**3GPP TSG RAN WG1 Meeting #104-E R1-210zzzz**

**e-Meeting, January 25th – February 5th, 2021**

**Source: Moderator (Intel Corporation)**

**Title:** **Summary E-mail Discussion [104e-NR-Pos-01]**

**Agenda item: 7.2.8**

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

Introduction

In this document, we provide summary and outcome of the RAN WG1 e-mail discussion [104e-NR-Pos-01] organized based on review of submitted contributions [1]-[8] as captured in [TBD].

# Overview of Remaining Opens

## Change of Cell on DL PRS ID (TP#1 and TP#2)

In [CATT, [3]] it is pointed out that there is no higher layer parameter to indicate the serving or non-serving cell for DL-PRS in the activation command. According to description in section 6.1.3.36 of the TS 38.321, the *DL-PRS ID* field is used to indicate the DL-PRS resource, when a UE receives an activation command of semi-persistent *SRS-Pos*. The following changes are suggested in text proposal provided below:

**Text proposal #1**

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| 6.2.1 UE sounding procedure*-----------------------------------------------------* Unchanged part omitted *------------------------------------------------*For a UE configured with one or more SRS resource configuration(s), and when the higher layer parameter *resourceType* in *SRS-Resource* or *SRS-PosResource-r16* is set to 'semi-persistent':- when a UE receives an activation command, as described in clause 6.1.3.17 or 6.1.3.36 of [10, TS 38.321], for an SRS resource, and when the UE would transmit a PUCCH with HARQ-ACK information in slot *n* corresponding to the PDSCH carrying the activation command is transmitted in slot n, the corresponding actions in [10, TS 38.321] and the UE assumptions on SRS transmission corresponding to the configured SRS resource set shall be applied starting from the first slot that is after slot $n+3N\_{slot}^{subframe,µ}$ where ** is the SCS configuration for the PUCCH. The activation command also contains spatial relation assumptions provided by a list of references to reference signal IDs, one per element of the activated SRS resource set. When the SRS is configured with the higher layer parameter *SRS-ResourceSet*, each ID in the list refers to a reference SS/PBCH block, NZP CSI-RS resource configured on serving cell indicated by *Resource Serving Cell ID* field in the activation command if present, same serving cell as the SRS resource set otherwise, or SRS resource configured on serving cell and uplink bandwidth part indicated by Resource *Serving Cell ID* field and *Resource BWP ID* field in the activation command if present, same serving cell and bandwidth part as the SRS resource set otherwise. When the SRS is configured with the higher layer parameter *SRS-PosResourceSet-r16*, each ID in the list of reference signal IDs may refer to a reference SS/PBCH block on a serving or non-serving cell indicated by *PCI* field in the activation command, NZP CSI-RS resource configured on serving cell indicated by *Resource Serving Cell ID* field in the activation command if present, same serving cell as the SRS resource set otherwise, ~~or~~ SRS resource configured on serving cell and uplink bandwidth part indicated by Resource *Serving Cell ID* field and *Resource BWP ID* field in the activation command if present, same serving cell and bandwidth part as the SRS resource set otherwise, or DL PRS resource associated with a *dl-PRS-ID* ~~of a serving or non-serving cell~~ indicated by *DL-PRS ID* field in the activation command if present, same serving cell as the SRS resource set otherwise ~~a higher layer parameter~~.*-----------------------------------------------------* Unchanged part omitted *------------------------------------------------*  |

**Text proposal #2**

In [Nokia, [5]], it is proposed to remove the term cell in the TS 38.214 Section “5.6.1.5 PRS reception procedure”. During RAN1#103-e some instances of this term were changed but others were missed.

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| ---- Unchanged texts omitted ----5.6.1.5 PRS reception procedure---- Unchanged texts omitted ----The UE expects that it will be configured with *dl-PRS-ID-r16* each of which is defined such that it may be associated with multiple DL PRS resource sets. ---- Unchanged texts omitted ---- |

### Initial Round #0

Companies are invited to provide their views on text proposal(s) in section 2.1.

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| **Company Name** | **Comments** |
| Huawei/HiSilicon | For TP#1, we disagree with the change, as according to MAC specification, the field DL-PRS ID should always be present. In addition, we do not think using serving/non-serving cell for this case needs fixing, if the intention is to fix it.For TP#2, we have similar proposal in R1-2101731, in which we suggest to change “cell” to “point”.

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| The UE expects that it will be configured with *dl-PRS-ID* each of which is defined such that it is associated with multiple DL PRS resource sets from the same point. The UE expects that one of these *dl-PRS-ID* along with a *nr-DL-PRS-ResourceSetID* and a *nr-DL-PRS-ResourceID* can be used to uniquely identify a DL PRS resource.  |

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| CATT | We support TP#1. For Huawei’s comments, we want to clarify that according to 38.321, in section 6.1.3.36(SP Positioning SRS Activation/Deactivation MAC CE), there is the following text:*- PI: This field indicates whether the field DL-PRS ID is present within the Spatial Relation for Resource IDi with DL-PRS. If the field is set to 1, the octet containing the field DL-PRS ID is present; otherwise, the octet is omitted;*Therefore, DL-PRS ID should not be always present. Moreover, we want to explain the intention of this TP, in fact, for the DL PRS configuration, the use of “cell” to refer to the TRP where the DL PRS is configured is incorrect. There is no higher layer parameter to indicate the serving or non-serving cell for DL-PRS in the activation command. Instead, as described in section 6.1.3.36 of TS 38.321[3], the *DL-PRS ID* field is used to indicate the DL-PRS resource, when a UE receives an activation command of semi-persistent SRS-Pos. Therefore, the descriptions here needs to be updated to make the indication of DL PRS correct. |
| Nokia/NSB | To Huawei’s comments: we think removing “from the same cell” is a better way to clarify the issue, especially given the agreed CRs from RAN1#103-e, but open to discussion if all other companies prefer the term “point”. We would like to highlight that the change from “is” to “may be” is also important as in our understanding it is not required to have multiple DL PRS resource sets for every TRP.  |
| Qualcomm | We don’t think the word “point” is correct, assuming the intention was “geographic point”. Strictly speaking in 37.355, each PRS resource may even have a different location:TRP-LocationInfoElement-r16 ::= SEQUENCE { **dl-PRS-ID-r16 INTEGER (0..255),** nr-PhysCellID-r16 NR-PhysCellID-r16 OPTIONAL, -- Need ON nr-CellGlobalID-r16 NCGI-r15 OPTIONAL, -- Need ON nr-ARFCN-r16 ARFCN-ValueNR-r15 OPTIONAL, -- Need ON associated-DL-PRS-ID-r16 INTEGER (0..255) OPTIONAL, trp-Location-r16 RelativeLocation-r16 OPTIONAL, -- Need OP trp-DL-PRS-ResourceSets-r16 SEQUENCE (SIZE(1..nrMaxSetsPerTrp-r16)) OF DL-PRS-ResourceSets-TRP-Element-r16 OPTIONAL, -- Need OP ...}**DL-PRS-ResourceSets-TRP-Element-r16 ::= SEQUENCE {** **dl-PRS-ResourceSetARP-r16 RelativeLocation-r16 OPTIONAL, -- Need OP** dl-PRS-Resource-ARP-List-r16 SEQUENCE (SIZE(1..nrMaxResourcesPerSet-r16)) OF DL-PRS-Resource-ARP-Element-r16 OPTIONAL, -- Need OP ...}**DL-PRS-Resource**-ARP-Element-r16 ::= SEQUENCE { **dl-PRS-Resource-ARP-location-r16 RelativeLocation-r16 OPTIONAL, -- Need OP** ...}So, agreeing with the initial proposal from Nokia seems more consistent.  |

## Misalignment of ‘*nr-TimeStamp*’ with TS37.355

In [vivo, [4]], the misalignment b/w RAN1 (TS 38.214) and RAN2 (TS 37.355) specifications is discussed with respect to *nr-TimeStamp* parameter. The values of the time stamp correspond to the reference provided by *nr-DL-PRS-ReferenceInfo*, which is associated with the reference TRP.In the TS37.355 [2], the descriptions are written as:

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| NR-TimeStamp-r16 ::= SEQUENCE { dl-PRS-ID-r16 INTEGER (0..255), nr-PhysCellID-r16 NR-PhysCellID-r16 OPTIONAL, -- Need ON nr-CellGlobalID-r16 NCGI-r15 OPTIONAL, -- Need ON nr-ARFCN-r16 ARFCN-ValueNR-r15 OPTIONAL, -- Need ON nr-SFN-r16 INTEGER (0..1023), nr-Slot-r16 CHOICE { scs15-r16 INTEGER (0..9), scs30-r16 INTEGER (0..19), scs60-r16 INTEGER (0..39), scs120-r16 INTEGER (0..79) }, ...} |
| ***dl-PRS-ID***This field specifies the DL-PRS ID of the TRP for which the *nr-SFN* is applicable. |

It is observed that from RAN2’s perspective, the ‘*nr-TimeStamp*’ for each measurement is associated with the TRP indicated by ‘dl-PRS-ID’.

The following text proposal is provided for the TS 38.214 to align it with the TS 37.355.

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| **TS38.214-g40**< Unchanged parts are omitted >For the DL RSTD, DL PRS-RSRP, and UE Rx-Tx time difference measurements the UE can report an associated higher layer parameter *nr-TimeStamp*. The *nr-TimeStamp* can include the SFN and the slot number for a subcarrier spacing. These values correspond to the *dl-PRS-ID* for which *nr-TimeStamp* is applicable ~~the reference which is provided by~~ *~~nr-DL-PRS-ReferenceInfo~~*~~.~~ < Unchanged parts are omitted > |

### Initial Round #0

Companies are invited to provide their views on text proposal(s) in section 2.2.

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| **Company Name** | **Comments** |
| Huawei/HiSilicon | We have concern on the changes.First, RAN1 made the following agreement in RAN1#99, and the changes are reverting it without clear justification.

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| Agreement:Modify the previous agreement on the definition of the time stamp as follows:A UE measurement can be associated with a time stamp. For UE RSTD, DL PRS RSRP and UE Rx-Tx time difference measurement report, the time stamp can include the SFN, as well as the slot number for a subcarrier spacing. These values correspond to the reference provided by the DL-PRS-RstdReferenceInfo. |

Second, RAN2 added *dl-PRS-ID* to the *NR-TimeStamp* IE as the result of the TRP ID email discussion in RAN2#110-e, in which the *dl-PRS-ID* is justified for the usage in *NR-TimeStamp* for UE-based positioning.[R2-2004701](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2004701.zip) Report on TRP-ID structure Ericsson report Rel-16[R2-2004704](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2004704.zip) Summary and Text Proposal on TRP-ID structure Ericsson discussion Rel-16[R2-2005894](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005894.zip) Report on TRP-ID continuation Ericsson report Rel-16[R2-2005904](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_110-e/Docs/R2-2005904.zip) [AT110-e][612][POS] Report on TRP-ID continuation email discussion (Ericsson) Ericsson report Rel-16The summary from R2-2004701 is attached below.

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| Table 2.5 Need for additional TRP identifiers in *NR-TimeStamp-r16* |
| Company | Comments |
| Huawei/HiSilicon | No need to include TRP ID or PCI, as it was agreed in RAN1 and captured in RAN1 specification, that the assistance data reference is used to identify the time stamp timing.Agreement (RAN1#99):Modify the previous agreement on the definition of the time stamp as follows:A UE measurement can be associated with a time stamp. For UE RSTD, DL PRS RSRP and UE Rx-Tx time difference measurement report, the time stamp can include the SFN, as well as the slot number for a subcarrier spacing. These values correspond to the reference provided by the DL-PRS-RstdReferenceInfo.TS 38.214For the DL RSTD, DL PRS-RSRP, and UE Rx-Tx time difference measurements the UE can report an associated higher layer parameter *Timestamp*. The *Timestamp* can include the SFN and the slot number for a subcarrier spacing. These values correspond to the reference which is provided by *DL-PRS-RSTDReferenceInfo*.  |
| Qualcomm | The proposed *NR-PhysCellId-r16* in the ASN.1 above is included in IE *TRP-ID-r16*, so no change is needed.The *NR-TimeStamp-r16* can also provide the time stamp for the location estimate (UE-based); e.g., IE *NR-DL-TDOA-LocationInformation,* for which the RAN1 agreement cited by Huawei above seems not applicable (i.e., the *TRP-ID* is optional present). |
| OPPO | We are not sure about the necessity of PCI/Arfcn/CGI information here in timestamp.If take DL TDOA as an example:1. For the time stamp included in *NR-DL-AoD-MeasElement-r16,* we assume the agreement cited by Huawei is applicable, so no need for additional information at all (not even PCI);
2. For the time stamp included in *NR-DL-TDOA-LocationInformation*, if Qualcomm comment is correct, and thus cell information is needed, we wonder if PCI is enough, considering the possible PCI confusion issue. As commented above, So to uniquely identify a TRP, either the combination of *nr-PhysCellId/nr-ARFCN* or *nr-CellGlobalId* can work, by assuming no local PCI confusion at a same local area for a same frequency. May be the latter one, i.e., *nr-CellGlobalId*, is safer. This applies to both UL and DL.
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| Ericsson | In response to the QC comment about this already being present in a complex IE:The clear majority of companies from the RAN2#109bis email discussion were in favor of splitting the TRP ID of the baseline into separate fields, so TRP ID (or another name) in this context is 0..255 and not including PCI.We agree with QC on the necessity to ensure that SFN is well-defined in all cases. |
| CATT | Agree with Qualcomm. |
| Intel | Agree with Huawei view, i.e. TRP-ID, PCI are not needed since it is based on reference cell.  |

In our view, if it is common understanding that UE can reselect the TRP for time stamp reporting associated with DL measurement and/or location fix (UE-based) in case of cell change during the LPP session, broadcast assistance data, etc., we should make our own agreement reverting the RAN1#99 agreement.In addition, if we open the discussion, we should discuss whether the *dl-PRS-ID* in the timestamp should be the same across all TRPs for UE-assisted positioning measurement report. |
| Nokia/NSB | We don’t think the change is needed.  |
| Qualcomm | Our understanding of the previous RAN1 agreement was that the UE would still be able to change the reference for timestamp in a similar way that the UE can change the reference for RSTD measurements. Note that the Agreement was made in #99, when it was still confusing the difference between the reference in the assistance data and the reference that the UE selects for measurement reporting. That is why we also had, if my recollection is correct, another related TP change in a recent meeting, to clarify the difference between the “reference in the assistance data” and the “reference in the measurement report”.Technically speaking, the UE maintains the SFN of the serving cell (single SFN), and asking a UE to report according to the SFN of some other cell is an unnecessary complication/requirement that does not provide a gain to the network: The network has knowledge of the SFN of all TRPs, so there is not really a need to ask a UE to maintain the SFN for both the chosen reference cell and a configured reference cell. Therefore, we are supportive of the clarification from vivo.  |

## Ambiguity for Measurement Gap Request

In [vivo, [4]], it is noticed that according to the TS 38.331, for ‘measurement gap request’, the related higher layer parameter should be ‘*LocationMeasurementIndication*’.

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| * *LocationMeasurementIndication*

The *LocationMeasurementIndication* message is used to indicate that the UE is going to either start or stop location related measurement which requires measurement gaps.Signalling radio bearer: SRB1RLC-SAP: AMLogical channel: DCCHDirection: UE to Network*LocationMeasurementIndication message*-- ASN1START-- TAG-LOCATIONMEASUREMENTINDICATION-STARTLocationMeasurementIndication ::= SEQUENCE { criticalExtensions CHOICE { locationMeasurementIndication LocationMeasurementIndication-IEs, criticalExtensionsFuture SEQUENCE {} }}LocationMeasurementIndication-IEs ::= SEQUENCE { measurementIndication SetupRelease {LocationMeasurementInfo}, lateNonCriticalExtension OCTET STRING OPTIONAL, nonCriticalExtension SEQUENCE{} OPTIONAL}-- TAG-LOCATIONMEASUREMENTINDICATION-STOP-- ASN1STOP |

The following TP is provided for the TS 38.214 to resolve ambiguity with respect to measurement gap request between specifications (TS 38.214 and TS 38.331).

**Text Proposal**

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| **TS 38.214-g40**< Unchanged parts are omitted >The UE is expected to measure the DL PRS resource outside the active DL BWP or with a numerology different from the numerology of the active DL BWP if the measurement is made during a configured measurement gap. When the UE is expected to measure the DL PRS resource outside the active DL BWP it may request a measurement gap ~~in~~ via higher layer parameter *LocationMeasurementIndication ~~MeasGapConfig~~* [12, TS 38.331]. < Unchanged parts are omitted > |

### Initial Round #0

Companies are invited to provide their views on text proposal(s) in section 2.3.

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| **Company Name** | **Comments** |
| Huawei/HiSilicon | *LocationMeasurementIndication* also includes the following types of requesting measurement gap, which may not be accurate.* NR Measurement gap for inter-RAT E-UTRA PRS measurement
* Fine LTE timing detetion for inter-RAT E-UTRA PRS measurement

It reads like when we want to describe the higher layer parameter, we are using RRCReconfiguration, which is too general. Suggest to change the parameter name to “NR-PRS-MeasurementInfoList”. |
| Nokia/NSB | We are okay with the change proposed by Huawei above.  |
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## DL PRS Resource / Resource Set IDs Reporting for DL-AOD

For the UE performing measurement reporting, it can be configured to report related IDs as following [vivo, [4]].

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| 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, UE Rx-Tx time difference. |

In specification TS 37.355, the related IDs are also applicable to the DL-AOD method.

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| NR-DL-AoD-MeasElement-r16 ::= SEQUENCE { dl-PRS-ID-r16 INTEGER (0..255), nr-PhysCellID-r16 NR-PhysCellID-r16 OPTIONAL, nr-CellGlobalID-r16 NCGI-r15 OPTIONAL, nr-ARFCN-r16 ARFCN-ValueNR-r15 OPTIONAL, nr-DL-PRS-ResourceID-r16 NR-DL-PRS-ResourceID-r16 OPTIONAL, nr-DL-PRS-ResourceSetID-r16 NR-DL-PRS-ResourceSetID-r16 OPTIONAL, nr-TimeStamp-r16 NR-TimeStamp-r16, nr-DL-PRS-RSRP-Result-r16 INTEGER (0..126), nr-DL-PRS-RxBeamIndex-r16 INTEGER (1..8) OPTIONAL, -- Cond SameRx nr-DL-AoD-AdditionalMeasurements-r16 NR-DL-AoD-AdditionalMeasurements-r16 OPTIONAL, ...} |

The following text proposal is suggested for the TS 38.214 to align it with the TS 37.355.

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| **TS 38.214-g40**< Unchanged parts are omitted >For DL UE positioning measurement reporting in higher layer parameters *NR-DL-TDOA-SignalMeasurementInformation* or *NR-Multi-RTT-SignalMeasurementInformation or NR-DL-AoD-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, UE Rx-Tx time difference, DL RSRP.< Unchanged parts are omitted > |

### Initial Round #0

Companies are invited to provide their views on text proposal(s) in section 2.2.

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| **Company Name** | **Comments** |
| Huawei/HiSilicon | We have concern on the change. We think that the intention of the text was to describe that reporting of DL PRS resource set ID and resource ID is configurable, which is not applicable for DL-AoD. The related parameters should have been *nr-DL-PRS-RstdMeasurementInfoRequest* and *nr-UE-RxTxTimeDiffMeasurementInfoRequest* in DL-TDOA and Multi-RTT RequestLocationInformation messages, respectively. The text was there in TS 38.214 g20, but was replaced by *NR-DL-TDOA-SignalMeasurementInformation* and *NR-Multi-RTT-SignalMeasurementInformation* in TS 38.214 g30, due to inaccurate description.This change gives the wrong impression that reporting of DL PRS resource set ID and DL PRS resource ID can be configurable by LMF for DL-AoD positioning, which is not aligned with LPP. |
| Nokia/NSB | We do not support the change. The UE should always report the DL PRS resource set ID and DL PRS resource ID for DL-AoD positioning. Otherwise the measurement report it completely useless at the LMF. The current spec reflects the intended behavior in our view.  |
| Qualcomm | Do not support the change as explained above |

Conclusions

In this contribution, the summary of the RAN WG1 e-mail discussion: “[104-e-NR-Pos-01] Email discussion/approval on DL PRS” is provided. As an outcome the following was agreed by RAN WG1: TBD

References

1. R1-2100127 Text Proposals on NR Positioning OPPO
2. R1-2100282 Maintenance of NR positioning support ZTE
3. R1-2100342 Discussion and TP on remaining issues in NR positioning CATT
4. R1-2100419 Maintenance on Rel-16 NR positioning vivo
5. R1-2100552 Draft CR on the usage of the term cell Nokia, Nokia Shanghai Bell
6. R1-2100707 Editorial CR on Rel-16 NR positioning LG Electronics
7. R1-2101731 Corrections to positioning SRS and higher layer parameters Huawei, HiSilicon
8. R1-2101758 Maintenance of NR positioning support Ericsson
9. R1-2100005 LS on Rel-16 NR Positioning Correction RAN3, Huawei
10. R1-210zzzz TBD