**3GPP TSG RAN WG1 #104bis-e R1-210zzzz**

**e-Meeting, April 12th – 20th, 2021**

**Source: Moderator (Intel Corporation)**

**Title: Summary of Email Discussion [104b-e-NR-Pos-01] on NR Positioning Maintenance**

**Agenda item: 7.2.8**

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

# Introduction

In this contribution, we provide summary of the RAN WG1 e-mail discussion [104b-e-NR-Pos-01] on remaining maintenance issues for NR positioning.

Based on review of contributions [1]-[6], the following aspects were agreed for [104b-e-NR-Pos-01] discussion during preparation phase captured in R1-2103793 (Summary of Remaining Opens for Rel.16 NR Positioning Maintenance):

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| [104b-e-NR-Pos-01] Email discussion/approval on the following until Apr-16 – Alexey (Intel)   * Aspect #1: Cell determination for DL PRS reception * Aspect #2: DL PRS measurement w/ different numerology * Aspect #7: Editorial corrections (for official endorsement) |

In this contribution, we continue discussion on above aspects as part of the RAN WG1 e-mail discussion - [104b-e-NR-Pos-01].

# Remaining Opens

In this section, we summarize submitted TPs / draft CRs for identified open aspects on NR positioning maintenance based on review of contributions [1] - [6].

## Aspect #1: Cell determination for DL PRS reception procedure

In [1], it is noticed that the current DL-PRS reception procedure requires UE to be able to identify the cell from which the DL-PRS is transmitted, for the purpose of

* DL-PRS punctured by the SSB
* SRS transmission power control and spatial relation with respect to DL-PRS

However, the current specification is not clear how the cell from which the DL-PRS is transmitted is determined by the UE. The following aspects require clarification:

* Aspect #1: PRS cell ID includes PCI and CGI, and for SSB of the non-serving cell, only PCI is provided. Whether PCI ambiguity across multiple frequency layers should be considered needs clarification.
* Aspect #2: PRS cell ID is optional. UE behaviour when PRS cell ID is not provided needs clarification.

To address mentioned above aspects, it is proposed to clarify the following behaviour for determining the PRS cell:

1. The PRS is transmitted not from any cell if neither PCI nor CGI is provided; the PRS is transmitted from a serving cell if at least PCI or CGI is provided and if PCI, CGI and ARFCN associated with the PRS, if provided, is the same as the information related to a serving cell; the PRS is transmitted from a non-serving cell otherwise
2. The PRS and the SSB are transmitted from the same serving cell if the serving cell from which the PRS is transmitted is the cell that is defined by the SSB; the PRS and the SSB are transmitted from the same non-serving cell if the PCI and the band of the PRS, if provided, is the same as the PCI of the SSB; the PRS and SSB are not transmitted from the same cell otherwise

The following text proposal was provided in draft CR [1]:

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| 5.1.6.5 PRS reception procedure ========================= Unchanged parts =========================  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 cell. 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.  The UE may be configured by the network with *nr-PhysCellID*, *nr-CellGlobalID*, and *nr-ARFCN* [17, TS 37.355] associated with a *dl-PRS-ID*.  - If neither *nr-PhysCellID* nor *nr-CellGlobalID* is provided, the UE may assume that the PRS is not associated with any cell;  - If *nr-PhysCellID* or *nr-CellGlobalID* is provided, and if *nr-PhysCellID*, *nr-CellGlobalID* and *nr-ARFCN* associated with the *dl-PRS-ID*, if provided, are the same as the physical cell ID, cell global ID, and ARFCN of a serving cell, respectively, the UE may assume that the PRS is transmitted from the serving cell;  - Otherwise, the UE may assume that the PRS is transmitted from a non-serving cell.  For the purpose of identifying whether PRS and SS/PBCH block are transmitted from the same cell  - If the UE assumes that PRS is transmitted from a serving cell, and if the serving cell is the same as the serving cell defined by the SS/PBCH block, the UE may assume that the PRS and the SS/PBCH block are trasnmitted from the same serving cell;  - If the UE assumes that PRS is transmitted from a non-serving cell of a band, and if *nr-PhysCellID* is provided, and is the same as physical cell ID of the SS/PBCH block from a non-serving cell of the same band, the UE may assume that the PRS and the SS/PBCH block are transmitted from the same non-serving cell;  - Otherwise, the UE may assume that the PRS and the SS/PBCH block are not transmitted from the same cell.  A DL PRS resource set is configured by *NR-DL-PRS-ResourceSet*, consists of one or more DL PRS resources and it is defined by: |

### Round #1

Companies are invited to provide comments on TP clarifying cell determination for DL PRS reception procedure

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| Company Name | Comments |
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## Aspect #2: DL PRS measurement w/ different numerology

In [2], it is noticed that only during measurement gap, the UE can measure DL-PRS outside the active DL BWP or a DL PRS with a numerology different from the one of the active DL BWP. It is a common understanding that the UE can request MG if the UE is expected to measure DL-PRS with different SCS. But the current specification 38.214 does not clarify that a UE can request measurement gap when the UE is expected to measure DL-PRS with different numerology.

To address discussed above point, the following text proposal is provided in [2].

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| 5.1.6.5 PRS reception procedure  <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 or with a numerology different from the numerology of the active DL BWP, it may request a measurement gap via higher layer parameter *NR-PRS-MeasurementInfoList* [12, TS 38.331].  <Unchanged parts are omitted> |

### Round #1

Companies are invited to provide comments on TP clarifying UE behavior for the case when DL PRS numerology is different from the numerology of the active DL BWP

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## Aspect #7: Editorial Corrections

In this section, we capture TPs with the proposed editorial changes provided in [5] and [6] respectively.

**Text proposal A:**

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| TS38.214-g50  5.1.6.5 PRS reception procedure  < Unchanged parts are omitted >  A DL PRS resource is defined by:  *- nr-DL-PRS-ResourceID* determines the DL PRS resource configuration identity. All DL PRS resource IDs are locally defined within a DL PRS resource set.  *- dl-PRS-SequenceID* is used to initialize cinit value used in pseudo random generator as described in Clause 7.4.1.7.2 of [4, TS 38.211] for generation of DL PRS sequence for a given DL PRS resource.  …  If the UE is configured with *DL-PRS-QCL-Info* and the QCL relation is between two DL PRS resources, then the UE assumes those DL PRS resources are associated with the same *dl-PRS-ID*. If *DL-PRS-QCL-Info* is configured to the UE with *qcl-Type* set to 'type-D' with a source ~~DL-PRS-Resource~~ DL PRS resource then the *nr-DL-PRS-ResourceSetId* and the *nr-DL-PRS-ResourceId* of the source DL PRS resource are expected to be indicated to the UE.  …  < Unchanged parts are omitted > |

**Text proposal B:**

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| TS 38.214 v16.5.0  ---------- unchanged text omitted--------------- 6.2.1 UE sounding procedure ---------- unchanged text omitted---------------  The UE may be configured by the higher layer parameter *resourceMapping* in *SRS-Resource* with an SRS resource occupying  adjacent OFDM symbols within the last 6 symbols of the slot, or at any symbol location within the slot if *resourceMapping-r16* is provided subject to UE capability, where all antenna ports of the SRS resources are mapped to each symbol of the resource. When the SRS is configured with the higher layer parameter *SRS-PosResourceSet,* the UE may be configured by the higher layer parameter *resourceMapping-r16* in *SRS-PosResource* with an SRS resource occupying adjacent symbols anywhere within the slot.  ---------- unchanged text omitted--------------- |

### Round #1

Companies are invited to provide comments on corrections summarized in TP-A and TP-B above

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| Company Name | Comments |
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# Conclusions

TBD

# References

1. [R1-2102347](file:///C:\\Users\\wanshic\\OneDrive%20-%20Qualcomm\\Documents\\Standards\\3GPP%20Standards\\Meeting%20Documents\\TSGR1_104b\\Docs\\R1-2102347.zip) Correction to the procedure to determine the cell of PRS Huawei, HiSilicon

1. [R1-2102375](file:///C:\\Users\\wanshic\\OneDrive%20-%20Qualcomm\\Documents\\Standards\\3GPP%20Standards\\Meeting%20Documents\\TSGR1_104b\\Docs\\R1-2102375.zip) Text Proposals on NR Positioning OPPO

1. [R1-2102597](file:///C:\\Users\\wanshic\\OneDrive%20-%20Qualcomm\\Documents\\Standards\\3GPP%20Standards\\Meeting%20Documents\\TSGR1_104b\\Docs\\R1-2102597.zip) Discussion and TP on remaining issues in NR positioning CATT

1. [R1-2102659](file:///C:\\Users\\wanshic\\OneDrive%20-%20Qualcomm\\Documents\\Standards\\3GPP%20Standards\\Meeting%20Documents\\TSGR1_104b\\Docs\\R1-2102659.zip) Maintenance of NR positioning support ZTE

1. [R1-2102948](file:///C:\\Users\\wanshic\\OneDrive%20-%20Qualcomm\\Documents\\Standards\\3GPP%20Standards\\Meeting%20Documents\\TSGR1_104b\\Docs\\R1-2102948.zip) Maintenance on Rel-16 NR positioning vivo
2. [R1-2103734](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_104b\Docs\R1-2103734.zip) Maintenance on Rel-16 NR positioning Ericsson