3GPP TSG-RAN WG3 Meeting #114-e R3-21xxxx

Online, 1 – 11 November 2021

**Agenda item: 19.2.1**

**Source: TBD**

**Title: (TP for NR\_pos\_enh BL CR for TS 38.455) Resolution of open issues for UL AoA**

**Document for: Discussion and Decision**

# 1 Introduction

This TP

# References

1. R3-214297 *Discussion on Rel-17 UL AoA enhancements with TP to NRPPa BL CR*, Ericsson, Huawei, Nokia, Nokia Shanghai Bell, CATT, ZTE

# A Appendix: Text Proposal for TS 38.455 BL CR

*Start of Text Proposal for TS 38.455 BL CR*

### 8.5.3 Measurement Update

#### 8.5.3.1 General

The Measurement Update Procedure allows the LMF to notify the NG-RAN node of a change in a previously configured measurement. This procedure applies only if the NG-RAN node is a gNB.

#### 8.5.3.2 Successful Operation



Figure 8.5.3.2.1: Measurement Update: Successful Operation.

The LMF initiates the procedure by sending a MEASUREMENT UPDATE message.

If the *SRS Configuration* IE is included in the MEASUREMENT UPDATE message, the NG-RAN node shall overwrite the previously stored SRS configuration.

If the *AoA Search Window Update List* IE is included in the MEASUREMENT UPDATE message, the NG-RAN node shall clear any previously stored AoA search window information and store the newly received information.

#### 8.5.3.3 Unsuccessful Operation

Not applicable.

#### 8.5.3.4 Abnormal Conditions

If the NG-RAN node cannot identify the previously requested measurement to be modified, it shall consider the procedure as failed and initiate local error handling.

If the NG-RAN node receives an *AoA Search Window Update Item* IE in the MEASUREMENT UPDATE message containing a TRP ID that was not included in the previously configured measurement, it shall consider the procedure as failed and initiate local error handling.

*Next Change*

9.1.4.1 MEASUREMENT REQUEST

This message is sent by the LMF to request the NG-RAN node to configure a positioning measurement.

Direction: LMF → NG-RAN node.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| NRPPa Transaction ID | M |  | 9.2.4 |  | - |  |
| LMF Measurement ID | M |  | INTEGER (1..65536, …)  |  | YES | reject |
| **TRP Measurement Request List** |  | *1* |  |  | YES | reject |
| **>TRP Measurement Request Item**  |  | *1..<maxnoofMeasTRPs>* |  |  | EACH | reject |
| >>TRP ID | M |  | 9.2.24 |  | - |  |
| >>Search Window Information | O |  | 9.2.26 |  | - |  |
| >>Cell ID | O |  | NR CGI9.2.9 | The Cell ID of the TRP identified by the *TRP ID* IE. | YES | ignore |
| >> AoA Search Window Information | O |  | UL-AoA Assistance Information 9.2.x4 |  | YES | ignore |
| Report Characteristics | M |  | ENUMERATED (OnDemand, Periodic, ...) |  | YES | reject |
| Measurement Periodicity | C-ifReportCharacteristicsPeriodic |  | ENUMERATED (120ms, 240ms, 480ms, 640ms, 1024ms, 2048ms, 5120ms, 10240ms, 1min, 6min, 12min, 30min, 60min,…, 20480ms, 40960ms)  | The codepoint 60min is not applicable | YES | reject |
| **TRP Measurement Quantities** |  | *1* |  |  | YES | reject |
| **>TRP Measurement Quantities Item** |  | *1 .. <maxnoPosMeas>* |  |  | EACH | reject |
| >TRP Measurement Type | M |  | ENUMERATED (gNB-RxTxTimeDiff, UL-SRS-RSRP, UL-AoA, UL-RTOA,…,) |  | - |  |
| >Timing Reporting Granularity Factor | O |  | INTEGER (0..5) | Value (0..5) corresponds to (k0..k5)TS 38.133 [16] | - |  |
| SFN initialisation Time | O |  | Relative Time 19009.2.36 | If this IE is not present, the TRP may assume that the value is same as its own SFN initialisation time. | YES | ignore |
| SRS Configuration | O |  | 9.2.28 |  | YES | ignore |
| Measurement Beam Information Request | O |  | ENUMERATED (true,...) |  | YES | ignore |
| System Frame Number | O  |  | INTEGER(0..1023) |  | YES | ignore |
| Slot Number | O |  | INTEGER(0..79) |  | YES | ignore |
| Response Time | O |  | 9.2.x6 |  | YES | ignore |

|  |  |
| --- | --- |
| **Condition** | **Explanation** |
| ifReportCharacteristicsPeriodic | This IE shall be present if the *Report Characteristics* IE is set to the value "Periodic". |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxnoPosMeas | Maximum no. of measured quantities that can be configured and reported with one positioning measurement message. Value is 16384. |
| maxnoofMeasTRPs | Maxmum no. of TRPs that can be included within one message. Value is 64.  |

*Next Change*

9.1.4.5 MEASUREMENT UPDATE

This message is sent by the LMF to update a previously configured measurement.

Direction: LMF → NG-RAN node.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | ignore |
| NRPPa Transaction ID | M |  | 9.2.4 |  | - |  |
| LMF Measurement ID | M |  | INTEGER (1..65536, …)  |  | YES | reject |
| RAN Measurement ID | M |  | INTEGER (1..65536, …)  |  | YES | reject |
| SRS Configuration | O |  | 9.2.28 |  | YES | ignore |
| **AoA Search Window Update List** (FFS) |  | *0..1* |  |  | YES | ignore |
| **>AoA Search Window Update Item**  |  | 1..<*maxnoofMeasTRPs*> |  |  | EACH | ignore |
| >>TRP ID | M |  | 9.2.24 |  | - |  |
| >> AoA Search Window Information | O |  | UL-AoA Assistance Information 9.2.x4 |  | YES | ignore |

|  |  |
| --- | --- |
| maxnoofMeasTRPs | Maxmum no. of TRPs that can be included within one message. Value is 64.  |

*Next Change*

9.2.x4 UL-AoA assistance information

This information element contains the expected uplink Angle of Arrival and uncertainty range.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** |
| CHOICE *AngleMeasurement* | M |  |  |  |
| >*Expected UL Angle of Arrival* |  |  |  |  |
| **>>Expected Azimuth AoA** |  | *1* |  | Defined as(φAOA - ΔφAOA/2, φAOA + ΔφAOA/2) |
| >>>Expected Azimuth AoA Value | M |  | INTEGER(0..3599) | φAOA component of Expected Azimuth AoA |
| >>>Expected Azimuth AoA Uncertainty Range | M |  | INTEGER(0..3599) | ΔφAOA component of Expected Azimuth AoA |
| **>>Expected Zenith AoA** |  | *0..1* |  | Defined as(θZOA – ΔθZOA/2, θZOA + ΔθZOA/2) |
| >>>Expected Zenith AoA Value | M |  | INTEGER(0..1799) | θZOA component of Expected Zenith AoA |
| >>>Expected Zenith AoA Uncertainty Range | M |  | INTEGER(0..1799) | ΔθZOA component of Expected Zenith AoA |
| >*Expected UL Angle of Arrival Zenith Only* |  |  |  | Defined as(θZOA – ΔθZOA/2, θZOA + ΔθZOA/2) |
| >>Expected Zenith AoA Value | M |  | INTEGER(0..1799) | θZOA component of Expected Zenith AoA |
| >>Expected Zenith AoA Uncertainty Range | M |  | INTEGER(0..1799) | ΔθZOA component of Expected Zenith AoA |
| **LCS to GCS Translation** |  | *0..1* |  | If absent, the azimuth and zenith are provided in GCS. |
| >Alpha | M |  | INTEGER (0..3599) |  |
| >Beta | M |  | INTEGER (0..3599) |  |
| >Gamma | M |  | INTEGER (0..3599) |  |

9.2.x5 Zenith Angle of Arrival

This information element contains the Zenith Angle of Arrival, which can correspond to linear array measurement.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** |
| Zenith Angle of Arrival | M |  | INTEGER(0..1799) | TS 38.133 [16] |
| **LCS to GCS Translation** |  | *0..1* |  | If absent, the zenith is provided in GCS.The z-axis of LCS is defined along the linear array axis. |
| >Alpha | M |  | INTEGER (0..3599) |  |
| >Beta | M |  | INTEGER (0..3599) |  |
| >Gamma | M |  | INTEGER (0..3599) |  |

*Next Change*

9.3.4 PDU Definitions

-- ASN1START

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

--

-- PDU definitions for NRPPa

--

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

NRPPA-PDU-Contents {

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

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

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

--

-- IE parameter types from other modules

--

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

IMPORTS

 AoASearchWindowUpdateList,

 Cause,

 CriticalityDiagnostics,

 E-CID-MeasurementResult,

 OTDOACells,

 OTDOA-Information-Item,

 Measurement-ID,

 UE-Measurement-ID,

 MeasurementPeriodicity,

 MeasurementQuantities,

 ReportCharacteristics,

 RequestedSRSTransmissionCharacteristics,

 Cell-Portion-ID,

 OtherRATMeasurementQuantities,

 OtherRATMeasurementResult,

 WLANMeasurementQuantities,

 WLANMeasurementResult,

 Assistance-Information,

 Broadcast,

 AssistanceInformationFailureList,

 SRSConfiguration,

 TRPMeasurementQuantities,

 TrpMeasurementResult,

 TRP-ID,

 TRPInformationTypeListTRPReq,

 TRPInformationListTRPResp,

 TRP-MeasurementRequestList,

 TRP-MeasurementResponseList,

 MeasurementBeamInfoRequest,

 PositioningBroadcastCells,

 SRSResourceSetID,

 SpatialRelationInfo,

 SRSResourceTrigger,

 TRPList,

 AbortTransmission,

 SystemFrameNumber,

 SlotNumber,

 RelativeTime1900,

 PRSTRPList,

 PRSTransmissionTRPList,

 ResponseTime

FROM NRPPA-IEs

 PrivateIE-Container{},

 ProtocolExtensionContainer{},

 ProtocolIE-Container{},

 ProtocolIE-ContainerList{},

 ProtocolIE-Single-Container{},

 NRPPA-PRIVATE-IES,

 NRPPA-PROTOCOL-EXTENSION,

 NRPPA-PROTOCOL-IES

FROM NRPPA-Containers

 maxnoOTDOAtypes,

 id-AoASearchWindowUpdateList,

 id-Cause,

 id-CriticalityDiagnostics,

 id-LMF-Measurement-ID,

 id-LMF-UE-Measurement-ID,

 id-OTDOACells,

 id-OTDOA-Information-Type-Group,

 id-OTDOA-Information-Type-Item,

 id-ReportCharacteristics,

 id-MeasurementPeriodicity,

 id-MeasurementQuantities,

 id-RAN-Measurement-ID,

 id-RAN-UE-Measurement-ID,

 id-E-CID-MeasurementResult,

 id-RequestedSRSTransmissionCharacteristics,

 id-Cell-Portion-ID,

 id-OtherRATMeasurementQuantities,

 id-OtherRATMeasurementResult,

 id-WLANMeasurementQuantities,

 id-WLANMeasurementResult,

 id-Assistance-Information,

 id-Broadcast,

 id-AssistanceInformationFailureList,

 id-SRSConfiguration,

 id-TRPMeasurementQuantities,

 id-MeasurementResult,

 id-TRP-ID,

 id-TRPInformationTypeListTRPReq,

 id-TRPInformationListTRPResp,

 id-TRP-MeasurementRequestList,

 id-TRP-MeasurementResponseList,

 id-TRP-MeasurementReportList,

 id-MeasurementBeamInfoRequest,

 id-PositioningBroadcastCells,

 id-SRSType,

 id-ActivationTime,

 id-SRSResourceSetID,

 id-TRPList,

 id-SRSSpatialRelation,

 id-AbortTransmission,

 id-SystemFrameNumber,

 id-SlotNumber,

 id-SRSResourceTrigger,

 id-SFNInitialisationTime,

 id-PRSTRPList,

 id-PRSTransmissionTRPList,

 id-ResponseTime

\*\* SKIPPING UNCHANGED TEXT \*\*

MeasurementUpdate ::= SEQUENCE {

 protocolIEs ProtocolIE-Container {{MeasurementUpdate-IEs}},

 ...

}

MeasurementUpdate-IEs NRPPA-PROTOCOL-IES ::= {

 { ID id-LMF-Measurement-ID CRITICALITY reject TYPE Measurement-ID PRESENCE mandatory}|

 { ID id-RAN-Measurement-ID CRITICALITY reject TYPE Measurement-ID PRESENCE mandatory}|

 { ID id-SRSConfiguration CRITICALITY ignore TYPE SRSConfiguration PRESENCE optional}|

 { ID id-AoASearchWindowUpdateList CRITICALITY ignore TYPE AoASearchWindowUpdateList PRESENCE optional},

 ...

}

*Next Change*

9.3.5 Information Element definitions

\*\* SKIPPING UNCHANGED TEXT \*\*

Expected-Azimuth-AoA ::= SEQUENCE {

 expected-Azimuth-AoA-value Expected-Value-AoA,

 expected-Azimuth-AoA-uncertainty Uncertainty-range-AoA,

 ...

}

Expected-Zenith-AoA ::= SEQUENCE {

 expected-Zenith-AoA-value Expected-Value-ZoA,

 expected-Zenith-AoA-uncertainty Uncertainty-range-ZoA,

 ...

}

\*\* SKIPPING UNCHANGED TEXT \*\*

TRPMeasurementQuantities-Item ::= ENUMERATED {

 gNB-RxTxTimeDiff,

 uL-SRS-RSRP,

 uL-AoA,

 uL-RTOA,

 ...

}

\*\* SKIPPING UNCHANGED TEXT \*\*

AoASearchWindowUpdateList ::= SEQUENCE (SIZE (1..maxNoOfMeasTRPs)) OF AoASearchWindowUpdateItem

AoASearchWindowUpdateItem ::= SEQUENCE {

 tRP-ID TRP-ID,

 aoA-window-information AoA-AssistanceInfo OPTIONAL,

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

 ...

}

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

 ...

}

*Next Change*

9.3.7 Constant definitions

\*\* SKIPPING UNCHANGED TEXT \*\*

id-Cell-ID ProtocolIE-ID ::= 60

id-PRSTRPList ProtocolIE-ID ::= x1

id-PRSTransmissionTRPList ProtocolIE-ID ::= x2

id-OnDemandTRPPRS ProtocolIE-ID ::= x3

id-AoA-SearchWindow ProtocolIE-ID ::= x4

id-AoASearchWindowUpdateList ProtocolIE-ID ::= x5

id-ZoA ProtocolIE-ID ::= x6

id-ResponseTime ProtocolIE-ID ::= x7

END

-- ASN1STOP

*End of Text Proposal for TS 38.455 BL CR*