**3GPP TSG- Meeting # *xxxx***

**, , - , 2024**

|  |
| --- |
| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** |  | **rev** | **3** | **Current version:** |  |  |
|  |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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| --- |
|  |
| ***Title:***  | Corrections to TS 37.355  |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** | 28 |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | 1.Fix the issues according to the LS from RAN4 in R4-2403363 on the report format of RSCPD. 2.Updates according to the LS from RAN1 in R1- 2401801 on the bandwidth used in measurements for positioning of RedCap UEs 3. Updates according to the agreement at RAN2#125bis:Agreement:Stage 3 impact is not specified any more to align PRS to fixed (e)DRX. Can consider towards next meeting if some modification is needed to the related NOTE in stage 2.Agreements:In this release, the new capability on location+measurements is only for PRUs.Keep the existing IE structure for LocationInformationType.When location+measurements are reported by a PRU, the measurements are valid at the reported location.Agreements:The TP from R2-2403796 is merged into the rapporteur CR.The term “PRU” can be used in 37.355. FFS if a definition is needed (possibly just a pointer to an existing definition).M001 remains ToDo.Agreements:TPs from R2-2403190 are agreeable in principle and can be taken into the rapporteur CR discussion. The corresponding RILs go to Agreed.DL-AoD aspects will not be captured until we have a reply from RAN1; the existing DL-AoD part can be removed pending the reply.Agreement:NR-DL-PRS-MeasurementTimeWindowsConfig should support one-shot window configuration. How to capture this in ASN.1 and field descriptions can be discussed in CR implementation. 4. Updates according to the agreement at RAN2#126:Agreements:Rx hopping in DL-AoD is supported as indicated by RAN1, with TP 1 from R2-2404433 as baseline.Aggregated measurement reports are supported as indicated by RAN1, with TP 2 from R2-2404433 as baseline (DL-PRS-ID changed to OPTIONAL, with an indication that it is always provided for the first measurement). TP to be checked as part of the LPP CR update.H006 is rejected.N013 is agreed.Agreement:Address PRS BW aggregation by adding the PRS resource ID to the linkage as an OPTIONAL field.Agreement:Paragraph on PRUs from R2-2404510 to be captured in the LPP rapporteur CR.M001 is Agreed.Agreements:Adopt the principle of the text proposal from section 2.2 to signal optionally which measurements are to be performed in the configured time window. Details to be checked in CR implementation.Capture in field description that the absence of a PRU location indicates that the PRU was unable to provide it. Exact wording to be determined in CR implementation. |
|  |  |
| ***Summary of change:*** | 1.Updates according to the LS from RAN4 in R4-2403363 and R1- 2401801.2.Updates according to the agreements at #125bis.3.Updates according to the agreements at #126. |
|  |  |
| ***Consequences if not approved:*** | Not fix the spotted issues in LPP |
|  |  |
| ***Clauses affected:*** | 6.4.1.1, 6.4.2, 6.4.3, 6.5.2.2, 6.5.10.4, 6.5.10.5, 6.5.10.6a, 6.5.11.4, 6.5.11.5, 6.5.12.4, 6.5.12.5. |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ... |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | Revision of R2-2404434 |

*START OF CHANGE*

### 4.1.1 LPP Configuration

LPP is used point-to-point between a location server (E-SMLC, LMF or SLP) and a target device (UE or SET) in order to position the target device using position-related measurements obtained by one or more reference sources. Figure 4.1.1-1 shows the configuration as applied to the control- and user-plane location solutions for E-UTRAN and NG-RAN (as defined in TS 36.305 [2], TS 38.305 [40], TS 23.273 [42] and TS 23.271 [3]).

LPP is also used point-to-point between a location server and a PRU. In this specification, procedures and messages specified for the target device equally apply to a PRU, as specified in TS 23.273 [42].

NB-IoT is a non-backward compatible variant of E-UTRAN supporting a reduced set of functionalities. In this specification, procedures and messages specified for the UE equally apply to the UE in NB-IoT.



Figure 4.1.1-1: LPP Configuration for Control- and User-Plane Positioning in E-UTRAN or NG-RAN

*NEXT CHANGE*

### 6.4.2 Common Positioning

#### – *CommonIEsProvideCapabilities*

The *CommonIEsProvideCapabilities* carries common IEs for a Provide Capabilities LPP message Type.

-- ASN1START

CommonIEsProvideCapabilities ::= SEQUENCE {

 ...,

 [[

 segmentationInfo-r14 SegmentationInfo-r14 OPTIONAL, -- Cond Segmentation

 lpp-message-segmentation-r14 BIT STRING { serverToTarget (0),

 targetToServer (1) } OPTIONAL

 ]],

 [[

 remoteUE-Indication-r18 BOOLEAN OPTIONAL, -- Cond NR

 locationEstimateAndMeasurementReporting-r18 ENUMERATED { supported } OPTIONAL

 ]]

}

-- ASN1STOP

| Conditional presence | Explanation |
| --- | --- |
| *Segmentation* | This field is optionally present, need OP, if *lpp-message-segmentation-req* has been received from the location server with bit 1 (*targetToServer*) set to value 1. The field shall be omitted if *lpp‑message‑segmentation-req* has not been received in this location session, or has been received with bit 1 (*targetToServer*) set to value 0. |
| *NR* | This field is optionally present for NR access if *remoteUE-IndicationReq* has been received from the location server in this location session. Otherwise it is not present. |

| *CommonIEsProvideCapabilities* field descriptions |
| --- |
| ***segmentationInfo***This field indicates whether this *ProvideCapabilities* message is one of many segments, as specified in clause 4.3.5. |
| ***lpp-message-segmentation***This field, if present, indicates the target device's LPP message segmentation capabilities. If bit 0 is set to value 1, it indicates that the target device supports receiving segmented LPP messages; if bit 0 is set to value 0 it indicates that the target device does not support receiving segmented LPP messages.If bit 1 is set to value 1, it indicates that the target device supports sending segmented LPP messages; if bit 1 is set to value 0 it indicates that the target device does not support sending segmented LPP messages. |
| ***remoteUE-Indication***This field indicates whether the target device in NR access is configured as a L2 U2N Remote UE. The target device in NR access may transmit a *ProvideCapabilities* message with an appropriate value of this field when it starts or stops operation as a U2N Remote UE. |
| ***locationEstimateAndMeasurementReporting***This field, if present, indicates that the PRU supports *locationEstimateAndMeasurementsRequired* in *LocationInformationType*.NOTE: In this version of the specification, this capability is only applicable to PRUs. |

*NEXT CHANGE*

#### – *CommonIEsRequestLocationInformation*

The *CommonIEsRequestLocationInformation* carries common IEs for a Request Location Information LPP message Type.

-- ASN1START

CommonIEsRequestLocationInformation ::= SEQUENCE {

 locationInformationType LocationInformationType,

 triggeredReporting TriggeredReportingCriteria OPTIONAL, -- Cond ECID

 periodicalReporting PeriodicalReportingCriteria OPTIONAL, -- Need ON

 additionalInformation AdditionalInformation OPTIONAL, -- Need ON

 qos QoS OPTIONAL, -- Need ON

 environment Environment OPTIONAL, -- Need ON

 locationCoordinateTypes LocationCoordinateTypes OPTIONAL, -- Need ON

 velocityTypes VelocityTypes OPTIONAL, -- Need ON

 ...,

 [[

 messageSizeLimitNB-r14 MessageSizeLimitNB-r14 OPTIONAL -- Need ON

 ]],

 [[

 segmentationInfo-r14 SegmentationInfo-r14 OPTIONAL -- Need ON

 ]],

 [[

 scheduledLocationTime-r17

 ScheduledLocationTime-r17 OPTIONAL, -- Need ON

 targetIntegrityRisk-r17

 TargetIntegrityRisk-r17 OPTIONAL -- Need ON

 ]]

}

LocationInformationType ::= ENUMERATED {

 locationEstimateRequired,

 locationMeasurementsRequired,

 locationEstimatePreferred,

 locationMeasurementsPreferred,

 ...,

 locationEstimateAndMeasurementsRequired-r18

}

PeriodicalReportingCriteria ::= SEQUENCE {

 reportingAmount ENUMERATED {

 ra1, ra2, ra4, ra8, ra16, ra32,

 ra64, ra-Infinity

 } DEFAULT ra-Infinity,

 reportingInterval ENUMERATED {

 noPeriodicalReporting, ri0-25,

 ri0-5, ri1, ri2, ri4, ri8, ri16, ri32, ri64

 }

}

TriggeredReportingCriteria ::= SEQUENCE {

 cellChange BOOLEAN,

 reportingDuration ReportingDuration,

 ...

}

ReportingDuration ::= INTEGER (0..255)

AdditionalInformation ::= ENUMERATED {

 onlyReturnInformationRequested,

 mayReturnAdditionalInformation,

 ...

}

QoS ::= SEQUENCE {

 horizontalAccuracy HorizontalAccuracy OPTIONAL, -- Need ON

 verticalCoordinateRequest BOOLEAN,

 verticalAccuracy VerticalAccuracy OPTIONAL, -- Need ON

 responseTime ResponseTime OPTIONAL, -- Need ON

 velocityRequest BOOLEAN,

 ...,

 [[ responseTimeNB-r14 ResponseTimeNB-r14 OPTIONAL -- Need ON

 ]],

 [[ horizontalAccuracyExt-r15 HorizontalAccuracyExt-r15 OPTIONAL, -- Need ON

 verticalAccuracyExt-r15 VerticalAccuracyExt-r15 OPTIONAL -- Need ON

 ]]

}

HorizontalAccuracy ::= SEQUENCE {

 accuracy INTEGER(0..127),

 confidence INTEGER(0..100),

 ...

}

VerticalAccuracy ::= SEQUENCE {

 accuracy INTEGER(0..127),

 confidence INTEGER(0..100),

 ...

}

HorizontalAccuracyExt-r15 ::= SEQUENCE {

 accuracyExt-r15 INTEGER(0..255),

 confidence-r15 INTEGER(0..100),

 ...

}

VerticalAccuracyExt-r15 ::= SEQUENCE {

 accuracyExt-r15 INTEGER(0..255),

 confidence-r15 INTEGER(0..100),

 ...

}

ResponseTime ::= SEQUENCE {

 time INTEGER (1..128),

 ...,

 [[ responseTimeEarlyFix-r12 INTEGER (1..128) OPTIONAL -- Need ON

 ]],

 [[ unit-r15 ENUMERATED { ten-seconds, ... , ten-milli-seconds-v1700 }

 OPTIONAL -- Need ON

 ]]

}

ResponseTimeNB-r14 ::= SEQUENCE {

 timeNB-r14 INTEGER (1..512),

 responseTimeEarlyFixNB-r14 INTEGER (1..512) OPTIONAL, -- Need ON

 ...,

 [[ unitNB-r15 ENUMERATED { ten-seconds, ... } OPTIONAL -- Need ON

 ]]

}

Environment ::= ENUMERATED {

 badArea,

 notBadArea,

 mixedArea,

 ...

}

MessageSizeLimitNB-r14 ::= SEQUENCE {

 measurementLimit-r14 INTEGER (1..512) OPTIONAL, -- Need ON

 ...

}

ScheduledLocationTime-r17 ::= SEQUENCE {

 utcTime-r17 UTCTime OPTIONAL, -- Need ON

 gnssTime-r17 SEQUENCE {

 gnss-TOD-msec-r17 INTEGER (0..3599999),

 gnss-TimeID-r17 GNSS-ID

 } OPTIONAL, -- Need ON

 networkTime-r17 CHOICE {

 e-utraTime-r17 SEQUENCE {

 lte-PhysCellId-r17 INTEGER (0..503),

 lte-ArfcnEUTRA-r17 ARFCN-ValueEUTRA,

 lte-CellGlobalId-r17 CellGlobalIdEUTRA-AndUTRA

 OPTIONAL, -- Need ON

 lte-SystemFrameNumber-r17 INTEGER (0..1023)

 },

 nrTime-r17 SEQUENCE {

 nr-PhysCellID-r17 NR-PhysCellID-r16,

 nr-ARFCN-r17 ARFCN-ValueNR-r15,

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

 nr-SFN-r17 INTEGER (0..1023),

 nr-Slot-r17 CHOICE {

 scs15-r17 INTEGER (0..9),

 scs30-r17 INTEGER (0..19),

 scs60-r17 INTEGER (0..39),

 scs120-r17 INTEGER (0..79)

 } OPTIONAL -- Need ON

 },

 ...

 } OPTIONAL, -- Need ON

 relativeTime-r17 INTEGER (1..1024) OPTIONAL -- Need ON

}

TargetIntegrityRisk-r17 ::= INTEGER (10..90)

-- ASN1STOP

| Conditional presence | Explanation |
| --- | --- |
| *ECID* | The field is optionally present, need ON, if E-CID or NR E-CID is requested. Otherwise it is not present. |

| *CommonIEsRequestLocationInformation* field descriptions |
| --- |
| ***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 measurements error if not possible.NOTE: '*locationEstimateAndMeasurementsRequired*' only applies to PRUs. If the PRU is requested to return both location estimate and measurements, the location estimate is determined independently of the reported measurements, and the measurements shall be valid at the reported location. |
| ***triggeredReporting***This IE indicates that triggered reporting is requested and comprises the following subfields:- ***cellChange***: If this field is set to TRUE, the target device provides requested location information each time the primary cell has changed.- ***reportingDuration***: Maximum duration of triggered reporting in seconds. A value of zero is interpreted to mean an unlimited (i.e. "infinite") duration. The target device should continue triggered reporting for the *reportingDuration* or until an LPP *Abort* or *LPP Error* message is received.The *triggeredReporting* field should not be included by the location server and shall be ignored by the target device if the *periodicalReporting* IE or *responseTime* IE or *responseTimeNB* IE is included in *CommonIEsRequestLocationInformation.* |
| ***periodicalReporting***This IE indicates that periodic reporting is requested and comprises the following subfields:- ***reportingAmount*** indicates the number of periodic location information reports requested. Enumerated values correspond to 1, 2, 4, 8, 16, 32, 64, or infinite/indefinite number of reports. If the *reportingAmount* is '*infinite/indefinite'*, the target device shou-ld continue periodic reporting until an LPP *Abort* message is received. The value '*ra1*' shall not be used by a sender.- ***reportingInterval*** indicates the interval between location information reports and the response time requirement for the first location information report. Enumerated values ri0-25, ri0-5, ri1, ri2, ri4, ri8, ri16, ri32, ri64 correspond to reporting intervals of 1, 2, 4, 8, 10, 16, 20, 32, and 64 seconds, respectively. Measurement reports containing no measurements or no location estimate are required when a *reportingInterval* expires before a target device is able to obtain new measurements or obtain a new location estimate. The value '*noPeriodicalReporting*' shall not be used by a sender. |
| ***additionalInformation***This IE indicates whether a target device is allowed to return additional information to that requested. If this IE indicates '*onlyReturnInformationRequested'* then the target device shall not return any additional information to that requested by the server. If this IE indicates '*mayReturnAdditionalInformation'* then the target device may return additional information to that requested by the server. If a location estimate is returned, any additional information is restricted to that associated with a location estimate (e.g. might include velocity if velocity was not requested but cannot include measurements). If measurements are returned, any additional information is restricted to additional measurements (e.g. might include E-CID measurements if A-GNSS measurements were requested but not E-CID measurements). |
| ***qos***This IE indicates the quality of service and comprises a number of sub-fields. In the case of measurements, some of the sub-fields apply to the location estimate that could be obtained by the server from the measurements provided by the target device assuming that the measurements are the only sources of error. Fields are as follows:- ***horizontalAccuracy*** indicates the maximum horizontal error in the location estimate at an indicated confidence level. The '*accuracy*' corresponds to the encoded uncertainty as defined in TS 23.032 [15] and '*confidence*' corresponds to confidence as defined in TS 23.032 [15].- ***verticalCoordinateRequest*** indicates whether a vertical coordinate is required (TRUE) or not (FALSE)- ***verticalAccuracy*** indicates the maximum vertical error in the location estimate at an indicated confidence level and is only applicable when a vertical coordinate is requested. The '*accuracy*' corresponds to the encoded uncertainty altitude as defined in TS 23.032 [15] and '*confidence*' corresponds to confidence as defined in TS 23.032 [15].- ***responseTime***- ***time*** indicates the maximum response time as measured between receipt of the *RequestLocationInformation* and transmission of a *ProvideLocationInformation*. If the *unit* field is absent, this is given as an integer number of seconds between 1 and 128. If the *unit* field is present with enumerated value '*ten-seconds*', the maximum response time is given in units of 10-seconds, between 10 and 1280 seconds. If the *unit* field is present with enumerated value '*ten-milli-seconds*', the maximum response time is given in units of 10-milli-seconds, between 0.01 and 1.28 seconds. If the *periodicalReporting* IE is included in *CommonIEsRequestLocationInformation*, this field should not be included by the location server and shall be ignored by the target device (if included).- ***responseTimeEarlyFix*** indicates the maximum response time as measured between receipt of the *RequestLocationInformation* and transmission of a *ProvideLocationInformation* containing early location measurements or an early location estimate. If the *unit* field is absent, this is given as an integer number of seconds between 1 and 128. If the *unit* field is present with enumerated value '*ten-seconds*', the maximum response time is given in units of 10-seconds, between 10 and 1280 seconds. If the *unit* field is present with enumerated value '*ten-milli-seconds*', the maximum response time is given in units of 10-milli-seconds, between 0.01 and 1.28 seconds. When this IE is included, a target should send a *ProvideLocationInformation* (or more than one *ProvideLocationInformation* if location information will not fit into a single message) containing early location information according to the *responseTimeEarlyFix* IE and a subsequent *ProvideLocationInformation* (or more than one *ProvideLocationInformation* if location information will not fit into a single message) containing final location information according to the *time* IE. A target shallomit sending a *ProvideLocationInformation* if the early location information is not available at the expiration of the time value in the *responseTimeEarlyFix* IE. A server should set the *responseTimeEarlyFix* IE to a value less than that for the *time* IE. A target shall ignore the *responseTimeEarlyFix* IE if its value is not less than that for the *time* IE.- ***unit*** indicates the unit of the *time* and *responseTimeEarlyFix* fields. Enumerated value '*ten-seconds*' corresponds to a resolution of 10 seconds. Enumerated value '*ten-milli-seconds*' corresponds to a resolution of 0.01 seconds. If this field is absent, the unit/resolution is 1 second. Enumerated value '*ten-milli-seconds*' is only applicable for NR E-CID Positioning, NR DL-TDOA Positioning, NR DL-AoD Positioning, and NR Multi-RTT Positioning. If the enumerated value '*ten-milli-seconds*' is included for methods others than NR E-CID Positioning, NR DL-TDOA Positioning, NR DL-AoD Positioning, and NR Multi-RTT Positioning the target device shall ignore the *unit* field.- ***velocityRequest*** indicates whether velocity (or measurements related to velocity) is requested (TRUE) or not (FALSE).- ***responseTimeNB***If the *periodicalReporting* IE or *responseTime* IE is included in *CommonIEsRequestLocationInformation*, this field should not be included by the location server and shall be ignored by the target device (if included).- ***timeNB*** indicates the maximum response time as measured between receipt of the *RequestLocationInformation* and transmission of a *ProvideLocationInformation*. If the *unitNB* field is absent, this is given as an integer number of seconds between 1 and 512. If the *unitNB* field is present, the maximum response time is given in units of 10-seconds, between 10 and 5120 seconds.- ***responseTimeEarlyFixNB*** indicates the maximum response time as measured between receipt of the *RequestLocationInformation* and transmission of a *ProvideLocationInformation* containing early location measurements or an early location estimate. If the *unitNB* field is absent, this is given as an integer number of seconds between 1 and 512. If the *unitNB* field is present, the maximum response time is given in units of 10-seconds, between 10 and 5120 seconds. When this IE is included, a target should send a *ProvideLocationInformation* (or more than one *ProvideLocationInformation* if location information will not fit into a single message) containing early location information according to the *responseTimeEarlyFixNB* IE and a subsequent *ProvideLocationInformation* (or more than one *ProvideLocationInformation* if location information will not fit into a single message) containing final location information according to the *timeNB* IE. A target shall omit sending a *ProvideLocationInformation* if the early location information is not available at the expiration of the time value in the *responseTimeEarlyFixNB* IE. A server should set the *responseTimeEarlyFixNB* IE to a value less than that for the *timeNB* IE. A target shall ignore the *responseTimeEarlyFixNB* IE if its value is not less than that for the *timeNB* IE.- ***unitNB*** indicates the unit of the *timeNB* and *responseTimeEarlyFixNB* fields. Enumerated value '*ten-second*' corresponds to a resolution of 10 seconds. If this field is absent, the unit/resolution is 1 second.- ***horizontalAccuracyExt*** indicates the maximum horizontal error in the location estimate at an indicated confidence level. The '*accuracyExt*' corresponds to the encoded high accuracy uncertainty as defined in TS 23.032 [15] and 'confidence' corresponds to confidence as defined in TS 23.032 [15]. This field should not be included by the location server and shall be ignored by the target device if the *horizontalAccuracy* field is included in QoS.- ***verticalAccuracyExt*** indicates the maximum vertical error in the location estimate at an indicated confidence level and is only applicable when a vertical coordinate is requested. The '*accuracyExt*' corresponds to the encoded high accuracy uncertainty as defined in TS 23.032 [15] and '*confidence*' corresponds to confidence as defined in TS 23.032 [15]. This field should not be included by the location server and shall be ignored by the target device if the *verticalAccuracy* field is included in QoS.All QoS requirements shall be obtained by the target device to the degree possible but it is permitted to return a response that does not fulfill all QoS requirements if some were not attainable. The single exception is *time* and *timeNB* which shall always be fulfilled – even if that means not fulfilling other QoS requirements.A target device supporting NB-IoT access shall support the *responseTimeNB* IE*.*A target device supporting HA GNSS shall support the *HorizontalAccuracyExt*, *VerticalAccuracyEx*, and *unit* fields with enumerated value '*ten-seconds*'.A target device supporting NB-IoT access and HA GNSS shall support the *unitNB* field. |
| ***environment***This field provides the target device with information about expected multipath and non line of sight (NLOS) in the current area. The following values are defined:- badArea: possibly heavy multipath and NLOS conditions (e.g. bad urban or urban).- notBadArea: no or light multipath and usually LOS conditions (e.g. suburban or rural).- mixedArea: environment that is mixed or not defined.If this field is absent, a default value of 'mixedArea' applies. |
| ***locationCoordinateTypes***This field provides a list of the types of location estimate that the target device may return when a location estimate is obtained by the target. |
| ***velocityTypes***This fields provides a list of the types of velocity estimate that the target device may return when a velocity estimate is obtained by the target. |
| ***messageSizeLimitNB***This field provides an octet limit on the amount of location information a target device can return.- ***measurementLimit*** indicates the maximum amount of location information the target device should return in response to the *RequestLocationInformation* message received from the location server.The limit applies to the overall size of the LPP message at LPP level (LPP Provide Location Information), and is specified in steps of 100 octets. The message size limit is then given by the value provided in *measurementLimit* times 100 octets. |
| ***segmentationInfo***This field indicates whether this *RequestLocationInformation* message is one of many segments, as specified in clause 4.3.5 |
| ***scheduledLocationTime***This field indicates that the target device is requested to obtain location measurements or location estimate valid at the *scheduledLocationTime* *T* and comprises the following subfields:- ***utcTime*** provides *T* in UTC in the form of YYMMDDhhmmssZ.- ***gnssTime*** provides *T* in GNSS system time of the GNSS indicated by *gnss-TimeID*.- ***gnss-TOD-msec*** specifies the GNSS TOD in 1-milli-second resolution rounded down to the nearest millisecond unit.- ***networkTime*** provides *T* in E-UTRA or NR network time.- ***lte-PhysCellId, lte-ArfcnEUTRA, lte-CellGlobalId*** identifies the reference cell (E-UTRA) that is used for the network time.- ***lte-systemFrameNumber*** specifies the system frame number in E-UTRA.- ***nr-PhysCellID***, ***nr-ARFCN*** , ***nr-CellGlobalID*** identifies the reference cell (NR) that is used for the network time.- ***nr-SFN*** specifies the system frame number in NR.- ***nr-Slot*** specifies the slot number in NR for the indicated subcarrier spacing (SCS). The total NR network time is given by *nr-SFN* + *nr-Slot*.- ***relativeTime*** provides *T* in seconds from current time, where current time is defined as the time the *CommonIEsRequestLocationInformation* was received.NOTE 1: A location estimate returned to an LCS Client, AF or UE for a scheduled location time can be treated by the LCS Client, AF or UE as an estimate of the location of the UE at the scheduled location time (see TS 23.273 [42]).NOTE 2: If this field is present, at least one of *utcTime*, *gnssTime*, *networkTime,* or *relativeTime* shall be present. |
| ***targetIntegrityRisk***This field indicates the TIR for which the PL is requested. The TIR is calculated by *P*=10-0.1*n* [hour-1] where *n* is the value of *targetIntegrityRisk* and the range is 10-1 to 10-9 per hour. |

#### – *CommonIEsProvideLocationInformation*

The *CommonIEsProvideLocationInformation* carries common IEs for a Provide Location Information LPP message Type.

-- ASN1START

CommonIEsProvideLocationInformation ::= SEQUENCE {

 locationEstimate LocationCoordinates OPTIONAL,

 velocityEstimate Velocity OPTIONAL,

 locationError LocationError OPTIONAL,

 ...,

 [[ earlyFixReport-r12 EarlyFixReport-r12 OPTIONAL

 ]],

 [[ locationSource-r13 LocationSource-r13 OPTIONAL,

 locationTimestamp-r13 UTCTime OPTIONAL

 ]],

 [[

 segmentationInfo-r14 SegmentationInfo-r14 OPTIONAL -- Cond Segmentation

 ]],

 [[

 integrityInfo-r17 IntegrityInfo-r17 OPTIONAL

 ]]

}

LocationCoordinates ::= CHOICE {

 ellipsoidPoint Ellipsoid-Point,

 ellipsoidPointWithUncertaintyCircle Ellipsoid-PointWithUncertaintyCircle,

 ellipsoidPointWithUncertaintyEllipse EllipsoidPointWithUncertaintyEllipse,

 polygon Polygon,

 ellipsoidPointWithAltitude EllipsoidPointWithAltitude,

 ellipsoidPointWithAltitudeAndUncertaintyEllipsoid

 EllipsoidPointWithAltitudeAndUncertaintyEllipsoid,

 ellipsoidArc EllipsoidArc,

 ...,

 highAccuracyEllipsoidPointWithUncertaintyEllipse-v1510

 HighAccuracyEllipsoidPointWithUncertaintyEllipse-r15,

 highAccuracyEllipsoidPointWithAltitudeAndUncertaintyEllipsoid-v1510

 HighAccuracyEllipsoidPointWithAltitudeAndUncertaintyEllipsoid-r15,

 ha-EllipsoidPointWithScalableUncertaintyEllipse-v1680 HA-EllipsoidPointWithScalableUncertaintyEllipse-r16,

 ha-EllipsoidPointWithAltitudeAndScalableUncertaintyEllipsoid-v1680

 HA-EllipsoidPointWithAltitudeAndScalableUncertaintyEllipsoid-r16,

 local2dPointWithUncertaintyEllipse-v1800 Local2dPointWithUncertaintyEllipse-r18,

 local3dPointWithUncertaintyEllipsoid-v1800 Local3dPointWithUncertaintyEllipsoid-r18

}

Velocity ::= CHOICE {

 horizontalVelocity HorizontalVelocity,

 horizontalWithVerticalVelocity HorizontalWithVerticalVelocity,

 horizontalVelocityWithUncertainty HorizontalVelocityWithUncertainty,

 horizontalWithVerticalVelocityAndUncertainty

 HorizontalWithVerticalVelocityAndUncertainty,

 ...

}

LocationError ::= SEQUENCE {

 locationfailurecause LocationFailureCause,

 ...

}

LocationFailureCause ::= ENUMERATED {

 undefined,

 requestedMethodNotSupported,

 positionMethodFailure,

 periodicLocationMeasurementsNotAvailable,

 ...

}

EarlyFixReport-r12 ::= ENUMERATED {

 noMoreMessages,

 moreMessagesOnTheWay

}

LocationSource-r13 ::= BIT STRING { a-gnss (0),

 wlan (1),

 bt (2),

 tbs (3),

 sensor (4),

 ha-gnss-v1510 (5),

 motion-sensor-v1550 (6),

 dl-tdoa-r16 (7),

 dl-aod-r16 (8) } (SIZE(1..16))

IntegrityInfo-r17 ::= SEQUENCE {

 horizontalProtectionLevel-r17 INTEGER (0..50000),

 verticalProtectionLevel-r17 INTEGER (0..50000) OPTIONAL,

 achievableTargetIntegrityRisk-r17 INTEGER (10..90) OPTIONAL,

 ...

}

-- ASN1STOP

| Conditional presence | Explanation |
| --- | --- |
| *Segmentation* | This field is optionally present, need OP, if *lpp-message-segmentation-req* has been received from the location server with bit 1 (*targetToServer*) set to value 1. The field shall be omitted if *lpp‑message‑segmentation-req* has not been received in this location session, or has been received with bit 1 (*targetToServer*) set to value 0. |

| *CommonIEsProvideLocationInformation* field descriptions |
| --- |
| ***locationEstimate***This field provides a location estimate using one of the geographic shapes defined in TS 23.032 [15]. Coding of the values of the various fields internal to each geographic shape follow the rules in TS 23.032 [15]. The conditions for including this field are defined for the *locationInformationType* field in a Request Location Information message.NOTE: If the *locationInformationType* field in a Request Location Information message was set to ‘*locationEstimateAndMeasurementsRequired*’ and this field is absent, it means that the PRU location is not available. |
| ***velocityEstimate***This field provides a velocity estimate using one of the velocity shapes defined in TS 23.032 [15]. Coding of the values of the various fields internal to each velocity shape follow the rules in TS 23.032 [15]. |
| ***locationError***This field shall be included if and only if a location estimate and measurements are not included in the LPP PDU. The field includes information concerning the reason for the lack of location information. The *LocationFailureCause* '*periodicLocationMeasurementsNotAvailable*' shall be used by the target device if periodic location reporting was requested, but no measurements or location estimate are available when *the reportingInterval* expired. |
| ***earlyFixReport***This field shall be included if and only if the *ProvideLocationInformation* message contains early location measurements or an early location estimate. The target device shall set the values of this field as follows:- noMoreMessages: This is the only or last *ProvideLocationInformation* message used to deliver the entire set of early location information.- moreMessagesOnTheWay: This is one of multiple *ProvideLocationInformation* messages used to deliver the entire set of early location information (if early location information will not fit into a single message).If this field is included, the IE *SegmentationInfo* shall not be included. |
| ***locationSource***This field provides the source positioning technology for the location estimate.NOTE 1: In this version of the specification, the entry 'tbs' is used only for TBS positioning based on MBS signals.NOTE 2: The entry 'sensor' is used only for positioning technology that uses barometric pressure sensor. The entry 'motion-sensor' is used for positioning technology that uses sensor(s) to detect displacement and movement, e.g. accelerometers, gyros, magnetometers. |
| ***locationTimestamp***This field provides the UTC time when the location estimate is valid and should take the form of *YYMMDDhhmmssZ*. |
| ***segmentationInfo***This field indicates whether this *ProvideLocationInformation* message is one of many segments, as specified in clause 4.3.5 |
| ***integrityInfo***This field provides the integrity result for the *locationEstimate.*- ***horizontalProtectionLevel*** provides the HPL for the *locationEstimate* along the semi-major axis of the error ellipse. Scale factor 0.01 metre; range 0 – 500 metres.- ***verticalProtectionLevel*** provides the VPL for the *locationEstimate*. Scale factor 0.01 metre; range 0 – 500 metres.- ***achievableTargetIntegrityRisk*** indicates the achievable TIR for which the HPL and VPL are provided. The achievable TIR is given by *P*=10-0.1n [hour-1] where *n* is the value of *achievableTargetIntegrityRisk* and the range is 10-1 to 10-9 per hour. If this field is absent, the achievable TIR is the same as the *targetIntegrityRisk* in *CommonIEsRequestLocationInformation*. |

NOTE: Void.

*NEXT CHANGE*

### 6.4.3 Common NR Positioning Information Elements

------Skip the unchanged part-----------------

#### *– NR-AggregatedDL-PRS-ResourceInfo-Element*

The IE *NR-AggregatedDL-PRS-ResourceInfo-Element* is used by the target device to indicate each of the aggregated DL-PRS Resource Set and/or the DL-PRS Resource to the location server.

-- ASN1START

NR-AggregatedDL-PRS-ResourceInfo-Element-r18 ::= SEQUENCE {

 aggregatedDL-PRS-ID-r18 INTEGER (0..255) OPTIONAL,

 nr-DL-PRS-ResourceSetID-r18 NR-DL-PRS-ResourceSetID-r16 OPTIONAL,

 nr-DL-PRS-ResourceID-r18 NR-DL-PRS-ResourceID-r16 OPTIONAL,

 ...

}

-- ASN1STOP

*NEXT CHANGE*

#### *– NR-DL-PRS-MeasurementTimeWindowsConfig*

The IE *NR-DL-PRS-MeasurementTimeWindowsConfig* provides a set of indicated time window(s) which is configured for the target device to perform measurements on indicated DL-PRS Resource Set(s) occurring within indicated time window(s).

-- ASN1START

NR-DL-PRS-MeasurementTimeWindowsConfig-r18 ::=

 SEQUENCE (SIZE(1..2)) OF

 NR-DL-PRS-MeasurementTimeWindowsConfigElement-r18

NR-DL-PRS-MeasurementTimeWindowsConfigElement-r18 ::= SEQUENCE {

 nr-StartSFN-TimeWindow-r18 INTEGER (0..1023),

 nr-PeriodicOrOneShotTimeWindow-r18 CHOICE {

 nr-PeriodicityAndSlotOffsetTimeWindow-r18

 NR-DL-PRS-Periodicity-and-ResourceSetSlotOffset-r16,

 nr-OneShotSlotOffsetTimeWindow-r18 CHOICE {

 scs15-r18 INTEGER (0..10239),

 scs30-r18 INTEGER (0..20479),

 scs60-r18 INTEGER (0..40959),

 scs120-r18 INTEGER (0..81919)

 }

 } OPTIONAL, -- Need ON

 nr-SymbolOffsetTimeWindow-r18 INTEGER (0..13) OPTIONAL, -- Need ON

 nr-DurationTimeWindow-r18 ENUMERATED { n1, n2, n4, n6, n8, n12, n16, ... },

 nr-SelectedDL-PRS-FrequencyLayerIndex-r18 INTEGER (0..nrMaxFreqLayers-1-r16)

 OPTIONAL, -- Need ON

 nr-SelectedDL-PRS-IndexListPerFreq-r18

 SEQUENCE (SIZE (1..nrMaxTRPsPerFreq-r16)) OF

 NR-SelectedDL-PRS-IndexPerTRP-r18 OPTIONAL, --Need OP

 nr-MeasurementsToPerformInTimeWindow-r18 BIT STRING { rstd (0),

 ueRxTx (1),

 rsrp (2),

 rsrpp (3),

 rscp (4),

 rscpd (5)

 } (SIZE(1..16)) OPTIONAL, -- Need ON

...

}

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

 ...

}

-- ASN1STOP

|  |
| --- |
| *NR-DL-PRS-MeasurementTimeWindowsConfig* field descriptions |
| ***nr-StartSFN-TimeWindow***This field specifies the start of the time window in system frame number. |
| ***nr-PeriodicOrOneShotTimeWindow***A one-shot field specifies the slot offset of the periodic or one-shot time window with respect to the SFN in IE *nr-StartSFN-TimeWindow* slot #0 for the TRP where the DL-PRS Resource Set is configured, and the periodicity of the periodic time window in slots configured per DL-PRS Resource Set. |
|  |
| ***nr-SymbolOffsetTimeWindow***This field specifies the symbol offset with respect to the slot offset in *nr-PeriodicOrOneShotTimeWindow*. |
| ***nr-DurationTimeWindow***This field specifies the desired duration of a time window for the indicated DL-PRS Resource Set in unit of slots. Enumerated value 'n1' corresponds to 1 slot, n2 to 2 slots, n4 to 4 slots and so on. |
| ***nr-SelectedDL-PRS-FrequencyLayerIndex***This field indicates the frequency layer provided in IE *NR-DL-PRS-AssistanceData*. Value 0 corresponds to the first frequency layer provided in *nr-DL-PRS-AssistanceDataList* in IE *NR-DL-PRS-AssistanceData*, value 1 to the second frequency layer in *nr-DL-PRS-AssistanceDataList*, and so on. |
| ***nr-SelectedDL-PRS-IndexListPerFreq***This field provides the list of addressed TRPs of the selected frequency layer. If this field is absent, all DL-PRS Resources of all TRPs of the indicated frequency layer are addressed. The number of the indicated DL-PRS Resource Set(s) for all the selected TRPs in this list is the same. |
| ***nr-SelectedTRP-Index***This field indicates the addressed TRP of the selected frequency layer. Value 0 corresponds to the first entry in *nr-DL-PRS-AssistanceDataPerFreq* provided in IE *NR-DL-PRS-AssistanceData*, value 1 corresponds to the second entry in *nr-DL-PRS-AssistanceDataPerFreq*, and so on. |
| ***dl-SelectedPRS-ResourceSetIndexList***This field provides the list of addressed DL-PRS Resource Sets of the selected TRPs of the selected frequency layer. If this field is absent, all DL-PRS Resource Sets and Resources of the indicated TRP are addressed. |
| ***nr-MeasurementsToPerfromInTimeWindow***This field indicates the measurements that UE shall perform in the configured time window. If multiple bits are set to 1, then UE shall perform multiple measurements in the same time window. |

*NEXT CHANGE*

#### *– NR-PositionCalculationAssistance*

The IE *NR-PositionCalculationAssistance* is used by the location server to provide assistance data including integrity information to enable UE‑based downlink positioning.

-- ASN1START

NR-PositionCalculationAssistance-r16 ::= SEQUENCE {

 nr-TRP-LocationInfo-r16 NR-TRP-LocationInfo-r16 OPTIONAL, -- Need ON

 nr-DL-PRS-BeamInfo-r16 NR-DL-PRS-BeamInfo-r16 OPTIONAL, -- Need ON

 nr-RTD-Info-r16 NR-RTD-Info-r16 OPTIONAL, -- Need ON

 ...,

 [[

 nr-TRP-BeamAntennaInfo-r17 NR-TRP-BeamAntennaInfo-r17 OPTIONAL, -- Need ON

 nr-DL-PRS-Expected-LOS-NLOS-Assistance-r17

 NR-DL-PRS-ExpectedLOS-NLOS-Assistance-r17

 OPTIONAL, -- Need ON

 nr-DL-PRS-TRP-TEG-Info-r17 NR-DL-PRS-TRP-TEG-Info-r17 OPTIONAL -- Need ON

 ]],

 [[

 nr-IntegrityServiceParameters-r18 NR-IntegrityServiceParameters-r18 OPTIONAL, -- Need OR

 nr-IntegrityServiceAlert-r18 NR-IntegrityServiceAlert-r18 OPTIONAL, -- Need OR

 nr-IntegrityRiskParameters-r18 NR-IntegrityRiskParameters-r18 OPTIONAL, -- Need OR

 nr-IntegrityParametersTRP-LocationInfo-r18 NR-IntegrityParametersTRP-LocationInfo-r18

 OPTIONAL, -- Cond Integrity1

 nr-IntegrityParametersDL-PRS-BeamInfo-r18

 NR-IntegrityParametersDL-PRS-BeamInfo-r18

 OPTIONAL, -- Cond Integrity2

 nr-IntegrityParametersRTD-Info-r18 NR-IntegrityParametersRTD-Info-r18

 OPTIONAL, -- Cond Integrity3

 nr-IntegrityParametersTRP-BeamAntennaInfo-r18 NR-IntegrityParametersTRP-BeamAntennaInfo-r18

 OPTIONAL, -- Cond Integrity4

 nr-PRU-DL-Info-r18 NR-PRU-DL-Info-r18 OPTIONAL -- Need ON

 ]]

}

NR-IntegrityParametersTRP-LocationInfo-r18 ::= SEQUENCE {

 trp-ErrorCorrelationTime-r18 INTEGER(0..255) OPTIONAL, -- Need ON

 dl-PRS-ResourceSetARP-ErrorCorrelationTime-r18 INTEGER(0..255) OPTIONAL, -- Need ON

 dl-PRS-ResourceARP-ErrorCorrelationTime-r18 INTEGER(0..255) OPTIONAL, -- Need ON

 ...

}

NR-IntegrityParametersDL-PRS-BeamInfo-r18 ::= SEQUENCE {

 dl-PRS-BeamInfoErrorCorrelationTime-r18 INTEGER (0..255),

 ...

}

NR-IntegrityParametersRTD-Info-r18 ::= SEQUENCE {

 rtd-ErrorCorrelationTime-r18 INTEGER (0..255),

 ...

}

NR-IntegrityParametersTRP-BeamAntennaInfo-r18 ::= SEQUENCE {

 trp-BeamAntennaInfoErrorCorrelationTime-r18 INTEGER (0..255),

 ...

}

-- ASN1STOP

| Conditional presence | Explanation |
| --- | --- |
| *Integrity1* | The field is optionally present, need OR, if *nr-TRP-LocationInfo* is present and *nr-IntegrityTRP-LocationBounds* is present in IE *NR-TRP-LocationInfo;* otherwise it is not present. |
| *Integrity2* | The field is optionally present, need OR, if *nr-DL-PRS-BeamInfo* is present and *nr-IntegrityBeamInfoBounds* is present in IE *NR-DL-PRS-BeamInfo;* otherwise it is not present. |
| *Integrity3* | The field is optionally present, need OR, if *nr-RTD-Info* is present and *nr-IntegrityRTD-InfoBounds* is present in IE *NR-RTD-Info;* otherwise it is not present. |
| *Integrity4* | The field is optionally present, need OR, if *nr-TRP-BeamAntennaInfo* is present and *nr-IntegrityBeamPowerBounds* is present in IE *NR-TRP-BeamAntennaInfo;* otherwise it is not present. |

| *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. |
| ***nr-DL-PRS-BeamInfo***This field provides the spatial directions of DL-PRS Resources for TRPs. |
| ***nr-RTD-Info***This field provides the time synchronization information between the reference TRP and neighbour TRPs.  |
| ***nr-TRP-BeamAntennaInfo***This field provides the relative DL-PRS Resource power between DL-PRS Resources per angle per TRP. |
| ***nr-DL-PRS-ExpectedLOS-NLOS-Assistance***This field provides the expected likelihood of a LOS propagation path from a TRP to the target device. The information is provided per TRP or per DL-PRS Resource. |
| ***nr-DL-PRS-TRP-TEG-Info***This field provides the TRP Tx TEG ID associated with the transmission of each DL-PRS Resource of the TRP. |
| ***nr-IntegrityServiceParameters***This field specifiesthe range of Integrity Risk (IR) for which the integrity assistance data are valid. |
| ***nr-IntegrityServiceAlert***This field indicates whether the corresponding assistance data can be used for integrity related applications. |
| ***trp-ErrorCorrelationTime***This field specifies the TRP Error Correlation Time which is the upper bound of the correlation time of the TRP error. The time is calculated using:$$t=\left\{\begin{array}{c}10i, \&i\leq 180\\1800+100(i-180), 180<\&i\leq 234 \\7200+1000\left(i-234\right), \&i>234\end{array} [s]\right.$$Range is 1-28,200 s. |
| ***dl-PRS-ResourceSetARP-ErrorCorrelationTime***This field, if present, specifies the DL-PRS Resource Set ARP Error Correlation Time which is the upper bound of the correlation time of the DL-PRS Resource Set ARP error. The time is calculated using:$$t=\left\{\begin{array}{c}10i, \&i\leq 180\\1800+100(i-180), 180<\&i\leq 234 \\7200+1000\left(i-234\right), \&i>234\end{array} [s]\right.$$Range is 1-28,200 s. |
| ***dl-PRS-ResourceARP-ErrorCorrelationTime***This field, if present, specifies the DL-PRS Resource ARP Error Correlation Time which is the upper bound of the correlation time of the DL-PRS Resource ARP error. The time is calculated using:$$t=\left\{\begin{array}{c}10i, \&i\leq 180\\1800+100(i-180), 180<\&i\leq 234 \\7200+1000\left(i-234\right), \&i>234\end{array} [s]\right.$$Range is 1-28,200 s. |
| ***rtd-ErrorCorrelationTime***This field specifies the inter-TRP synchronization error Correlation Time which is the upper bound of the correlation time of the inter-TRP synchronization error. The correlation time is calculated using:$$t=\left\{\begin{array}{c}10i, 1\leq \&i\leq 180\\1800+100(i-180), 180<\&i\leq 234 \\7200+1000\left(i-234\right), 234<i \end{array} [s]\right.$$Where *i* is the value given by *rtdErrorCorrelationTime*. Range is 1-28,200 s. |
| ***dl-PRS-BeamInfoErrorCorrelationTime***This field specifies the Beam Boresight Direction Angle Error Correlation Time which is the upper bound of the correlation time of the DL-PRS Resource angle error. The time is calculated using:$$t=\left\{\begin{array}{c}10i, \&i\leq 180\\1800+100(i-180), 180<\&i\leq 234 \\7200+1000\left(i-234\right), \&i>234\end{array} [s]\right.$$Range is 1-28,200 s. |
| ***trp-BeamAntennaInfoErrorCorrelationTime***This field specifies the Mean Beam Power Error Correlation Time which is the upper bound of the correlation time of the mean beam power error.The time is calculated using:$$t=\left\{\begin{array}{c}10i, \&i\leq 180\\1800+100(i-180), 180<\&i\leq 234 \\7200+1000\left(i-234\right), \&i>234\end{array} [s]\right.$$Range is 1-28,200 s. |
| ***nr-PRU-DL-Info***This field provides the measurements reported by a PRU to the target UE. |

*NEXT CHANGE*

#### – *NR-PRU-DL-Info*

The IE *NR-PRU-DL-Info* is used by the location server to provide the carrier phase measurements with associated measurements and additional information reported by a PRU for UE-based DL-TDOA to a target UE.

-- ASN1START

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

 ...

}

NR-PRU-RSCP-MeasurementInformation-r18 ::= SEQUENCE (SIZE(1..nrMaxTRPs-r16)) OF

 NR-PRU-RSCP-MeasElement-r18

NR-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 LOS-NLOS-Indicator-r17,

 perResource LOS-NLOS-Indicator-r17

 } OPTIONAL, -- Need ON

 nr-RSCP-r18 INTEGER (0..3599) OPTIONAL, -- Need ON

 nr-DL-PRS-RSRP-Result-r18 INTEGER (0..126) OPTIONAL, -- Need ON

 nr-DL-PRS-FirstPathRSRP-Result-r18 INTEGER (0..126) OPTIONAL, -- Need ON

 nr-PhaseQuality-r18 NR-PhaseQuality-r18 OPTIONAL, -- Need ON

 nr-PRU-RSCP-AddSampleMeasurements-r18 SEQUENCE (SIZE (1..nrNumOfSamples-1-r18 )) OF

 NR-RSCP-AdditionalMeasurements-r18 OPTIONAL, -- Need ON

 nr-PRU-RSRP-AddSampleMeasurements-r18 SEQUENCE (SIZE (1..nrNumOfSamples-1-r18)) OF

 INTEGER (0..61) OPTIONAL, -- Need ON

 nr-PRU-FirstPathRSRP-ResultDiff-AddSampleMeasurements-r18

 SEQUENCE (SIZE (1..nrNumOfSamples-1-r18 )) OF INTEGER (0..61) 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-r18

NR-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-DL-PRS-RSRP-ResultDiff-r18 INTEGER (0..61) OPTIONAL, -- Need ON

 nr-DL-PRS-FirstPathRSRP-ResultDiff-r18 INTEGER (0..61) OPTIONAL, -- Need ON nr-PRU-RSCP-AdditionalMeasurementsList-r18 SEQUENCE (SIZE (1..nrNumOfSamples-r18 )) OF

 NR-RSCP-AdditionalMeasurements-r18 OPTIONAL, -- Need ON

 nr-PRU-RSRPDiff-AdditionalMeasurementsList-r18 SEQUENCE (SIZE (1..nrNumOfSamples-r18 )) OF INTEGER (0..61) OPTIONAL, -- Need ON

 nr-PRU-FirstPathRSRP-ResultDiff-AdditionalMeasurementsList-r18

 SEQUENCE (SIZE (1..nrNumOfSamples-r18 )) OF INTEGER (0..61) OPTIONAL, -- Need ON

 ...

}

-- ASN1STOP

| *NR-PRU-DL-Info* field descriptions |
| --- |
| ***nr-PRU-LocationInfo***This field provides the location coordinates of the PRU. |
| ***nr-PRU-DL-TDOA-MeasInfo***This field specifies the list of carrier phase measurement RSCPD together with the other measurement information in DL-TDOA by the PRU. |
| ***nr-PRU-DL-AoD-MeasInfo***This field specifies the list of other measurement information in DL-AoD by the PRU. |
| ***nr-PRU-RSCP-MeasInfo***This field specifies the list of carrier phase measurement RSCP measured by the PRU, together with DL-PRS RSRP, and/or DL-PRS RSRPP measurement(s) associated with the RSCP measurements. |

*NEXT CHANGE*

#### *–* *NR-TRP-LocationInfo*

The IE *NR-TRP-LocationInfo* is used by the location server to provide the coordinates of TRPs and coordinates of the antenna reference points for a set of TRPs together with integrity information. For each TRP, the ARP location can be provided for each associated DL-PRS Resource ID per DL-PRS Resource Set.

-- ASN1START

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

 NR-TRP-LocationInfoPerFreqLayer-r16

NR-TRP-LocationInfoPerFreqLayer-r16 ::= SEQUENCE {

 referencePoint-r16 ReferencePoint-r16 OPTIONAL, -- Cond NotSameAsPrev

 trp-LocationInfoList-r16 SEQUENCE (SIZE (1..nrMaxTRPsPerFreq-r16)) OF

 TRP-LocationInfoElement-r16,

 ...

}

TRP-LocationInfoElement-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

 associated-DL-PRS-ID-r16 INTEGER (0..255) OPTIONAL, -- Need OP

 trp-Location-r16 RelativeLocation-r16 OPTIONAL, -- Need OP

 trp-DL-PRS-ResourceSets-r16 SEQUENCE (SIZE(1..nrMaxSetsPerTrpPerFreqLayer-r16)) OF

 DL-PRS-ResourceSets-TRP-Element-r16 OPTIONAL, -- Need OP

 ...,

 [[

 trp-LocationCartesian-r18 RelativeCartesianLocation-r18 OPTIONAL, -- Need OP

 nr-IntegrityTRP-LocationBounds-r18

 NR-IntegrityLocationBounds-r18 OPTIONAL -- Need OR

 ]]

}

DL-PRS-ResourceSets-TRP-Element-r16 ::= SEQUENCE {

 dl-PRS-ResourceSetARP-r16 RelativeLocation-r16 OPTIONAL, -- Need OP

 dl-PRS-Resource-ARP-List-r16 SEQUENCE (SIZE(1..nrMaxResourcesPerSet-r16)) OF

 DL-PRS-Resource-ARP-Element-r16 OPTIONAL, -- Need OP

 ...,

 [[

 dl-PRS-ResourceSetARP-Cartesian-r18 RelativeCartesianLocation-r18 OPTIONAL, -- Need OP

 nr-IntegrityDL-PRS-ResourceSetARP-LocationBounds-r18

 NR-IntegrityLocationBounds-r18 OPTIONAL -- Need OR

 ]]

}

DL-PRS-Resource-ARP-Element-r16 ::= SEQUENCE {

 dl-PRS-Resource-ARP-location-r16 RelativeLocation-r16 OPTIONAL, -- Need OP

 ...,

 [[

 dl-PRS-Resource-ARP-locationCartesian-r18

 RelativeCartesianLocation-r18 OPTIONAL, -- Need OP

 nr-IntegrityDL-PRS-ResourceARP-LocationBounds-r18

 NR-IntegrityLocationBounds-r18 OPTIONAL -- Need OR

 ]]

}

NR-IntegrityLocationBounds-r18 ::= SEQUENCE {

 units-r18 ENUMERATED {mm, cm, m, ...},

 meanLocationErrorBound-r18 SEQUENCE {

 horizontal-r18 INTEGER (0..255),

 vertical-r18 INTEGER (0..255)

 },

 stdDevLocationErrorBound-r18 SEQUENCE {

 horizontal-r18 INTEGER (0..255),

 vertical-r18 INTEGER (0..255)

 },

 ...

}

-- ASN1STOP

| Conditional presence | Explanation |
| --- | --- |
| *NotSameAsPrev* | The field is mandatory present in the first entry of the *NR-TRP-LocationInfoPerFreqLayer* in the *nr-TRP-LocationInfo* list; otherwise it is optionally present, need OP. |

| *NR-TRP-LocationInfo* field descriptions |
| --- |
| ***referencePoint***This field specifies the reference point used to define the location of TRPs provided in the *trp-LocationInfoList*. If this field is absent, the reference point is the same as in the previous entry of the *NR-TRP-LocationInfoPerFreqLayer* in the *NR-TRP-LocationInfo* list. |
| ***trp-LocationInfoList***This field provides the antenna reference point locations of the DL-PRS Resources for the TRPs together with integrity information and comprises the following sub-fields:- ***dl-PRS-ID***: This field is used along with a DL-PRS Resource Set ID and a DL-PRS Resource ID to uniquely identify a DL-PRS Resource, and is associated to a single TRP.- ***nr-PhysCellID***: This field specifies the physical cell identity of the associated TRP.- ***nr-CellGlobalID***: This field specifies the NCGI, the globally unique identity of a cell in NR, of the associated TRP.- ***nr-ARFCN***: This field specifies the NR-ARFCN of the TRP's CD-SSB (as defined in TS 38.300 [47]) corresponding to *nr-PhysCellID*.- ***associated-DL-PRS-ID***: This field, if present, specifies the *dl-PRS-ID* of the associated TRP from which the *trp-location* or *trp-LocationCartesian* information is adopted. If the field is present, the field *trp-Location* and *trp-LocationCartesian* shall be absent.- ***trp-Location, trp-LocationCartesian***: This field provides the location of the TRP relative to the *referencePoint* location either in geodetic coordinates (*trp-Location*)or local Cartesian coordinates (*trp-LocationCartesian*). If none of *trp-Location*, *trp-LocationCartesian* is present, the TRP location coincides with the *referencePoint* location, unless the field *associated-dl-PRS-ID*is present, in which case the *trp-Location* or *trp-LocationCartesian* is adopted from the associated TRP indicated by *associated-dl-PRS-ID*.- ***nr-IntegrityTRP-LocationBounds***: This field provides the mean and standard deviation TRP location error bound which is the mean value and the standard deviation of an overbounding model that bounds the TRP location error. This field comprises the following sub-fields:- ***units***: This field specifies the units (scale factor) for the *meanLocationErrorBound* and s*tdDevLocationErrorBound*. Enumerated values mm, cm, and m correspond to 10-3 metre, 10-2 metre, and 1 metre, respectively.- ***meanLocationErrorBound***: This field specifies the mean TRP Location Error bound in horizontal and vertical direction, which are the mean values for a set of two overbounding models that bound the TRP location error in horizontal and vertical directions.Scale factor is 1 with units provided in *units* field.- ***stdDevLocationErrorBound***: This field specifies the standard deviation TRP Location Error bound in horizontal and vertical direction, which are the standard deviation values for a set of two overbounding models that bound the TRP location error in horizontal and vertical directions.Scale factor is 1 with units provided in *units* field.- ***trp-DL-PRS-ResourceSets***: This field provides the antenna reference point location(s) of the DL-PRS Resource Set(s) associated with this TRP together with integrity information. If this field is absent, the antenna reference point location(s) of the DL-PRS Resource Set(s) coincides with the *trp-Location/trp-LocationCartesian* location. This field comprises the following sub-fields:- ***dl-PRS-ResourceSetARP, dl-PRS-ResourceSetARP-Cartesian***: This field provides the antenna reference point location of the DL-PRS Resource Set relative to the *trp-Location* or *trp-LocationCartesian* location. If none of *dl-PRS-ResourceSetARP*, *dl-PRS-ResourceSetARP-Cartesian* is present, the antenna reference point location of this DL-PRS Resource Set coincides with the *trp-Location* or *trp-LocationCartesian* location.- ***nr-IntegrityDL-PRS-ResourceSetARP-LocationBounds***: This field provides the mean and the standard deviation ARP of the location error bound of the DL-PRS Resource Set of an overbounding model that bounds the antenna reference point location error of the DL-PRS Resource Set. This field comprises the sub-fields *units***,** *meanLocationErrorBound,* and *stdDevLocationErrorBound****,*** as described under *nr-IntegrityTRP-LocationBounds*.- ***dl-PRS-Resource-ARP-List***: This field provides the antenna reference point location(s) of the DL-PRS Resource(s) associated with this Resource Set of the TRP together with integrity information. If this field is absent, the antenna reference point location(s) of the DL-PRS Resources coincides with the *dl-PRS-ResourceSetARP* location or *dl-PRS-ResourceSetARP-Cartesian*. This field comprises the following sub-fields:- ***dl-PRS-Resource-ARP-location, dl-PRS-Resource-ARP-locationCartesian***: This field provides the antenna reference point location of the DL-PRS Resource associated with the DL-PRS Resource Set of the TRP relative to the *dl-PRS-ResourceSetARP/dl-PRS-ResourceSetARP-Cartesian* location. If none of *dl-PRS-Resource-ARP-location*, *dl-PRS-Resource-ARP-locationCartesian* is present, the antenna reference point location of this DL-PRS Resource coincides with the *dl-PRS-ResourceSetARP* location or *dl-PRS-Resource-ARP-locationCartesian*.- ***nr-IntegrityDL-PRS-ResourceARP-LocationBounds***: This field provides the mean and the standard deviation ARP of the location error bound of the DL-PRS Resources of an overbounding model that bounds the antenna reference point location error of the DL-PRS Resource. This field comprises the sub-fields *units***,** *meanLocationErrorBound,* and *stdDevLocationErrorBound****,*** as described under *nr-IntegrityTRP-LocationBounds*. |

NOTE 5: The locations may be provided in either geodetic coordinates (*RelativeLocation*) or local Cartesian coordinates (*RelativeCartesianLocation*), but not both.

*NEXT CHANGE*

#### 6.5.2.2 GNSS Assistance Data Elements

#### – *GNSS-LOS-NLOS-GridPoints*

The IE *GNSS-LOS-NLOS-GridPoints* is used by the location server to provide a list of grid point coordinates or an array of correction points ("grid") for which specific assistance data can be provided.

-- ASN1START

GNSS-LOS-NLOS-GridPoints-r18 ::= SEQUENCE {

 gridPointsSetID-r18 INTEGER (0..16383),

 horizontalGridPoints-r18 ArrayOfGridPoints-r18,

 referenceAltitudeFine-r18 INTEGER (0..9) OPTIONAL, -- Need OP

 verticalGridPoints-r18 VerticalGridPoints-r18 OPTIONAL, -- Cond 3D

 ...

}

ArrayOfGridPoints-r18 ::= SEQUENCE {

 referencePointLatitude-r18 INTEGER (-16777216.. 16777215),

 referencePointLongitude-r18 INTEGER (-33554432.. 33554431),

 numberOfStepsSouth-r18 INTEGER (0.. 255),

 numberOfStepsEast-r18 INTEGER (0.. 255),

 stepSouth-r18 SpatialDelta-r18,

 stepEast-r18 SpatialDelta-r18,

 bitmaskOfGrids-r18 CHOICE {

 bog16-r18 BIT STRING (SIZE(16)),

 bog64-r18 BIT STRING (SIZE(64)),

 bog256-r18 BIT STRING (SIZE(256)),

 ...

 } OPTIONAL, -- Need OP

 ...

}

VerticalGridPoints-r18 ::=SEQUENCE {

 referenceAltitudeCoarse-r18 INTEGER (-50..900),

 numberOfStepsDown-r18 INTEGER (1..3),

 stepDown-r18 SpatialDelta-r18,

 upperValidityDeltaAltitude-r18 SpatialDelta-r18 OPTIONAL, -- Need OP

 lowerValidityDeltaAltitude-r18 SpatialDelta-r18 OPTIONAL, -- Need OP

 ...

}

SpatialDelta-r18 ::= ENUMERATED {n1, n2, n3, n4, n5, n10, n20, n50, n100}

-- ASN1STOP

| Conditional presence | Explanation |
| --- | --- |
| *3D* | This field is mandatory present if a 3D grid is provided; otherwise it is absent. |

| *GNSS-LOS-NLOS-GridPoints* field descriptions |
| --- |
| ***gridPointsSetID***This field provides the ID of the spatial grid point set. It is a regionally unique arbitrary number that is used by the UE to ensure that provided assistance data associated to a spatial grid point set is being applied to the correct set of points.The grid point set ID identifies a grid defined by a reference point corresponding to the northwest corner (of the upper layer in case of a 3D grid), where the rest of the grid is defined by a number of steps and step lengths in the south, east (down in case of a 3D grid). The grid is valid within the horizontal perimeter of the grid and between an upper and lower validity altitude, where the upper validity altitude is (*referenceAltitudeFine* + 10\* *referenceAltitudeCoarse* + *upperValidityDeltaAltitude*), and the lower validity altitude is (*referenceAltitudeFine* + 10\* *referenceAltitudeCoarse* – *numberOfStepsDown*\**stepDown* – *lowerValidityDeltaAltitude*). |
| ***referencePointLatitude***This field specifies the latitude for the reference point, expressed in the range of -90° , +90°, coded as a number between -224 and 224-1, coded in 2's complement binary on 25 bits. The relation between the latitude X in the range [‑90°, 90°] and the coded number N is: $N=\left⌊\frac{X}{90^{∘}}2^{24}\right⌋$where  denotes the greatest integer less than or equal to x (floor operator).The reference point defines the northwest corner of the grid point array. |
| ***referencePointLongitude***This field specifies the longitude for the reference point, expressed in the range -180°, +180°, coded as a number between -225 and 225-1, coded in 2's complement binary on 26 bits. The relation between the longitude X in the range [-180°, 180°) and the coded number N is: $N=\left⌊\frac{X}{180^{∘}}2^{25}\right⌋$The reference point defines the northwest corner of the grid point array. |
| ***numberOfStepsSouth, numberOfStepsEast, numberOfStepsDown***These fields specify the number of steps for south, east and down direction respectively. |
| ***stepSouth, stepEast, stepDown***These fields specify the spacing of the grid points for south, east and down respectively. Enumerated values *n1, n2, n3, n4, n5, n10, n20, n50, n100* correspond to 1, 2, 3, 4, 5, 10, 20, 50, 100 meters, respectively. |
| ***bitmaskOfGrids***This field specifies the availability of grid data at the horizontal grid points in the array and applies to all altitude layers of the grid. If a specific bit is enabled (set to '1'), the grid is available. Only the first (*numberOfStepsSouth*+1)×(*numberOfStepsEast*+1) bits are used, the remainder are set to '0'. Starting with the northwest corner of the array (top left on a north oriented map) the grid points are enumerated with row precedence – first row west to east, second row west to east, until last row west to east – ending with the southeast corner of the array. If the field is omitted all grid points are used and none omitted. |
| ***referenceAltitudeFine***If this field is present and- the field *referenceAltitudeCoarse* is also present, it provides the fine resolution of the 3D grid altitude of the upmost layer, or- the field *referenceAltitudeCoarse* is absent, it provides the altitude above ground level of the 2D grid,with a scale factor of 1m.If the field is absent, the default value is 0m. |
| ***referenceAltitudeCoarse***This field is present if a 3D grid is provided and specifies the coarse altitude, scale factor 10m, of the upmost layer of the grid relative to the WGS84 ellipsoid. If this field is absent, a 2D grid is provided, valid for ground level. |
| ***upperValidityDeltaAltitude***This field, if present, specifies the upper validity altitude relative to the grid upper layer altitude. Enumerated values *n1, n2, n3, n4, n5, n10, n20, n50, n100* correspond to 1, 2, 3, 4, 5, 10, 20, 50, 100 meters, respectively. If the field is absent, the default value is 0m. |
| ***lowerValidityDeltaAltitude***This field, if present, specifies the lower validity altitude relative to the lowest grid layer altitude. Enumerated values *n1, n2, n3, n4, n5, n10, n20, n50, n100* correspond to 1, 2, 3, 4, 5, 10, 20, 50, 100 meters, respectively. If the field is absent, the default value is 0m. |
|  |

*NEXT CHANGE*

#### 6.5.10.4 NR DL-TDOA Location Information Elements

#### – *NR-DL-TDOA-SignalMeasurementInformation*

The IE *NR-DL-TDOA-SignalMeasurementInformation* is used by the target device to provide NR DL-TDOA measurements to the location server.

NOTE 1: The *dl-PRS-ReferenceInfo* defines the "RSTD reference" TRP. The *nr-RSTD's* and *nr-RSTD-ResultDiff*'s in *nr-DL-TDOA-MeasList* are provided relative to the "RSTD reference" TRP.

NOTE 2: The "RSTD reference" TRP may or may not be the same as the "assistance data reference" TRP provided by *nr-DL-PRS-ReferenceInfo* in IE *NR-DL-PRS-AssistanceData.*

NOTE 3: The target device includes a value of zero for the *nr-RSTD* and *nr-RSTD-ResultDiff* of the "RSTD reference" TRP in *nr-DL-TDOA-MeasList*.

-- ASN1START

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

 dl-PRS-ReferenceInfo-r16 DL-PRS-ID-Info-r16,

 nr-DL-TDOA-MeasList-r16 NR-DL-TDOA-MeasList-r16,

 ...,

 [[

 nr-UE-RxTEG-TimingErrorMargin-r17 TEG-TimingErrorMargin-r17 OPTIONAL -- Cond UERxTEG

 ]]

}

NR-DL-TDOA-MeasList-r16 ::= SEQUENCE (SIZE(1..nrMaxTRPs-r16)) OF NR-DL-TDOA-MeasElement-r16

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),

 ...,

 kMinus6-r18 INTEGER (0..126083073),

 kMinus5-r18 INTEGER (0..63041537),

 kMinus4-r18 INTEGER (0..31520769),

 kMinus3-r18 INTEGER (0..15760385),

 kMinus2-r18 INTEGER (0..7880193),

 kMinus1-r18 INTEGER (0..3940097)

 },

 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-MeasBasedOnAggregatedResources-r18 ENUMERATED {true} OPTIONAL,

 nr-AggregatedDL-PRS-ResourceInfo-List-r18 SEQUENCE (SIZE (2.. 3)) OF

 NR-AggregatedDL-PRS-ResourceInfo-Element-r18 OPTIONAL,

 nr-RSCPD-r18 INTEGER (0..3599) OPTIONAL,

 nr-PhaseQuality-r18 NR-PhaseQuality-r18 OPTIONAL,

 nr-RSCPD-AddMeasurementSamples-r18 SEQUENCE (SIZE (1..nrNumOfSamples-1-r18 )) OF

 NR-RSCPD-AdditionalMeasurementSamplesElement-r18 OPTIONAL,

 nr-ReportDL-PRS-MeasBasedOnSingleOrMultiHopRx-r18

 ENUMERATED { singleHop, multipleHop } OPTIONAL

 ]]

}

NR-DL-TDOA-AdditionalMeasurements-r16 ::= SEQUENCE (SIZE (1..3)) OF

 NR-DL-TDOA-AdditionalMeasurementElement-r16

NR-DL-TDOA-AdditionalMeasurementsExt-r17 ::= SEQUENCE (SIZE (1..maxAddMeasTDOA-r17)) OF

 NR-DL-TDOA-AdditionalMeasurementElement-r16

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

 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-ResultDiff-r16 CHOICE {

 k0-r16 INTEGER (0..8191),

 k1-r16 INTEGER (0..4095),

 k2-r16 INTEGER (0..2047),

 k3-r16 INTEGER (0..1023),

 k4-r16 INTEGER (0..511),

 k5-r16 INTEGER (0..255),

 ...,

 kMinus6-r18 INTEGER (0..524224),

 kMinus5-r18 INTEGER (0..262112),

 kMinus4-r18 INTEGER (0..131056),

 kMinus3-r18 INTEGER (0..65528),

 kMinus2-r18 INTEGER (0..32764),

 kMinus1-r18 INTEGER (0..16382)

 },

 nr-TimingQuality-r16 NR-TimingQuality-r16,

 nr-DL-PRS-RSRP-ResultDiff-r16 INTEGER (0..61) OPTIONAL,

 nr-AdditionalPathList-r16 NR-AdditionalPathList-r16 OPTIONAL,

 ...,

 [[

 nr-UE-Rx-TEG-ID-r17 INTEGER (0..maxNumOfRxTEGs-1-r17) OPTIONAL,

 nr-DL-PRS-FirstPathRSRP-ResultDiff-r17

 INTEGER (0..61) OPTIONAL,

 nr-los-nlos-IndicatorPerResource-r17

 LOS-NLOS-Indicator-r17 OPTIONAL,

 nr-AdditionalPathListExt-r17 NR-AdditionalPathListExt-r17 OPTIONAL

 ]],

 [[

 nr-MeasBasedOnAggregatedResources-r18 ENUMERATED {true} OPTIONAL,

 nr-AggregatedDL-PRS-ResourceInfo-List-r18 SEQUENCE (SIZE (2.. 3)) OF

 NR-AggregatedDL-PRS-ResourceInfo-Element-r18 OPTIONAL,

 nr-RSCPD-r18 INTEGER (0..3599) OPTIONAL,

 nr-PhaseQuality-r18 NR-PhaseQuality-r18 OPTIONAL,

 nr-RSCPD-AdditionalMeasurementsAddSamples-r18

 SEQUENCE (SIZE (1..nrNumOfSamples-1-r18 )) OF

 NR-RSCPD-AdditionalMeasurementSamplesElement-r18 OPTIONAL,

 nr-ReportDL-PRS-MeasBasedOnSingleOrMultiHopRx-r18

 ENUMERATED { singleHop, multipleHop } OPTIONAL

 ]]

}

NR-RSCPD-AdditionalMeasurementSamplesElement-r18 ::= SEQUENCE {

 nr-RSCPD-r18 INTEGER (0..3599) OPTIONAL,

 nr-PhaseQuality-r18 NR-PhaseQuality-r18 OPTIONAL,

 nr-TimeStamp-r18 NR-TimeStamp-r16 OPTIONAL,

 ...

}

-- ASN1STOP

| Conditional presence | Explanation |
| --- | --- |
| *UERxTEG* | The field is optionally present, need OP, if the field *nr-UE-Rx-TEG-ID* is present; otherwise it is not present. |

|  |
| --- |
| *NR-DL-TDOA-SignalMeasurementInformation* field descriptions |
| ***nr-UE-RxTEG-TimingErrorMargin***This field specifies the UE Rx TEG timing error margin value for all the UE Rx TEGs within one *NR-DL-TDOA-SignalMeasurementInformation*. If the *nr-UE-Rx-TEG-ID* is present and this field is absent, the receiver should consider the UE Rx TEG timing error margin value to be the maximum applicable value as defined in TS 38.133 [46]. |
| ***dl-PRS-ID***This field is used along with a DL-PRS Resource Set ID and a DL-PRS Resources ID to uniquely identify a DL-PRS Resource. This ID can be associated with multiple DL-PRS Resource Sets associated with a single TRP.Each TRP should only be associated with one such ID. |
| ***nr-PhysCellID***This field specifies the physical cell identity of the associated TRP, as defined in TS 38.331 [35]. |
| ***nr-CellGlobalID***This field specifies the NCGI, the globally unique identity of a cell in NR, of the associated TRP, as defined in TS 38.331 [35]. |
| ***nr-ARFCN***This field specifies the NR-ARFCN of the TRP's CD-SSB (as defined in TS 38.300 [47]) corresponding to *nr-PhysCellID*. |
| ***nr-TimeStamp***This field specifies the time instance at which the TOA, RSCP (if included) and DL PRS-RSRP/RSRPP (if included) measurement is performed. The *nr-SFN,* *nr-Slot* and *nr-Symbol* (if included) in IE *NR-TimeStamp* correspond to the TRP provided in *dl-PRS-ReferenceInfo* as specified in TS 38.214 [45]. Note, the TOA measurement refers to the TOA of this neighbour TRP or the reference TRP, as applicable, used to determine the *nr-RSTD* or *nr-RSTD-ResultDiff*. |
| ***nr-RSTD***This field specifies the relative timing difference between this neighbour TRP and the DL-PRS reference TRP, as defined in TS 38.215 [36]. Mapping of the measured quantity is defined as in TS 38.133 [46]. |
| ***nr-AdditionalPathList***This field specifies one or more additional detected path timing values for the TRP or resource, relative to the path timing used for determining the *nr-RSTD* value. If this field was requested but is not included, it means the UE did not detect any additional path timing values. If this field is present, the field *nr-AdditionalPathListExt* shall be absent. |
| ***nr-TimingQuality***This field specifies the target device′s best estimate of the quality of the TOA measurement. Note, the TOA measurement refers to the TOA of this neighbour TRP or the reference TRP, as applicable, used to determine the *nr-RSTD* or *nr-RSTD-ResultDiff*. |
| ***nr-DL-PRS-RSRP-Result***This field specifies the NR DL-PRS reference signal received power (DL PRS-RSRP) measurement, as defined in TS 38.215 [36]. The mapping of the quantity is defined as in TS 38.133 [46]. |
| ***nr-DL-TDOA-AdditionalMeasurements***This field provides up to 3 additional RSTD measurements per pair of TRPs, with each measurement between a different pair of DL-PRS Resources or DL-PRS Resource Sets of the DL-PRS for those TRPs [45].If this field is present, the field *nr-DL-TDOA-AdditionalMeasurementsExt* shall be absent. |
| ***nr-UE-Rx-TEG-ID***This field provides the ID of the UE Rx TEG associated with the TOA measurement. Note, the TOA measurement refers to the TOA of this neighbour TRP or the reference TRP, as applicable, used to determine the *nr-RSTD* or *nr-RSTD-ResultDiff*. When different UE Rx TEGs for RSTD measurements are requested, the maximum number of reported RSTD measurements associated with different DL-PRS Resources per UE Rx TEG per target TRP is 4. |
| ***nr-DL-PRS-FirstPathRSRP-Result***This field specifies the NR DL-PRS reference signal received path power (DL PRS-RSRPP) of the first detected path in time, as defined in TS 38.215 [36]. The mapping of the measured quantity is defined as in TS 38.133 [46]. |
| ***nr-los-nlos-Indicator***This field specifies the target device's best estimate of the LOS or NLOS of the TOA measurement for the TRP or resource. Note, the TOA measurement refers to the TOA of this neighbour TRP or the reference TRP, as applicable, used to determine the *nr-RSTD* or *nr-RSTD-ResultDiff*.This field also applies to specify the target device's best estimate of the LOS or NLOS of the RSCP measurement for the TRP or resource. Note, the RSCP measurement refers to the RSCP of this neighbour TRP or the reference TRP, as applicable, used to determine the *nr-RSCPD*.NOTE: If the requested type or granularity in *nr-los-nlos-IndicatorRequest* is not possible, the target device may provide a different type and granularity for the estimated *LOS-NLOS-Indicator.* |
| ***nr-AdditionalPathListExt***This field provides up to 8 additional detected path timing values for the TRP or resource, relative to the path timing used for determining the *nr-RSTD* value. If this field was requested but is not included, it means the UE did not detect any additional path timing values. If this field is present, the field *nr-AdditionalPathList* shall be absent. |
| ***nr-DL-TDOA-AdditionalMeasurementsExt***This field, in addition to the measurements provided in *NR-DL-TDOA-MeasElement*, provides TOA measurements of up to 4 DL-PRS Resources of a TRP with different UE Rx TEGs. For a certain DL-PRS Resource, there can be up to 8 TOA measurement results with respect to different Rx TEGs.If this field is present, the field *nr-DL-TDOA-AdditionalMeasurements* shall be absent. |
| ***nr-MeasBasedOnAggregatedResources***This field indicates whether the RSTD measurement, RSRP measurement (if included), and RSRPP measurement (if included) is based on aggregated DL-PRS Resources. |
| ***nr-AggregatedDL-PRS-ResourceInfo-List***This field provides the DL-PRS Resource Set IDs which are used for the aggregated RSTD, RSRP, or RSRPP measurement results. This field is optionally present if the field *nr-MeasBasedOnAggregatedResources* is present; otherwise, it is not present. If the field is present, the field *nr-DL-PRS-ResourceID* and *nr-DL-PRS-ResourceSetID* should not be included, and the *dl-PRS-ID* in IE *NR-DL-TDOA-MeasElement* shall be ignored by a receiver. The IE a*ggregatedDL-PRS-ID* in the *nr-AggregatedDL-PRS-ResourceInfo-List* is always provided for the first measurement when *nr-AggregatedDL-PRS-ResourceInfo-List* is included in *NR-DL-TDOA-MeasElement*. The a*ggregatedDL-PRS-ID* is not present in the *nr-AggregatedDL-PRS-ResourceInfo-List* when *nr-AggregatedDL-PRS-ResourceInfo-List* is included in *NR-DL-TDOA-AdditionalMeasurementElement*. |
| ***nr-RSCPD***This field specifies the NR DL reference signal carrier phase difference measurement, as defined in TS 38.215 [36]. Mapping of the measured quantity is defined as in TS 38.133 [46]. This neighbour TRP measurement is made using DL-PRS Resources from the same PFL as the reference TRP measurement. |
| ***nr-PhaseQuality***This field specifies the target device′s best estimate of the quality of the RSCPD measurement. |
| ***nr-RSCPD-AddMeasurementSamples***This field, in addition to the *nr-RSCPD* measurements provided in *NR-DL-TDOA-MeasElement*, provides up to 3 RSCPD measurements samples associated with the *nr-RSTD* in *NR-DL-TDOA-MeasElement*.  |
| ***nr-ReportDL-PRS-MeasBasedOnSingleOrMultiHopRx***This field indicates that the reported measurement is based on DL-PRS receive hopping with either single hop or multiple hops. |
| ***nr-RSTD-ResultDiff***This field provides the additional DL RSTD measurement result relative to *nr-RSTD.* The RSTD value of this measurement is obtained by adding the value of this field to the value of the *nr-RSTD* field. The mapping of the field is defined in TS 38.133 [46]. |
| ***nr-DL-PRS-RSRP-ResultDiff***This field provides the additional DL-PRS RSRP measurement result relative to *nr-DL-PRS-RSRP-Result.* The DL-PRS RSRP value of this measurement is obtained by adding the value of this field to the value of the *nr-DL-PRS-RSRP-Result* field. The mapping of the field is defined in TS 38.133 [46]. |
| ***nr-DL-PRS-FirstPathRSRP-ResultDiff***This field specifies the additional NR DL-PRS reference signal received path power (DL PRS-RSRPP) of the first detected path in time relative to *nr-DL-PRS-FirstPathRSRP-Result*. The DL-PRS RSRPP of first path value of this measurement is obtained by adding the value of this field to the value of the *nr-DL-PRS-FirstPathRSRP-Result* field. The mapping of the field is defined in TS 38.133 [46]. |
| ***nr-los-nlos-IndicatorPerResource***This field specifies the target device's best estimate of the LOS or NLOS of the TOA measurement for the resource. Note, the TOA measurement refers to the TOA of this neighbour TRP or the reference TRP, as applicable, used to determine the *nr-RSTD* or *nr-RSTD-ResultDiff*.This field may only be present if the field *nr-LOS-NLOS-Indicator* choice indicates *perResource*. |
| ***nr-RSCPD-AdditionalMeasurementsAddSamples***This field, in addition to the *nr-RSCPD* measurement provided in *NR-DL-TDOA-AdditionalMeasurementElement*, provides up to 3 RSCPD measurement samples associated with the RSTD measurement in *NR-DL-TDOA-AdditionalMeasurementElement.* |

*NEXT CHANGE*

#### 6.5.10.5 NR DL-TDOA Location Information Request

#### – *NR-DL-TDOA-RequestLocationInformation*

The IE *NR-DL-TDOA-RequestLocationInformation* is used by the location server to request NR DL-TDOA location measurements from a target device.

-- ASN1START

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),

 dl-PRS-RSCPD-Request-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-JointMeasurementRequest-r18 SEQUENCE {

 nr-DL-PRS-JointMeasurementRequestedPFL-List-r18 SEQUENCE (SIZE (2..3)) OF

 INTEGER (0..nrMaxFreqLayers-1-r16) OPTIONAL -- Need ON

 } OPTIONAL, -- Need ON

 nr-DL-PRS-RxHoppingRequest-r18 SEQUENCE {

 nr-DL-PRS-RxHoppingTotalBandwidth-r18 CHOICE {

 fr1 ENUMERATED {mhz40, mhz50, mhz80, mhz100},

 fr2 ENUMERATED {mhz100, mhz200, mhz400}

 } OPTIONAL -- Need ON

 } OPTIONAL -- Need ON

 ]]

}

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

 maxDL-PRS-RSTD-MeasurementsPerTRP-Pair-r16 INTEGER (1..4) OPTIONAL, -- Need ON

 timingReportingGranularityFactor-r16 INTEGER (0..5) OPTIONAL, -- Need ON

 ...,

 [[

 measureSameDL-PRS-ResourceWithDifferentRxTEGs-r17

 ENUMERATED { n0, n2, n3, n4, n6, n8, ... }

 OPTIONAL, -- Need ON

 reducedDL-PRS-ProcessingSamples-r17 ENUMERATED { requested, ... } OPTIONAL, -- Need ON

 lowerRxBeamSweepingFactor-FR2-r17 ENUMERATED { requested } OPTIONAL -- Need ON

 ]],

 [[

 timingReportingGranularityFactorExt-r18 INTEGER (-6..-1) OPTIONAL, -- Need ON

 nr-DL-PRS-MeasurementTimeWindowsConfig-r18

 NR-DL-PRS-MeasurementTimeWindowsConfig-r18 OPTIONAL -- Need ON

 ]]

}

-- ASN1STOP

|  |
| --- |
| *NR-DL-TDOA-RequestLocationInformation* field descriptions |
| ***nr-DL-PRS-RstdMeasurementInfoRequest***This field indicates whether the target device is requested to report DL-PRS Resource ID(s) or DL-PRS Resource Set ID(s) used for determining the timing of each TRP in RSTD measurements.  |
| ***nr-RequestedMeasurements***This field specifies the NR DL-TDOA measurements requested. This is represented by a bit string, with a one‑value at the bit position means the particular measurement is requested; a zero‑value means not requested. The *dl-PRS-RSCPD-Request* means that the target device is requested to provide DL RSCPD measurement. |
| ***nr-AssistanceAvailability***This field indicates whether the target device may request additional DL-PRS assistance data from the server. TRUE means allowed and FALSE means not allowed. |
| ***additionalPaths***This field, if present, indicates that the target device is requested to provide the *nr-AdditionalPathList* in IE *NR-DL-TDOA-SignalMeasurementInformation*. If this field is present, the field *additionalPathsExt* shall be absent. |
| ***nr-UE-RxTEG-Request***This field, if present, indicates that the target device is requested to provide the *nr-UE-Rx-TEG-ID* in IE *NR-DL-TDOA-SignalMeasurementInformation.* |
| ***nr-los-nlos-IndicatorRequest***This field, if present, indicates that the target device is requested to provide the indicated type and granularity of the estimated *LOS-NLOS-Indicator* in the *NR-DL-TDOA-SignalMeasurementInformation*. |
| ***additionalPathsExt***This field, if present, indicates that the target device is requested to provide the *nr-AdditionalPathListExt* in IE *NR-DL-TDOA-SignalMeasurementInformation*. If this field is present, the field *additionalPaths* shall be absent. |
| ***additionalPathsDL-PRS-RSRP-Request***This field, if present, indicates that the target device is requested to provide the *nr-DL-PRS-RSRPP* for the additional paths in fields *nr-AdditionalPathList* or *nr-AdditionalPathListExt*. |
| ***multiMeasInSameReport***This field, if present, indicates that the target device is requested to provide multiple measurement instances in a single measurement report; i.e., include the *nr-DL-TDOA-SignalMeasurementInstances* (in the case of UE-assisted mode is requested) or *nr-DL-TDOA-LocationInformationInstances* (in the case of UE-based mode is requested) in IE *NR-DL-TDOA-ProvideLocationInformation.* |
| ***nr-DL-PRS-JointMeasurementRequest***This field, if present, indicates that the target device is requested to perform joint measurement across aggregated PFLs. |
| ***nr-DL-PRS-JointMeasurementRequestedPFL-List***This field, if present, indicates the target device is requested to perform joint measurements on the indicated two or three PFLs. 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-RxHoppingRequest***This field, if present, indicates that the target device is requested to use DL-PRS Rx hopping for performing RSTD, RSRP (if requested in *nr-RequestedMeasurements*), or RSRPP measurements (if requested in *nr-RequestedMeasurements*) and report the hopping information used for performing the measurements. This field is not included when *dl-PRS-RSCPD-Request* or *nr-DL-PRS-JointMeasurementRequest* is included. |
| ***nr-DL-PRS-RxHoppingTotalBandwidth***This field, if present, indicates the total bandwidth in MHz across all hops for the DL-PRS measurement. If the configured value *nr-DL-PRS-RxHoppingTotalBandwidth* is larger than the configured DL-PRS bandwidth in the provided assistance data, the UE shall assume that the actual nr-*DL-PRS-RxHoppingTotalBandwidth* is equal to the width of the configured DL-PRS in the provided assistance data.  |
|  |
| ***maxDL-PRS-RSTD-MeasurementsPerTRP-Pair***This field specifies the maximum number of DL-PRS RSTD measurements per pair of TRPs. The maximum number is defined across all Positioning Frequency Layers. When requested for aggregated measurements by the location server, this field specifies the maximum number of aggregated DL-PRS RSTD measurements per pair of TRPs. The maximum number is defined across all Positioning Frequency Layers. |
| ***timingReportingGranularityFactor, timingReportingGranularityFactorExt***This field specifies the recommended reporting granularity for the DL RSTD measurements. Value (0..5) corresponds to (*k0*..*k5*) and value (-6..-1) corresponds to (*kMinus6*..*kMinus1*) 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*. 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. |
| ***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 location server requests aggregated measurements, the target device is requested to measure the same aggregated DL-PRS Resources of a TRP with N different UE Rx TEGs. |
| ***reducedDL-PRS-ProcessingSamples***This field, if present and set to '*requested*', indicates that the target device is requested to perform the requested measurements with reduced number of samples (M=1 or M=2) as specified in TS 38.133 [46]. When requested for aggregated measurements by the location server, this field indicates processing of reduced number of samples for the aggregated measurements. |
| ***lowerRxBeamSweepingFactor-FR2***This field, if present, indicates that the target device is requested to use a lower Rx beam sweeping factor than 8 for FR2 according to UE's capability. When requested for aggregated measurements by the location server, this field indicates that the target device is requested to use a lower Rx beam sweeping factor than 8 for FR2 according to UE's capability for the aggregated measurements. |
| ***nr-DL-PRS-MeasurementTimeWindowsConfig***This field indicates DL-PRS Resource Set(s) occurring within time window(s) for performing measurements where the time window is indicated by a start time, periodicity, offset and duration. |

*NEXT CHANGE*

#### 6.5.10.6a NR DL-TDOA Capability Information Elements

#### *– NR-DL-TDOA-MeasurementCapability*

The IE *NR-DL-TDOA-MeasurementCapability* defines the DL-TDOA measurement capability. The UE can include this IE only if the UE supports *NR-DL-PRS-ResourcesCapability* for DL-TDOA. Otherwise, the UE does not include this IE.

-- ASN1START

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

 dl-RSTD-MeasurementPerPairOfTRP-FR1-r16 INTEGER (1..4),

 dl-RSTD-MeasurementPerPairOfTRP-FR2-r16 INTEGER (1..4),

 supportOfDL-PRS-RSRP-MeasFR1-r16 ENUMERATED { supported} OPTIONAL,

 supportOfDL-PRS-RSRP-MeasFR2-r16 ENUMERATED { supported} OPTIONAL,

 ...,

 [[

 nr-UE-TEG-Capability-r17 NR-UE-TEG-Capability-r17 OPTIONAL,

 dl-tdoa-MeasCapabilityBandList-r17 SEQUENCE (SIZE (1..nrMaxBands-r16)) OF

 DL-TDOA-MeasCapabilityPerBand-r17 OPTIONAL

 ]]

}

DL-TDOA-MeasCapabilityPerBand-r17 ::= SEQUENCE {

 freqBandIndicatorNR-r17 FreqBandIndicatorNR-r16,

 supportOfDL-PRS-FirstPathRSRP-r17 ENUMERATED { supported } OPTIONAL,

 dl-PRS-MeasRRC-Inactive-r17 ENUMERATED { supported } OPTIONAL,

 ...,

 [[

 supportOfDL-PRS-BWA-RRC-Connected-r18 ENUMERATED { supported } OPTIONAL,

 supportOfDL-PRS-BWA-RRC-Inactive-r18 ENUMERATED { supported } OPTIONAL,

 supportOfDL-PRS-BWA-RRC-Idle-r18 ENUMERATED { supported } OPTIONAL,

 nr-DL-PRS-RSCPD-ReportingRRC-Connected-r18 ENUMERATED { supported } OPTIONAL,

 assocSingleRSTD-WithUpToNsampleRSCPD-r18 ENUMERATED { supported } OPTIONAL,

 nr-DL-PRS-RSCPD-MeasurementRRC-Idle-r18 ENUMERATED { supported } OPTIONAL,

 supportOfLegacyMeasurementInTimeWindow-r18 ENUMERATED { supported } OPTIONAL,

 supportOfRSCPD-MeasurementInTimeWindow-r18 ENUMERATED { supported } OPTIONAL,

 supportOfUE-basedCarrierPhasePositioning-r18 ENUMERATED { supported } OPTIONAL,

 supportOfSymbolTimeStampForRSCPD-r18 ENUMERATED { supported } OPTIONAL,

 supportOfFinerTimingReportGranularityForPRS-Meas-r18 ENUMERATED { minus1, minus2,

 minus3, minus4, minus5, minus6}

 OPTIONAL

]]

}

-- ASN1STOP

|  |
| --- |
| *NR-DL-TDOA-MeasurementCapability* field descriptions |
| ***dl-RSTD-MeasurementPerPairOfTRP-FR1***Indicates number of DL RSTD measurements per pair of TRPs on FR1. |
| ***dl-RSTD-MeasurementPerPairOfTRP-FR2***Indicates number of DL RSTD measurements per pair of TRPs on FR2. |
| ***supportOfDL-PRS-RSRP-MeasFR1***Indicates whether the UE supports DL-PRS RSRP measurement for DL-TDOA on FR1. |
| ***supportOfDL-PRS-RSRP-MeasFR2***Indicates whether the UE supports DL-PRS RSRP measurement for DL-TDOA on FR2. |
| ***nr-UE-TEG-Capability***Indicates the UE TEG capability. |
| ***supportOfDL-PRS-FirstPathRSRP***Indicates whether the target device supports DL-PRS RSRPP of first path measurement for DL-TDOA. The UE can include this field only if the UE supports *prs-ProcessingCapabilityBandList*. Otherwise, the UE does not include this field. The UE supporting *additionalPathsReport* and *supportOfDL-PRS-FirstPathRSRP* shall support RSRPP reporting for K=1 or 2 additional paths. |
| ***dl-PRS-MeasRRC-Inactive***This field, if present, indicates that the target device supports DL-PRS measurement in RRC\_INACTIVE state. The UE can include this field only if the UE supports *maxNrOfDL-PRS-ResourceSetPerTrpPerFrequencyLayer, maxNrOfTRP-AcrossFreqs, maxNrOfPosLayer* and *dl-PRS-BufferType-RRC-Inactive*. Otherwise, the UE does not include this field.NOTE 1: This capability is applicable to both, UE-assisted and UE-based DL-TDOA.NOTE 2: The capabilities *NR-DL-PRS-ResourcesCapability, dl-RSTD-MeasurementPerPairOfTRP-FR1, dl-RSTD-MeasurementPerPairOfTRP-FR2, supportOfDL-PRS-RSRP-MeasFR1, supportOfDL-PRS-RSRP-MeasFR2, simul-NR-DL-AoD-DL-TDOA* are the same in RRC\_INACTIVE state. |
| ***supportOfDL-PRS-BWA-RRC-Connected***Indicates whether the target device supports DL-PRS bandwidth aggregation in RRC\_CONNECTED for DL-TDOA.The UE can include this field only if the UE supports *maxNrOfDL-PRS-ResourceSetPerTrpPerFrequencyLayer, maxNrOfTRP-AcrossFreqs, maxNrOfPosLayer* and *prs-BWA-TwoContiguousIntrabandInMG-RRC-Connected*. Otherwise, the UE does not include this field. |
| ***supportOfDL-PRS-BWA-RRC-Inactive***Indicates whether the target device supports DL-PRS bandwidth aggregation in RRC\_INACTIVE for DL-TDOA.The UE can include this field only if the UE supports *dl-PRS-MeasRRC-Inactive* and *prs-BWA-TwoContiguousIntrabandInMG-RRC-IdleAndInactive*. Otherwise, the UE does not include this field. |
| ***supportOfDL-PRS-BWA-RRC-Idle***Indicates whether the target device supports DL-PRS bandwidth aggregation in RRC\_IDLE for DL-TDOA.The UE can include this field only if the UE supports *supportOfPRS-MeasurementRRC-Idle* and *prs-BWA-TwoContiguousIntrabandInMG-RRC-IdleAndInactive*. Otherwise, the UE does not include this field. |
| ***nr-DL-PRS-RSCPD-ReportingRRC-Connected***This field, if present, indicates that the target device supports reporting RSCPD in RRC CONNECTED.The UE can include this field only if the UE supports *dl-RSTD-MeasurementPerPairOfTRP-FR1* and *dl-RSTD-MeasurementPerPairOfTRP-FR2*. Otherwise, the UE does not include this field.NOTE 3: RSCPD is reported together with RSTD measurement. |
| ***nr-DL-PRS-RSCPD-ReportingRRC-Inactive***This field, if present, indicates that the target device supports reporting RSCPD in RRC INACTIVE. The UE can include this field only if the UE supports *dl-PRS-MeasRRC-Inactive*. Otherwise, the UE does not include this field.NOTE 4: RSCPD is reported together with RSTD measurement. |
| ***assocSingleRSTD-WithUpToNsampleRSCPD***This field, if present, indicates that the target device supports associating a single RSTD measurement with up to N\_sample RSCPD measurement. The UE can include this field only if the UE supports one of *nr-DL-PRS-RSCPD-ReportingRRC-Connected* and *nr-DL-PRS-RSCPD-ReportingRRC-Inactive*. Otherwise, the UE does not include this field. |
| ***nr-DL-PRS-RSCPD-MeasurementRRC-Idle***This field, if present, indicates that the target device supports DL RSCPD measurement based on DL-PRS measurement in RRC\_IDLE. The UE can include this field only if the UE supports *supportOfPRS-MeasurementRRC-Idle*. Otherwise, the UE does not include this field.NOTE 5: DL RSCPD is reported along with measurement report for DL-RSTD |
| ***supportOfLegacyMeasurementInTimeWindow***This field, if present, indicates that the target device supports performing legacy measurements inside the indicated time window only for DL TDoA. The UE can include this field only if the UE supports *maxNrOfDL-PRS-ResourcesPerResourceSet* and *maxNrOfDL-PRS-ResourcesPerPositioningFrequencylayer*. Otherwise, the UE does not include this field. |
| ***supportOfRSCPD-MeasurementInTimeWindow***This field, if present, indicates that the target device supports RSCPD measurement on indicated DL-PRS resource sets within the indicated time window(s) for UE based and UE assisted positioning. The UE can include this field only if the UE supports of *supportedBandwidthPRS*, *dl-PRS-BufferType*, *durationOfPRS-Processing*, *maxNumOfDL-PRS-ResProcessedPerSlot*. Otherwise, the UE does not include this field. |
| ***supportOfUE-basedCarrierPhasePositioning***This field, if present, indicates that the target device supports carrier phase measurement for UE-based positioning and support of assistance data for UE-based carrier phase positioning. |
| ***supportOfSymbolTimeStampForRSCPD***This field, if present, indicates that the target device supports reporting timestamp with OFDM symbol index associated with RSCPD measurement. The UE can include this field only if the UE supports one of *nr-DL-PRS-RSCPD-ReportingRRC-Connected* and *nr-DL-PRS-RSCPD-ReportingRRC-Inactive*. Otherwise, the UE does not include this field. |
| ***supportOfFinerTimingReportGranularityForPRS-Meas***This field, if present, indicates that the target device supports of finer timing reporting granularity for DL-PRS measurement. |

*NEXT CHANGE*

#### 6.5.11.4 NR DL-AoD Location Information Elements

#### – *NR-DL-AoD-SignalMeasurementInformation*

The IE *NR-DL-AoD-SignalMeasurementInformation* is used by the target device to provide NR DL-AoD measurements to the location server.

-- ASN1START

NR-DL-AoD-SignalMeasurementInformation-r16 ::= SEQUENCE {

 nr-DL-AoD-MeasList-r16 NR-DL-AoD-MeasList-r16,

 ...

}

NR-DL-AoD-MeasList-r16 ::= SEQUENCE (SIZE(1..nrMaxTRPs-r16)) OF NR-DL-AoD-MeasElement-r16

NR-DL-AoD-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-DL-PRS-RSRP-Result-r16 INTEGER (0..126),

 nr-DL-PRS-RxBeamIndex-r16 INTEGER (1..8) OPTIONAL,

 nr-DL-AoD-AdditionalMeasurements-r16

 NR-DL-AoD-AdditionalMeasurements-r16 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-DL-AoD-AdditionalMeasurementsExt-r17

 NR-DL-AoD-AdditionalMeasurementsExt-r17 OPTIONAL

 ]],

 [[

 nr-ReportDL-PRS-MeasBasedOnSingleOrMultiHopRx-r18

 ENUMERATED { singleHop, multipleHop } OPTIONAL

 ]]

}

NR-DL-AoD-AdditionalMeasurements-r16 ::= SEQUENCE (SIZE (1..7)) OF

 NR-DL-AoD-AdditionalMeasurementElement-r16

NR-DL-AoD-AdditionalMeasurementsExt-r17 ::= SEQUENCE (SIZE (1..maxAddMeasAoD-r17)) OF

 NR-DL-AoD-AdditionalMeasurementElement-r17

NR-DL-AoD-AdditionalMeasurementElement-r16 ::= SEQUENCE {

 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-DL-PRS-RSRP-ResultDiff-r16 INTEGER (0..30),

 nr-DL-PRS-RxBeamIndex-r16 INTEGER (1..8) OPTIONAL,

 ...

}

NR-DL-AoD-AdditionalMeasurementElement-r17 ::= SEQUENCE {

 nr-DL-PRS-ResourceID-r17 NR-DL-PRS-ResourceID-r16 OPTIONAL,

 nr-DL-PRS-ResourceSetID-r17 NR-DL-PRS-ResourceSetID-r16 OPTIONAL,

 nr-TimeStamp-r17 NR-TimeStamp-r16,

 nr-DL-PRS-RSRP-ResultDiff-r17 INTEGER (0..30) OPTIONAL, -- Cond rsrp

 nr-DL-PRS-RxBeamIndex-r17 INTEGER (1..8) OPTIONAL,

 nr-DL-PRS-FirstPathRSRP-ResultDiff-r17 INTEGER (0..61) OPTIONAL, -- Cond rsrpp

 nr-los-nlos-IndicatorPerResource-r17 LOS-NLOS-Indicator-r17 OPTIONAL,

 ...,

 [[

 nr-ReportDL-PRS-MeasBasedOnSingleOrMultiHopRx-r18

 ENUMERATED { singleHop, multipleHop } OPTIONAL

 ]]

}

-- ASN1STOP

| Conditional presence | Explanation |
| --- | --- |
| *rsrpp*  | The field is mandatory present if the field *nr-DL-PRS-FirstPathRSRP-ResultDiff-r17* is absent; otherwise it is optionally present, need ON. |
| *rsrp* | The field is mandatory present if the field *nr-DL-PRS-RSRP-ResultDiff-r17* is absent; otherwise it is optionally present, need ON. |

|  |
| --- |
| *NR-DL-AoD-SignalMeasurementInformation* field descriptions |
| ***dl-PRS-ID***This field is used along with a DL-PRS Resource Set ID and a DL-PRS Resource ID to uniquely identify a DL-PRS Resource. This ID can be associated with multiple DL-PRS Resource Sets associated with a single TRP.Each TRP should only be associated with one such ID. |
| ***nr-PhysCellID***This field specifies the physical cell identity of the associated TRP, as defined in TS 38.331 [35]. |
| ***nr-CellGlobalID***This field specifies the NCGI, the globally unique identity of a cell in NR, of the associated TRP, as defined in TS 38.331 [35]. |
| ***nr-ARFCN***This field specifies the NR-ARFCN of the TRP's CD-SSB (as defined in TS 38.300 [47]) corresponding to *nr-PhysCellID*. |
| ***nr-TimeStamp***This field specifies the time instance at which the measurement is performed. |
| ***nr-DL-PRS-RSRP-Result***This field specifies the NR DL-PRS reference signal received power (DL-PRS RSRP) measurement, as defined in TS 38.215 [36]. The mapping of the measured quantity is defined as in TS 38.133 [46]. |
| ***nr-DL-PRS-RxBeamIndex***This field provides an index of the target device receive beam used for DL-PRS measurements associated with a single TRP in *nr-DL-AoD-MeasList-r16* when additional DL-PRS measurements are also included in either *nr-DL-AoD-AdditionalMeasurements-r16* or *nr-DL-AoD-AdditionalMeasurementsExt-r17*. If the value of the receive beam index for two or more DL-PRS measurements is the same, it indicates that the target device receive beam for the two or more DL-PRS measurements associated with a TRP were made with the same RX beam. The field is mandatory present if at least two DL-PRS RSRP measurements and/or DL-PRS RSRPP measurements from the same DL-PRS Resource Set associated with a TRP have been made with the same RX beam by the target device; otherwise it is not present. |
| ***nr-DL-AoD-AdditionalMeasurements***This field specifies a list of additional DL-PRS RSRP measurements of different DL-PRS resources for the same TRP. If this field is present, the field *nr-DL-AoD-AdditionalMeasurementsExt* should not be present. |
| ***nr-DL-PRS-FirstPathRSRP-Result***This field specifies the NR DL-PRS reference signal received path power (DL-PRS RSRPP) of the first detected path in time, as defined in TS 38.215 [36]. The mapping of the measured quantity is defined as in TS 38.133 [46]. |
| ***nr-los-nlos-Indicator***This field specifies the target device's best estimate of the LOS or NLOS of the RSRP or RSRPP of first path measurement for the TRP or resource.NOTE: If the requested type or granularity in *nr-los-nlos-IndicatorRequest* is not possible, the target device may provide a different type and granularity for the estimated *LOS-NLOS-Indicator.* |
| ***nr-DL-AoD-AdditionalMeasurementsExt***This field specifies a list of additional DL-PRS RSRP and/or DL-PRS RSRPP measurements of different DL-PRS resources for the same TRP. If this field is present, the field *nr-DL-AoD-AdditionalMeasurements* should not be present. |
| ***nr-DL-PRS-RSRP-ResultDiff***This field provides the additional DL-PRS RSRP measurement result relative to *nr-DL-PRS-RSRP-Result*. The DL-PRS RSRP value of this measurement is obtained by adding the value of this field to the value of the *nr-DL-PRS-RSRP-Result* field. The mapping of the field is defined in TS 38.133 [46]. |
| ***nr-DL-PRS-FirstPathRSRP-ResultDiff***This field specifies the additional NR DL-PRS reference signal received path power (DL-PRS RSRPP) of the first detected path in time relative to *nr-DL-PRS-FirstPathRSRP-Result*. The DL-PRS RSRPP of first path value of this measurement is obtained by adding the value of this field to the value of the *nr-DL-PRS-FirstPathRSRP-Result* field. The mapping of the field is defined in TS 38.133 [46]. |
| ***nr-los-nlos-IndicatorPerResource***This field specifies the target device's best estimate of the LOS or NLOS of the RSRP or RSRPP of first path measurement for the resource.This field may only be present if the field *nr-LOS-NLOS-Indicator* choice indicates *perResource*. |
| ***nr-ReportDL-PRS-MeasBasedOnSingleOrMultiHopRx***This field indicates that the reported measurement is based on receiving single or multiple hops of DL-PRS. |

*NEXT CHANGE*

#### 6.5.11.5 NR DL-AoD Location Information Request

#### – *NR-DL-AoD-RequestLocationInformation*

The IE *NR-DL-AoD-RequestLocationInformation* is used by the location server to request NR DL-AoD location measurements from a target device.

-- ASN1START

NR-DL-AoD-RequestLocationInformation-r16 ::= SEQUENCE {

 nr-AssistanceAvailability-r16 BOOLEAN,

 nr-DL-AoD-ReportConfig-r16 NR-DL-AoD-ReportConfig-r16,

 ...,

 [[

 multiMeasInSameReport-r17 ENUMERATED { requested } OPTIONAL -- Need ON

 ]],

 [[

 nr-DL-PRS-RxHoppingRequest-r18 SEQUENCE {

 nr-DL-PRS-RxHoppingTotalBandwidth-r18 CHOICE {

 fr1 ENUMERATED {mhz40, mhz50, mhz80, mhz100},

 fr2 ENUMERATED {mhz100, mhz200, mhz400}

 } OPTIONAL -- Need ON

 } OPTIONAL -- Need ON

 ]]

}

NR-DL-AoD-ReportConfig-r16 ::= SEQUENCE {

 maxDL-PRS-RSRP-MeasurementsPerTRP-r16 INTEGER (1..8) OPTIONAL, -- Need ON

 ...,

 [[

 maxDL-PRS-RSRP-MeasurementsPerTRP-r17 INTEGER (9..24) OPTIONAL, -- Need ON

 maxDL-PRS-RSRPP-MeasurementsPerTRP-r17 INTEGER (1..24) OPTIONAL, -- Need ON

 nr-los-nlos-IndicatorRequest-r17 SEQUENCE {

 type-r17 LOS-NLOS-IndicatorType1-r17,

 granularity-r17

 LOS-NLOS-IndicatorGranularity1-r17,

 ...

 } OPTIONAL, -- Need ON

 reducedDL-PRS-ProcessingSamples-r17 ENUMERATED { requested, ... }

 OPTIONAL, -- Need ON

 lowerRxBeamSweepingFactor-FR2-r17 ENUMERATED { requested } OPTIONAL -- Need ON

 ]],

 [[

 nr-DL-PRS-MeasurementTimeWindowsConfig-r18

 NR-DL-PRS-MeasurementTimeWindowsConfig-r18 OPTIONAL -- Need ON

 ]]

}

-- ASN1STOP

| *NR-DL-AoD-RequestLocationInformation* field descriptions |
| --- |
| ***nr-AssistanceAvailability***This field indicates whether the target device may request additional DL-PRS assistance data from the server. TRUE means allowed and FALSE means not allowed. |
| ***multiMeasInSameReport***This field, if present, indicates that the target device is requested to provide multiple measurement instances in a single measurement report; i.e., include the *nr-DL-AoD-SignalMeasurementInstances* (in the case of UE-assisted mode is requested) or *nr-DL-AoD-LocationInformationInstances* (in the case of UE-based mode is requested) in IE *NR-DL-AoD-ProvideLocationInformation.* |
|  |
| ***nr-DL-PRS-RxHoppingRequest***This field, if present, indicates that the target device is requested to perform DL-PRS Rx hopping for performing RSRP or RSRPP measurements and report the hopping information used for performing the measurements. |
| ***nr-DL-PRS-RxHoppingTotalBandwidth***This field, if present, indicates the total bandwidth of all hops in MHz. If the configured value *nr-DL-PRS-RxHoppingTotalBandwidth* is larger than the configured DL-PRS bandwidth in the provided assistance data, the UE shall assume that the actual nr-*DL-PRS-RxHoppingTotalBandwidth* is equal to the width of the configured DL-PRS in the provided assistance data. |
| ***maxDL-PRS-RSRP-MeasurementsPerTRP***This field specifies the maximum number of DL-PRS RSRP measurements on different DL-PRS Resources from the same TRP. If this field with -r17 suffix is present, the field with -r16 suffix should not be present. |
| ***maxDL-PRS-RSRPP-MeasurementsPerTRP***This field specifies the maximum number of DL-PRS RSRPP measurements on different DL-PRS Resources from the same TRP. |
| ***nr-los-nlos-IndicatorRequest***This field, if present, indicates that the target device is requested to provide the indicated type and granularity of the estimated *LOS-NLOS-Indicator* in the *NR-DL-AoD-SignalMeasurementInformation*. |
| ***reducedDL-PRS-ProcessingSamples***This field, if present and set to '*requested*', indicates that the target device is requested to perform the requested measurements with reduced number of samples (M=1 or M=2) as specified in TS 38.133 [46]. |
| ***lowerRxBeamSweepingFactor-FR2***This field, if present, indicates that the target device is requested to use a lower Rx beam sweeping factor than 8 for FR2 according to UE's capability. |
| ***nr-DL-PRS-MeasurementTimeWindowsConfig***This field indicates DL-PRS Resource Set(s) occurring within time window(s) for performing measurements where the time window is indicated by a start time, periodicity, offset and duration. |

*NEXT CHANGE*

#### 6.5.12.4 NR Multi-RTT Location Information Elements

#### – *NR-Multi-RTT-SignalMeasurementInformation*

The IE *NR-Multi-RTT-SignalMeasurementInformation* is used by the target device to provide NR Multi-RTT measurements to the location server.

-- ASN1START

NR-Multi-RTT-SignalMeasurementInformation-r16 ::= SEQUENCE {

 nr-Multi-RTT-MeasList-r16 NR-Multi-RTT-MeasList-r16,

 nr-NTA-Offset-r16 ENUMERATED { nTA1, nTA2, nTA3, nTA4, ... } OPTIONAL,

 ...,

 [[

 nr-SRS-TxTEG-Set-r17 SEQUENCE (SIZE(1..maxTxTEG-Sets-r17)) OF

 NR-SRS-TxTEG-Element-r17 OPTIONAL

 -- Cond Case2-3

 ]],

 [[

 nr-UE-RxTEG-TimingErrorMargin-r17 TEG-TimingErrorMargin-r17 OPTIONAL,-- Cond TEGCase3

 nr-UE-TxTEG-TimingErrorMargin-r17 TEG-TimingErrorMargin-r17 OPTIONAL,-- Cond TEGCase2-3

 nr-UE-RxTxTEG-TimingErrorMargin-r17 RxTxTEG-TimingErrorMargin-r17 OPTIONAL -- Cond TEGCase1-2

 ]]

}

NR-Multi-RTT-MeasList-r16 ::= SEQUENCE (SIZE(1..nrMaxTRPs-r16)) OF NR-Multi-RTT-MeasElement-r16

NR-Multi-RTT-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-UE-RxTxTimeDiff-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),

 ...,

 kMinus6-r18 INTEGER (0..126083073),

 kMinus5-r18 INTEGER (0..63041537),

 kMinus4-r18 INTEGER (0..31520769),

 kMinus3-r18 INTEGER (0..15760385),

 kMinus2-r18 INTEGER (0..7880193),

 kMinus1-r18 INTEGER (0..3940097)

 },

 nr-AdditionalPathList-r16 NR-AdditionalPathList-r16 OPTIONAL,

 nr-TimeStamp-r16 NR-TimeStamp-r16,

 nr-TimingQuality-r16 NR-TimingQuality-r16,

 nr-DL-PRS-RSRP-Result-r16 INTEGER (0..126) OPTIONAL,

 nr-Multi-RTT-AdditionalMeasurements-r16

 NR-Multi-RTT-AdditionalMeasurements-r16 OPTIONAL,

 ...,

 [[

 nr-UE-RxTx-TEG-Info-r17 NR-UE-RxTx-TEG-Info-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-Multi-RTT-AdditionalMeasurementsExt-r17

 NR-Multi-RTT-AdditionalMeasurementsExt-r17 OPTIONAL

 ]],

 [[

 nr-MeasBasedOnAggregatedResources-r18 ENUMERATED {true} OPTIONAL,

 nr-AggregatedDL-PRS-ResourceInfo-List-r18 SEQUENCE (SIZE (2..3)) OF

 NR-AggregatedDL-PRS-ResourceInfo-Element-r18 OPTIONAL,

 nr-RSCP-r18 INTEGER (0..3599) OPTIONAL,

 nr-PhaseQuality-r18 NR-PhaseQuality-r18 OPTIONAL,

 nr-RSCP-AddSampleMeasurements-r18

 SEQUENCE (SIZE (1..nrNumOfSamples-1-r18 )) OF NR-RSCP-AdditionalMeasurements-r18

 OPTIONAL,

 nr-ReportDL-PRS-MeasBasedOnSingleOrMultiHopRx-r18

 ENUMERATED { singleHop, multipleHop } OPTIONAL,

 nr-NTN-UE-RxTxMeasurements-r18 NR-NTN-UE-RxTxMeasurements-r18 OPTIONAL

 ]]

}

NR-Multi-RTT-AdditionalMeasurements-r16 ::= SEQUENCE (SIZE (1..3)) OF

 NR-Multi-RTT-AdditionalMeasurementElement-r16

NR-Multi-RTT-AdditionalMeasurementsExt-r17 ::= SEQUENCE (SIZE (1..maxAddMeasRTT-r17)) OF

 NR-Multi-RTT-AdditionalMeasurementElement-r16

NR-Multi-RTT-AdditionalMeasurementElement-r16 ::= SEQUENCE {

 nr-DL-PRS-ResourceID-r16 NR-DL-PRS-ResourceID-r16 OPTIONAL,

 nr-DL-PRS-ResourceSetID-r16 NR-DL-PRS-ResourceSetID-r16 OPTIONAL,

 nr-DL-PRS-RSRP-ResultDiff-r16 INTEGER (0..61) OPTIONAL,

 nr-UE-RxTxTimeDiffAdditional-r16 CHOICE {

 k0-r16 INTEGER (0..8191),

 k1-r16 INTEGER (0..4095),

 k2-r16 INTEGER (0..2047),

 k3-r16 INTEGER (0..1023),

 k4-r16 INTEGER (0..511),

 k5-r16 INTEGER (0..255),

 ...,

 kMinus6-r18 INTEGER (0..524224),

 kMinus5-r18 INTEGER (0..262112),

 kMinus4-r18 INTEGER (0..131056),

 kMinus3-r18 INTEGER (0..65528),

 kMinus2-r18 INTEGER (0..32764),

 kMinus1-r18 INTEGER (0..16382)

 },

 nr-TimingQuality-r16 NR-TimingQuality-r16,

 nr-AdditionalPathList-r16 NR-AdditionalPathList-r16 OPTIONAL,

 nr-TimeStamp-r16 NR-TimeStamp-r16,

 ...,

 [[

 nr-UE-RxTx-TEG-Info-r17 NR-UE-RxTx-TEG-Info-r17 OPTIONAL,

 nr-DL-PRS-FirstPathRSRP-ResultDiff-r17 INTEGER (0..61) OPTIONAL,

 nr-los-nlos-IndicatorPerResource-r17 LOS-NLOS-Indicator-r17 OPTIONAL,

 nr-AdditionalPathListExt-r17 NR-AdditionalPathListExt-r17 OPTIONAL

 ]],

 [[

 nr-MeasBasedOnAggregatedResources-r18 ENUMERATED {true} OPTIONAL,

 nr-AggregatedDL-PRS-ResourceInfo-List-r18 SEQUENCE (SIZE (2..3)) OF

 NR-AggregatedDL-PRS-ResourceInfo-Element-r18 OPTIONAL,

 nr-RSCP-r18 INTEGER (0..3599) OPTIONAL,

 nr-PhaseQuality-r18 NR-PhaseQuality-r18 OPTIONAL,

 nr-RSCP-AdditionalMeasurementsAddSample-r18

 SEQUENCE (SIZE (1..nrNumOfSamples-1-r18 )) OF NR-RSCP-AdditionalMeasurements-r18

 OPTIONAL,

 nr-ReportDL-PRS-MeasBasedOnSingleOrMultiHopRx-r18

 ENUMERATED { singleHop, multipleHop } OPTIONAL,

 nr-NTN-UE-RxTxMeasurements-r18 NR-NTN-UE-RxTxMeasurements-r18 OPTIONAL

 ]]

}

NR-SRS-TxTEG-Element-r17 ::= SEQUENCE {

 nr-TimeStamp-r17 NR-TimeStamp-r16 OPTIONAL, -- Need OP

 nr-UE-Tx-TEG-ID-r17 INTEGER (0..maxNumOfTxTEGs-1-r17),

 carrierFreq-r17 SEQUENCE {

 absoluteFrequencyPointA-r17 ARFCN-ValueNR-r15,

 offsetToPointA-r17 INTEGER (0..2199)

 } OPTIONAL,

 srs-PosResourceList-r17 SEQUENCE (SIZE (1..maxNumOfSRS-PosResources-r17)) OF

 INTEGER (0..maxNumOfSRS-PosResources-1-r17),

 ...

}

NR-UE-RxTx-TEG-Info-r17 ::= CHOICE {

 case1-r17 SEQUENCE {

 nr-UE-RxTx-TEG-ID-r17 INTEGER (0..maxNumOfRxTxTEGs-1-r17)

 },

 case2-r17 SEQUENCE {

 nr-UE-RxTx-TEG-ID-r17 INTEGER (0..maxNumOfRxTxTEGs-1-r17),

 nr-UE-Tx-TEG-Index-r17 INTEGER (1..maxTxTEG-Sets-r17)

 },

 case3-r17 SEQUENCE {

 nr-UE-Rx-TEG-ID-r17 INTEGER (0..maxNumOfRxTEGs-1-r17),

 nr-UE-Tx-TEG-Index-r17 INTEGER (1..maxTxTEG-Sets-r17)

 },

 ...

}

NR-RSCP-AdditionalMeasurements-r18 ::= SEQUENCE {

 nr-RSCP-r18 INTEGER (0..3599) OPTIONAL,

 nr-PhaseQuality-r18 NR-PhaseQuality-r18 OPTIONAL,

 nr-TimeStamp-r18 NR-TimeStamp-r16 OPTIONAL,

 ...

}

NR-NTN-UE-RxTxMeasurements-r18 ::= SEQUENCE {

 nr-NTN-UE-RxTxTimeDiffSubframeOffset-r18 INTEGER (0..542),

 nr-NTN-DL-TimingDrift-r18 INTEGER (-265..265)

}

-- ASN1STOP

| Conditional presence | Explanation |
| --- | --- |
| *Case2-3* | The field is mandatory present if the IE *NR-UE-RxTx-TEG-Info* is provided for choice's *case2* and *case3*. Otherwise it is not present. |
| *TEGCase3* | The field is optionally present, need OP, if the IE *NR-UE-RxTx-TEG-Info* is provided for choice *case3*. Otherwise it is not present. |
| *TEGCase2-3* | The field is optionally present, need OP, if the IE *NR-UE-RxTx-TEG-Info* is provided for choice's *case2* and *case3*. Otherwise it is not present. |
| *TEGCase1-2* | The field is optionally present, need OP, if the IE *NR-UE-RxTx-TEG-Info* is provided for choice's *case1* and *case2*. Otherwise it is not present. |

|  |
| --- |
| *NR-Multi-RTT-SignalMeasurementInformation* field descriptions |
| ***nr-NTA-Offset***This field provides the *NTAoffset* used by the target device as specified in TS 38.133 [46], Table 7.1.2-2. Enumerated values nTA1, nTA2, nTA3, and nTA4 correspond to *NTAoffset* of 25600 Tc, 0 Tc, 39936 Tc, and 13792 Tc, respectively. |
| ***nr-SRS-TxTEG-Set***This field provides the SRS for Positioning Resources associated with a particular UE Tx TEG and comprises the following subfields:- ***nr-TimeStamp*** specifies the start time for which the *NR-SRS-TxTEG-Element* is valid. If this field is absent, the *nr-TimeStamp* of this instance of the *NR-SRS-TxTEG-Element* of the *nr-SRS-TxTEG-Set* is the same as the *nr-TimeStamp* of the previous instance of the *NR-SRS-TxTEG-Element*. If this field is also absent in the first *NR-SRS-TxTEG-Element* of the *nr-SRS-TxTEG-Set*, all *NR-SRS-TxTEG-Element*'s provided are valid for the measurement period of the *NR-Multi-RTT-SignalMeasurementInformation.*- ***nr-UE-Tx-TEG-ID*** specifies the ID of this UE Tx TEG.- ***carrierFreq*** specifies the frequency of the SRS for positioning resources.- ***srs-PosResourceList*** specifies the SRS for Positioning Resources belonging to this UE Tx TEG.For each UE Tx TEG, there may be up to 8 changes (different *nr-TimeStamp*) of the TEG-SRS association information provided in *nr-SRS-TxTEG-Set*, i.e., the maximum value for *maxTxTEG-Sets* is 64. |
| ***nr-UE-RxTEG-TimingErrorMargin***This field specifies the UE Rx TEG timing error margin value for all the UE Rx TEGs within one *NR-Multi-RTT-SignalMeasurementInformation*. If the IE *NR-UE-RxTx-TEG-Info* is present with choice *case3* and this field is absent, the receiver should consider the UE Rx TEG timing error margin value to be the maximum value available in IE *TEG-TimingErrorMargin*. |
| ***nr-UE-TxTEG-TimingErrorMargin***This field specifies the UE Tx TEG timing error margin value for all the UE Tx TEGs within one *NR-Multi-RTT-SignalMeasurementInformation*. If the IE *NR-UE-RxTx-TEG-Info* is present with choice *case2* or *case3* and this field is absent, the receiver should consider the UE Tx TEG timing error margin value to be the maximum value available in IE *TEG-TimingErrorMargin*. |
| ***nr-UE-RxTxTEG-TimingErrorMargin***This field specifies the UE RxTx TEG timing error margin value for all the UE RxTx TEGs within one *NR-Multi-RTT-SignalMeasurementInformation*. If the IE *NR-UE-RxTx-TEG-Info* is present with choice *case1* or *case2* and this field is absent, the receiver should consider the UE RxTx TEG timing error margin value to be the maximum applicable value as defined in TS 38.133 [46]. |
| ***dl-PRS-ID***This field is used along with a DL-PRS Resource Set ID and a DL-PRS Resources ID to uniquely identify a DL-PRS Resource. This ID can be associated with multiple DL-PRS Resource Sets associated with a single TRP.Each TRP should only be associated with one such ID. |
| ***nr-PhysCellID***This field specifies the physical cell identity of the associated TRP, as defined in TS 38.331 [35]. |
| ***nr-CellGlobalID***This field specifies the NCGI, the globally unique identity of a cell in NR, of the associated TRP, as defined in TS 38.331 [35]. |
| ***nr-ARFCN***This field specifies the NR-ARFCN of the TRP's CD-SSB (as defined in TS 38.300 [47]) corresponding to *nr-PhysCellID*. |
| ***nr-UE-RxTxTimeDiff***This field specifies the UE Rx–Tx time difference measurement, as defined in TS 38.215 [36].  |
| ***nr-AdditionalPathList***This field specifies one or more additional detected path timing values for the TRP or resource, relative to the path timing used for determining the *nr-UE-RxTxTimeDiff* value. If this field was requested but is not included, it means the UE did not detect any additional path timing values. If this field is present, the field *nr-AdditionalPathListExt* shall be absent. |
| ***nr-TimeStamp***This field specifies the time instance for which the measurement is performed. If RSCP measurement is present, the timestamp applies to both RSCP and UE Rx–Tx time difference measurement. |
| ***nr-TimingQuality***This field specifies the target device′s best estimate of the quality of the measurement. |
| ***nr-DL-PRS-RSRP-Result***This field specifies the NR DL-PRS reference signal received power (DL PRS-RSRP) measurement, as defined in TS 38.215 [36]. The mapping of the quantity is defined as in TS 38.133 [46]. |
| ***nr-Multi-RTT-AdditionalMeasurements***This field provides up to 3 additional UE Rx-Tx time difference measurements corresponding to a single configured SRS Resource or Resource Set for positioning. Each measurement corresponds to a single received DL-PRS Resource or DL-PRS Resource Set [45].If this field is present, the field *nr-Multi-RTT-AdditionalMeasurementsExt* shall be absent. |
| ***nr-UE-RxTx-TEG-Info***This field provides the ID(s) of the UE TEG associated with the *nr-UE-RxTxTimeDiff* or*nr-UE-RxTxTimeDiffAdditional* measurement. One of the following combinations of TEG IDs can be provided:- ***case1*** provides the UE RxTx TEG ID;- ***case2*** provides the UE RxTx TEG ID together with the UE Tx TEG ID. The *nr-UE-Tx-TEG-Index* provides the index to the *nr-SRS-TxTEG-Set* field for the applicable UE Tx TEG ID, where value '1' indicates the first *NR-SRS-TxTEG-Element* in *nr-SRS-TxTEG-Set*, value '2' indicates the second *NR-SRS-TxTEG-Element* in *nr-SRS-TxTEG-Set*, and so on;- ***case3*** provides the UE Rx TEG ID together with the UE Tx TEG ID. The *nr-UE-Tx-TEG-Index* provides the index to the *nr-SRS-TxTEG-Set* field for the applicable UE Tx TEG ID, where value '1' indicates the first *NR-SRS-TxTEG-Element* in *nr-SRS-TxTEG-Set*, value '2' indicates the second *NR-SRS-TxTEG-Element* in *nr-SRS-TxTEG-Set*, and so on. |
| ***nr-DL-PRS-FirstPathRSRP-Result***This field specifies the NR DL-PRS reference signal received path power (DL PRS-RSRPP) of the first detected path in time, as defined in TS 38.215 [36]. The mapping of the measured quantity is defined as in TS 38.133 [46]. |
| ***nr-los-nlos-Indicator***This field specifies the target device's best estimate of the LOS or NLOS of the UE Rx-Tx Time Difference, RSRP or RSRPP of first path measurement for the TRP or resource.NOTE: If the requested type or granularity in *nr-los-nlos-IndicatorRequest* is not possible, the target device may provide a different type and granularity for the estimated *LOS-NLOS-Indicator.* |
| ***nr-AdditionalPathListExt***This field provides up to 8 additional detected path timing values for the TRP or resource, relative to the path timing used for determining the *nr-UE-RxTxTimeDiff* value. If this field was requested but is not included, it means the UE did not detect any additional path timing values. If this field is present, the field *nr-AdditionalPathList* shall be absent. |
| ***nr-Multi-RTT-AdditionalMeasurementsExt***This field, in addition to the measurements provided in *NR-Multi-RTT-MeasElement*, provides UE Rx-Tx time difference measurements of up to 4 DL-PRS Resources of a TRP with different UE RxTx or UE Rx TEGs. For a certain DL-PRS Resource, there can be up to 8 measurement results with respect to different UE RxTx or UE Rx TEGs. If this field is present, the field *nr-Multi-RTT-AdditionalMeasurements* shall be absent. |
| ***nr-MeasBasedOnAggregatedResources***This field indicates whether the UE RxTx Time Difference measurement, RSRP measurement (if included), and RSRPP measurement (if included) is based on aggregated DL-PRS Resources. |
| ***nr-AggregatedDL-PRS-ResourceInfo-List***This field provides the DL-PRS Resource Set IDs which are used for the aggregated UE Rx-Tx time difference, RSRP, or RSRPP measurement results. This field is optionally present if the field *nr-MeasBasedOnAggregatedResources* is present; otherwise, it is not present. If the field is present, the field *nr-DL-PRS-ResourceID* and *nr-DL-PRS-ResourceSetID* should not be included, and the *dl-PRS-ID* in IE *NR-Multi-RTT-MeasElement* shall be ignored by a receiver. The IE a*ggregatedDL-PRS-ID* in the *nr-AggregatedDL-PRS-ResourceInfo-List* is always provided for the first measurement when *nr-AggregatedDL-PRS-ResourceInfo-List* is included in *NR-Multi-RTT-MeasElement*. The a*ggregatedDL-PRS-ID* is not present in the *nr-AggregatedDL-PRS-ResourceInfo-List* when *nr-AggregatedDL-PRS-ResourceInfo-List* is included in *NR-Multi-RTT-AdditionalMeasurementElement*. |
| ***nr-RSCP***This field specifies the NR DL reference signal carrier phase measurement, as defined in TS 38.215 [36]. Mapping of the measured quantity is defined as in TS 38.133 [46]. |
| ***nr-PhaseQuality***This field specifies the target device′s best estimate of the quality of the RSCP measurement. |
| ***nr-RSCP-AddSampleMeasurements***This field, in addition to the measurements provided in *NR-Multi-RTT-MeasElement*, provides up to 3 RSCP measurements associated with the *nr-UE-RxTxTimeDiff* in *NR-Multi-RTT-MeasElement*. |
| ***nr-ReportDL-PRS-MeasBasedOnSingleOrMultiHopRx***This field indicates that the reported measurement is based on DL-PRS receive hopping with either single hop or multiple hops. |
| ***nr-DL-PRS-RSRP-ResultDiff***This field provides the additional DL-PRS RSRP measurement result relative to *nr-DL-PRS-RSRP-Result.* The DL-PRS RSRP value of this measurement is obtained by adding the value of this field to the value of the *nr-DL-PRS-RSRP-Result*. The mapping of this field is defined as in TS 38.133 [46]. |
| ***nr-UE-RxTxTimeDiffAdditional***This field provides the additional UE Rx-Tx Difference measurement result relative to *nr-UE-RxTxTimeDiff.* The UE Rx-Tx Difference value of this measurement is obtained by adding the value of this field to the value of the *nr-UE-RxTxTimeDiff* field. The mapping of the field is defined in TS 38.133 [46]. |
| ***nr-DL-PRS-FirstPathRSRP-ResultDiff***This field specifies the additional NR DL-PRS reference signal received path power (DL PRS-RSRPP) of the first detected path in time relative to *nr-DL-PRS-FirstPathRSRP-Result*. The DL-PRS RSRPP of first path value of this measurement is obtained by adding the value of this field to the value of the *nr-DL-PRS-FirstPathRSRP-Result* field. The mapping of the field is defined in TS 38.133 [46]. |
| ***nr-los-nlos-IndicatorPerResource***This field specifies the target device's best estimate of the LOS or NLOS of the UE Rx-Tx Time Difference, RSRP or RSRPP of first path measurement for the resource.This field may only be present if the field *nr-LOS-NLOS-Indicator* choice indicates *perResource*. |
| ***nr-RSCP-AdditionalMeasurementsAddSample***This field, provides up to 3 RSCP measurement samples associated with the UE Rx-Tx Time Difference measurement in *NR-Multi-RTT-AdditionalMeasurementElement.* |
| ***nr-NTN-UE-RxTxMeasurements***This field provides additional measurements for the UE Rx-Tx time difference in NTN and comprises the following subfields:- ***nr-NTN-UE-RxTxTimeDiffSubframeOffset*** specifies the UE Rx-Tx time difference subframe offset measurement in unit of subframe, as defined in TS 38.215 [36].- ***nr-NTN-DL-TimingDrift*** specifies the DL timing drift measurement, as defined in TS 38.215 [36]. The granularity of *nr-NTN-DL-TimingDrift* is 0.1 ppm. Values are given in unit of corresponding granularity. |

*NEXT CHANGE*

#### 6.5.12.5 NR Multi-RTT Location Information Request

#### – *NR-Multi-RTT-RequestLocationInformation*

The IE *NR-Multi-RTT-RequestLocationInformation* is used by the location server to request NR Multi-RTT location measurements from a target device.

-- ASN1START

NR-Multi-RTT-RequestLocationInformation-r16 ::= SEQUENCE {

 nr-UE-RxTxTimeDiffMeasurementInfoRequest-r16

 ENUMERATED { true } OPTIONAL, -- Need ON

 nr-RequestedMeasurements-r16 BIT STRING { prsrsrpReq (0),

 firstPathRsrpReq-r17 (1),

 dl-PRS-RSCP-Request-r18 (2)

 } (SIZE(1..8)),

 nr-AssistanceAvailability-r16 BOOLEAN,

 nr-Multi-RTT-ReportConfig-r16 NR-Multi-RTT-ReportConfig-r16,

 additionalPaths-r16 ENUMERATED { requested } OPTIONAL, -- Need ON

 ...,

 [[

 nr-UE-RxTxTEG-Request-r17 ENUMERATED { case1, case2, case3, ... }

 OPTIONAL, -- Need ON

 measureSameDL-PRS-ResourceWithDifferentRxTxTEGs-r17

 ENUMERATED { n0, n2, n3, n4, n6, n8, ... }

 OPTIONAL, -- Need ON

 measureSameDL-PRS-ResourceWithDifferentRxTEGs-r17

 ENUMERATED { n0, n2, n3, n4, n6, n8, ... }

 OPTIONAL, -- Need ON

 reducedDL-PRS-ProcessingSamples-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

 lowerRxBeamSweepingFactor-FR2-r17 ENUMERATED { requested } OPTIONAL -- Need ON

 ]],

 [[

 nr-DL-PRS-RxHoppingRequest-r18 SEQUENCE {

 nr-DL-PRS-RxHoppingTotalBandwidth-r18 CHOICE {

 fr1 ENUMERATED {mhz40, mhz50, mhz80, mhz100},

 fr2 ENUMERATED {mhz100, mhz200, mhz400}

 } OPTIONAL -- Need ON

 } OPTIONAL, -- Need ON

 timingReportingGranularityFactorExt-r18 INTEGER (-6..-1) OPTIONAL, -- Need ON

 nr-DL-PRS-JointMeasurementRequest-r18 SEQUENCE {

 nr-DL-PRS-JointMeasurementRequestedPFL-List-r18 SEQUENCE (SIZE (2..3)) OF

 INTEGER (0..nrMaxFreqLayers-1-r16) OPTIONAL -- Need ON

 } OPTIONAL, -- Need ON

 nr-DL-PRS-MeasurementTimeWindowsConfig-r18

 NR-DL-PRS-MeasurementTimeWindowsConfig-r18 OPTIONAL -- Need ON

 ]]

}

NR-Multi-RTT-ReportConfig-r16 ::= SEQUENCE {

 maxDL-PRS-RxTxTimeDiffMeasPerTRP-r16 INTEGER (1..4) OPTIONAL, -- Need ON

 timingReportingGranularityFactor-r16 INTEGER (0..5) OPTIONAL -- Need ON

}

-- ASN1STOP

|  |
| --- |
| *NR-Multi-RTT-RequestLocationInformation* field descriptions |
| ***nr-UE-RxTxTimeDiffMeasurementInfoRequest***This field, if present, indicates that the target device is requested to report the DL-PRS Resource ID(s) or DL-PRS Resource Set ID(s) associated with the DL-PRS Resources(s) or the DL-PRS Resource Set(s) which are used in determining the UE Rx-Tx time difference measurements. |
| ***nr-RequestedMeasurements***This field specifies the NR Multi-RTT measurements requested. This is represented by a bit string, with a one‑value at the bit position means the particular measurement is requested; a zero‑value means not requested. The *dl-PRS-RSCP-Request* means that the target device is requested to provide DL RSCP measurement. |
| ***nr-AssistanceAvailability***This field indicates whether the target device may request additional DL-PRS assistance data from the server. TRUE means allowed and FALSE means not allowed. |
| ***maxDL-PRS-RxTxTimeDiffMeasPerTRP***This field specifies the maximum number of UE-Rx-Tx time difference measurements for different DL-PRS Resources or DL-PRS Resource Sets per TRP.  |
| ***timingReportingGranularityFactor,*** ***timingReportingGranularityFactorExt***This field specifies the recommended reporting granularity for the UE Rx-Tx time difference measurements. Value (0..5) corresponds to (*k0*..*k5*) and value (-6..-1) corresponds to (*kMinus6..kMinus1*) used for *nr-UE-RxTxTimeDiff* and *nr-UE-RxTxTimeDiffAdditional* in *NR-Multi-RTT-MeasElement*. The UE may select a different granularity value for *nr-UE-RxTxTimeDiff* and *nr-UE-RxTxTimeDiffAdditional*. 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. |
| ***additionalPaths***This field, if present, indicates that the target device is requested to provide the *nr-AdditionalPathList* in IE *NR-Multi-RTT-SignalMeasurementInformation*. If this field is present, the field *additionalPathsExt* shall be absent. |
| ***nr-UE-RxTxTEG-Request***This field, if present, indicates that the target device is requested to provide the *NR-UE-RxTx-TEG-Info* in IE *NR-Multi-RTT-SignalMeasurementInformation.* Enumerated value '*case1*' indicates that the target device is requested to provide the *case1* choice in *NR-UE-RxTx-TEG-Info*, enumerated value '*case2*' indicates that the target device is requested to provide the *case2* choice in *NR-UE-RxTx-TEG-Info*, and so on. |
| ***measureSameDL-PRS-ResourceWithDifferentRxTxTEGs***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 RxTx TEGs and with the same UE Tx TEG. Enumerated value '*n0*' indicates that the number *N* of different UE RxTx 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 RxTx TEGs, value '*n3*' indicates that the target device is requested to measure the same DL-PRS Resource of a TRP with 3 different UE RxTx TEGs, and so on. When the location server requests aggregated measurements, this field indicates a request for configuring the target device to measure the same aggregated DL-PRS Resources of a TRP with N different UE RxTx TEGs.If this field is present, the field *nr-UE-RxTxTEG-Request* should also be present.If this field is present, the field *measureSameDL-PRS-ResourceWithDifferentRxTEGs* should not be present. |
| ***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. When the location server 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.If this field is present, the field *nr-UE-RxTxTEG-Request* should also be present.If this field is present, the field *measureSameDL-PRS-ResourceWithDifferentRxTxTEGs* should not be present. |
| ***reducedDL-PRS-ProcessingSamples***This field, if present and set to '*requested*', indicates that the target device is requested to perform the requested measurements with reduced number of samples (M=1 or M=2) as specified in TS 38.133 [46]. When requested for aggregated measurements by the location server, this field indicates processing of reduced number of samples for the aggregated measurements. |
| ***nr-los-nlos-IndicatorRequest***This field, if present, indicates that the target device is requested to provide the indicated type and granularity of the estimated *LOS-NLOS-Indicator* in the *NR-Multi-RTT-SignalMeasurementInformation*.  |
| ***additionalPathsExt***This field, if present, indicates that the target device is requested to provide the *nr-AdditionalPathListExt* in IE *NR-Multi-RTT-SignalMeasurementInformation*. If this field is present, the field *additionalPaths* shall be absent. |
| ***additionalPathsDL-PRS-RSRP-Request***This field, if present, indicates that the target device is requested to provide the *nr-DL-PRS-RSRPP* for the additional paths in the field *nr-AdditionalPathList* or *nr-AdditionalPathListExt*.  |
| ***multiMeasInSameReport***This field, if present, indicates that the target device is requested to provide multiple measurement instances in a single measurement report; i.e., include the *nr-Multi-RTT-SignalMeasurementInstances* in IE *NR-Multi-RTT-ProvideLocationInformation.* |
| ***lowerRxBeamSweepingFactor-FR2***This field, if present, indicates that the target device is requested to use a lower Rx beam sweeping factor than 8 for FR2 according to UE's capability. When requested for aggregated measurements by the location server, this field indicates that the target device is requested to use a lower Rx beam sweeping factor than 8 for FR2 according to UE's capability for the aggregated measurements. |
| ***nr-DL-PRS-RxHoppingRequest***This field, if present, indicates that the target device is requested to use DL-PRS Rx hopping for performing UE-Rx-Tx time difference, RSRP (if requested in *nr-RequestedMeasurements*), or RSRPP measurements (if requested in *nr-RequestedMeasurements*) and report the hopping information used for performing the measurements. This field is not included when *dl-PRS-RSCP-Request* or *nr-DL-PRS-JointMeasurementRequest*is is included. |
| ***nr-DL-PRS-RxHoppingTotalBandwidth***This field, if present, indicates the total bandwidth in MHz across all hops for the DL-PRS measurement. If the configured value *nr-DL-PRS-RxHoppingTotalBandwidth* is larger than the configured DL-PRS bandwidth in the provided assistance data, the UE shall assume that the actual nr-*DL-PRS-RxHoppingTotalBandwidth* is equal to the width of the configured DL-PRS in the provided assistance data. |
| ***nr-DL-PRS-JointMeasurementRequest***This field, if present, indicates that the target device is requested to perform joint measurement across aggregated PFLs. |
| ***nr-DL-PRS-JointMeasurementRequestedPFL-List***This field, if present, indicates that the target device is requested to perform joint measurements on the indicated two or three PFLs that are linked for DL-PRS BW aggregation. 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-MeasurementTimeWindowsConfig***This field indicates DL-PRS Resource Set(s) occurring within time window(s) for performing measurements where the time window is indicated by a start time, periodicity, offset and duration. |

*END OF CHANGE*