: 4 RSTD is defined as maxNumOf-RSTD-perPRSperRxTEG in RAN1 parameter table

So the max number of NR RSTD report is 32 ([4]\*[8]) in R17.

* + The existing LPP aligns with the agreement in RAN1.
* Few issues are observed in the CR R2-2205003:
	+ The AdditionalTEG-Measurements in *NR-DL-TDOA-AdditionalMeasurementElement-r16* in R2-2205003 should be a list of RSTD, not only one.
	+ The total number of RSTD in CR R2-2205003 is only 11, which doesn’t align with the RAN1 parameter list: “The maximum number of UE RxTEGs [for UE-assisted DL TDOA and/or Multi-RTT] [32]”.
* The RxTEG associated with measurement data structure has been proposed by CATT in R2-2200300, but the measurement structure of asn.1 has been compromised in R2-2202410 Report of [Pre117-e][611][POS] Open issues on positioning accuracy enhancements (CATT) after the email discussion.
* The multiple measurement instances from RAN1 have been supported within the timestamp in the existing asn.1 design.
* RAN1 will discuss the Maximum number of measurement instances in a report at RAN WG1 #109-e meeting after their pre-meeting discussion. RAN1 plans to define the Maximum number of measurement instances in a report, and include the number in the RRC parameter list.

**Proposals for discussion:**

**Proposal 4a: RAN2 to** **agree to reply an LS to RAN4 to notice that RAN2 wait for further notice of RxTEG exact values from RAN4.**

**Proposal 4b: RAN2 to agree the updates on measurement instances by LPP rapporteur and wait for the value of maximum number of measurement instances in a report from RAN1 later.**

**Proposal 4c: RAN2 to further discuss the CR [R2-2205003] via offline.**

# 5. Align the stage-2 specification to introduce the NRPPa enhancement

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| CATT R2-2204696R2-2204697R2-2204698 | Observation 1: The R17 NRPPa related positioning enhancement is not correctly captured in the positioning stage 2 specification currently. Proposal 1: By taking the draft CR in R2-2204697 as baseline, RAN2 to further discuss how to capture the NRPPa related positioning enhancement in the TS38.305.Proposal 2: RAN2 to agree to send an LS R2-2204698 along with the draft CR on TS38.305 [1] to RAN3, so as to ask them to confirm whether the R17 positioning related positioning enhancement is correctly captured.  |
| Ericsson R2-2205807 | Add the missing new signalling between gNB and LMF to align with NRPPa. |

Summary:

- CATT and Ericsson both propose to introduce the R17 NRPPa related positioning enhancement to the positioning stage 2 specification.

- Further, CATT also propose to send LS and the CR on introducing the R17 NRPPa related positioning enhancement to the positioning stage 2 specification to RAN3, and ask RAN3 to double confirm.

Rapporteur’s comments:

- The R17 NRPPa related positioning enhancement is lacked in the positioning stage 2 specification, which should be introduced so as to complete the work of the R17 positioning enhancement.

**Proposals for discussion:**

**Proposal 5a: RAN2 to further discuss on how to capture the** **R17 NRPPa related positioning enhancement via offline, based on the CR in R2-2204697 and R2-2205807.**

**Proposal 5b: RAN2 to further discuss whether to send LS on the stage-2 update to RAN3 for confirmation, and the LS in R2-2204698 can be taken as baseline if needed.**

# 6. PRU

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| XiaomiR2-2205370 | Proposal 1: Correction information from LMF to UE and antenna orientation information from PRU to LMF are not supported in Rel17.Proposal 2: The LMF acquires the knowledge of which UEs act as PRUs by OAM configuration or LPP provide capability message.Proposal 3: The LMF could indicate UE to report its known location and/or location based on PRS measurement when the LMF acquires the PRU location by LPP request location information message. |
| vivoR2-2205582 | Proposal 2: RAN2 to postpone the PRU discussion to later release (e.g. Rel-18). |

Summary:

- Xiaomi suggests the correction information from LMF to UE and antenna orientation information from PRU to LMF are not supported in Rel17. Xiaomi points out that LMF acquires the knowledge of which UEs act as PRUs by OAM configuration or LPP provide capability message, and LMF can indicate PRU to report its known location and/or location based on PRS measurement.

- vivo suggests to postpone the PRU discussion to later release.

**Proposals for discussion:**

**Proposal 6a: RAN2 to discuss if there is no further specification enhancement on PRU in RAN2, postpone the PRU to later release, and send a reply LS to RAN1.**

# 7. Summary

**Potentially easy to agree**

*beam antenna information for UE-based DL-AoD:*

**Proposal 2a: RAN2 to agree merge the CR [R2-2204987] and parts of CR [R2-2205008] to the LPP CR, i.e., add the reference TRP which shall be absent in case that the nr-TRP-BeamAntennaAngles is present, and update the power granularity of the relative power of the DL-PRS resource to align with RAN1 agreement.**

**Proposal 2b: RAN2 to agree the CR [R2-2205008] to clarify that the relative power value is absent for the first element in the beamPowerList.**

*Additional Measurement for DL-AoD:*

**Proposal 2d: RAN2 to agree the CR [R2-2205016] to update the measurement report information for DL-AoD according to LS R2-2204420 (issue 6), i.e., for Rel-17 DL-AoD, the first RSRP measurement is mandatory, while the additional RSRP measurements and all the RSRPP measurements are optional.**

*Measurement report:*

**Proposal 4b: RAN2 to agree the updates on measurement instances by LPP rapporteur and wait for the value of maximum number of measurement instances in a report from RAN1 later.**

**Proposal 4a: RAN2 to** **agree to reply an LS to RAN4 to notice that RAN2 wait for further notice of RxTEG exact values from RAN4.**

**Need further discussion:**

**TxTEG report in RRC and LPP**

*TxTEG report mechanism in RRC aspect:*

**Proposal 1a: RAN2 to agree configuring event triggered reporting for UL-TDOA to enable reporting of the association between UE TxTEG ID and SRSp resources when a change in the association is identified.**

**Proposal 1b: RAN2 to agree update the asn.1 of UE-TxTEG-RequestUL-TDOA-Config-r17 in RRC as event triggered reporting as below:**

EventTriggerConfig-r17::= SEQUENCE {

 reportInterval-r7 ENUMERATED {ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240}

 reportAmount-r17 ENUMERATED {1, infinity},

 ...

}

*TxTEG report of asn.1 issues in RRC and LPP:*

**Proposal 1c: RAN2 to agree the max numbers of TEG-IDs in one RRC message and maxTxTEG-Sets-r17 in LPP message is 64. And send the agreement to RAN1 and RAN4 for confirmation.**

**Proposal 1d: RAN2 to agree the asn.1 update in LPP on UE TxTEG:**

**- Delete the condition in *nr-SRS-TxTEG-Set-r17***

**- Change the structure of *NR-UE-RxTx-TEG-Info-r17* from choice to sequence**

**- Delete the FFSs in *NR-UE-RxTx-TEG-Info-r17***

*Failure report mechanism Tx/Rx TEG in RRC and LPP:*

**Proposal 1e: RAN2 to discuss whether the failure report mechanism Tx/Rx TEG in RRC and LPP is essential correction and discuss the CR[R2-2205806] in detail via offline.**

**DL-AoD related enhancement**

*Adjacent beam assistance data for UE-assisted DL-AoD:*

**Proposal 2c: RAN2 to further discuss the CR [R2-2205005] with consideration on RAN1’s agreement that the PRS subset and PRS boresight can be configured at the same time for UE-assisted DL-AoD.**

**LOS/NLOS related enhancement**

**Proposal 3a: RAN2 to discuss if the los/nlos indicator is designed as choice of per TRP or per resource in measurement report.**

NR-DL-TDOA-MeasElement-r16 ::= SEQUENCE {

nr-LOS-NLOS-Indicator-r17 CHOICE {

 perTRP LOS-NLOS-Indicator-r17,

 perResource LOS-NLOS-Indicator-r17

 } OPTIONAL,

**Proposal 3b: RAN2 to further discuss if the corrections in R2-2205004 and R2-2205307 are essential corrections via offline.**

**Measurement report**

**Proposal 4c: RAN2 to further discuss the CR [R2-2205003] via offline.**

**Align the stage 2 specification to introduce the NRPPa enhancement**

**Proposal 5a: RAN2 to further discuss on how to capture the** **R17 NRPPa related positioning enhancement via offline, based on the CR in R2-2204697 and R2-2205807.**

**Proposal 5b: RAN2 to further discuss whether to send LS on the stage-2 update to RAN3 for confirmation, and the LS in R2-2204698 can be taken as baseline if needed.**

**PRU**

**Proposal 6a: RAN2 to discuss if there is no further specification enhancement on PRU in RAN2, postpone the PRU to later release, and send a reply LS to RAN1.**