**3GPP TSG RAN WG1 #108 R1-21zzzzz**

**e-Meeting, February 21st – March 3rd, 2022**

**Source: Moderator (Intel Corporation)**

**Title: Summary of Preparation Phase for Rel.16 NR Positioning Maintenance [108-e-R16-Pos-01]**

**Agenda item: 7.2.8**

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

# Introduction

This document provides overview of contributions submitted for R16 NR Positioning maintenance [1]-[8]. In addition, it provides feature lead recommendation and summary of the following RAN1 e-mail discussion [108-e-Prep-AI7.2.8]:

* [108-e-Prep-AI7.2.8] Preparation phase for Rel-16 NR Positioning maintenance

# Overview of Contributions

## Aspect #1: Descriptions of dl-PRS-ID

In [1] it is proposed to make a correction to reflect that *dl-PRS-ID* (or a TRP) is not always associated with multiple DL PRS resource sets, as the number of DL PRS resource sets of a TRP can be 1 in some cases. It is proposed to resolve this in the same way as it was done in TS37.355 [2] by using the following descriptions marked in yellow.

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| ***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. |

The following TP is provided to resolve minor inconsistency discussed in aspect #1

**Text Proposal**

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| **TS 38.214, section 5.1.6.5**< Unchanged parts are omitted >The UE expects that it will be configured with *dl-PRS-ID* each of which is defined such that it ~~is~~ can be associated with multiple DL PRS resource sets. The UE expects that one of these *dl-PRS-ID* along with a *nr-DL-PRS-ResourceSetID* and a *nr-DL-PRS-ResourceID-r16* can be used to uniquely identify a DL PRS resource.< Unchanged parts are omitted > |

## Aspect #2: Descriptions of dl-PRS-CombSizeN-AndReOffset

In [1] it is proposed to make a correction to align a description related to *dl-PRS-CombSizeN-AndReOffset* in TS38.214 and 37.355.

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| A DL PRS resource is defined by:*…**- dl-PRS-CombSizeN-AndReOffset* defines the starting RE offset of the first symbol within a DL PRS resource in frequency. The relative RE offsets of the remaining symbols within a DL PRS resource are defined based on the initial offset and the rule described in Clause 7.4.1.7.3 of [4, TS 38.211]. *…* |

We found that the description of this parameter in TS38.214 is not aligned with the description in 37.355 and incomplete, since this parameter should not only specifie REOffset, but also CombSizeN.

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| NR-DL-PRS-Resource-r16 ::= SEQUENCE { nr-DL-PRS-ResourceID-r16 NR-DL-PRS-ResourceID-r16, dl-PRS-SequenceID-r16 INTEGER (0.. 4095), dl-PRS-CombSizeN-AndReOffset-r16 CHOICE { n2-r16 INTEGER (0..1), n4-r16 INTEGER (0..3), n6-r16 INTEGER (0..5), n12-r16 INTEGER (0..11), ... }, dl-PRS-ResourceSlotOffset-r16 INTEGER (0..nrMaxResourceOffsetValue-1-r16), dl-PRS-ResourceSymbolOffset-r16 INTEGER (0..12), dl-PRS-QCL-Info-r16 DL-PRS-QCL-Info-r16 OPTIONAL, --Need ON ...} |
| ***dl-PRS-CombSizeN-AndReOffset***This field specifies the Resource Element spacing in each symbol of the DL-PRS Resource and the Resource Element (RE) offset in the frequency domain for the first symbol in a DL-PRS Resource. All DL-PRS Resource Sets belonging to the same Positioning Frequency Layer have the same value of comb size. The relative RE offsets of following symbols are defined relative to the RE Offset in the frequency domain of the first symbol in the DL-PRS Resource according to TS 38.211 [41]. The comb size configuration should be aligned with the comb size configuration for the frequency layer. |

The following TP is proposed to align description of parameter in TS 38.214 and TS 37.355

**Text Proposal**

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| **TS 38.214, section 5.1.6.5**< Unchanged parts are omitted >A DL PRS resource is defined by:*…**- dl-PRS-CombSizeN-AndReOffset* defines the comb size of a DL-PRS Resource and the starting RE offset of the first symbol within ~~a~~the DL PRS resource in frequency. The relative RE offsets of the remaining symbols within a DL PRS resource are defined based on the initial offset and the rule described in Clause 7.4.1.7.3 of [4, TS 38.211]. *…*< Unchanged parts are omitted > |

## Aspect #3: Reference point for UL SRS-RSRP

In [2] and [3], it is noticed that RAN4 had discussed the reference point for UL SRS-RSRP triggered by RAN1 LS (R1-2112744) and had sent Response LS to RAN1 (R4-2202682). However, the current description of the reference point for UL SRS-RSRP in section 5.2.5 in 38.215 is not matched with the Response LS from RAN4 (R4-2202682).

The same TP is proposed for aspect #3 in [2] and [3].

**Text proposal**

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| **TS 38.215**< Unchanged parts are omitted >5.2.5 UL SRS reference signal received power (UL SRS-RSRP)

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| **Definition** | UL SRS reference signal received power (UL SRS-RSRP) is defined as linear average of the power contributions (in [W]) of the resource elements carrying sounding reference signals (SRS). UL SRS‑RSRP shall be measured over the configured resource elements within the considered measurement frequency bandwidth in the configured measurement time occasions.The reference point for UL SRS-RSRPP shall be:* for type 1-C base station TS 38.104 [9]: the Rx antenna connector,
* for type 1-O or 2-O base station TS 38.104 [9]: based on the combined signal from antenna elements corresponding to a given receiver branch,
* for type 1-H base station TS 38.104 [9]: the Rx Transceiver Array Boundary connector.

For frequency range 1 and 2, if receiver diversity is in use by the gNB, the reported UL SRS-RSRP value shall not be lower than the corresponding UL SRS-RSRP of any of the individual receiver branches. |

< Unchanged parts are omitted > |

**FL note:**

**In definition, the abbreviation of UL SRS-RSRPP seems should be changed to UL SRS-RSRP, as there are different definitions for SRS-RSRP and SRS-RSRPP and reference points are applicable for both.**

## Aspect #4: Correction to expected RSTD

In [4], it is observed that specification (TS 38.214) is not clear how the difference is defined for parameters “expected RSTD” in the assistance data. It is proposed to clarify that parameter in the assistance data is defined between the target DL PRS and the assistance data reference.

The following TP is proposed to address described isssue.

**Text proposal**

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| **TS 38.214 section 5.1.6.5**5.1.6.5 PRS reception procedure========================= Unchanged parts =========================The UE may be configured to report quality metrics *NR-TimingQuality* corresponding to the DL RSTD and UE Rx-Tx time difference measurements which include the following fields:*- timingQualityValue* which provides the best estimate of the uncertainty of the measurement*- timingQualityResolution* which specifies the resolution levels used in the *timingQualityValue* field.The UE expects to be configured with higher layer parameter *nr-DL-PRS-ExpectedRSTD*, which defines the time difference for the target DL PRS with respect to the received DL subframe timing of the reference indicated by the higher layer parameter *nr-DL-PRS-ReferenceInfo*, and *nr-DL-PRS-ExpectedRSTD-Uncertainty*, which defines a search window around the *nr-DL-PRS-ExpectedRSTD*.For DL UE positioning measurement reporting in higher layer parameters *NR-DL-TDOA-SignalMeasurementInformation* or *NR-Multi-RTT-SignalMeasurementInformation* the UE can be configured to report the DL PRS resource ID(s) or the DL PRS resource set ID(s) associated with the DL PRS resource(s) or the DL PRS resource set(s) which are used in determining the UE measurements DL RSTD, or UE Rx-Tx time difference, respectively.========================= Unchanged parts ========================= |

Preparation Phase Discussion

Round #1

From FL perspective, all aspects provided in submitted tdocs deserve clarifications and can be recommended for subsequent RAN1 e-mail discussion(s).

Companies are invited to express their views on maintenance aspects to be further discussed by RAN1.

Comments from companies:

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| Company Name | Comments |
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Conclusions

In this document, we have provided overview of the contributions submitted to RAN1#108e for R16 NR positioning maintenance.

References

1. R1-2201077 Maintenance on Rel-16 NR positioning vivo

1. R1-2202267 Draft CR on reference point for UL SRS-RSRP CATT

1. R1-2202420 Correction to expected RSTD Huawei, HiSilicon

1. R1-2202453 Correction to UL SRS-RSRP Huawei, HiSilicon