**3GPP TSG-RAN WG2 Meeting #126 Draft R2-2405874**

**Fukuoka, Japan, May 20 – 24, 2024**

**Agenda item:** 7.2.3

**Source:** Intel Corporation

**Title:** [AT126][406][POS] Remaining SLPP issues (Intel)

**Document for:**  Discussion and decision

# Introduction

This is the report of following at meeting offline discussion:

* [AT126][406][POS] Remaining SLPP issues (Intel)

 Scope: F2F offline to discuss remaining SLPP issues with ASN.1 impact.

 Intended outcome: Report to CB session

 Schedule: Wednesday 2024-05-22 0900-0930 in Brk3

 Deadline: Thursday 2024-05-23 1000 JST

# Discussion

## 2.1 Rapp022 The SL-PRS Rx UE reports measurements for multiple Rx ARP-IDs in a single measurement report

Based on R2-2404304, RAN2 discussed the issue and concluded that:

Agreement:

Introduce a list of 4 measurement elements, to support multiple Rx ARPs reporting in single measurement report. Implementation to be worked out in SLPP rapporteur CR (including request and potentially capability, to be discussed).

The open issue is what the changes should be, including the request and potential capability.

R2-2405248 provided the TP as

**Measurement report:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SL-AoA-ProvideLocationInformation ::= SEQUENCE { sl-AoA-SignalMeasurementInformation SL-AoA-SignalMeasurementInformation OPTIONAL, ...}SL-AoA-SignalMeasurementInformation ::= SEQUENCE { sl-AoA-MeasList SEQUENCE (SIZE(1..maxNrOfUEs)) OF SL-AoA-MeasElementPerARP-ID-Rx, ...}SL-AoA-MeasElementPerARP-ID-Rx ::= SEQUENCE (SIZE(1..4)) OF SL-AoA-MeasElementSL-AoA-MeasElement ::= SEQUENCE { applicationLayerID OCTET STRING OPTIONAL, -- Cond FirstElement sl-LCS-GCS-Translation LCS-GCS-Translation OPTIONAL, -- sl-LCS-to-GCS-translation los-NLOS-Indicator LOS-NLOS-Indicator OPTIONAL, -- sl-losNlosIndicator sl-AngleQuality MeasurementAngleQuality OPTIONAL, -- sl-AngleQuality sl-AoA-AdditionalPathList SL-AoA-AdditionalPathList OPTIONAL, sl-AzimuthAoA-Result INTEGER (0..3599) OPTIONAL, -- sl-PRS-AoA sl-POS-ARP-ID-Rx INTEGER (1..4) OPTIONAL, -- sl-pos-arpID-Rx sl-PRS-ResourceId INTEGER (0..16) OPTIONAL, -- sl-PRS-ResourceId sl-PRS-RSRP-Result INTEGER (0..126) OPTIONAL, -- sl-PRS-RSRP sl-PRS-RSRPP-Result INTEGER (0..126) OPTIONAL, -- sl-PRS-RSRPP sl-TimeStamp SL-TimeStamp OPTIONAL, -- sl-Timestamp sl-ElevationAoA-Result INTEGER (0..1800) OPTIONAL, -- sl-PRS-AoA ...}

| Conditional presence | Explanation |
| --- | --- |
| *FirstElement* | The field is mandatory present in the first *SL-AoA-MeasElement* in IE *SL-AoA-MeasElementPerARP-ID-Rx*. Otherwise it is not present. |

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**Request location:**

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| SL-AoA-RequestLocationInformation ::= SEQUENCE { measurementReportingType ENUMERATED {gcs,lcsWithTranslation,lcsWithoutTranslation} OPTIONAL, measurementsForMultipleARP-IDs-Rx SEQUENCE { requestedARP-IDs-Rx BIT STRING (SIZE (4)) OPTIONAL } OPTIONAL, sl-ARP-InfoRequest ENUMERATED { true } OPTIONAL, sl-AzimuthAoA-Request ENUMERATED { true } OPTIONAL, sl-ElevationAoA-Request ENUMERATED { true } OPTIONAL, sl-LOS-NLOS-IndicatorRequest ENUMERATED { true } OPTIONAL, sl-PRS-RSRP-Request ENUMERATED { true } OPTIONAL, sl-RSRPP-Request ENUMERATED { true } OPTIONAL, sl-AdditionalPathsRequest ENUMERATED { true } OPTIONAL, ...} |

**Capability:**

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| SL-AoA-CapabilityPerBand ::= SEQUENCE { --R1 41-1-7g SL PRS measurement for SL AoA sl-AoA-Meas BIT STRING { gcs (0), lcsWithTranslation (1), lcsWithoutTranslation (2) }  (SIZE (1..8)) OPTIONAL, measurementsForMultipleARP-IDs-Rx ENUMERATED { supported } OPTIONAL, ...} |

Note, here is examples for AoA. It should be applied for other SL methods.

Rapporteur would like to check companies’ view

#### Discussion point : Do companies agree the TP shown in R2-2405248 on measurement report, request and capability?

Question from Rapporteur, should “sl-LCS-GCS-Translation LCS-GCS-Translation” be treated same as applicationlayer ID?

**Discussion:**

* Vivo think ARP is optional feature, some UEs may not support it. Therefore we should remove ARP from the field name.
* Rapp022, update the TP (P1 in R2-2405248) to treat sl-LCS-GCS-Translation in the same way as applicationLayerID. Capture the updated changes in Rapporteur CR. The field name of SL-AoA-MeasElementPerARP-ID-Rx can be reconsidered in next meeting.

## 2.2 one angular measurement (AoA/ZoA) is mandatory in the measurement report for SL-AoA positioning

RAN2 discussed RAN4 question, and agreed:

Agreements:

At least one angular measurement (AoA/ZoA) is mandatory in the measurement report for SL-AoA positioning.

R2-2405248 provided the good example on how to capture it

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| SL-AoA-RequestLocationInformation ::= SEQUENCE { sl-AoA-Request ENUMERATED { aoa, zoa, both }, sl-ARP-InfoRequest ENUMERATED { true } OPTIONAL, sl-LOS-NLOS-IndicatorRequest ENUMERATED { true } OPTIONAL, sl-PRS-RSRP-Request ENUMERATED { true } OPTIONAL, sl-FirstPathRSRPP-Request ENUMERATED { true } OPTIONAL, sl-AdditionalPathsRequest ENUMERATED { true } OPTIONAL, ...} |

Rapporteur would like to check companies’ view:

#### Discussion point : Do companies agree to introduce “sl-AoA-Request ENUMERATED { aoa, zoa, both },” in SL-AoA-RequestLocationInformation?

**Discussion:**

* introduce “sl-AoA-Request ENUMERATED { aoa, zoa, both },” in SL-AoA-RequestLocationInformation

## 2.3 Redundant structure for SL-ToA measurement report, P3 from R2-2404612

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| Current SL-ToA measurement report does not have measurement list since the SL-ToA measurement is generated and reported by each anchor UE individually. However there still exist following issues:* Having a two layer structure, which is redundant; (yellow highlight)
* Having application layer ID; (green highlight)

SL-TOA-SignalMeasurementInformation ::= SEQUENCE { los-NLOS-Indicator LOS-NLOS-Indicator OPTIONAL, -- sl-losNlosIndicator |

Rapporteur would like to check companies’ view:

#### Discussion point : Do companies agree to Delete the two-level structure and the applicationLayerID in SL-TOA-SignalMeasurementInformation., i.e. P3 from R2-2404612?

**Discussion:**

* **Delete the two-level structure and the applicationLayerID in SL-TOA-SignalMeasurementInformation., i.e. P3 from R2-2404612**

## 2.4 TP on Relative velocity

Based on R2-2405268, RAN2 agreed:

Agreement:

Define relative velocity with uncertainty as defined in TS 23.032 based on

- radial velocity component,

- angular velocity components (exact representation to be discussed in CR implementation)

while specifying

- independent uncertainty and confidence values for each radial / traversal component parameter.

Details to be further discussed in SLPP CR implementation.

**Option 1:** The TP provided in R2-2405268 (P4) is (Note, applicationLayerID is not needed)

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|  relativeVelocityWithUncertainty RelativeVelocityWithUncertainty}…RelativeVelocityWithUncertainty ::= SEQUENCE {  radialSpeedWithUncertainty RadialSpeedWithUncertainty OPTIONAL, traverseSpeedWithUncertainty TraverseSpeedWithUncertainty OPTIONAL, traverseAzimuthWithUncertainty TraverseAzimuthWithUncertainty OPTIONAL, traverseElevationWithUncertainty TraverseElevationWithUncertainty OPTIONAL}RadialSpeedWithUncertainty ::= SEQUENCE { radialSpeed INTEGER(0..2047), radialUncertaintySpeed INTEGER(0..255), confidence INTEGER(0..100)}TraverseSpeedWithUncertainty ::= SEQUENCE { transverseSpeed INTEGER(0..2047), transverseUncertaintySpeed INTEGER(0..255), confidence INTEGER(0..100)}TraverseAzimuthWithUncertainty ::= SEQUENCE { transverseAzimuth INTEGER(0..3599), transverseUncertaintyAzimuth INTEGER(0..127), confidence INTEGER(0..100)}TraverseElevationWithUncertainty ::= SEQUENCE { traverseElevation INTEGER(0..1800), traverseUncertaintyElevation INTEGER(0..63), confidence INTEGER(0..100)} |

**Option 2:** TP (P3) from R2-2405248 is

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| *– RelativeVelocityWithUncertainty*The IE *RelativeVelocityWithUncertainty* is used to describe the relative velocity with uncertainty of a device B relative to a device A characterised by a radial velocity component and a perpendicular transverse velocity component as defined in TS 23.032 [7].-- ASN1STARTRelativeVelocityWithUncertainty-r18 ::= SEQUENCE { radialVelocityComponent-r18 SEQUENCE { unitsRadialVelocity-r18 ENUMERATED { mPerS, cmPerS,...}, radialVelocity-r18 INTEGER (-2048..2047), uncertaintyRadialVelocity-r18 INTEGER (0..255), confidenceUncertaintyRadialVelocity-r18 INTEGER (0..100) } OPTIONAL, transverseVelocityComponent-r18 SEQUENCE { unitsTransverseVelocity-r18 ENUMERATED { degPerSec1, degPerSec0-1,...}, azimuth-r18 SEQUENCE { azimuthRateOfChange-r18 INTEGER (0..1023), uncertaintyAzimuthRateOfChange-r18 INTEGER (0..255), confidenceUncertaintyAzimuthRateOfChange-r18 INTEGER (0..100), } OPTIONAL, elevation-r18 SEQUENCE { elevationRateOfChange-r18 INTEGER (0..1023), uncertaintyElevationRateOfChange-r18 INTEGER (0..255), confidenceUncertaintyElevationRateOfChange-r18 INTEGER (0..100) } OPTIONAL, } OPTIONAL, ...}-- ASN1STOP

| *RelativeVelocityWithUncertainty* field descriptions |
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| ***radialVelocityComponent***This field provides the radial velocity component characterised by a rate of change of range between the device A and device B:- ***unitsRadialVelocity*** provides the unit for the *radialVelocity*. Enumerated values '*mPerS*' and '*cmPerS*' indicate units m/s and cm/s, respectively.- ***radialVelocity*** provides the radial velocity as defined in TS 23.032 [7] in units given in the *unitsRadialVelocity* field. Positive values indicate increasing range between device A and B; negative values indicate decreasing range between device A and B.- ***uncertaintyRadialVelocity*** provides the (single-sided) uncertainty of the *radialVelocity* in increments of 1 the unit given in the *unitsRadialVelocity* field.- ***confidenceUncertaintyRadialVelocity*** provides the confidence of the *uncertaintyRadialVelocity*, as defined in TS 23.032 [7] for the "Confidence". |
| ***transverseVelocityComponent***This field provides the transverse velocity component characterised by a rate of change of direction to the device B from the device A:- ***unitsTransverseVelocity*** provides the unit for the *azimuth* and *elevation* components. Enumerated values '*degPerSec1*' and '*degPerSec0-1*' indicate units 1-degree per second and 0.1 degree per second, respectively.- ***azimuthRateOfChange*** provides the rate of change of azimuth measured clockwise from North in a horizontal plane through the device A as defined in TS 23.032 [7] in units given in the *unitsTransverseVelocity* field.- ***uncertaintyAzimuthRateOfChange*** provides the (single-sided) uncertainty of the *azimuthRateOfChange* in increments of 1 units given in the *unitsTransverseVelocity* field.- ***confidenceUncertaintyAzimuthRateOfChange*** provides the confidence of the *uncertaintyAzimuthRateOfChange*, as defined in TS 23.032 [7] for the "Confidence".- ***elevationRateOfChange*** provides the rate of change of elevation measured from Zenith in a vertical plane through the devices A and B in increments of 1 degree per second, as defined in TS 23.032 [7] in units given in the *unitsTransverseVelocity* field. - ***uncertaintyElevationRateOfChange*** provides the (single-sided) uncertainty of the *elevationRateOfChange* in increments of 1 in units given in the *unitsTransverseVelocity* field.- ***confidenceUncertaintyElevationRateOfChange*** provides the confidence of the *uncertaintyElevationRateOfChange*, as defined in TS 23.032 [7] for the "Confidence". |

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Rapporteur would like to check companies’ view:

#### Discussion point : which TP should be used as baseline, P4 from R2-2405268 or P3 from R2-2405248

**Discussion:**

* QC concern on Nokia’s TP is, for ranging, the UE cannot measure the speed, but only the change of range and direction.
* Nokia clarify their TP is capture the definition in SA2. They suggest to ask SA2 the meaning of their definition.
* Rapp024 Introduce relative velocity, capture the TP P3 from R2-2405248 into Rapporteur CR for relative velocity.
* Send LS to SA2, indicate the differences between RAN2 TP on relative velocity and SA2 definition (Nokia).

## 2.5 sending multiple UE capabilities in ProvideUECapabilties corresponding to multiple UEs within a single SLPP message, each identified by an application layer ID, P1 from R2-2404763

The proposal is:

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| The issue is that in the UL SLPP transport message, it can be seen that only 3 containers are included. While for the current SLPP message, it can only carry the UE capability for a single UE. Take the UE capability for SL-TDOA for an example.If one SLPP message includes the capability for a single UE, the UE needs to send multiple SLPP provide UE capability message for multiple UEs, which creates high signalling overhead.***Propsoal1*: Support sending multiple UE capabilities in *ProcideUECapabilties* corresponding to multiple UEs within a single SLPP message, each identified by an application layer ID.** |

From Rapporteur perspective, it is optimization. RAN2 should avoid to optimize this scenario.

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Rapporteur would like to check companies’ view:

#### Discussion point : Do companies agree to mark P1 of R2-2404763 as not pursue?

**Discussion:**

* MTK consider multiple SLPP messages are contained in RSPP message. Why it will introduce the problem of multiple messages?
* Huawei, CT1 RSPP design can only support 3 containers in RSPP. That’s the limitation.
* P1 multiple UE capabilities in ProvideUECapabilties of R2-2404763 is not pursued.
* Send LS to CT4 and CC SA2, indicate the maximum devices supported in SLPP is 256. Ask CT4 to take it into account in their future work (Huawei).

## 2.6 Add a field for SFN-initilziationTime in provide/request SL-PRS assistance data, P2 from R2-2404763

R2-2404763 mentioned the issue that

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| In the current SLPP spec, the SL-PRS assistance data has been defined as follows for multiple anchor UEs. There is no field description defined for the field while by the name of the field, it seems to indicate the time when SL-PRS is transmitted.However, as have been discussed above, for both SL-TDOA and SL-TOA, the LMF should be able to know the reference time of the UE such that (a) for SL-TDOA, the RTD between anchor UEs can be known; (b) for SL-TOA, the exact time for the SL-PRS is transmitted can be known .Based on the discussion above, we propose the following:***Proposal2*: Add a field for *SFN-initilziationTime* in provide/request SL-PRS assistance data.** |

The paper referred the old specification, tx-timeStamp does not exist in the latest version. Rapporteur would like to check companies’ view on this

#### Discussion point : Do companies agree to mark P2 of R2-2404763 as not pursue?

**Discussion:**

* Huawei clarity the intention is to align with NRPPa message.
* Intel clarify that it has been discussed in RANP. The compromise was, RAN2 only captures the agreements from RAN1, and will not discuss synchronization as Uu interface. Huawei clarify that it may be done via OAM way.
* P2 of R2-2404763 on synchronization is not pursued

## 2.7 supported/required positioning method for server in Metadata, R2-2404869

R2-2404869 mentioned the issue that

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| **Proposal 1: RAN2 to agree that the candidate SL positioning server UE or the target UE to indicate the supported/ the required SL positioning method in the discovery msg.** **Proposal 2: RAN2 to agree the text proposal of TS 38.355 regarding supported/required server UE SL positioning methods in the following Annex section.**  |

The issue has been discussed in several meeting. In last meeting, RAN2 has agreed no pursue based on [AT125bis][409][POS] Remaining SLPP issues (Intel) R2-2403811: Therefore Rapporteur would suggest, not treat the contribution.

**Discussion:**

* OPPO, other companies commented that other factors may also impact the accuracy of the SL positioning. But it is for anchor. Server may not support the proper positioning method for particular QoS requirements.
* positioning method for server in Metadata (R2-2404869) is not pursued.

# Summary

Based on the input from companies, we have the following proposals:

* Rapp022, update the TP (P1 in R2-2405248) to treat sl-LCS-GCS-Translation in the same way as applicationLayerID. Capture the updated changes in Rapporteur CR. The field name of SL-AoA-MeasElementPerARP-ID-Rx can be reconsidered in next meeting.
* introduce “sl-AoA-Request ENUMERATED { aoa, zoa, both },” in SL-AoA-RequestLocationInformation
* Delete the two-level structure and the applicationLayerID in SL-TOA-SignalMeasurementInformation., i.e. P3 from R2-2404612
* Rapp024 Introduce relative velocity, capture the TP P3 from R2-2405248 into Rapporteur CR for relative velocity.
* Send LS to SA2, indicate the differences between RAN2 TP on relative velocity and SA2 definition (Nokia).
* P1 multiple UE capabilities in ProvideUECapabilties of R2-2404763 is not pursued.
* Send LS to CT4 and CC SA2, indicate the maximum devices supported in SLPP is 256. Ask CT4 to take it into account in their future work (Huawei).
* P2 of R2-2404763 on synchronization is not pursued
* positioning method for server in Metadata (R2-2404869) is not pursued.