3GPP TSG-RAN WG3 Meeting #123 R3-24xxxx

Athens, Greece, 26 February - 01 March 2024

**Agenda item: 23.3**

**Source: Nokia, Nokia Shanghai Bell**

**Title: (TP for TS 38.455 BL CR) Resolution of open issues for RedCap UEs**

**Document for: Discussion and Decision**

# 1 Introduction

In this paper, we resolve several open issues related to positioning for RedCap UE.

# 2 Discussion

## 2.2 Positioning for RedCap UE

SRS Configuration:

According to RAN1 agreements in rows 150-151 of [2], an SRS configuration with Tx hopping contains the following parameters:

- a hop bandwidth common to all hops

- a single overlap value can be configured for all hops for the SRS resource

- starting slot offset and starting symbol for the SRS resource with tx hopping (first hop)

- starting slot offset and symbol for each of the hops following the first hop

- number of consecutive symbols in a hop common to all hops

- number of hops

- SRS for positioning with Tx hopping can be configured to be periodic, aperiodic or semi-persistent

The existing *Positioning SRS Resource* IE can be extended with a new *Tx Hopping Configuration* IE that includes parameters aligned with RRC as follows:

TxHoppingConfig-r18 ::= SEQUENCE {

 overlapValue-r18 ENUMERATED {zeroRB, oneRB, twoRB, fourRB},

 numberOfHops INTEGER(1..6),

 slotOffsetForRemainingHopsList-r18 SEQUENCE (SIZE (1..maxNrofHops-r18-1) ) OF SlotOffsetForRemainingHops-r18,

 ...

}

SlotOffsetForRemainingHops-r18 ::= SEQUENCE {

 slotOffsetRemainingHops-r18 CHOICE {

 aperiodic-r18 SEQUENCE {

 slotOffset-r18 INTEGER (1..32) OPTIONAL, -- Need S

 startPosition-r18 INTEGER (0..13) OPTIONAL, -- Need S

 ...

 },

 semi-persistent-r18 SEQUENCE {

 periodicityAndOffset-sp-r18 SRS-PeriodicityAndOffset-r16 OPTIONAL, -- Need R

 periodicityAndOffset-sp-Ext-r18 SRS-PeriodicityAndOffsetExt-r16 OPTIONAL, -- Need R

 ...

 },

 periodic-r18 SEQUENCE {

 periodicityAndOffset-p-r18 SRS-PeriodicityAndOffset-r16 OPTIONAL, -- Need R

 periodicityAndOffset-p-Ext-r18 SRS-PeriodicityAndOffsetExt-r16 OPTIONAL, -- Need R

 ...

 },

 ...

 }

}

**Proposal 4: Introduce a new *Tx Hopping Configuration* IE in the *Positioning SRS Resource* IE that is aligned with RRC (TxHoppingConfig-r18).**

In RRC, the periodicity and offset in TxHoppingConfig-r18 reuses SRS-PeriodicityAndOffset-r16 which is also reused in SRS-PosResource-r16 and SRS-PosUplinkTransmissionWindowConfig-r18. Therefore, RAN3 should introduce a common *SRS Periodicity* IE that can be reused, which aligns with RRC and simplifies RAN3 specifications.

**Proposal 5: Introduce a new *SRS Periodicity* IE which can be reused within the *Requested SRS Transmission Characteristics* IE, *Positioning SRS Resource* IE, and *Tx Hopping Configuration* IE (in alignment with RRC).**

Requested SRS Transmission Characteristics:

According to RAN1 agreements in row 149 of [2], “for a RedCap UE with Tx FH capability, a request on bandwidth for SRS for positioning from the LMF to the serving gNB that exceeds RedCap UE bandwidth implies configuration of SRS for positioning with Tx FH configuration.”

Therefore, when the existing *Bandwidth* IE in the *Requested SRS Transmission Characteristics* IE exceeds the bandwidth capability of the RedCap UE, the serving gNB implicitly knows that Tx hopping configuration is needed so there is no need for any new explicit indicator. So far, RAN1 has not reached any agreements on new parameters for Requested SRS Transmission Characteristics.

*Observation: When LMF requests UL SRS transmission for RedCap UE, there is no need for any explicit request indicator for Tx frequency hopping.*

Measurements:

According to RAN1 agreement in row 152 of [2], an IE is needed in the measurement result to indicate that the reported measurement is based on receiving single or multiple hops of UL SRS for positioning. This can be achieved by introducing a new *Measured* *Frequency Hops* IE that has two enumerated values, {singleHop, multiHop).

**Proposal 6: Introduce a new *Measured* *Frequency Hops* IE in the *TRP Measurement Result* IE that is encoded as ENUMERATED (singleHop, multiHop, …).**

# 3 Conclusions

In this paper, we evaluated open issues related to positioning accuracy enhancements and proposed the following:

For positioning for RedCap UE:

*Observation: When LMF requests UL SRS transmission for RedCap UE, there is no need for any explicit request indicator for Tx frequency hopping.*

**Proposal 4: Introduce a new *Tx Hopping Configuration* IE in the *Positioning SRS Resource* IE that is aligned with RRC (TxHoppingConfig-r18).**

**Proposal 5: Introduce a new *SRS Periodicity* IE which can be reused within the *Requested SRS Transmission Characteristics* IE, *Positioning SRS Resource* IE, and *Tx Hopping Configuration* IE (in alignment with RRC).**

**Proposal 6: Introduce a new *Frequency Hopping* IE in the *TRP Measurement Result* IE that is encoded as ENUMERATED (singleHop, multiHop, …).**

A TP for NRPPa is provided in Annex A.

# References

1. R4-2321545 *Response to reply LS on SRS and PRS bandwidth aggregation for positioning*, RAN4
2. R3-240010 *LS on Rel-18 higher-layers parameter list*, RAN1
3. R3-240333 *(TP for TS 38.473 BL CR) F1AP updates for NR positioning*, Nokia, Nokia Shanghai Bell

# Annex A: Text Proposal for TS 38.455

*Start of modifications*

9.2.27 Requested SRS Transmission Characteristics

This IE contains the requested SRS configuration for the UE.

| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** | **Criticality** | **Assigned Criticality** |
| --- | --- | --- | --- | --- | --- | --- |
| Number Of Periodic Transmissions | C-ifResourceTypePeriodic |  | INTEGER (0..500,…) | The number of periodic SRS transmissions requested. The value of ‘0’ represents an infinite number of periodic SRS transmissions. | - |  |
| Resource Type | M |  | ENUMERATED (periodic, semi-persistent, aperiodic, …) |  | - |  |
| CHOICE *Bandwidth* | M |  |  |  | - |  |
| *>FR1* |  |  | ENUMERATED (5mHz, 10mHz, 20mHz, 40mHz, 50mHz, 80mHz, 100mHz, ... , 160mHz, 200mHz) |  |  |  |
| *>FR2* |  |  | ENUMERATED (50mHz, 100mHz, 200mHz, 400mHz,…, 600mHz, 800mHz) |  |  |  |
| **SRS Resource Set List** |  | *0.. 1* |  |  | - |  |
| **>SRS Resource Set Item** |  | *1..<* *maxnoSRS-ResourceSets>* |  |  | - |  |
| >>Number of SRS Resources Per Set | O |  | INTEGER (1..16,...) | The number of SRS Resources per resource set for SRS transmission.  | - |  |
| **>>Periodicity List** |  | *0.. 1* |  |  | - |  |
| **>>>Periodicity List Item** |  | *1..<maxnoSRS-ResourcePerSet>* |  |  | - |  |
| >>>>PeriodicitySRS | M |  | ENUMERATED (0.125, 0.25, 0.5, 0.625, 1, 1.25, 2, 2.5, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 160, 320, 640, 1280, 2560, 5120, 10240, …) | Milli-seconds | - |  |
| >>Spatial Relation Information | O |  | 9.2.34 | This IE is ignored if the *Spatial Relation Information per SRS Resource* IE is present. | - |  |
| >>Pathloss Reference Information | O |  | 9.2.53 |  | - |  |
| >>Spatial Relation Information per SRS Resource | O |  | 9.2.60 |  | - |  |
| SSB Information | O |  | 9.2.54 |  | - |  |
| SRS Frequency | O |  | INTEGER(0..3279165) | NR ARFCN The carrier frequency of SRS transmission bandwidth. | YES | ignore |
| Bandwidth Aggregation Request Information | O |  | ENUMERATED(true, …) |  | YES | ignore |
| Positioning Validity Area Cell List | O |  | 9.2.x4 |  | YES | ignore |
| CHOICE *Transmission Comb* | O |  |  |  | YES | ignore |
| *>Comb Two* |  |  |  |  |  |  |
| >>Comb Offset | M |  | INTEGER(0..1) |  | - |  |
| >>Cyclic Shift | M |  | INTEGER(0..7) |  | - |  |
| *>Comb Four* |  |  |  |  |  |  |
| >>Comb Offset | M |  | INTEGER(0..3) |  | - |  |
| >>Cyclic Shift | M |  | INTEGER(0..11) |  | - |  |
| *>Comb Eight* |  |  |  |  |  |  |
| >>Comb Offset | M |  | INTEGER(0..7) |  | - |  |
| >>Cyclic Shift | M |  | INTEGER(0..5) |  | - |  |
| Resource Mapping |  | *0..1* |  |  | YES | ignore |
| >Start Position | M |  | INTEGER(0..13) |  | - |  |
| >Number of Symbols | M |  | ENUMERATED(n1,n2,n4, n8, n12} |  | - |  |
| Frequency Domain Shift | O |  | INTEGER(0..268) |  | YES | ignore |
| C-SRS | O |  | INTEGER(0..63) |  | YES | ignore |
| CHOICE *Resource Type Positioning* | O |  |  |  | YES | ignore |
| *>periodic* |  |  |  |  |  |  |
| >>SRS Periodicity | M |  | 9.2.z1 |  | - |  |
| >>Offset | M |  | INTEGER(0..81919,…) |  | - |  |
| *>semi-persistent* |  |  |  |  |  |  |
| >>SRS Periodicity | M |  | 9.2.z1 |  | - |  |
| >>Offset | M |  | INTEGER(0..81919,…) |  | - |  |
| *>aperiodic* |  |  |  | Not applicable if the *Positioning Validity Area Cell List* IE is included |  |  |
| >>slot offset | M |  | INTEGER(0..32) |  | - |  |
| Sequence ID | O |  | INTEGER(0..65535) |  | YES | ignore |

|  |  |
| --- | --- |
| **Condition** | **Explanation** |
| ifResourceTypePeriodic | This IE shall be present if the *Resource Type* IE is set to the value "Periodic". |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxnoSRS-ResourceSets | Maximum no of requested SRS Resource Sets for SRS transmission. Value is 16. |
| maxnoSRS-ResourcePerSet  | Maximum no of SRS Resources per set. Value is 16. |

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

### 9.2.30 Positioning SRS Resource

This information element contains the SRS resource for positioning.

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
| --- | --- | --- | --- | --- | --- | --- |
| Positioning SRS Resource ID | M |  | INTEGER(0..63) |  | - |  |
| CHOICE *Transmission Comb* | M |  |  |  | - |  |
| *>Comb Two* |  |  |  |  |  |  |
| >>Comb Offset | M |  | INTEGER(0..1) |  | - |  |
| >>Cyclic Shift | M |  | INTEGER(0..7) |  | - |  |
| *>Comb Four* |  |  |  |  |  |  |
| >>Comb Offset | M |  | INTEGER(0..3) |  | - |  |
| >>Cyclic Shift | M |  | INTEGER(0..11) |  | - |  |
| *>Comb Eight* |  |  |  |  |  |  |
| >>Comb Offset | M |  | INTEGER(0..7) |  | - |  |
| >>Cyclic Shift | M |  | INTEGER(0..5) |  | - |  |
| Start Position | M |  | INTEGER(0..13) |  | - |  |
| Number of Symbols | M |  | ENUMERATED(n1,n2,n4, n8, n12) |  | - |  |
| Frequency Domain Shift | M |  | INTEGER(0..268) |  | - |  |
| C-SRS | M |  | INTEGER(0..63) |  | - |  |
| Group or Sequence Hopping | M |  | ENUMERATED(Neither, groupHopping, sequenceHopping) |  | - |  |
| CHOICE *Resource Type Positioning* | M |  |  |  | - |  |
| *>periodic* |  |  |  |  |  |  |
| >>SRS Periodicity | M |  | 9.2.z1 |  | - |  |
| >>Offset | M |  | INTEGER(0..81919,…) |  | - |  |
| *>semi-persistent* |  |  |  |  |  |  |
| >>SRS Periodicity | M |  | 9.2.z1 |  | - |  |
| >>Offset | M |  | INTEGER(0..81919,…) |  | - |  |
| *>aperiodic* |  |  |  |  |  |  |
| >>slot offset | M |  | INTEGER(0..32) |  | - |  |
| Sequence ID | M |  | INTEGER(0..65535) |  | - |  |
| CHOICE *Spatial Relation Positioning* | O |  |  |  | - |  |
| *>SSB* |  |  |  |  |  |  |
| >>NR PCI | M |  | INTEGER (0..1007) |  | - |  |
| >>SSB index | O |  | INTEGER(0..63) |  | - |  |
| *>PRS* |  |  |  |  |  |  |
| >>PRS ID | M |  | INTEGER(0..255) |  | - |  |
| >>PRS Resource Set ID | M |  | INTEGER(0..7) |  | - |  |
| >>PRS Resource ID | O |  | INTEGER(0..63) |  | - |  |
| Tx Hopping Configuration | O |  | 9.2.z2 |  | YES | ignore |

<<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

### 9.2.37 TRP Measurement Result

This information element contains the measurement result.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
| **Measured Result Item** |  | *1 .. <maxnoPosMeas>* |  |  |  |  |
| >CHOICE *Measured Results Value* | M |  |  |  |  |  |
| >>UL Angle of Arrival | M |  | 9.2.38 |  | - |  |
| >>UL SRS-RSRP | M |  | INTEGER (0..126) |  | - |  |
| >>UL RTOA | M |  | 9.2.39 |  | - |  |
| >>gNB Rx-Tx Time Difference | M |  | 9.2.40 |  | - |  |
| >>Z-AoA | M |  | 9.2.67 |  | YES | reject |
| >>Multiple UL-AoA | M |  | 9.2.71 |  | YES | reject |
| >>UL SRS-RSRPP | M |  | 9.2.72 |  | YES | reject |
| >>UL RSCP | M |  | 9.2.x3 |  | YES | reject |
| >Time Stamp | M |  | 9.2.42 |  | - |  |
| >Measurement Quality | O |  | 9.2.43 |  | - |  |
| >Measurement Beam Information | O |  | 9.2.57 |  | - |  |
| >SRS Resource type | O |  | 9.2.73 |  | YES | ignore |
| >ARP ID | O |  | 9.2.75 |  | YES | ignore |
| >LoS/NLoS Information | O |  | 9.2.77 |  | YES | ignore |
| >Measured Frequency Hops | O |  | ENUMERATED (singleHop, multiHop, …) |  | YES | ignore |
| **>Aggregated Positioning SRS Resource ID List**  |  | *0..1* |  | Indicates the used SRS for positioning resources across aggregated carriers. | YES | ignore |
| **>>Aggregated Positioning SRS Resource ID Item** |  | 1..< *maxnoaggregatedPosSRS-Resources* > |  |  | - |  |
| >>>Positioning SRS Resource ID | M |  | INTEGER (0..63) |  |  |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoPosMeas | Maximum no. of measured quantities that can be configured and reported with one positioning measurement message. Value is 16384. |
| maxnoaggregatedPosSRS-Resources | Maximum no of aggregated Positioning SRS resources per UL BWP. Value is 3. |

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

### 9.2.z1 SRS Periodicity

This information element indicates the SRS periodicity.

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| --- | --- | --- | --- | --- |
| SRS Periodicity | M |  | ENUMERATED(slot1, slot2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160, slot320, slot640, slot1280, slot2560, slot5120, slot10240, slot40960, slot81920,…, slot128, slot256, slot512, slot20480) |  |

### 9.2.z2 Tx Hopping Configuration

This information element indicates the Tx hopping configuration.

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| --- | --- | --- | --- | --- |
| Overlap Value | M |  | ENUMERATED(rb0, rb1, rb2, rb4) |  |
| Number of Hops | M |  | INTEGER(1..6) |  |
| **Slot Offset for Remaining Hops List** |  | *1* |  |  |
| **>Slot Offset for Remaining Hops Item** |  | *1..<maxnoofHopsMinusOne>* |  |  |
| >>CHOICE *slot offset remaining hops* | M |  |  |  |
| >>>*aperiodic* |  |  |  |  |
| >>>>Slot Offset | O |  | INTEGER(1..32) |  |
| >>>>Start Position | O |  | INTEGER(0..13) |  |
| *>>>semi-persistent* |  |  |  |  |
| >>>>SRS Periodicity | M |  | 9.2.z1 |  |
| >>>>Offset | M |  | INTEGER(0..81919, …) |  |
| *>>>periodic* |  |  |  |  |
| >>>>SRS Periodicity | M |  | 9.2.z1 |  |
| >>>>Offset | M |  | INTEGER(0..81919, …) |  |

| Range bound | Explanation |
| --- | --- |
| maxnoofHopsMinusOne | Maximum no of hops that can be configured for positioning SRS transmission minus one. Value is 5. |

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

9.3.5 Information Element definitions

-- ASN1START

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Information Element Definitions

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-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

NRPPa-IEs {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

ngran-access (22) modules (3) nrppa (4) version1 (1) nrppa-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

 id-MeasurementQuantities-Item,

 id-CGI-NR,

 id-SFNInitialisationTime-NR,

 id-GeographicalCoordinates,

 id-ResultSS-RSRP,

 id-ResultSS-RSRQ,

 id-ResultCSI-RSRP,

 id-ResultCSI-RSRQ,

 id-AngleOfArrivalNR,

 id-ResultNR,

 id-ResultEUTRA,

 maxCellinRANnode,

 maxCellReport,

 maxNrOfErrors,

 maxNoMeas,

 maxnoOTDOAtypes,

 maxServCell,

 id-OtherRATMeasurementQuantities-Item,

 id-WLANMeasurementQuantities-Item,

 maxGERANMeas,

 maxUTRANMeas,

 maxWLANchannels,

 maxnoFreqHoppingBandsMinusOne,

 id-TDD-Config-EUTRA-Item,

 maxNrOfPosSImessage,

 maxnoAssistInfoFailureListItems,

 maxNrOfSegments,

 maxNrOfPosSIBs,

 maxnoPosMeas,

 maxnoTRPs,

 maxnoTRPInfoTypes,

 maxNoOfMeasTRPs,

 maxNoPath,

 maxnoofAngleInfo,

 maxnolcs-gcs-translation,

 maxnoBcastCell,

 maxnoSRSTriggerStates,

 maxnoSpatialRelations,

 maxNRMeas,

 maxEUTRAMeas,

 maxIndexesReport,

 maxCellReportNR,

 maxnoSRS-Carriers,

 maxnoSCSs,

 maxnoSRS-Resources,

 maxnoSRS-PosResources,

 maxnoSRS-ResourceSets,

 maxnoSRS-ResourcePerSet,

 maxnoSRS-PosResourceSets,

 maxnoSRS-PosResourcePerSet,

 maxPRS-ResourceSets,

 maxPRS-ResourcesPerSet,

 maxNoSSBs,

 maxnoofPRSresourceSet,

 maxnoofPRSresource,

 maxnoofULAoAs,

 maxNoPathExtended,

 maxnoARPs,

 maxnoTRPTEGs,

 maxnoUETEGs,

 maxFreqLayers,

 maxnoPRSTRPs,

 maxNumResourcesPerAngle,

 maxnoAzimuthAngles,

 maxnoElevationAngles,

 maxnoVACell,

 maxnoaggregatedPosSRS-Resources,

 maxnoaggregatedPosSRS-ResourceSets,

 maxnoAggPosPRSResourceSets,

 maxnoofTimeWindowSRS,

 maxnoofTimeWindowMea,

 maxnoofHopsMinusOne,

 id-Cell-ID,

 id-TRPInformationTypeItem,

 id-SrsFrequency,

 id-TRPType,

 id-SRSSpatialRelationPerSRSResource,

 id-PRS-Resource-ID,

 id-OnDemandPRS,

 id-AoA-SearchWindow,

 id-ZoA,

 id-MultipleULAoA,

 id-UL-SRS-RSRPP,

 id-SRSResourcetype,

 id-ExtendedAdditionalPathList,

 id-ARPLocationInfo,

 id-ARP-ID,

 id-Los-NLoSInformation,

 id-NumberOfTRPRxTEG,

 id-NumberOfTRPRxTxTEG,

 id-TRPTxTEGAssociation,

 id-TRPTEGInformation,

 id-TRP-Rx-TEGInformation,

 id-TRPBeamAntennaInformation,

 id-NR-TADV,

 id-pathPower,

 id-SRSPortIndex,

 id-UETxTimingErrorMargin,

 id-nrofSymbolsExtended,

 id-repetitionFactorExtended,

 id-StartRBHopping,

 id-StartRBIndex,

 id-transmissionCombn8,

 id-UL-RSCPMeas,

 id-Bandwidth-Aggregation-Request-Information,

 id-PosSRSResourceSet-Aggregation-List,

 id-ReportingGranularitykminus1,

 id-ReportingGranularitykminus2,

 id-SymbolIndex,

 id-TimingReportingGranularityFactorExtended,

 id-PosValidityAreaCellList,

 id-TransmissionCombPos,

 id-ResourceMapping,

 id-FreqDomainShift,

 id-C-SRS,

 id-ResourceTypePos,

 id-SequenceIDPos,

 id-PRSBWAggregationRequestInfo,

 id-AggregatedPosSRSResourceID-List,

 id-AggregatedPRSResourceSetList,

 id-TRPPhaseQuality,

 id-TxHoppingConfiguration,

 id-MeasuredFrequencyHops

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

-- L

<<<<<<<<< unchanged texts omitted >>>>>>>>>>>

MeasuredFrequencyHops ::= ENUMERATED {singleHop, multiHop, ...}

MeasuredResults ::= SEQUENCE (SIZE (1.. maxNoMeas)) OF MeasuredResultsValue

MeasuredResultsValue ::= CHOICE {

 valueAngleOfArrival-EUTRA INTEGER (0..719),

 valueTimingAdvanceType1-EUTRA INTEGER (0..7690),

 valueTimingAdvanceType2-EUTRA INTEGER (0..7690),

 resultRSRP-EUTRA ResultRSRP-EUTRA,

 resultRSRQ-EUTRA ResultRSRQ-EUTRA,

 choice-Extension ProtocolIE-Single-Container {{ MeasuredResultsValue-ExtensionIE }}

}

MeasuredResultsValue-ExtensionIE NRPPA-PROTOCOL-IES ::= {

{ ID id-ResultSS-RSRP CRITICALITY ignore TYPE ResultSS-RSRP PRESENCE mandatory }|

 { ID id-ResultSS-RSRQ CRITICALITY ignore TYPE ResultSS-RSRQ PRESENCE mandatory }|

 { ID id-ResultCSI-RSRP CRITICALITY ignore TYPE ResultCSI-RSRP PRESENCE mandatory }|

 { ID id-ResultCSI-RSRQ CRITICALITY ignore TYPE ResultCSI-RSRQ PRESENCE mandatory }|

 { ID id-AngleOfArrivalNR CRITICALITY ignore TYPE UL-AoA PRESENCE mandatory }|

 { ID id-NR-TADV CRITICALITY ignore TYPE NR-TADV PRESENCE mandatory },

 ...

}

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

-- P

<<<<<<<<< unchanged texts omitted >>>>>>>>>>>

PosSRSResource-List ::= SEQUENCE (SIZE (1..maxnoSRS-PosResources)) OF PosSRSResource-Item

PosSRSResource-Item ::= SEQUENCE {

 srs-PosResourceId SRSPosResourceID,

 transmissionCombPos TransmissionCombPos,

 startPosition INTEGER (0..13),

 nrofSymbols ENUMERATED {n1, n2, n4, n8, n12},

 freqDomainShift INTEGER (0..268),

 c-SRS INTEGER (0..63),

 groupOrSequenceHopping ENUMERATED { neither, groupHopping, sequenceHopping },

 resourceTypePos ResourceTypePos,

 sequenceId INTEGER (0.. 65535),

 spatialRelationPos SpatialRelationPos OPTIONAL,

 iE-Extensions ProtocolExtensionContainer { { PosSRSResource-Item-ExtIEs} } OPTIONAL,

 ...

}

PosSRSResource-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {

 { ID id-TxHoppingConfiguration CRITICALITY ignore EXTENSION TxHoppingConfiguration PRESENCE optional}, ...

}

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

-- R

<<<<<<<<< unchanged texts omitted >>>>>>>>>>>

ResourceTypePeriodicPos ::= SEQUENCE {

 sRSperiodicity SRSPeriodicity,

 offset INTEGER(0..81919, ...),

 iE-Extensions ProtocolExtensionContainer { { ResourceTypePeriodicPos-ExtIEs} } OPTIONAL,

 ...

}

ResourceTypePeriodicPos-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {

 ...

}

ResourceTypeSemi-persistentPos ::= SEQUENCE {

 sRSperiodicity SRSPeriodicity,

 offset INTEGER(0..81919, ...),

 iE-Extensions ProtocolExtensionContainer { { ResourceTypeSemi-persistentPos-ExtIEs} } OPTIONAL,

 ...

}

ResourceTypeSemi-persistentPos-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {

 ...

}

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

-- S

<<<<<<<<< unchanged texts omitted >>>>>>>>>>>

SlotNumber ::= INTEGER (0..79)

SlotOffsetForRemainingHopsList ::= SEQUENCE (SIZE (1..maxnoHopsMinusOne)) OF SlotOffsetForRemainingHopsItem

SlotOffsetForRemainingHopsItem ::= SEQUENCE {

 slotOffsetRemainingHops SlotOffsetRemainingHops,

 iE-Extensions ProtocolExtensionContainer { { SlotOffsetForRemainingHopsItem-ExtIEs} } OPTIONAL,

 ...

}

SlotOffsetForRemainingHopsItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {

 ...

}

SlotOffsetRemainingHops ::= CHOICE {

 aperiodic SlotOffsetRemainingHopsAperiodic,

 semi-persistent SlotOffsetRemainingHopsSemiPersistent,

 periodic SlotOffsetRemainingHopsPeriodic,

 choice-extension ProtocolIE-Single-Container {{ SlotOffsetRemainingHops-ExtIEs }}

}

SlotOffsetRemainingHops-ExtIEs NRPPA-PROTOCOL-IES ::= {

 ...

}

SlotOffsetRemainingHopsAperiodic ::= SEQUENCE {

 slotOffset INTEGER (1..32) OPTIONAL,

 startPosition INTEGER (0..13) OPTIONAL,

 iE-Extensions ProtocolExtensionContainer { { SlotOffsetRemainingHopsAperiodic-ExtIEs} } OPTIONAL,

 ...

}

SlotOffsetRemainingHopsAperiodic-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {

 ...

}

SlotOffsetRemainingHopsSemiPersistent ::= SEQUENCE {

 sRSperiodicity SRSPeriodicity,

 offset INTEGER(0..81919, ...),

 iE-Extensions ProtocolExtensionContainer { { SlotOffsetRemainingHopsSemiPersistent-ExtIEs} } OPTIONAL,

 ...

}

SlotOffsetRemainingHopsSemiPersistent-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {

 ...

}

SlotOffsetRemainingHopsPeriodic ::= SEQUENCE {

 sRSperiodicity SRSPeriodicity,

 offset INTEGER(0..81919, ...),

 iE-Extensions ProtocolExtensionContainer { { SlotOffsetRemainingHopsSemiPeriodic-ExtIEs} } OPTIONAL,

 ...

}

SlotOffsetRemainingHopsSemiPeriodic-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {

 ...

}

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

SRSInfo ::= SEQUENCE {

 sRSResource SRSResourceID,

 ...

}

SRSPeriodicity ::= ENUMERATED {slot1, slot2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160, slot320, slot640, slot1280, slot2560, slot5120, slot10240, slot40960, slot81920, ..., slot128, slot256, slot512, slot20480}

SRSTransmissionStatus ::= ENUMERATED {stopped, ...}

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

-- T

<<<<<<<<< unchanged texts omitted >>>>>>>>>>>

TrpMeasurementResult ::= SEQUENCE (SIZE (1.. maxnoPosMeas)) OF TrpMeasurementResultItem

TrpMeasurementResultItem ::= SEQUENCE {

 measuredResultsValue TrpMeasuredResultsValue,

 timeStamp TimeStamp,

 measurementQuality TrpMeasurementQuality OPTIONAL,

 measurementBeamInfo MeasurementBeamInfo OPTIONAL,

 iE-Extensions ProtocolExtensionContainer {{TrpMeasurementResultItem-ExtIEs}} OPTIONAL,

 ...

}

TrpMeasurementResultItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {

 { ID id-SRSResourcetype CRITICALITY ignore EXTENSION SRSResourcetype PRESENCE optional}|

 { ID id-ARP-ID CRITICALITY ignore EXTENSION ARP-ID PRESENCE optional}|

 { ID id-Los-NLoSInformation CRITICALITY ignore EXTENSION Los-NLoSInformation PRESENCE optional }|

 { ID id-MeasuredFrequencyHops CRITICALITY ignore EXTENSION MeasuredFrequencyHops PRESENCE optional }|

 { ID id-AggregatedPosSRSResourceID-List CRITICALITY ignore EXTENSION AggregatedPosSRSResourceID-List PRESENCE optional },

 ...

}

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

TRPType ::= ENUMERATED {

 prsOnlyTP,

 srsOnlyRP,

 tp,

 rp,

 trp,

 ...,

 mobile-trp

}

TxHoppingConfiguration ::= SEQUENCE {

 overlapValue ENUMERATED {rb0, rb1, rb2, rb4},

 numberOfHops INTEGER (1..6),

 slotOffsetForRemainingHopsList SlotOffsetForRemainingHopsList,

 iE-extensions ProtocolExtensionContainer { { TxHoppingConfiguration-ExtIEs } } OPTIONAL,

 ...

}

TxHoppingConfiguration-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {

 ...

}

TypeOfError ::= ENUMERATED {

 not-understood,

 missing,

 ...

}

<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

9.3.7 Constant definitions

-- ASN1START

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Constant definitions

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

NRPPA-Constants {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

ngran-access (22) modules (3) nrppa (4) version1 (1) nrppa-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

 ProcedureCode,

 ProtocolIE-ID

FROM NRPPA-CommonDataTypes;

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Elementary Procedures

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

id-errorIndication ProcedureCode ::= 0

id-privateMessage ProcedureCode ::= 1

id-e-CIDMeasurementInitiation ProcedureCode ::= 2

id-e-CIDMeasurementFailureIndication ProcedureCode ::= 3

id-e-CIDMeasurementReport ProcedureCode ::= 4

id-e-CIDMeasurementTermination ProcedureCode ::= 5

id-oTDOAInformationExchange ProcedureCode ::= 6

id-assistanceInformationControl ProcedureCode ::= 7

id-assistanceInformationFeedback ProcedureCode ::= 8

id-positioningInformationExchange ProcedureCode ::= 9

id-positioningInformationUpdate ProcedureCode ::= 10

id-Measurement ProcedureCode ::= 11

id-MeasurementReport ProcedureCode ::= 12

id-MeasurementUpdate ProcedureCode ::= 13

id-MeasurementAbort ProcedureCode ::= 14

id-MeasurementFailureIndication ProcedureCode ::= 15

id-tRPInformationExchange ProcedureCode ::= 16

id-positioningActivation ProcedureCode ::= 17

id-positioningDeactivation ProcedureCode ::= 18

id-pRSConfigurationExchange ProcedureCode ::= 19

id-measurementPreconfiguration ProcedureCode ::= 20

id-measurementActivation ProcedureCode ::= 21

id-sRSInformationReservationNotification ProcedureCode ::= xx

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Lists

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

maxNrOfErrors INTEGER ::= 256

maxCellinRANnode INTEGER ::= 3840

maxIndexesReport INTEGER ::= 64

maxNoMeas INTEGER ::= 64

maxCellReport INTEGER ::= 9

maxCellReportNR INTEGER ::= 9

maxnoOTDOAtypes INTEGER ::= 63

maxServCell INTEGER ::= 5

maxEUTRAMeas INTEGER ::= 8

maxGERANMeas INTEGER ::= 8

maxNRMeas INTEGER ::= 8

maxUTRANMeas INTEGER ::= 8

maxWLANchannels INTEGER ::= 16

maxnoFreqHoppingBandsMinusOne INTEGER ::= 7

maxNoPath INTEGER ::= 2

maxNrOfPosSImessage INTEGER ::= 32

maxnoAssistInfoFailureListItems INTEGER ::= 32

maxNrOfSegments INTEGER ::= 64

maxNrOfPosSIBs INTEGER ::= 32

maxNoOfMeasTRPs INTEGER ::= 64

maxnoTRPs INTEGER ::= 65535

maxnoTRPInfoTypes INTEGER ::= 64

maxnoofAngleInfo INTEGER ::= 65535

maxnolcs-gcs-translation INTEGER ::= 3

maxnoBcastCell INTEGER ::= 16384

maxnoSRSTriggerStates INTEGER ::= 3

maxnoSpatialRelations INTEGER ::= 64

maxnoPosMeas INTEGER ::= 16384

maxnoSRS-Carriers INTEGER ::= 32

maxnoSCSs INTEGER ::= 5

maxnoSRS-Resources INTEGER ::= 64

maxnoSRS-PosResources INTEGER ::= 64

maxnoSRS-ResourceSets INTEGER ::= 16

maxnoSRS-ResourcePerSet INTEGER ::= 16

maxnoSRS-PosResourceSets INTEGER ::= 16

maxnoSRS-PosResourcePerSet INTEGER ::= 16

maxPRS-ResourceSets INTEGER ::= 2

maxPRS-ResourcesPerSet INTEGER ::= 64

maxNoSSBs INTEGER ::= 255

maxnoofPRSresourceSet INTEGER ::= 8

maxnoofPRSresource INTEGER ::= 64

maxnoofULAoAs INTEGER ::= 8

maxNoPathExtended INTEGER ::= 8

maxnoARPs INTEGER ::= 16

maxnoUETEGs INTEGER ::= 256

maxnoTRPTEGs INTEGER ::= 8

maxFreqLayers INTEGER ::= 4

maxNumResourcesPerAngle INTEGER ::= 24

maxnoAzimuthAngles INTEGER ::= 3600

maxnoElevationAngles INTEGER ::= 1801

maxnoPRSTRPs INTEGER ::= 256

maxnoVAcell INTEGER ::= 32

maxnoaggregatedPosSRS-Resources INTEGER ::= 3

maxnoaggregatedPosSRS-ResourceSets INTEGER ::= 48

maxnoAggPosPRSResourceSets INTEGER ::= 3

maxnoofTimeWindowSRS INTEGER ::= 16

maxnoofTimeWindowMea INTEGER ::= 16

maxnoofHopsMinusOne INTEGER ::= 5

<<<<<<<<< unchanged texts omitted >>>>>>>>>>>

id-AggregatedPosSRSResourceID-List ProtocolIE-ID ::= x19

id-AggregatedPRSResourceSetList ProtocolIE-ID ::= x20

id-TRPPhaseQuality ProtocolIE-ID ::= x21

id-SRSNewCellIdentity ProtocolIE-ID ::= x22

id-TxHoppingConfiguration ProtocolIE-ID ::= x23

id-MeasuredFrequencyHops ProtocolIE-ID ::= x24

END

-- ASN1STOP

<<<<<<<<<<<<<<<<<<<< End of Changes >>>>>>>>>>>>>>>