3GPP TSG-RAN WG2 Meeting #119bis-e***R2-22xxxxx***

Electronic, October 10 – 19, 2022

**Agenda item:** 6.11.2.3

**Source:** Qualcomm Incorporated

**Title:** Summary of [AT119bis-e][416][POS] LPP CR (Qualcomm)

**Document for:**  Discussion

# 1. Introduction

This document summarizes the following email discussion:

* [AT119bis-e][416][POS] LPP CR (Qualcomm)

Scope: Merge the agreed LPP changes into a rapporteur CR.

Intended outcome: Agreeable CR

Deadline: Friday 2022-10-14 1000 UTC

## 1.1 References

[1] R2-2209430, "Correction to UE capability for DL-AoD" , Huawei, HiSilicon.

[2] R2-2209431, "Correction to TEG margin reporting", Huawei, HiSilicon.

[3] R2-2209434, "Corrections on the timing error margins", CATT.

[4] R2-2209435, "Change Request of missing UE capabilities", CATT.

[5] R2-2209436, "Corrections on the LPP capabilities", CATT.

[6] R2-2209683, "NR-DL-AoD-SignalMeasurementInformation corrections", Nokia, Nokia Shanghai Bell.

[7] R2-2210199, "Correction on the maximum number of SRS and TxTEG association", ZTE, Sanechips.

[8] R2-2210606, "Discussion on the provision of AL for achievable TIR calculation" , vivo.

[9] R2-2210784, "Summary of AI 6.11.2.3: LPP corrections", Qualcomm Incorporated.

[10] (Draft) "Report from session on positioning and sidelink relay", Session Chair (MediaTek).

# 2. Discussion

The following agreements were made [10].

Agreements:

Proposal 1: The CR in 'R2-2209430, "Correction to UE capability for DL-AoD", Huawei, HiSilicon' is an essential correction. Agree a revision of the CR with the editorial issues fixed.

Proposal 3: The changes related to capability indices 23-3-3, 27-12, and 27-4-1 in 'R2-2209436, "Corrections on the LPP capabilities", CATT ' are essential corrections. Agree a revision of the CR with the change for 27-20 removed, and with the Note for 27-4-1 removed from DL-AoD.

Proposal 6: The CR in 'R2-2209683, "NR-DL-AoD-SignalMeasurementInformation corrections", Nokia, Nokia Shanghai Bell' is an essential correction. Revise the CR using the latest version of the specification.

Proposal 7: The CR in 'R2-2210199, "Correction on the maximum number of SRS and TxTEG association", ZTE, Sanechips' is an essential correction. Convert the CR into a backwards compatible change by clarifying in an ASN.1 comment that the applicable value is 64. Add the "Isolated Impact" statement to the CR cover sheet.

Details of all proposals to be checked in email discussion [416].

The details of the Proposals are discussed in the following.

## Issue #1: Proposal 1 [9]

Proposal 1: The CR in 'R2-2209430, "Correction to UE capability for DL-AoD", Huawei, HiSilicon' is an essential correction. Agree a revision of the CR with the editorial issues fixed.

According to the email discussion scope, a "Rapporteur CR" with the agreed corrections will be prepared. However, for the CR in R2-2209430 [1], it was proposed to keep this CR separate [10]:

"On P1, Huawei indicate the proposal is BC, but they think there might be a need for a separate CR for visibility due to interoperability considerations."

The interoperability statement on the CR cover sheet [1] indicates the following:

"If the UE is implemented according to the CR while the network is not; or if the network is implemented according to the CR while the UE is not, the UE [added by Moderator] and the network would have different undestanding on the reported UE capabilities nr-DL-PRS-BeamInfoSup-r17 and dl-PRS-ResourcePrioritySubset-Sup-r17."

At previous meeting, we kept only the NBC CRs (ASN and/or functional) separate.

**Question 1:** Do you agree that the content of the CR in 'R2-2209430, "Correction to UE capability for DL-AoD", Huawei, HiSilicon' [1] should be kept separate, and **not** merged into the "Rapporteur CR"?

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| Company | Yes/No | Comments |
| Huawei, HiSilicon | Yes | The CR is backward compatible in the ASN.1 level, but has larger functionality impacts than the other CRs. It is better to highlight the change in the CR by an independent CR. |
| CATT | No | The same issue is found as one of issues in CATT’s CR (R2-2209436). CATT proposed to correct the descriptions of the two IEs to avoid the corrections on the ASN.1 which is summarized in R2-2210784.   |  |  |  |  | | --- | --- | --- | --- | | Index | Feature group | Components | Reasons | | 27-20 | PRS subset association for UE assisted DL-AoD | 1. Support of assistance data enhancement to indicate a subset of PRS resources for each PRS resource for the purpose of prioritization of DL-AoD reporting.  2. Supported resource set relationship for the target PRS resource and the associated subset | There is no ENUMERATED value in *dl-PRS-ResourcePrioritySubset-Sup* and *nr-DL-PRS-BeamInfoSup* doesn’tfollow the description in feature list. |   ***nr-DL-PRS-BeamInfoSup***  This field, if present, indicates the supported resource set relationship for the target DL-PRS Resource and the associated subset in IE *NR-DL-PRS-Info*.  ***dl-PRS-ResourcePrioritySubset-Sup***  This field, if present, indicates that the target device supports the *DL-PRS-ResourcePrioritySubset* in IE *NR-DL-PRS-Info.*  CATT doesn’t support to introduce a separate CR on this issue. Companies also may make a choice which option (CATT’s or Huawei’s) is better to be merged to the "Rapporteur CR" as LPP capabilities issues. |
| Intel | Yes | We can swap the IE as proposed by Huawei without ASN.1 BC. From functionality perspective, CATT and Huawei CRs are same, i.e. NBC. |
| Nokia | Yes |  |
| vivo |  | No strong view on the separate CR.  As to the options raised by CATT, we prefer to swap the field name directly, which is a BC change and is clear. Fixing the issue with an unsuitable description is confusing. |
| Rapporteur |  | The proposal from CATT removes the capability 27-21 (PRS boresight direction for UE-assisted DL-AoD), which is highly NBC. |
| ZTE | Yes | dl-PRS-ResourcePrioritySubset-Sup should have candidate values as ‘{sameSet, DifferentSet, sameOrDifferentSet}’. so agree with HW’s change, without field description change.  HW’s change is NBC and can be allocated with a separate CR |
| Ericsson | No | This is editorial CR. Changing the name of field is allowed. Chaging the content of field is on the other hand NBC. |
| Xiaomi | No strong view | Fine to follow the majority’s view. |
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If you have any comments on the content of the CR in 'R2-2209430, "Correction to UE capability for DL-AoD", Huawei, HiSilicon' [1] please provide them in the Table below.

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| Company | Comments |
| CATT | Please find the candidate solution on this issue above. |
| Nokia | Delete CR revision history info. It can be updated when the CR revision number is Rev 1. Some typos in the inter-operability statement. |
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## Issue #2: Proposal 3 [9]

Proposal 3: The changes related to capability indices 23-3-3, 27-12, and 27-4-1 in 'R2-2209436, "Corrections on the LPP capabilities", CATT ' are essential corrections. Agree a revision of the CR with the change for 27-20 removed, and with the Note for 27-4-1 removed from DL-AoD.

On Proposal 3, there were no concerns raised online.

However, given that a "Rapporteur's CR" will be prepared, Proposal 3 is rephrased below.

The content of this CR [5] according to the Proposal 3 above is included in the first version of the LPP CR, which is available in the same folder as this discussion document.

**Question 2:** Do you agree with the following:

The changes related to capability indices 23-3-3, 27-12, and 27-4-1 in 'R2-2209436, "Corrections on the LPP capabilities", CATT' [5] will be merged into the Rapporteur CR but with the additional Note for 27-4-1 removed from DL-AoD.

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| Company | Yes/No | Comments |
| Huawei,HiSilicon | Yes |  |
| CATT | Yes as proponent | Agree the capabilities indices 23-3-3, 27-12, and 27-4-1 in R2-2209436 CR to be merged into the Rapporteur CR but with the additional Note for 27-4-1 removed from DL-AoD.  Furthermore, the capabilities indices 27-20 in R2-2209436 CR can also be merged into the Rapporteur CR if there is no conclusion in Q1 because all of these capabilities are corrected in order to align with feature list. |
| Intel | Yes |  |
| Nokia | Yes | In the summary of change in R2-2209436, 27-3-3 was mistakenly entered instead of 27-3-2 in the reason for change field. According to the attachment in R2-2209117 the correct FG number is 27-3-2. This Question 2 refers to 23-3-3 instead of 27-3-2. |
| vivo | Yes |  |
| ZTE | Yes | It should be 27-3-3 |
| Ericsson | Yes |  |
| Xiaomi | Yes |  |
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## Issue #3: Proposal 6 [9]

Proposal 6: The CR in 'R2-2209683, "NR-DL-AoD-SignalMeasurementInformation corrections", Nokia, Nokia Shanghai Bell' is an essential correction. Revise the CR using the latest version of the specification.

Concerns were raised that an essential correction may also be needed for Rel-16 [10]:

"On P6, Huawei wonder if there is Rel-16 impact; they are OK with a Rel-17 CR but think we could consider a Rel-16 version next meeting."

Concerns were raised that change #3 [6]:

"(**3.)** *nr-DL-PRS-RxBeamIndex* indication is used for DL-PRS measurements only when additional DL-PRS measurements are also included and all these DL-PRS measurements are associated with a single TRP (up to 8 measurements in Rel-16 or 24 measurements in Rel-17).

**(3.)**  In 6.5.11.4, NR-DL-AoD-SignalMeasurementInformation, clarify the field description for nr-DL-PRS-RxBeamIndex that it is used for DL-PRS measurements only when additional DL-PRS measurements are also included and all DL-PRS measurements are associated with a single TRP."

is not essential [10]:

"CATT think on P6, “associated with a single TRP” should be deleted in the description, because the IE is already per-TRP. Nokia think this may be clear from the ASN.1, but an explicit clarification is useful."

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| ***nr-DL-PRS-RxBeamIndex***  This field provides an index of the target device receive beam used for DL-PRS measurements associated with a single TRP in *nr-DL-AoD-MeasList-r16* when additional DL-PRS measurements are also included in either *nr-DL-AoD-AdditionalMeasurements-r16* or *nr-DL-AoD-AdditionalMeasurementsExt-r17*. If the value of the receive beam index for two or more DL-PRS measurements is the same, it indicates that the target device receive beam for the two or more DL-PRS measurements associated with a TRP were made with the same RX beam. The field is mandatory present if at least two DL-PRS RSRP measurements and/or DL-PRS RSRPP measurements from the same DL-PRS Resource Set associated with a TRP have been made with the same RX beam by the target device; otherwise it is not present. |

The content of this CR [6] according to the Proposal 6 above is included in the first version of the LPP CR, which is available in the same folder as this discussion document.

**Question 3:** For the CR in R2-2209683, "NR-DL-AoD-SignalMeasurementInformation corrections", Nokia, Nokia Shanghai Bell' [6] do you agree that for the change #3, the phrase "associated with a (single) TRP" is **not** needed?

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| Company | Yes/No | Comments |
| Huawei, HiSilicon | Yes | It is useful to clarify that the field is included only when two Rx beams are the same for the reception of the resources from the same TRP.  But this has R16 impacts. It is also beneficial to clarify in the R16 version. |
| CATT | No  (not needed) | “associated with a single TRP in *nr-DL-AoD-MeasList-r16*” seems duplicated not only because ‘***dl-PRS-ID***’ already clarifies: “This ID can be associated with multiple DL-PRS Resource Sets associated with a single TRP”, but also because the IE ***nr-DL-PRS-RxBeamIndex*** is per-TRP.  We are also fine to follow the majority’s view. |
| Intel | Yes |  |
| Nokia | No (the phrase is needed) | The reason we included the phrase “associated with a (single) TRP” is exactly for the reason that CATT quoted, which is the *nr-DL-PRS-RxBeamIndex* is a per-TRP IE. Hence this IE is present in each element of the list “*NR-DL-AoD-MeasList-r16*”. This phrase “associated with a (single) TRP” was added to avoid confusing that the Rx beam index is set the same for 2 or more DL PRS measurements **across different elements in the same list** viz. “NR-DL-AoD-MeasList-r16”. So, we actually think this phrase is essential to have in the field description. |
| vivo |  | No strong view, only editorial clarification. OK to have it if the proponents think it can make the spec clearer.  We also noticed that the phase already exists in the field ***nr-DL-AoD-AdditionalMeasurementsExt***but is absent in the field ***nr-DL-PRS-RSRP-ResultDiff***. |
| ZTE | No | We think the phrase is useful for a more clear understanding |
| Ericsson |  | We are fine with the CR |
| Xiaomi | No | Agee with the CR. |
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If you have any comments on the content of the CR in ' R2-2209683, "NR-DL-AoD-SignalMeasurementInformation corrections", Nokia, Nokia Shanghai Bell' [6] please provide them in the Table below.

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## Issue #4: Proposal 7 [9]

Proposal 7: The CR in 'R2-2210199, "Correction on the maximum number of SRS and TxTEG association", ZTE, Sanechips' is an essential correction. Convert the CR into a backwards compatible change by clarifying in an ASN.1 comment that the applicable value is 64. Add the "Isolated Impact" statement to the CR cover sheet.

Comments were made that the correction may be better made in the field description [10]:

"Lenovo think on P7, the change as proposed is one way to do it, but it could also be in the field description. Intel think we should take a BC change and are OK with the ASN.1 comment. Huawei agree with Lenovo that the field description would be a better place."

Therefore, there appears to be two options:

Option 1:

– *Multiplicity and type constraint definitions*

-- ASN1START

[parts omitted]

maxNumOfRxTEGs-r17 INTEGER ::= 32

maxNumOfRxTEGs-1-r17 INTEGER ::= 31

maxNumOfTxTEGs-1-r17 INTEGER ::= 7

maxTxTEG-Sets-r17 INTEGER ::= 256 -- Maximum applicable number is 64

maxNumOfRxTxTEGs-1-r17 INTEGER ::= 255

maxNumOfTRP-TxTEGs-1-r17 INTEGER ::= 7

maxNumOfSRS-PosResources-r17 INTEGER ::= 64

maxNumOfSRS-PosResources-1-r17 INTEGER ::= 63

[parts omitted]

-- ASN1STOP

Option 2:

-- ASN1START

NR-Multi-RTT-SignalMeasurementInformation-r16 ::= SEQUENCE {

nr-Multi-RTT-MeasList-r16 NR-Multi-RTT-MeasList-r16,

nr-NTA-Offset-r16 ENUMERATED { nTA1, nTA2, nTA3, nTA4, ... } OPTIONAL,

...,

[[

nr-SRS-TxTEG-Set-r17 SEQUENCE (SIZE(1..maxTxTEG-Sets-r17)) OF

NR-SRS-TxTEG-Element-r17 OPTIONAL

-- Cond Case2-3

]],

[[

nr-UE-RxTEG-TimingErrorMargin-r17 TEG-TimingErrorMargin-r17 OPTIONAL,-- Cond TEGCase3

nr-UE-TxTEG-TimingErrorMargin-r17 TEG-TimingErrorMargin-r17 OPTIONAL,-- Cond TEGCase2-3

nr-UE-RxTxTEG-TimingErrorMargin-r17 RxTxTEG-TimingErrorMargin-r17 OPTIONAL -- Cond TEGCase1-2

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}

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| *NR-Multi-RTT-SignalMeasurementInformation* field descriptions |
| ***nr-SRS-TxTEG-Set***  This field provides the SRS for Positioning Resources associated with a particular UE Tx TEG and comprises the following subfields:  - ***nr-TimeStamp*** specifies the start time for which the *NR-SRS-TxTEG-Element* is valid. If this field is absent, the *nr-TimeStamp* of this instance of the *NR-SRS-TxTEG-Element* of the *nr-SRS-TxTEG-Set* is the same as the *nr-TimeStamp* of the previous instance of the *NR-SRS-TxTEG-Element*. If this field is also absent in the first *NR-SRS-TxTEG-Element* of the *nr-SRS-TxTEG-Set*, all *NR-SRS-TxTEG-Element*'s provided are valid for the measurement period of the *NR-Multi-RTT-SignalMeasurementInformation.*  - ***nr-UE-Tx-TEG-ID*** specifies the ID of this UE Tx TEG.  - ***carrierFreq*** specifies the frequency of the SRS for positioning resources.  - ***srs-PosResourceList*** specifies the SRS for Positioning Resources belonging to this UE Tx TEG.  For each UE Tx TEG, there may be up to 8 changes (different *nr-TimeStamp*) of the TEG-SRS association information provided in *nr-SRS-TxTEG-Set*, i.e., the maximum value for *maxTxTEG-Sets* is 64. |

**Question 4:** For the Issue#4 above, which Option do you prefer?

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| Company | Option 1/ Option 2/ Both/  None | Comments |
| Huawei, HiSilicon | Option2 |  |
| CATT | Option 2 | Option 1 is NBC but option 2 is BC. We prefer a BC according to the RAN2 Chair’s guidance. |
| Intel | Option 1 | Both option 1 and 2 are BC from ASN.1 perspective. Both option 1 and 2 are NBC from functionality perspective. To us, option 1 is more clear. |
| Nokia | Option 1 or Both | We prefer the comment in the ASN.1 as it is potentially more visible for implementers this way and could reduce errors. Including the same in the field description could be warranted as well to reaffirm the correct value against the contradictory ASN.1 value. |
| vivo | Option 2 or Both | Both are BC as the variable still occupies 8 bits.  We noticed that similar changes are only added in the field description in 38.331 and are formulated as: In this release, the maximum value for xxx is xxx.  We share some views with Nokia that adding in the ASN.1 may be beneficial for implementers. So we are ok with both. |
| Rapporteur |  | Option 2 is not an essential correction, since already specified in the field description (assuming the reader of the spec is able to calculate 8x8 himself). The confusion comes from the fact that the field description implies '64' but the ASN allows '256'. So what is now the correct value? This is where the essential correction is needed. |
| ZTE | Option 1 or both | 64 for the IE is what this version of spec allows. UE may not have the capability to support more than 64 according to a series of RAN1 agreements.  Agree with nokia that option 1 is more clear. Also ok to have both corrections |
| Ericsson | both |  |
| Xiaomi | Option 1 | The filed descriptions already indicates that there may be up to 8 changes. |
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## Other

Any other comments (e.g., on the first draft LPP CR) can be provided in the table below.

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# Annex: Agreements [10]

Agreements:

Proposal 1: The CR in 'R2-2209430, "Correction to UE capability for DL-AoD", Huawei, HiSilicon' is an essential correction. Agree a revision of the CR with the editorial issues fixed.

Proposal 3: The changes related to capability indices 23-3-3, 27-12, and 27-4-1 in 'R2-2209436, "Corrections on the LPP capabilities", CATT ' are essential corrections. Agree a revision of the CR with the change for 27-20 removed, and with the Note for 27-4-1 removed from DL-AoD.

Proposal 6: The CR in 'R2-2209683, "NR-DL-AoD-SignalMeasurementInformation corrections", Nokia, Nokia Shanghai Bell' is an essential correction. Revise the CR using the latest version of the specification.

Proposal 7: The CR in 'R2-2210199, "Correction on the maximum number of SRS and TxTEG association", ZTE, Sanechips' is an essential correction. Convert the CR into a backwards compatible change by clarifying in an ASN.1 comment that the applicable value is 64. Add the "Isolated Impact" statement to the CR cover sheet.

Details of all proposals to be checked in email discussion [416].

Agreement:

Proposal 2: The CR in 'R2-2209435, "Change Request of missing UE capabilities", CATT ' is not an essential correction.

Agreement:

RAN2 confirm that for the field nr-UE-RxTEG-TimingErrorMargin in IE NR-DL-TDOA-SignalMeasurementInformation, and for the fields nr-UE-TxTEG-TimingErrorMargin and nr-UE-RxTxTEG-TimingErrorMargin in IE NR-Multi-RTT-SignalMeasurementInformation, absence of the fields indicates the maximum value and the fields do not need to be made mandatory.