**3GPP TSG RAN WG1 #111 R1-22abcd**

**Toulouse, France, November 14th – 18th, 2022**

**Source: Moderator (Nokia)**

**Title: Feature Lead Summary #1 for Maintenance of multipath/NLOS mitigation**

**Agenda item:** **8.5**

**Document for:**  **Discussion and Decision**

# Introduction

In the WID, [1], for ePos the following objective was added at RAN#91 and was completed:

* Study and specify, if agreed, the enhancements of information reporting from UE and gNB for multipath/NLOS mitigation [RAN1, RAN2, RAN3]

In this contribution, we provide a summary of the maintenance for information reporting from UE and gNB for multipath/NLOS mitigation proposed by companies in contributions [2]-[5] and summarized in [6]. We also make some initial proposals to facilitate RAN1 discussion.

Issues for discussion

## Issue: RSRPP and RSTD measurement

The observations and proposals raised in [2] are:

* **Observation 1**: The current RSRPP and RSTD definitions could lead to the LMF misunderstanding the reported values as the “paths” may not be defined the same way for both measurements.
* **Proposal 1**: When, as part of DL-TDOA, the UE reports both RSTD and RSRPP measurements it should use the same detected paths for both measurements in the reporting.
* **Proposal 2**: When, as part of Multi-RTT, the UE reports both UE Rx-Tx time difference and RSRPP measurements it should use the same detected paths for both measurements in the reporting.
* **Observation 2**: The definition of DL RSTD does not include the word path and is not tied to the “first path” which is also an undefined term in specification.
* **Proposal 3**: Agree to the CR in R1-2211309.

The draft CR to TS 38.214 from [3] is also copied here:

<omitted text>

#### 5.1.6.5 PRS reception procedure

<omitted text>

The UE may be configured to measure and report, subject to UE capability, up to 24 DL PRS-RSRP measurements on different DL PRS resources associated with the same *dl-PRS-ID*. When the UE reports DL PRS-RSRP measurements from one DL PRS resource set, the UE may indicate which DL PRS-RSRP measurements associated with the same higher layer parameter *nr-DL-PRS-RxBeamIndex* [17, TS 37.355] have been performed using the same spatial domain filter for reception if for each *nr-DL-PRS-RxBeamIndex* reported there are at least 2 DL PRS-RSRP measurements associated with it within the DL PRS resource set. The UE may be configured to measure and optionally report via higher layer signaling *nr-DL-PRS-FirstPathRSRP-Result*, subject to UE capability, up to 24 DL PRS RSRPP for the first detected path on different DL PRS resources associated with the same *dl-PRS-ID*.

When the UE is configured to report both PRS RSTD and PRS RSRPP measurements as part of the same higher layer parameter *NR-DL-TDOA-SignalMeasurementInformation* the same detected paths for both PRS RSTD and PRS RSRPP measurements should be used in the reporting.

When the UE is configured to report both UE Rx-Tx and PRS RSRPP measurements as part of the same higher layer parameter *NR-Multi-RTT-SignalMeasurementInformation*, the same detected paths for both UE Rx-Tx and PRS RSRPP measurements should be used in the reporting.

<omitted text>

### Round #1 Discussion

**Question 1:**

Do you agree that for a DL PRS RSTD measurement the UE will use the first path to calculate the RSTD even though the definition does not include explicitly mention the term path?

Companies views:

|  |  |  |
| --- | --- | --- |
| Company Name | Yes/No | Comments |
| vivo | Yes with comment | At least, for UE Rx-Tx time difference, the first path explicitly appears in the definition 5.1.30 UE Rx – Tx time difference  |  |  | | --- | --- | | **Definition** | The UE Rx – Tx time difference is defined as TUE-RX –TUE-TX  Where:  TUE-RX is the UE received timing of downlink subframe #*i* from a Transmission Point (TP) [18], defined by the first detected path in time.  TUE-TX is the UE transmit timing of uplink subframe #*j* that is closest in time to the subframe #i received from the TP.  Multiple DL PRS or CSI-RS for tracking resources, as instructed by higher layers, can be used to determine the start of one subframe of the first arrival path of the TP.  For frequency range 1, the reference point for TUE-RX measurement shall be the Rx antenna connector of the UE and the reference point for TUE-TX measurement shall be the Tx antenna connector of the UE. For frequency range 2, the reference point for TUE‑RX measurement shall be the Rx antenna of the UE and the reference point for TUE‑TX measurement shall be the Tx antenna of the UE. | | **Applicable for** | RRC\_CONNECTED,  RRC\_INACTIVE | |
|  |  |  |

**Question 2:**

Do you agree that the correct UE behavior when measuring DL PRS RSRPP and DL PRS RSTD on the same DL PRS resource is to use the same first path for both measurements?

Companies views:

|  |  |  |
| --- | --- | --- |
| Company Name | Yes/No | Comments |
|  |  |  |
|  |  |  |

**Question 3:**

Should the specification clarify that the UE should use the same first path for both measurements when reporting DL PRS RSRPP and DL PRS RSTD as part of DL-TDOA? Similarly when reporting UE Rx-Tx time difference and DL PRS RSRPP in Multi-RTT.

Companies views:

|  |  |  |
| --- | --- | --- |
| Company Name | Yes/No | Comments |
| vivo | No | For us, RAN 2 description in LPP is clear enough. |
|  |  |  |

Conclusion

In this contribution, we provided a review of the submitted contributions for NR Positioning on maintenance of information reporting from UE and gNB for multipath/NLOS mitigation and prepared an initial set of proposals to facilitate further discussion/decision by RAN1 during the RAN1#111.

Outcome (if any):

To be updated

References

1. RP-210903, Revised WID on NR Positioning Enhancements, CATT, Intel Corporation, Ericsson.
2. R1-2211308 , Maintenance of NR Positioning Enhancements, Nokia, Nokia Shanghai Bell.
3. R1-2211309, Correction on PRS RSTD and PRS RSRPP reporting, Nokia, Nokia Shanghai Bell.
4. R1-2210266, Summary for preparation phase on maintenance of Rel-17 WI on NR positioning enhancements, Moderator (CATT).