3GPP TSG-RAN WG1 Meeting #105-e R1- 210NNNN

e-Meeting, May 10th – 27th, 2021

**Source: Moderator (Ericsson)**

**Title: Output #1 for email discussion [105-e-NR-Pos-02]**

**Agenda item: 7.2.8**

**Document for: Discussion and Decision**

1. Introduction

This contribution documents the output of email discussion [105-e-NR-Pos-02] triggered by the following Chairman’s decision and based on the feature lead summary for AI 7.2.8[TBD,[4]:

[105-e-NR-Pos-02] Email discussion/approval on the following until May 24 – Florent (Ericsson)

* Aspect #4: DL PRS periodicity and muting repetition factor
* Aspect #6: On MG request inside of the active DL BWP
* Aspect #7: On MG for NR Positioning
1. List of Remaining Opens on NR Positioning

## Aspect #4: DL PRS periodicity and muting repetition factor

### Feature Lead Summary

In , it is proposed to clarify in section 5.1.6.5 of TS 38.214, that the product of $T\_{per}^{PRS}$ and dl-prs-MutingBitRepetitionFactor shall not be more than $2^{μ}×1280$. Otherwise the configuration of DL PRS resouce would cause SFN ambiguity.

For NR DL PRS resource configruation, the DL PRS resource periodicity can take values $T\_{per}^{PRS}\in 2^{μ}\left\{4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 160, 320, 640, 1280, 2560, 5120, 10240\right\} $slots and higher layer parameter dl-prs-MutingBitRepetitionFactor of consecutive instances of a DL PRS resource set can take values of {1, 2, 4, 8}.

The following TP is proposed to address the raised aspect.

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| --- |
| 5.1.6.5 PRS reception procedure<Unchanged parts are omitted>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:*- nr-DL-PRS-ResourceSetID* defines the identity of the DL PRS resource set configuration. *- dl-PRS-Periodicity-and-ResourceSetSlotOffset* defines the DL PRS resource periodicity and takes values $T\_{per}^{PRS}\in 2^{μ}\left\{4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 160, 320, 640, 1280, 2560, 5120, 10240\right\} $slots, where $μ=0, 1, 2, 3 $for *dl-PRS-SubcarrierSpacing*=15, 30, 60 and 120 kHz respectively and the slot offset for DL PRS resource set with respect to SFN0 slot 0. All the DL PRS resources within one DL PRS resource set are configured with the same DL PRS resource periodicity. The UE does not expect that the product of $T\_{per}^{PRS}$ and higher layer parameter *dl-prs-MutingBitRepetitionFactor* exceeds $^{}$, where $μ=0, 1, 2, 3 $for *dl-PRS-SubcarrierSpacing*=15, 30, 60 and 120 kHz respectively.<Unchanged parts are omitted> |

### first round of comments

Companies are encouraged to provide their view on the TP in the table below

|  |  |
| --- | --- |
| Company | Comment |
| Huawei, HiSilicon | We understand RAN4 is discussing the issue, and we think that from RAN1 perspective, it is useful to clarify that the muting periodicity does not exceed SFN period.For the TP, we think that the bitmap width of *nr-option1-muting* should also be added to the product, so that the overall muting periodicity is PRS resource set periodicity times the muting occasion group length (denoted by *dl-prs-MutingBitRepetitionFactor)* times the muting bitmap width.In summary, it should be “the product of $T\_{per}^{PRS}$ , higher layer parameter *dl-prs-MutingBitRepetitionFactor* and the length of the higher layer parameter *nr-option1-muting*” |
| Nokia, NSB | The supported values of $T\_{per}^{PRS}$ go up to 10240, 20480, 40960, and 81920 (per LPP spec and RAN1 agreement) for SCS of 15, 30, 60 and 120 kHz. So even for *dl-prs-MutingBitRepetitionFactor* equal to 1 then some values would not be possible if the TP is approved for each SCS in our understanding. So, is the correct understanding that the TP propose to eliminate some of the values of periodicities already agreed?  |
| vivo | We share the understanding as Huawei that the product should be 3 parameters, not two. Futhermore, the limit should be 2^u\*10240 slots (corresponding to 10ms) for different SCS. We also prefer to put the changes together with muting. Our proposed wording is below.TS38.214*- dl-PRS-MutingOption1* and *dl-PRS-MutingOption2* define the time locations where the DL PRS resource is expected to not be transmitted for a DL PRS resource set. If *dl-PRS-MutingOption1* is configured, each bit in the bitmap of *dl-PRS-MutingOption1* corresponds to a configurable number provided by higher layer parameter *dl-prs-MutingBitRepetitionFactor* of consecutive instances of a DL PRS resource set where all the DL PRS resources within the set are muted for the instance that is indicated to be muted. The length of the bitmap can be {2, 4, 6, 8, 16, 32} bits. The UE does not expect that the product of DL PRS resource periodicity $T\_{per}^{PRS}$ and higher layer parameter *dl-prs-MutingBitRepetitionFactor* and the length of the bitmap of *dl-PRS-MutingOption1* exceeds $2^{μ}×10240$, where $μ=0, 1, 2, 3 $for *dl-PRS-SubcarrierSpacing*=15, 30, 60 and 120 kHz respectively. If *dl-PRS-MutingOption2* is configured each bit in the bitmap of *dl-PRS-MutingOption2* corresponds to a single repetition index for each of the DL PRS resources within each instance of a *nr-DL-PRS-ResourceSet* and the length of the bitmap is equal to the values of *dl-PRS-ResourceRepetitionFactor*. Both *dl-PRS-MutingOption1* and *dl-PRS-MutingOption2* may be configured at the same time in which case the logical AND operation is applied to the bit maps as described in Clause 7.4.1.7.4 of [4, TS 38.211].Alternatively, we’re also okay to make such changes in TS 37.355, instead of RAN1’s specification. |
| OPPO | We are ok with the suggestion by HW that the product of those three parameter shall not be > 2^u 10240. Regarding where this shall be specified: either 38.314 or 37.355 is fine. |
| ZTE | OK with vivo’s revision. Some small changes to align the wordings in TS 38.211,The UE does not expect that the product of DL PRS resource periodicity $T\_{per}^{PRS}$, higher layer parameter *dl-prs-MutingBitRepetitionFactor* and the size of the bitmap given by the high layer parameter *dl-PRS-MutingOption1* exceeds $2^{μ}×10240$, where $μ=0, 1, 2, 3 $for *dl-PRS-SubcarrierSpacing*=15, 30, 60 and 120 kHz respectively.  |
| CATT | We are generally fine with the updated TP in vivo’s comments accroding to Huawei’s suggestions with small modifications as follows, and don’t support original TP. The product of the 3 factors($T\_{per}^{PRS}$, *MutingBitRepetitionFactor,* $L$) should be no more than 10240ms.TS38.214*- dl-PRS-MutingOption1* and *dl-PRS-MutingOption2* define the time locations where the DL PRS resource is expected to not be transmitted for a DL PRS resource set. If *dl-PRS-MutingOption1* is configured, each bit in the bitmap of *dl-PRS-MutingOption1* corresponds to a configurable number provided by higher layer parameter *dl-prs-MutingBitRepetitionFactor* of consecutive instances of a DL PRS resource set where all the DL PRS resources within the set are muted for the instance that is indicated to be muted. The length of the bitmap can be {2, 4, 6, 8, 16, 32} bits. The UE does not expect that the product of DL PRS resource periodicity $T\_{per}^{PRS}$, the higher layer parameter *dl-prs-MutingBitRepetitionFactor* and the size of the bitmap of *dl-PRS-MutingOption1* exceeds $2^{μ}×10240$, where $μ=0, 1, 2, 3 $for *dl-PRS-SubcarrierSpacing*=15, 30, 60 and 120 kHz respectively. If *dl-PRS-MutingOption2* is configured each bit in the bitmap of *dl-PRS-MutingOption2* corresponds to a single repetition index for each of the DL PRS resources within each instance of a *nr-DL-PRS-ResourceSet* and the length of the bitmap is equal to the values of *dl-PRS-ResourceRepetitionFactor*. Both *dl-PRS-MutingOption1* and *dl-PRS-MutingOption2* may be configured at the same time in which case the logical AND operation is applied to the bit maps as described in Clause 7.4.1.7.4 of [4, TS 38.211]. |
| Qualcomm | OK with the revision |
|  |  |

### Summary of first round of comments and way forward

Based on the received comments, the TP can be revised as follow. The revision is the one provided by CATT which combines the revision by Huawei, vivo and ZTE.

TP#1

|  |
| --- |
| 5.1.6.5 PRS reception procedure<Unchanged parts are omitted>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:*- nr-DL-PRS-ResourceSetID* defines the identity of the DL PRS resource set configuration. *- dl-PRS-Periodicity-and-ResourceSetSlotOffset* defines the DL PRS resource periodicity and takes values $T\_{per}^{PRS}\in 2^{μ}\left\{4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 160, 320, 640, 1280, 2560, 5120, 10240\right\} $slots, where $μ=0, 1, 2, 3 $for *dl-PRS-SubcarrierSpacing*=15, 30, 60 and 120 kHz respectively and the slot offset for DL PRS resource set with respect to SFN0 slot 0. All the DL PRS resources within one DL PRS resource set are configured with the same DL PRS resource periodicity. The UE does not expect that the product of DL PRS resource periodicity $T\_{per}^{PRS}$, the higher layer parameter *dl-prs-MutingBitRepetitionFactor* and the size of the bitmap of *dl-PRS-MutingOption1* exceeds $2^{μ}×10240$, where $μ=0, 1, 2, 3 $for *dl-PRS-SubcarrierSpacing*=15, 30, 60 and 120 kHz respectively.<Unchanged parts are omitted> |

### Second round of comments

Companies are encouraged to provide their view on the TP in the table below

|  |  |
| --- | --- |
| Company | Comment |
| CATT | Support the updated TP#1 above. |

## Aspect #6: On MG request inside of the active DL BWP

### Feature Lead Summary

In , it is proposed to remove the restriction for UE to request measurement gap only when outside current active DL BWP. The following TP was provided to address this aspect:

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| --- |
| ---- Unchanged texts 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 it may request a measurement gap via higher layer parameter *NR-PRS-MeasurementInfoList* [12, TS 38.331]. ---- Unchanged texts omitted ---- |

### first round of comments

Companies are encouraged to provide their view on the TP in the table below

|  |  |
| --- | --- |
| Company | Comment |
| Nokia/NSB | Support (okay with the common proposed in Ericsson’s version as well). |
| vivo | OK. |
| OPPO | Ok |
| CATT | Support this TP, if one comma is added before the deleted words.And maybe Aspect#6 and #7 can be combined into one issue for discussion. |
| Qualcomm | OK |
| Apple | Support with editorial suggested by CATT |

### Summary of first round of comments and way forward

Based on the comments, the TP is updated with the changes proposed by CATT, which combines the TP with the TP in aspect #7:

|  |
| --- |
| ---- Unchanged texts 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, it may request a measurement gap via higher layer parameter *NR-PRS-MeasurementInfoList* [12, TS 38.331]. ---- Unchanged texts omitted ---- |

### Second round of comments

Companies are encouraged to provide their view on the TP in the table below

|  |  |
| --- | --- |
| Company | Comment |
| CATT | Support the updated TP above. |

## Aspect #7: On MG for NR Positioning

### Feature Lead Summary

In [3], it is proposed to clarify that measurements gaps are always present when measuring PRS. The following TP was provided for this aspect:

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| --- |
| <unchanged part 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, it may request a measurement gap via higher layer parameter *NR-PRS-MeasurementInfoList* [12, TS 38.331]. <unchanged part omitted> |

### first round of comments

Companies are encouraged to provide their view on the TP in the table below

|  |  |
| --- | --- |
| Company | Comment |
| Huawei, HiSilicon | OK with the change and the comma. |
| Nokia/NSB | Support. |
| vivo | OK |
| OPPO | This TP is same to the TP in Aspect#6, right?  |
| ZTE | Support |
| CATT | Support. This TP is the same with Aspect#6 expect for the addition of one comma.And maybe Aspect#6 and #7 can be combined into one issue for discussion. |
| Qualcomm | OK |
| Apple | Same view as OPPO and CATT |

### Summary of first round of comments and way forward

The TP is addressed in aspect 6.

# Conclusion

TBD

1. References
2. R1-2104738 Corrections on DL PRS resource configuration OPPO
3. R1-2105518 Draft CR on measurement gap description for positioning Nokia, Nokia Shanghai Bell
4. R1-2105907 Maintenance on Rel-16 NR positioning Ericsson
5. R1-210zzzz Feature Leads Summary for NR Positioning Maintenance – AI 7.2.8