3GPP TSG-RAN WG2 Meeting #124 R2-231xxxx

Chicago, USA, 13-17 November 2023

**Agenda item: 7.2.1**

**Source: CATT**

**Title: [Post124][416][POS] Rel-18 positioning 37.355 CR (CATT)**

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

**Document for: Discussion and Agreement**

# 1 Introduction

This document is to kick off the following email discussion:

* [Post124][416][POS] Rel-18 positioning 37.355 CR (CATT)

 Scope: Finalise and check the Rel-18 positioning 37.355 CR (including taking into account parameter list updates).

 Intended outcome: Agreed CR

 Deadline: Short (for RP)

In this email discussion, companies are invited to check the Rel-18 positioning 37.355 CR (including taking into account parameter list updates).

# 2 Contact Information

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

|  |  |
| --- | --- |
| Company | Contact: Name (E-mail) |
| Huawei,HiSIlicon | yinghaoguo@huawei.com |
| vivo | panxiang@vivo.com |
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# 3 Discussion

**Question 1**: Please provide comments below on the Rel-18 positioning 37.355 CR.

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| --- | --- | --- |
| Company | Clause | Comments |
| Huawei, HiSilicon | Coversheet | On other specs, need to include all the specs that have R18 positioning changes[Rapp]: accepted. |
| Huawei, HiSilicon | – CommonIEsRequestLocationInformation | -- ASN1STOPEditor Notes:FFS exact IE structure of the request for location+measurements in the agreement of RAN2#123bis.There seems to be no need to define an IE for locationEstimateAndMeasurementsRequired. It is just a codepoint for LocationInformationType[Rapp]: agreement in #123bis was just captured here. We will discuss and update it in the maintainment phase. |
| Huawei, HiSilicon | – CommonIEsRequestLocationInformation | ***locationInformationType***This IE indicates whether the server requires a location estimate or measurements. For '*locationEstimateRequired*', the target device shall return a location estimate if possible, or indicate a location error if not possible. For '*locationMeasurementsRequired*', the target device shall return measurements if possible, or indicate a location error if not possible. For '*locationEstimatePreferred*', the target device shall return a location estimate if possible, but may also or instead return measurements for any requested position methods for which a location estimate is not possible. For '*locationMeasurementsPreferred*', the target device shall return location measurements if possible, but may also or instead return a location estimate for any requested position methods for which return of location measurements is not possible. For '*locationEstimateAndMeasurementsRequired*', the PRU shall return both location estimate and measurements if possible, or indicate a location error if not possible.NOTE: If the PRU is requested to return both location estimate and measurements, the location information is determined independently of the reported measurements.No need to explicitly mention about the “PRU” here. IT is just “target device”[Rapp]: Comments from Qualcomm on clause 6.4.2 prefer to specify the PRU instead of target UE. The description will be put into open issue and further discuss in maintain state. |
| Huawei, HiSilicon | – NR-AdditionalPathList | NR-AdditionalPath-r16 ::= SEQUENCE { nr-RelativeTimeDifference-r16 CHOICE { k0-r16 INTEGER(0..16351), k1-r16 INTEGER(0..8176), k2-r16 INTEGER(0..4088), k3-r16 INTEGER(0..2044), k4-r16 INTEGER(0..1022), k5-r16 INTEGER(0..511), ..., kMinus1-r18 INTEGER(0..32701), kMinus2-r18 INTEGER(0..65401) },There is currently no RAN4 input on the R4 parameter list. So this should not be captured for now. But it captured, the added part should be bounded by [[ ]][Rapp]: Even there is no RAN4 parameter list, but there is RAN4 LS ([R2-2311745](file:///C%3A%5C%5CUsers%5C%5Cmtk16923%5C%5CDocuments%5C%5C3GPP%20Meetings%5C%5C202311%20-%20RAN2_124%2C%20Chicago%5C%5CExtracts%5C%5CR2-2311745_R4-2317390.docx%22%20%5Co%20%22C%3AUsersmtk16923Documents3GPP%20Meetings202311%20-%20RAN2_124%2C%20ChicagoExtractsR2-2311745_R4-2317390.docx)) where they told us the values.  |
| Huawei, HiSilicon | – NR-DL-PRS-AssistanceData | NR-DL-PRS-AggregationElement-r18 ::= SEQUENCE { nr-DL-PRS-FrequencyLayerIndex-r18 INTEGER (0..nrMaxFreqLayers-1-r16), nr-DL-PRS-TRP-Index-r18 INTEGER (0..nrMaxTRPsPerFreq-1-r16), nr-DL-PRS-ResourceSetIndex-r18 INTEGER (0..nrMaxSetsPerTrpPerFreqLayer-1-r16)}If the linked PRS are from the saem TRP, the TRP ID does not need to be included in each of the element.,[Rapp]: If there is no critical issue, we prefer to follow the current implementation and there is already a note in the field description, so I think it is clear. Let’s see more companies view.  |
| Huawei, HiSilicon | – NR-On-Demand-DL-PRS-Configurations |  [[ onDemandDL-PRS-AggregationList-r18 SEQUENCE (SIZE (1.. maxOD-DL-PRS-Configs-r17)) OF  OnDemandDL-PRS-AggregationInfo-r18 OPTIONAL ]]Need code is missingAlso, it should be enough just to provide the linkage in the on-demand PRS configuration. And the linkage information should be optional that it is present only when it is different from the AD.[Rapp]: Thanks, I add the need code. Besides, I think the current implementation is indeed just providing the linkage information, since we do not repeatedly provide the detailed PFL or PRS information, right?  |
| Huawei, HiSilicon | – NR-On-Demand-DL-PRS-Information | -- Editor’s note: Possible enhancements are needed to support alignment of the PRS configuration to the fixed (e)DRX configuration.Editor;s NOTE should be removed. No enhancement has been agreed as of now. [Rapp]: accepted. |
| Huawei, HiSilicon | *NR-On-Demand-DL-PRS-Request* |  [[ dl-PRS-AggregationID-PrefList-r18 SEQUENCE (SIZE (1.. maxOD-DL-PRS-Configs-r17)) OF INTEGER (1.. maxOD-DL-PRS-Configs-r17) OPTIONAL, nr-OnDemandDL-PRS-AggregationReqList-r18 SEQUENCE (SIZE (1.. maxOD-DL-PRS-Configs-r17)) OF NR-OnDemandDL-PRS-AggregationReqElement-r18 OPTIONAL ]]What are the differences between these two requests, are they needed at the same time?The request only needs to be index for the list containing the linkage[Rapp]: Similar like the legacy on-demand PRS, one is for explicit request, i.e., the detailed parameters; the other is for ID based request, i.e., the available on-demand PRS bandwidth aggregation configurations. |
| Huawei, HiSilicon | – NR-PRU-DL-Info | NR-PRU-DL-Info-r18 ::= SEQUENCE { nr-PRU-LocationInfo-r18 LocationCoordinates OPTIONAL, -- Need ON nr-PRU-DL-TDOA-MeasInfo-r18 NR-DL-TDOA-SignalMeasurementInformation-r16 OPTIONAL, -- Need ON nr-PRU-DL-AoD-MeasInfo-r18 NR-DL-AoD-SignalMeasurementInformation-r16 OPTIONAL, -- Need ON nr-PRU-RSCP-MeasInfo-r18 NR-PRU-RSCP-MeasurementInformation-r18  OPTIONAL, -- Need ON ...}RSCP meas already included in the DL-TDOA measInfo and DL-AoDmeasInfo.No need to include it separately[Rapp]: RSCPD is reported together with RSTD, RSCP is reported together with UE Rx-Tx according to RAN1 agreement. RSCP is not included in DL-TDOA measInfo and DL-AoDmeasInfo. |
| Huawei, HiSilicon |  | NR-DL-TDOA-RequestLocationInformation-r16 ::= SEQUENCE { nr-DL-PRS-RstdMeasurementInfoRequest-r16 ENUMERATED { true } OPTIONAL,-- Need ON nr-RequestedMeasurements-r16 BIT STRING { prsrsrpReq (0), firstPathRsrpReq-r17 (1), jointMeasurementsReq-r18 (2) } (SIZE(1..8)), nr-AssistanceAvailability-r16 BOOLEAN, nr-DL-TDOA-ReportConfig-r16 NR-DL-TDOA-ReportConfig-r16 OPTIONAL, -- Need ON additionalPaths-r16 ENUMERATED { requested } OPTIONAL, -- Need ON ..., [[ nr-UE-RxTEG-Request-r17 ENUMERATED { requested } OPTIONAL, -- Need ON nr-los-nlos-IndicatorRequest-r17 SEQUENCE { type-r17 LOS-NLOS-IndicatorType1-r17, granularity-r17 LOS-NLOS-IndicatorGranularity1-r17, ... } OPTIONAL, -- Need ON additionalPathsExt-r17 ENUMERATED { requested } OPTIONAL, -- Need ON additionalPathsDL-PRS-RSRP-Request-r17 ENUMERATED { requested } OPTIONAL, -- Need ON multiMeasInSameReport-r17 ENUMERATED { requested } OPTIONAL -- Need ON ]], [[ nr-DL-PRS-JointMeasurementRequested-r18 SEQUENCE (SIZE (2..3)) OF  INTEGER (0..nrMaxFreqLayers-1-r16) OPTIONAL, -- Need ON nr-DL-PRS-RxHoppingRequest-r18 ENUMERATED { requested } OPTIONAL, -- Need ON nr-DL-PRS-RxHoppingTotalBandwidth-r18 CHOICE { fr1 ENUMERATED {mhz40, mhz50, mhz80, mhz100}, fr2 ENUMERATED {mhz100, mhz200, mhz400} } OPTIONAL, -- Need ON nr-DL-PRS-RSCPD-Request-r18 ENUMERATED { requested } OPTIONAL -- Need ON ]]is this needed if we have nr-DL-PRS-JointMeasurementRequested-r18? It seems that nr-RequestedMeasurements is applied for a specified measurement defined in 38.215The same question also applies for nr-DL-PRS-RxHoppingRequest-r18[Rapp]: Just follow RRC parameters from RAN1 which include two separate parameters. From RAN1’s perspective, maybe it’s up to UE to decide the combined PFLs or the bandwidth when network doesn't specify the detailed parameters. Below please find the parameters in RAN1 RRC parameter list:nr-aggregate-DL-FreqLayersnr-linked-DL-FreqLayerIndexList-PrsAggregationnr-Requested-DL-PRS-measurementBasedOnMultihopRxnr-Requested-TotalBWAcrossHops-DL-PRS-measurementBasedOnMultihopRx |
| Huawei, HiSilicon | – NR-Multi-RTT-SignalMeasurementInformation |  nr-UE-RxTxTimeDiffBasedOnAggregatedResources-r18 ENUMERATED {true} OPTIONAL, nr-AggregatedDL-PRS-ResourceSetID-List-r18 SEQUENCE (SIZE (2.. 3)) OF NR-DL-PRS-ResourceSetID-r16 OPTIONAL,These two fields also seem to be duplicated in functionality. The same issue also for [Rapp]: But this is what RAN1 asks RAN2 to capture as per the RAN1 RRC parameter list.  |
| Huawei, HiSilicon | DL-TDOA and DL-AoD | The Ad in NR-PRU-DL-Info should also be able to be provided by dedicated signalling in addition to posSIB?[Rapp]: Yes and already supports it.nr-PRU-DL-Info-r18 is included in *NR-PositionCalculationAssistance* which is the dedicated signalling. |
| Qualcomm | 3.1 | Definition of Positioning frequency layer:This does not look like a proper definition. For example, two DL-PRS Resource Sets may not have common periodicities but may still belong to the same PFL.The proposed definition in [R2-2313241](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_124/Docs/R2-2313241.zip) seems better (i.e., explicitly lists the common parameter).[Rapp]: accepted.  |
| Qualcomm | 6.4.2 | *CommonIEsProvideCapabilities**locationEstimateAndMeasurementReporting* is not a common capability. It is only applicable for PRUs and would not be needed if a new IE is introduced for PRU location reporting (see next comment and [R2-2312805](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_124/Docs/R2-2312805.zip)). |
| Qualcomm | 6.4.2 | *LocationInformationType* 🡪 *locationEstimateAndMeasurementsRequired*The *locationInformationType* in *CommonIEsRequestLocationInformation* controls the requested positioning mode (UE-based, UE-assisted) for position location of a target UE. If a UE operates as a PRU, the PRU provides location measurements performed at a known location (e.g., to support carrier phase positioning, etc.). In this case, the PRU is not a "target UE", since the PRU location must already be known via some other means.Extending the *locationInformationType* with an entry for "location+measurements" would be ambiguous/incorrect, since it implies that the "measurements" were also used for obtaining the "PRU location" (i.e., UE-based and UE-assisted mode combined) (see (existing) field descriptions). In addition, the *LocationError* in *CommonIEsProvideLocationInformation* would then also be ambiguous ("This field shall be included if and only if a location estimate and measurements are not included in the LPP PDU"). Also, a new time stamp for the location estimate seems needed (1-seconds granularity does not look appropriate for a moving PRU (e.g., if the measurements are time stamped at symbol level)). A new IE should be introduced for PRU location request/report as proposed in [R2-2312805](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_124/Docs/R2-2312805.zip). This would not mix "positioning of a target UE" with "PRU operation" and can accommodate additional PRU specific items.[Rapp]: We didn’t further discuss this location and measurement report in #124. The existing timestamp of location seems not proper. So I will put this issue into open issue list and will be discussed in #125 meeting.**Conclusion from RAN1#112 meeting notes for information:**A PRU can report its location and associated uncertainty as is the case for other UEs. It is not necessary to always include the PRU location information with the PRU measurements in the same report. The PRU location information and measurements should be decoupled, where decoupled means that the PRU location information is determined independently of the reported measurements, even if the PRU location information and the PRU measurements would be included in the same report. |
| Qualcomm | 6.4.3 | This field specifies the DL-PRS Resource Sets across DL-PRS Positioning Frequency Layers available for DL-PRS bandwidth aggregation. The 2 or 3 DL-PRS Resource Sets indicated by IE *Should be* *NR-linkedDL-PRS-ResourceSetID-ListPRS-Aggregation* are linked for bandwidth aggregation.Delete Typo. [Rapp]: Thanks, Done!  |
| Qualcomm | 6.4.3 | [[ integrityBeamInfoBounds-r18 IntegrityBeamInfoBounds-r18 OPTIONAL -- Need ON ]]This should be Neep OP, given that the field description describes the behaviour if absent.***integrityBeamInfoBounds***This field provides an overbounding model that bounds the spatial direction information of the DL-PRS Resources. If this field is absent, the *integrityBeamInfoBounds* for this instance of the *DL-PRS-BeamInfoElement* is the same as the *integrityBeamInfoBounds* of the first instance of the *DL-PRS-BeamInfoElement* in *DL-PRS-BeamInfoResourceSet*. If integrity bounds are provided, this field shall be present at least in the first instance of the *DL-PRS-BeamInfoResourceSet*.This should be "previous instance". Otherwise there seems little/no bit savings. I.e., close angles may have the same uncertainty, which however, may not be the same as the first angle.[Rapp]: Updated. |
| Qualcomm | 6.4.3 | NR-SelectedDL-PRS-IndexPerTRP-r18 ::= SEQUENCE { nr-SelectedTRP-Index-r18 INTEGER (0..nrMaxTRPsPerFreq-1-r16), dl-SelectedPRS-ResourceSetIndexList-r18 SEQUENCE (SIZE (1..nrMaxSetsPerTrpPerFreqLayer-r16)) OF INTEGER (0..nrMaxSetsPerTrpPerFreqLayer-1-r16) OPTIONAL, --Need OP ...}***NR-SelectedDL-PRS-ResourceSetIndexList***This field specifies the associated DL-PRS Resource Sets of *nr-DL-PRS-AssistanceDataList* with the time window.Field names in ASN.1 and description do not match.[Rapp]: Thanks and deleted the description of *NR-SelectedDL-PRS-ResourceSetIndexList*. |
| Qualcomm | 6.4.3 | – *NR-IntegrityRiskParameters*This IE is used only in IE *NR-PositionCalculationAssistance-r16* and should be defined there (not a common IE). [Rapp]: this IE is used in posSIB *posSibType7-x NR-IntegrityRiskParameters.* |
| Qualcomm | 6.4.3 | ***nr-ProbOnsetTRP-Fault***This field specifies the Probability of Onset of TRP fault.This field specifies the onset probability that the residual range or range rate error exceeds a bound created using the minimum allowed inflation factor *Kmin*, and bounding parameters as *mean* + *Kmin* \* *stdDev* where *Kmin* = *normInv*(*irMaximum* / 2), with *irMaximum* as provided in IE *nr-IntegrityServiceParameters*.The probability is calculated by *P*=10-0.04*n* [hour-1] where *n* is the value of *nr-ProbOnsetTRP-Fault* and the range is 10-10.2 to 1 per hour.This seems not correct. Should be analogous to GNSS (*probOnsetSatFault*):"This field specifies the Probability of Onset of TRP Fault per Time Unit which is the probability of occurrence of TRP error to exceed the error bound for more than the Time to Alert (TTA).This field specifies the onset probability that the error exceeds a bound created using the minimum allowed inflation factor *Kmin*, and bounding parameters as *mean* + *Kmin* \* *stdDev* where *Kmin* = *normInv*(*irMaximum* / 2), with *irMaximum* as provided in IE *NR-Integrity-ServiceParameters*.The probability is calculated by *P*=10-0.04*n* [hour-1] where *n* is the value of *probOnsetSatFault* and the range is 10-10.2 to 1 per hour."[Rapp]: Thanks and updated. |
| Qualcomm | 6.4.3 | ***nr-MeanTRP-FaultDuration***This field specifies the Mean TRP fault Duration which is the mean duration between when a constellation fault occurs.Scale factor 1 s; range 1-3600 s.Similar to above:"This field specifies the Mean TRP Fault Duration which is the mean duration between when a TRP fault occurs, and the user is alerted by IE *NR-IntegrityServiceAlert* (or the integrity violation is over).Scale factor 1 s; range 1-3,600 s."[Rapp]: Thanks and updated. |
| Qualcomm | 6.4.3 | NR-TRP-IntegrityServiceAlertPerFreqLayer-r18 ::= SEQUENCE (SIZE (1..nrMaxTRPsPerFreq-r16)) OF TRP-IntegrityServiceAlertElement-r18, ...}Typo should be deleted.[Rapp]: Thanks and updated. |
| Qualcomm | 6.4.3,5.2.1a,5.2.2a | *NR-PeriodicAssistData*The Note in section 5.2.1a and 5.2.2a should also be updated; e.g.:NOTE 1: In this version of the specification, periodic assistance data transfer is supported for HA GNSS (e.g., RTK) and NR DL-TDOA positioning only.[Rapp]: Thanks and updated. |
| Qualcomm | 6.4.3 |

| *GNSS-PeriodicControlParam* field descriptions |
| --- |
| ***deliveryAmount***This field specifies the number of periodic assistance data deliveries. Integer values *N*=1…31 correspond to an amount of 2*N*. Integer value *N*=32 indicates an 'infinite/indefinite' amount, which means that the assistance data delivery should continue until a LPP *Abort* message is received.  |
| ***deliveryInterval***This field specifies the interval between assistance data deliveries in milliseconds.  |

This should be *NR-PeriodicControlParam*[Rapp]: Thanks and updated. |
| Qualcomm | 6.4.3 | – *NR-PRU-DL-Info*The IE *NR-PRU-DL-Info* is used by the location server to provide the carrier phase measurements together with the associated legacy measurement reported by a PRU, with additional information of this PRU to a target UE.This is not appropriate specification text. Should describe what is actually provided; e.g.,"The IE *NR-PRU-DL-Info* is used by the location server to provide DL-TDOA, DL-AoD, and RSCP PRU measurements to the target device."(same in the field description Table)[Rapp]: Thanks and updated. But the legacy measurement is not clear in RAN1 LS yet. Can we ask RAN1 to clarify what the legacy measurement exactly is? Is the measurement in DL-AoD also needed or not?  |
| Qualcomm | 6.4.3 | IntegrityRTD-InfoBounds-r18 ::= SEQUENCE { meanRTD-r18 INTEGER (0..255) OPTIONAL, -- Need OR stdDevRTD-r18 StdDevRTD-r18, ...}This should be deleted. In all other integrity bounds, the mean is mandatory present.[Rapp]: Thanks and updated. |
| Qualcomm | 6.4.3 | NR-TimeStamp-r16 ::= SEQUENCE { dl-PRS-ID-r16 INTEGER (0..255), nr-PhysCellID-r16 NR-PhysCellID-r16 OPTIONAL, -- Need ON nr-CellGlobalID-r16 NCGI-r15 OPTIONAL, -- Need ON nr-ARFCN-r16 ARFCN-ValueNR-r15 OPTIONAL, -- Need ON nr-SFN-r16 INTEGER (0..1023), nr-Slot-r16 CHOICE { scs15-r16 INTEGER (0..9), scs30-r16 INTEGER (0..19), scs60-r16 INTEGER (0..39), scs120-r16 INTEGER (0..79) }, ..., [[ nr-Symbol-r18 INTEGER (0..13) OPTIONAL -- Need OR ]]}This should be Need ON (this IE seems used in UL only).[Rapp]: It is also used in DL in *NR-PRU-DL-Info*. SoNeed OR is needed. |
| Qualcomm | 6.4.3 | ***integrityBeamPowerBounds***This field specifies the mean and the Standard Deviation beam power error bound for an overbounding model that bounds the beam power error. If this field is absent, the integrityBeamInfoBounds for this instance of the *beamPowerList* is the same as integrityBeamInfoBounds of the first instance in the *beamPowerList*. If integrity bounds are provided, this field shall be included at least in the first instance of the *beamPowerList*.This should be in Italic font.This should be previous instance (see also comment on *integrityBeamInfoBounds* above)[Rapp]: Thanks and updated. |
| Qualcomm | 6.4.3 | NR-TRP-LocationInfoPerFreqLayer-r16 ::= SEQUENCE { referencePoint-r16 ReferencePoint-r16 OPTIONAL, -- Cond NotSameAsPrev trp-LocationInfoList-r16 SEQUENCE (SIZE (1..nrMaxTRPsPerFreq-r16)) OF TRP-LocationInfoElement-r16, ..., [[ integrityReferencePointLocationBounds-r18  IntegrityLocationBounds-r18 OPTIONAL -- Need OP ]]}This is not needed. The bound is provided for the "last stage" only; i.e., either TRP location, Set location, or Resource location. The Reference Point Bound will be implicit/included in the TRP location bound.*integrityTRP-LocationBounds* description is at a wrong place.[Rapp]: The TRP location coincides with the *referencePoint* location when ***trp-Location*** is absent. When ***trp-Location*** is absent, does it look strange that there is still *integrityTRP-LocationBounds* here, if integrityReferencePointLocationBounds is not need? But I’m fine to follow your suggestion. |
| Qualcomm | 6.4.3 | Field description for *NR-TRP-LocationInfo*:If this field is absent, the bounds of the antenna reference point location of this DL-PRS Resource Set coincides with the *integrityTRP-LocationBounds*.If this field is absent, the bounds of the antenna reference point location(s) of this DL-PRS Resources coincides with the *integrityDL-PRS-ResourceSetARP-LocationBounds*.The bounds should not "coincide" with something. The bounds are provided for the "final stage" of the coordinates. If this field is absent the bounds of TRP location coincides with the *integrityReferencePointLocationBounds*, unless the field *associated-dl-PRS-ID*is present, in which case the *integrityTRP-LocationBounds* is adopted from the associated TRP indicated by *associated-dl-PRS-ID*.I don't think the bounds are adopted from *associated-dl-PRS-ID*?[Rapp]: Thanks and updated. |
| Qualcomm | 6.4.3 | IntegrityLocationBounds-r18 ::= SEQUENCE { meanLatitude-r18 INTEGER (0..255), meanLongitude-r18 INTEGER (0..255), meanheight-r18 INTEGER (0..255), stdDevLatitude-r18 INTEGER (0..255), stdDevLongitude-r18 INTEGER (0..255), stdDevheight-r18 INTEGER (0..255), ...}The meaning of the INTEGER values is not specified?[Rapp]: Thanks and updated. |
| Qualcomm | 6.5.10.2 |

| Conditional presence | Explanation |
| --- | --- |
| *PerADReq* | This field is mandatory present if the target device requests periodic NR assistance data delivery. |

Should clarify for which NR AD this is applicable:

| Conditional presence | Explanation |
| --- | --- |
| *PerADReq* | This field is mandatory present if the target device requests periodic NR assistance data delivery. This field may only be included if '*pruInfo*' bit in*nr-PosCalcAssistanceRequest* is set to '1'. |

 [Rapp]: Thanks and updated. |
| Qualcomm | 6.5.10.4,6.5.12.4 |  nr-AggregatedDL-PRS-ResourceSetID-List-r18 SEQUENCE (SIZE (2.. 3)) OF NR-DL-PRS-ResourceSetID-r16 OPTIONAL,This would be ambiguous. To identify a DL-PRS Resource Set (across PFLs), the DL-PRS ID would be needed in addition; i.e.:nr-AggregatedDL-PRS-ResourceSetID-List-r18 SEQUENCE (SIZE (2.. 3)) OF NR-AggregatedDL-PRS-ResourceSetID-Element-r18 OPTIONAL,NR-AggregatedDL-PRS-ResourceSetID-Element-r18 ::= SEQUENCE { dl-PRS-ID-r16 INTEGER (0..255), nr-DL-PRS-ResourceID-r16 NR-DL-PRS-ResourceID-r16}[Rapp]: Thanks, Done!  |
| Qualcomm | 6.5.10.5,6.5.12.5 | *NR-DL-TDOA-RequestLocationInformation* field descriptions:*NR-Multi-RTT-SignalMeasurementInformation* field descriptions***timingReportingGranularityFactor, timingReportingGranularityFactorExt***This field specifies the recommended reporting granularity for the DL RSTD measurements. Value (0..5) corresponds to (*k0*..*k5*) and value (6..7) corresponds to (kMinus1..kMinus2)used for *nr-RSTD* and *nr-RSTD-ResultDiff* in *NR-DL-TDOA-MeasElement*. The UE may select a different granularity value for *nr-RSTD* and *nr-RSTD-ResultDiff*. If the IE *timingReportingGranularityFactorExt is present, NW shall not configure the IE timingReportingGranularityFactor.*This should be proper phrased; e.g.:"The *timingReportingGranularityFactorExt* should not be included by the location server and shall be ignored by the target device if *timingReportingGranularityFactor* is included.The *timingReportingGranularityFactor* should not be included by the location server and shall be ignored by the target device if *timingReportingGranularityFactorExt* is included."[Rapp]: Thanks, Done!  |
| Qualcomm | 6.5.10.5,6.5.12.5 | ***measureSameDL-PRS-ResourceWithDifferentRxTEGs***This field, if present, indicates that the target device is requested to measure the same DL-PRS Resource of a TRP with *N* different UE Rx TEGs. Enumerated value '*n0*' indicates that the number *N* of different UE Rx TEGs to measure the same DL PRS Resource can be determined by the target device, value '*n2*' indicates that the target device is requested to measure the same DL-PRS Resource of a TRP with 2 different UE Rx TEGs, value '*n3*' indicates that the target device is requested to measure the same DL-PRS Resource of a TRP with 3 different UE Rx TEGs, and so on.If this field is present, the field *nr-UE-RxTEG-Request* should also be present. When the LMF requests aggregated measurements, a request for configuring the UE to measure the same aggregated DL-PRS Resources of a TRP with N different UE Rx TEGs.I don't understand this sentence; seems incomplete?[Rapp]: Thanks and updated. |
| Qualcomm | 6.5.10.5,6.5.12.5 | ***nr-DL-PRS-JointMeasurementRequested***This field indicates Request from the LMF to the UE indicating which two or three PFLs to be used for performing joint measurement. The field can be present if *jointMeasurementsReq*-r18 in *nr-RequestedMeasurements-r16* is set to one-value. Otherwise, it is absent. Value 0 corresponds to the first frequency layer provided in nr-DL-PRS-AssistanceDataList, value 1 to the second frequency layer in *nr-DL-PRS-AssistanceDataList*, and so on.***nr-DL-PRS-JointMeasurementRequested***This field indicates which two or three PFLs and the DL PRS resource sets in the two or three DL PFLs that are linked for DL PRS BW aggregation for the joint measurements. The field can be present if *jointMeasurementsReq-r18* in *nr-RequestedMeasurements-r16* is set to one-value. Otherwise, it is absent. Value 0 corresponds to the first frequency layer provided in nr-DL-PRS-AssistanceDataList, value 1 to the second frequency layer in *nr-DL-PRS-AssistanceDataList*, and so on.Location Request is always from location server (which may be a SLP) to UE. Should be aligned with other field descriptions; e.g., "This field, if present, indicates that the target device is requested…"This is not needed.ASN.1 indicates only PFL.May require a general check: "LMF" should usually be "location server"; "UE" should usually be "target device", since these methods are also applicable to SUPL. [Rapp]: Thanks, Done!  |
| Qualcomm |  | Annex with Agreements should be deleted (this is a "final" CR).[Rapp]: accepted. |
| Nokia | 3.1 | Definition of Positioning frequency layer:In our view, the current definition in the running CR is not only incomplete, but also incorrect. Not all parameters for the resource sets in the PFL are common. We suggest reusing the TP from R2-2313241. If I remember correct, there were no disagreements on the TP during discussions in RAN2#124.[Rapp]: accepted. |
| ZTE |  | Issue 1See R2-2313896, K=-3,-4,-5,-6 should be added. Also should be added in  ***timingReportingGranularityFactorExt*** kMinus1-r18 INTEGER(0..32701), kMinus2-r18 INTEGER(0..65401)[Rapp]: Prefer not for now, because the value is still FFS, we need to update until RAN4 indicate the value to us. Issue 2There is no such IE in ASN.1. this field description should be deleted.***NR-SelectedDL-PRS-ResourceSetIndexList***This field specifies the associated DL-PRS Resource Sets of *nr-DL-PRS-AssistanceDataList* with the time window.[Rapp]: Thanks and updated.Issue 3whether the condition is needed? The IE is used for periodic AD request.For one shot PRU info, UE should also make the request according to R1’s reply LS “Both one time (aperiodic) and periodic provision of PRU carrier phase measurements should be supported, which could be requested by the UE. ”. Should have a new IE in method-RequestAssistanceData to request one-shot AD for CPP– NR-PeriodicAssistDataReqThe IE *NR-PeriodicAssistDataReq* is used by the target device to request periodic assistance data delivery from a location server.-- ASN1STARTNR-PeriodicAssistDataReq-r18 ::= SEQUENCE { nr-PRU-DL-InfoReq-r18 NR-PeriodicControlParam-r18 OPTIONAL, -- Cond pPRU ...}-- ASN1STOP

| *Conditional presence* | Explanation |
| --- | --- |
| *pPRU* | The field is mandatory present if the target device requests periodic *NR-PRU-DL-Info*; otherwise it is not present. |

[Rapp]: please find the one-shot request and periodic request as below in asn.1:NR-DL-TDOA-RequestAssistanceData-r16 ::= SEQUENCE { nr-PhysCellID-r16 NR-PhysCellID-r16 OPTIONAL, nr-AdType-r16 BIT STRING { dl-prs (0), posCalc (1) } (SIZE (1..8)), ..., [[ nr-PosCalcAssistanceRequest-r17 BIT STRING { trpLoc (0), beamInfo (1), rtdInfo (2), losNlosInfo (3), trpTEG-Info (4), integrityParameters-r18 (5), pruInfo-r18 (6) } (SIZE (1..8)) OPTIONAL, nr-on-demand-DL-PRS-Request-r17 NR-On-Demand-DL-PRS-Request-r17 OPTIONAL, nr-DL-PRS-ExpectedAoD-or-AoA-Request-r17 ENUMERATED { eAoD, eAoA } OPTIONAL, pre-configured-AssistanceDataRequest-r17 ENUMERATED { true } OPTIONAL ]], [[ nr-PeriodicAssistDataReq-r18 NR-PeriodicAssistDataReq-r18 OPTIONAL -- Cond PerADReq ]]}Issue 4This should have a condition that if the legacy reported resource set ID is not present, the IE can be optionally present? Since legacy there is also a reported resource set ID. They should not be both presentednr-AggregatedDL-PRS-ResourceSetID-List-r18 SEQUENCE (SIZE (2..3)) OF NR-DL-PRS-ResourceSetID-r16 OPTIONAL,[Rapp]: Thanks, Done! Issue 5Maximum number of window is 2, should be SIZE(1..2).NR-DL-PRS-MeasurementTimeWindowsConfig-r18 ::=  SEQUENCE (SIZE(1..nrMaxSetsPerTrpPerFreqLayer-r16)) OF NR-DL-PRS-MeasurementTimeWindowsConfigElement-r18[Rapp]: Thanks and updated.Issue 6*GNSS-PeriodicControlParam* field descriptions typo, GNSS to NR.[Rapp]: Thanks and updated. |
| ZTE2 |  | In *NR-TimeStamp*, the field description of *nr-Symbol* should clarify that this field is only used for carrier phase positioning. ***nr-Symbol***This field specifies the NR symbol index within the NR slot number indicated by *nr-Slot* for the time stamp. |
| ZTE2 |  | In the DL-TDOA measurement report, it should be: 1 RSCPD measurement + up to 3 additional sample’s RSCPD measurements; so the legacy 0 should be changed to 1;nr-RSCPD-AddSampleMeasurements-r18 SEQUENCE (SIZE (0..nrNumOfSamples-1-r18 )) OF  NR-RSCPD-AdditionalMeasurementElement-r18 OPTIONAL, In the DL-TDOA additional measurement report, each additional report should be : 1 RSCPD measurement + up to 3 additional sample RSCPD measurements.* So the RSCPD measurement associated with the PRS resource ID/timestamp in each RSTD additional measurement should be added in NR-DL-TDOA-AdditionalMeasurementElement-r16;
* The RSCPD additional measurement should be 1..nrNumOfSamples-1-r18. -1 should be added

nr-RSCPD-r18 INTEGER (0..61565) OPTIONAL, nr-PhaseQuality-r18 NR-PhaseQuality-r18 OPTIONAL,(these two IEs should be add in each RSTD additional measurement )nr-RSCPD-AdditionalMeasurements-r18 SEQUENCE (SIZE (1..nrNumOfSamples(-1 should be added here)-r18 )) OF NR-RSCPD-AdditionalMeasurementElement-r18 OPTIONAL, |
| ZTE2 |  | In the multi-RTT measurement report, it should be: 1 RSCP measurement + up to 3 additional sample RSCP measurements; so the legacy 0 should be changed to 1; nr-RSCP-AddSampleMeasurements-r18  SEQUENCE (SIZE (0..nrNumOfSamples-1-r18 )) OF NR-RSCP-AdditionalMeasurements-r18 OPTIONAL,In the multi-RTT additional measurement report, each additional report should be : 1 RSCP measurement + up to 3 additional sample RSCP measurements.* So the RSCP measurement associated with the PRS resource ID/timestamp in each RxTx time difference additional measurement should be added in NR-Multi-RTT-AdditionalMeasurementElement-r16;
* The RSCP additional measurement should be 1..nrNumOfSamples-1-r18. -1 should be added

nr-RSCP-r18 INTEGER (0..3600) OPTIONAL, nr-PhaseQuality-r18 NR-PhaseQuality-r18 OPTIONAL,(these two IEs should be add in each RxTx time difference additional measurement )nr-RSCP-AdditionalMeasurements-r18 SEQUENCE (SIZE (1..nrNumOfSamples(-1 should be added here)-r18 )) OF NR-RSCP-AdditionalMeasurements-r18 OPTIONAL,Also the field description for timestamp in multi-RTT should change. The timestamp should be shared for both RSCH and Rx Tx time difference measurement. Proposed change is in green:***nr-TimeStamp***This field specifies the time instance for which the measurement is performed. If RSCP measurement is present, the timestamp Should be the same for both RSCP and RxTx time difference measurement. |
| vivo | 6.4.3 | NR-AdditionalPath-r16 ::= SEQUENCE { nr-RelativeTimeDifference-r16 CHOICE { k0-r16 INTEGER(0..16351), k1-r16 INTEGER(0..8176), k2-r16 INTEGER(0..4088), k3-r16 INTEGER(0..2044), k4-r16 INTEGER(0..1022), k5-r16 INTEGER(0..511), ..., kMinus1-r18 INTEGER(0..32701), kMinus2-r18 INTEGER(0..65401) }, nr-PathQuality-r16 NR-TimingQuality-r16 OPTIONAL, ..., [[ nr-DL-PRS-RSRPP-r17 INTEGER (0..126) OPTIONAL ]]}AgreementThe new *ReportingGranularityfactor* also supports k = {-3, -4, -5, -6} in addition to {-1, -2} * These k values are applicable for timing measurements for all applicable positioning methods
	+ Support for both DL and UL
	+ Support for both FR1 and FR2

Suggestion: Capture the {-3, -4, -5, -6} in addition to {-1, -2} |
| vivo | 6.4.3 | *–* *NR-DL-PRS-MeasurementTimeWindowsConfig*The IE *NR-DL-PRS-MeasurementTimeWindowsConfig* provides a set of indicated time window(s) which is configured from server to target UE to perform measurements on indicated DL PRS resource set(s) occurring within indicated time window(s) for DL CPP, DL-TDOA, Multi-RTT and DL-AoD.-- ASN1STARTNR-DL-PRS-MeasurementTimeWindowsConfig-r18 ::=  SEQUENCE (SIZE(1..nrMaxSetsPerTrpPerFreqLayer-r16)) OF NR-DL-PRS-MeasurementTimeWindowsConfigElement-r18Suggestion:highlighted target UE -> target UE or PRUResponse to Q4 will be based on the following:Each indicated DL-PRS resourceSet can be associated with one indicated time window, or two indicated time windows.For the highlighted nrMaxSetsPerTrpPerFreqLayer-r16, no need to reuse this irrelevant number, one or two window can be associated with each resource set. |
| vivo | 6.4.3 | NR-DL-PRS-AggregationElement-r18 ::= SEQUENCE { nr-DL-PRS-FrequencyLayerIndex-r18 INTEGER (0..nrMaxFreqLayers-1-r16), nr-DL-PRS-TRP-Index-r18 INTEGER (0..nrMaxTRPsPerFreq-1-r16), nr-DL-PRS-ResourceSetIndex-r18 INTEGER (0..nrMaxSetsPerTrpPerFreqLayer-1-r16)}AgreementConfiguring up to two PFL combinations is supported (e.g. PFL1 aggregated with PFL2 and PFL3 aggregated with PFL4). Suggestion:Add a note to reflect the above restriction. |
| vivo | 6.5.10.1 | NR-DL-TDOA-ProvideAssistanceData-r16 ::= SEQUENCE { nr-DL-PRS-AssistanceData-r16 NR-DL-PRS-AssistanceData-r16 OPTIONAL, -- Need ON nr-SelectedDL-PRS-IndexList-r16 NR-SelectedDL-PRS-IndexList-r16 OPTIONAL, -- Need ON nr-PositionCalculationAssistance-r16 NR-PositionCalculationAssistance-r16 OPTIONAL, -- Cond UEB nr-DL-TDOA-Error-r16 NR-DL-TDOA-Error-r16 OPTIONAL, -- Need ON ..., [[ nr-On-Demand-DL-PRS-Configurations-r17 NR-On-Demand-DL-PRS-Configurations-r17 OPTIONAL, -- Need ON nr-On-Demand-DL-PRS-Configurations-Selected-IndexList-r17 NR-On-Demand-DL-PRS-Configurations-Selected-IndexList-r17 OPTIONAL, -- Need ON assistanceDataValidityArea-r17 AreaID-CellList-r17 OPTIONAL -- Need ON ]], [[ nr-PeriodicAssistData-r18 NR-PeriodicAssistData-r18 OPTIONAL -- Cond CtrTrans ]]}Suggestion:highlighted nr-PeriodicAssistData is for UE-based and should be included in NR-PositionCalculationAssistance. |
| vivo | 6.5.10.4 | NR-DL-TDOA-MeasElement-r16 ::= SEQUENCE { dl-PRS-ID-r16 INTEGER (0..255), nr-PhysCellID-r16 NR-PhysCellID-r16 OPTIONAL, nr-CellGlobalID-r16 NCGI-r15 OPTIONAL, nr-ARFCN-r16 ARFCN-ValueNR-r15 OPTIONAL, nr-DL-PRS-ResourceID-r16 NR-DL-PRS-ResourceID-r16 OPTIONAL, nr-DL-PRS-ResourceSetID-r16 NR-DL-PRS-ResourceSetID-r16 OPTIONAL, nr-TimeStamp-r16 NR-TimeStamp-r16, nr-RSTD-r16 CHOICE { k0-r16 INTEGER (0..1970049), k1-r16 INTEGER (0..985025), k2-r16 INTEGER (0..492513), k3-r16 INTEGER (0..246257), k4-r16 INTEGER (0..123129), k5-r16 INTEGER (0..61565), ..., kMinus1-r18 INTEGER (0..3940097), kMinus2-r18 INTEGER (0..7880193) }, nr-AdditionalPathList-r16 NR-AdditionalPathList-r16 OPTIONAL, nr-TimingQuality-r16 NR-TimingQuality-r16, nr-DL-PRS-RSRP-Result-r16 INTEGER (0..126) OPTIONAL, nr-DL-TDOA-AdditionalMeasurements-r16 NR-DL-TDOA-AdditionalMeasurements-r16 OPTIONAL, ..., [[ nr-UE-Rx-TEG-ID-r17 INTEGER (0..maxNumOfRxTEGs-1-r17) OPTIONAL, nr-DL-PRS-FirstPathRSRP-Result-r17 INTEGER (0..126) OPTIONAL, nr-los-nlos-Indicator-r17 CHOICE { perTRP-r17 LOS-NLOS-Indicator-r17, perResource-r17 LOS-NLOS-Indicator-r17 } OPTIONAL, nr-AdditionalPathListExt-r17 NR-AdditionalPathListExt-r17 OPTIONAL, nr-DL-TDOA-AdditionalMeasurementsExt-r17 NR-DL-TDOA-AdditionalMeasurementsExt-r17 OPTIONAL ]], [[ nr-RSTD-BasedOnAggregatedResources-r18 ENUMERATED {true} OPTIONAL, nr-AggregatedDL-PRS-ResourceSetID-List-r18 SEQUENCE (SIZE (2.. 3)) OF NR-DL-PRS-ResourceSetID-r16 OPTIONAL,Suggestion:highlighted SEQUENCE (SIZE (2.. 3) -> SEQUENCE (SIZE (1.. 2) The resource sets are other aggregated sets, thus 1 or 2 are sufficient. |
| vivo | 6.5.10.4 | nr-RSCPD-r18 INTEGER (0..61565) OPTIONAL, nr-RSCPD-ResultDiff-r18 INTEGER (0..61565) OPTIONAL,Suggestion:The above two nums should not be the same. |
| vivo | 6.5.10.6 |  periodicAssistanceData-r18 BIT STRING { solicited (0), unsolicited (1) } (SIZE (1..8)) OPTIONAL,Suggestion:highlighted periodicAssistanceData is for UE-based and should be included in nr-PosCalcAssistanceSupport. |
| ZTE3 | 6.4.3 | – *NR-PRU-DL-Info*The IE *NR-PRU-DL-Info* is used by the location server to provide the carrier phase measurements together with the associated legacy measurement reported by a PRU, with additional information of this PRU to a target UE.-- ASN1STARTNR-PRU-DL-Info-r18 ::= SEQUENCE { nr-PRU-LocationInfo-r18 LocationCoordinates OPTIONAL, -- Need ON nr-PRU-DL-TDOA-MeasInfo-r18 NR-DL-TDOA-SignalMeasurementInformation-r16 OPTIONAL, -- Need ON nr-PRU-DL-AoD-MeasInfo-r18 NR-DL-AoD-SignalMeasurementInformation-r16 OPTIONAL, -- Need ON nr-PRU-RSCP-MeasInfo-r18 NR-PRU-RSCP-MeasurementInformation-r18  OPTIONAL, -- Need ON ...}NR-PRU-RSCP-MeasurementInformation-r18 ::= SEQUENCE (SIZE(1..nrMaxTRPs-r16)) OF  NR-PRU-RSCP-MeasElement-r18NR-PRU-RSCP-MeasElement-r18 ::= SEQUENCE { dl-PRS-ID-r18 INTEGER (0..255), nr-PhysCellID-r18 NR-PhysCellID-r16 OPTIONAL, -- Need ON nr-CellGlobalID-r18 NCGI-r15 OPTIONAL, -- Need ON nr-ARFCN-r18 ARFCN-ValueNR-r15 OPTIONAL, -- Need ON nr-DL-PRS-ResourceID-r18 NR-DL-PRS-ResourceID-r16 OPTIONAL, -- Need ON nr-DL-PRS-ResourceSetID-r18 NR-DL-PRS-ResourceSetID-r16 OPTIONAL, -- Need ON nr-TimeStamp-r18 NR-TimeStamp-r16, nr-los-nlos-Indicator-r18 CHOICE { perTRP-r17 LOS-NLOS-Indicator-r17, perResource-r17 LOS-NLOS-Indicator-r17 } OPTIONAL, -- Need ON nr-RSCP-r18 INTEGER (0..3600) OPTIONAL, -- Need ON nr-PhaseQuality-r18 NR-PhaseQuality-r18 OPTIONAL, -- Need ON nr-PRU-RSCP-AddSampleMeasurements-r18 SEQUENCE (SIZE (0..nrNumOfSamples-1-r18 )) OF NR-PRU-RSCP-AdditionalMeasurements-r18 OPTIONAL, -- Need ON nr-PRU-RSCP-AdditionalMeasurements-r18 NR-PRU-RSCP-AdditionalMeasurements-r18 OPTIONAL, -- Need ON ...}NR-PRU-RSCP-AdditionalMeasurements-r18 ::= SEQUENCE (SIZE (1..3)) OF NR-PRU-RSCP-AdditionalMeasurementElement-r18NR-PRU-RSCP-AdditionalMeasurementElement-r18 ::= SEQUENCE { nr-DL-PRS-ResourceID-r18 NR-DL-PRS-ResourceID-r16 OPTIONAL, -- Need ON nr-DL-PRS-ResourceSetID-r18 NR-DL-PRS-ResourceSetID-r16 OPTIONAL, -- Need ON nr-PRU-RSCP-AdditionalMeasurements-r18 SEQUENCE (SIZE (1..nrNumOfSamples-r18 )) OF NR-RSCP-AdditionalMeasurements-r18 OPTIONAL, -- Need ON ...}-- ASN1STOPGreen one quoted the wrong IE. Green one should be changed to NR-RSCP-AdditionalMeasurements-r18.Two yellow one have the same IE name, which is not correct. The second yellow one should be another name, e.g., nr-PRU-RSCP-AddSampleAdditionalMeasurements-r18 |
| ZTE3 | 6.4.3 | DL-PRS-Resource-ARP-Element-r16 ::= SEQUENCE { dl-PRS-Resource-ARP-location-r16 RelativeLocation-r16 OPTIONAL, -- Need OP ..., [[ integrityDL-PRS-ResourceSetARP-LocationBounds-r18 IntegrityLocationBounds-r18 OPTIONAL -- Need OP ]]}Yellow “set” should be deleted since it is per resource error bound |

# 4 Reference

[1] R2-2313117 Introduction of Expanded and improved NR positioning CATT CR Rel-18 37.355 17.6.0 0481 - B NR\_pos\_enh2

[2] R2-2313895 Reply LS on CPP (R1-2312393; contact: CATT) RAN1 LS in Rel-18 NR\_pos\_enh2 To:RAN2 Cc:RAN4, RAN3, SA2

[3] R2-2313896 Reply LS on SRS and PRS bandwidth aggregation for positioning (R1-2312395; contact: ZTE) RAN1 LS in Rel-18 NR\_pos\_enh2 To:RAN4 Cc:RAN2, RAN3

[4] R2-2313897 Reply LS on request for clarifications on RedCap positioning, carrier phase positioning, and bandwidth aggregation for positioning (R1- 2312434; contact: Nokia) RAN1 LS in Rel-18 NR\_pos\_enh2 To:RAN2 Cc:RAN3, RAN4

[5] R1-2312661 LS on Rel-18 higher-layers parameter list RAN1, Ericsson To: RAN2, RAN3; Cc: RAN4

[6] R2-2313564 Report from session on positioning and sidelink relay Session chair (MediaTek)