3GPP TSG-RAN WG2 Meeting #121-bis-e***R2-23xxxxx***

Online, April 17 – 26, 2023

**Agenda item:** 5.3

**Source:** ZTE Corporation (Rapporteur)

**Title:** Rel-15/16 positioning stage 3 CRs

**Document for:**  Discussion

# Introduction

This document is to kick off the following email discussion:

 **[AT121bis-e][410][POS] Rel-15/16 positioning stage 3 CRs (ZTE)**

      Scope: Check the CRs from agenda items 5.3.2, 5.3.3, and 5.3.4: R2-2302985 / R2-2302986 / R2-2302989 / R2-2302990 / R2-2304046 / R2-2304047 / R2-2304048 / R2-2303501 / R2-2303502.

      Intended outcome: Report and agreed CRs (without CB if possible)

      Deadline: Monday 2023-04-24 2359 UTC

This document summarizes the following contributions submitted for Agenda Item 5.3.2 (NR Rel-15 and Rel-16 – RRC), 5.3.3 (NR Rel-15 and Rel-16 – LPP) and 5.3.4(NR Rel-15 and Rel-16 – MAC).

**AI 5.3.2 – RRC corrections:**

1. R2-2302985 Correction on SI update for posSIB-r16 Huawei, HiSilicon CR Rel-16 38.331 16.12.0 3974 - F NR\_pos-Core
2. R2-2302986 Correction on SI update for posSIB-r17 Huawei, HiSilicon CR Rel-17 38.331 17.4.0 3975 - F NR\_pos-Core, NR\_redcap\_enh-Core

**AI 5.3.3 – LPP corrections:**

1. R2-2302989 Correction to nr-DL-TDOA-AdditionalMeasurements-r16 Huawei, HiSilicon CR Rel-16 37.355 16.10.0 0434 - F NR\_pos-Core
2. R2-2302990 Correction to nr-DL-TDOA-AdditionalMeasurements-r17 Huawei, HiSilicon CR Rel-17 37.355 17.4.0 0435 - A NR\_pos-Core
3. R2-2304046 Correction of Location Server behaviour Ericsson CR Rel-15 37.355 15.3.0 0438 - F NR\_newRAT-Core
4. R2-2304047 Correction of Location Server behaviour Ericsson CR Rel-16 37.355 16.10.0 0439 - A NR\_newRAT-Core
5. R2-2304048 Correction of Location Server behaviour Ericsson CR Rel-17 37.355 17.4.0 0440 - A NR\_newRAT-Core

**AI 5.3.4 – MAC corrections:**

1. R2-2303501 Correction on DL MAC CE for SP Positioning SRS ZTE Corporation CR Rel-16 38.321 16.11.0 1590 - F NR\_pos-Core
2. R2-2303502 Correction on DL MAC CE for SP Positioning SRS ZTE Corporation CR Rel-17 38.321 17.4.0 1591 - A NR\_pos-Core

# Rel-16 RRC corrections

Regarding to the SI change indication, [1][2] proposed that SI change indication is not applicable to posSIBs according to 38.331, clause 5.2.2.2. however the table 6.5-1 in section 6.5 only mentions the SI change excludes SIB6, SIB7, SIB8. Therefore changes in [1][2] are provided as below:

**Rel-16 CR[1]:**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 6.5 Short MessageShort Messages can be transmitted on PDCCH using P-RNTI with or without associated *Paging* message using Short Message field in DCI format 1\_0 (see TS 38.212 [17], clause 7.3.1.2.1).Table 6.5-1 defines Short Messages. Bit 1 is the most significant bit.Table 6.5-1: Short Messages

|  |  |
| --- | --- |
| Bit | Short Message |
| 1 | ***systemInfoModification***If set to 1: indication of a BCCH modification other than SIB6, SIB7,SIB8 and posSIB. |
| 2 | ***etwsAndCmasIndication***If set to 1: indication of an ETWS primary notification and/or an ETWS secondary notification and/or a CMAS notification. |
| 3 | ***stopPagingMonitoring***This bit can be used for only operation with shared spectrum channel access and if *nrofPDCCH-MonitoringOccasionPerSSB-InPO* is present.If set to 1: indication that the UE may stop monitoring PDCCH occasion(s) for paging in this Paging Occasion as specified in TS 38.304 [20], clause 7.1. |
| 4 – 8 | Not used in this release of the specification, and shall be ignored by UE if received. |

 |

**Rel-17 CR[2]:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 6.5 Short MessageShort Messages can be transmitted on PDCCH using P-RNTI with or without associated *Paging* message using Short Message field in DCI format 1\_0 (see TS 38.212 [17], clause 7.3.1.2.1).Table 6.5-1 defines Short Messages. Bit 1 is the most significant bit.Table 6.5-1: Short Messages

|  |  |
| --- | --- |
| Bit | Short Message |
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| 2 | ***etwsAndCmasIndication***If set to 1: indication of an ETWS primary notification and/or an ETWS secondary notification and/or a CMAS notification. |
| 3 | ***stopPagingMonitoring***This bit can be used for only operation with shared spectrum channel access and if *nrofPDCCH-MonitoringOccasionPerSSB-InPO* is present.If set to 1: indication that the UE may stop monitoring PDCCH occasion(s) for paging in this Paging Occasion as specified in TS 38.304 [20], clause 7.1. |
| 4 | ***systemInfoModification-eDRX***If set to 1: indication of a BCCH modification other than SIB6, SIB7, SIB8 and posSIB. This indication applies only to UEs using IDLE eDRX cycle longer than the BCCH modification period. |
| 5 – 8 | Not used in this release of the specification, and shall be ignored by UE if received. |

 |

**Rapporteur’s comments:**

Rapporteur thinks the change is correct. In [2], the WI code in the coversheet should be NR\_pos\_enh-Core since it is a Rel-17 CR with cat F.

**Q1: Do companies agree with the Rel-16/Rel-17 RRC CRs [1] and [2] and the WI code modification of [2]?**

|  |  |  |
| --- | --- | --- |
| companies | Yes/No | comments |
| ZTE | Yes |  |
| vivo | Yes |  |
| OPPO | Yes |  |
| CATT | Yes |  |
| Intel | Yes |  |
| Huwei, HiSIlicon | Yes, | The reason why they are both cat F is that in R17 version, there is another change for eDRX, which was introduced in R17. So, they should be both Cat F. for R16, the WI code is for positioning and for R17, the WI code is for positioning and redcap |
| Lenovo | Yes |  |
| Qualcomm | Yes |  |
| MediaTek | Yes |  |
| Xiaomi | Yes |  |
| Samsung | Yes |  |
| LG | Yes |  |
| Nokia | Yes |  |

Rapporteur summary:

Companies are fine with the CR content for both Rel-16 and Rel-17. After offline discussion with Huawei, rapporteur thinks the WI code of Rel-17 CR should remain as it currently is. So no change is made to the CR.

***Proposal 1: Agree Rel-16 RRC CR R2-2302985 and Rel-17 RRC CR R2-2302986.***

# Rel-15/16 LPP corrections

## Add field description of nr-DL-TDOA-AdditionalMeasurements

It is proposed by [3] [4]to add field description of nr-DL-TDOA-AdditionalMeasurements IE in both Rel-16 LPP spec and Rel-17 LPP spec.

**Rel-16 CR[3]:**

|  |
| --- |
| ***nr-DL-TDOA-AdditionalMeasurements***This field, in addition to the measurements provided in *nr-DL-TDOA-MeasElement*, provides TOA measurements of up to 3 DL-PRS Resources of a TRP. |

**Rel-17 CR[4]:**

|  |
| --- |
| ***nr-DL-TDOA-AdditionalMeasurements***This field, in addition to the measurements provided in *nr-DL-TDOA-MeasElement*, provides TOA measurements of up to 3 DL-PRS Resources of a TRP.If this field is present, the field *nr-DL-TDOA-AdditionalMeasurementsExt* should not be present. |

**Rapporteur’s comments:**

Rapporteur thinks the change is correct.

**Q2: Do companies agree with the Rel-16/Rel-17 LPP CRs [3] and [4]?**

|  |  |  |
| --- | --- | --- |
| companies | Yes/No | comments |
| ZTE | Yes |  |
| vivo | Yes with comments | The additional measurement is the RSTD measurement rather than TOA. |
| OPPO | Yes |  |
| CATT | No | The IEs in *nr-DL-TDOA-AdditionalMeasurements* have been decribed clearly. The CR is not essential and is not correct, because: 1. TOA is not provided here abviously;
2. TimingQuality is also provided.
 |
| Ericsson | No | Agree with CATT. The ***nr-DL-TDOA-AdditionalMeasurements* is not a field but points to an IE and the field in the IE is already captured. So, no need to have this.** |
| Intel | No | Not essential |
| Huawei, HiSIlicon | Yes | The field is more needed in R17, if companies are not OK for the R16 version, it is OK that we only change it for R17. |
| Lenovo | Yes but | We see some value for having a field description for nr-DL-TDOA-AdditionalMeasurements since currently only a field description for nr-DL-TDOA-AdditionalMeasurementsExt exists in LPP. Details of the field description can be left to further discussion, e.g. merge of nr-DL-TDOA-AdditionalMeasurements and nr-DL-TDOA-AdditionalMeasurementsExt. |
| Qualcomm | No | Not essential. The reason why the description for the *nr-DL-TDOA-AdditionalMeasurementsExt* was added is because of the TEG reporting. However, for the *nr-DL-TDOA-AdditionalMeasurements*, this is just for additional RSTDs. |
| MediaTek | Slightly no | This change does not really seem essential. The field itself is clear when the related field descriptions are taken into account, and the Rel-17 dependency between the fields is already captured in the Ext field description. |
| Xiaomi | Yes | The additional measurement is the RSTD measurement. |
| Samsung | Yes with comment | At least, the correction for R17 seems needed to us. Since the field description of TDOA-AdditionalMeasurementsExt already extists in R17, it would be beneficial to have the field description also for TDOA-AdditionalMeasurements to clarify the different usage of two fields as described in QC’s comment.By the way, there seems the same issue also for *nr-Multi-RTT-AdditionalMeasurements-r16.* |
| LG | Yes | Seems not essential, but we wonder why specification avoid description.  |
| Nokia | Yes with comment | Agree to have only a Rel-17 CR. The list size for the -r16 and -r17 fields are 3 and 31 respectively. Also, Rel-16 does not support TEGs. So, some clarification on how the list of 3 additional measurements differ from the list of 31 measurements is useful. |

Rapporteur Summary:

14 companies participated in the discussion, in which:

(6/14) companies support both R16 and R17 CR;

(5/14) companies does not support both R16 and R17 CR;

(3/14) companies support only R17 CR.

Since there are majority on the support of Rel-17 CR, rapporteur suggests to agree Rel-17 CR only. Companies think the TOA measurement is inappropriate and should be RSTD measurement, the CR wording should be modified. In addition, if only Rel-17 CR is agreed, the CR category and WI code should be updated accordingly, i.e., cat F and NR\_pos\_enh-Core.

***Proposal 2: Revise the Rel-17 CR R2-2302990, changing ‘TOA’ to ‘RSTD’, changing CR category to cat F, changing WI code to NR\_pos\_enh-Core.***

**Q2-1: Do companies agree with revised Rel-17 CR?**

|  |  |  |
| --- | --- | --- |
| Companies  | Agree/disagree | Comments  |
|  |  |  |
|  |  |  |
|  |  |  |

## Correction of Location Server behaviour

It is proposed by [5][6][7] that the network’s behaviour should not have any explicit ‘shall’ requirements. Therefore [5] [6][7] have changed all the ‘location server shall..’ to ‘location server does..’ in the LPP specification for Rel-15, Rel-16 and Rel-17, respectively.

**Rapporteur’s comments:**

This change on the NW’s behaviour is reasonable to follow the spec writting rules. In addition, RAN2#121 also has achieved the following to support the CRs:

|  |
| --- |
| [Note in NR-DL-PRS-AssistanceData field descriptions]Proposal 5: The CRs inR2-2301432 Correction of Note in NR-DL-PRS-AssistanceData field descriptions Ericsson CR Rel-16 37.355 16.9.0 0411 - F NR\_pos-CoreR2-2301434 Correction of Note in NR-DL-PRS-AssistanceData field descriptions Ericsson CR Rel-17 37.355 17.3.0 0413 - A NR\_pos-Coreare essential corrections.Discussion:Qualcomm think the CR is not correct; NOTEs to tables are not informative and can contain requirements. They also understand that the solution came from RAN1 and the “shall” in the NOTE aligns with that solution.Intel point out that it is a “shall” on the network. Chair understands that we would normally say “the location server sets…” Qualcomm would be OK with this solution.* To be changed to “the location server sets the value”
* Agreed with this change and with the editorial change from R2-2300328 merged in
 |

However, one ‘shall’ may be missed out in Rel-15/Rel-16/Rel-17 specifications as follows:

|  |
| --- |
| 6.5.2.2 GNSS Assistance Data Elements– *GNSS-ReferenceTime*The IE *GNSS-ReferenceTime* is used by the location server to provide the GNSS specific system time with uncertainty and the relationship between GNSS system time and network air-interface timing of the eNodeB/NodeB/BTS transmission in the reference cell.If the IE *networkTime* is present, the IEs *gnss-SystemTime* and *networkTime* provide a valid relationship between GNSS system time and air-interface network time, as seen at the approximate location of the target device, i.e. the propagation delay from the gNB/ng-eNB/eNodeB/NodeB/BTS to the target device is compensated for by the location server.  |

Rapporteur suggests to include this change in the [5], [6] and [7].

**Q3: Do companies agree with the current content of Rel-15/Rel-16/Rel-17 LPP CRs of [5],[6] and [7]?**

|  |  |  |
| --- | --- | --- |
| companies | Yes/No | comments |
| ZTE | Yes |  |
| vivo | Yes |  |
| OPPO | Yes |  |
| CATT | See the comment | We prefer to correct this issue from the Rel-18 specification. |
| Ericsson | Yes | To mention to CATT: We should not have spec inconsistency; i.e in one version we say shall and in other we remove shall. |
| Intel | No | Not essential |
| Huawei, HiSilicon | NO | when you come to the 3GPP drafting rules see Annex E of 21801, a requirement should be expressed with a “shall” in the spec and the above change is on a requirement |
| Lenovo | Maybe from Rel-17 onwards | * Cover page: is the WI code “NR\_newRAT-Core” correct?
* The “shall” for the location server is used since Rel-9 (see TS 36.355) and until now nobody complained about the “shall” requirements for the location server. We wonder whether it is critical to fix it from Rel-15. If companies want to fix it then it might be sufficient to do it from Rel-17.
 |
| Qualcomm | No | Not essential. This text is there since Rel-9 and we are not aware of any problems in the field/deployments. Agree with CATT. Can be considered for Rel-18, if needed. |
| MediaTek | Yes, but OK to start from Rel-17 | Generally agree with Lenovo/CATT that it is not critical to correct this historical issue for all releases. |
| Xiaomi | No | Not essential |
| Samsung | Yes from R17 |  |
| LG | Yes from R17 | Agree with MediaTek.  |
| Nokia | No | Not essential. |

Rapporteur summary:

Q3’s summary is given under Q4.

**Q4: Do companies agree with adding the missing change (as specified in rapporteur’s comments) to the CRs?**

|  |  |  |
| --- | --- | --- |
| companies | Yes/No | comments |
| ZTE | Yes |  |
| vivo | Yes |  |
| OPPO | Yes |  |
| CATT | See the comment | See our comment in Q3. |
| Ericsson | Yes | To mention to CATT: We should not have spec inconsistency; i.e in one version we say shall and in other we remove shall. |
| Intel | No | Not essential |
| Huawei, HiSilicon | No |  |
| Lenovo | Maybe from Rel-17 onwards | If there is support for the corrections then Rel-17 is preferred. |
| Qualcomm | No | See our comment in Q3. |
| MediaTek | Yes, but OK to start from Rel-17 |  |
| Xiaomi | No |  |
| Samsung | Yes from R17 |  |
| LG | Yes from R17 |  |
| Nokia | No | Not essential. |

Rapporteur summary:

14 companies participated in the discussion, in which:

(4/14) companies support the Rel-15, Rel-16 and Rel-17 CR with the adding change;

(4/14) companies support the Rel-17 CR with the adding change;

(6/14) companies does not support the Rel-15, Rel-16 and Rel-17 CR, and think Rel-18 should address the issue.

The majority support the Rel-17 CR with the adding change. Same as above, if only Rel-17 CR is agreed, the WI code and CR category should also be changed. So rapporteur suggest to propose:

***Proposal 3: Revise the CR R2-2304048, adding the missing change in section 6.5.2.2, changing CR category to cat F, changing WI code to NR\_pos\_enh-Core.***

**Q4-1: Do companies agree with revised Rel-17 CR?**

|  |  |  |
| --- | --- | --- |
| Companies  | Agree/disagree | Comments  |
|  |  |  |
|  |  |  |
|  |  |  |

# Rel-16 MAC corrections

In [8][9], it is proposed to change ‘omitted’ to ‘absent’ in the SP Positioning SRS Activation/Deactivation MAC CE, the reason is, the agreement of RAN2#110 specifies the field DL-PRS resource ID and the field SSB index are optionally present, but the wording ‘omitted’ will imply that the network shall include the octet and the UE shall omit the octet, which is not aligned with the agreement. Therefore, [8][9] include following changes:

|  |
| --- |
| 6.1.3.36 SP Positioning SRS Activation/Deactivation MAC CE- PI: This field indicates whether the field DL-PRS resource 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 resource ID is present; otherwise, the octet is absent;- SI: This field indicates whether the field SSB index is present within the Spatial Relation for Resource IDi with SSB. If the field is set to 1, the octet containing the field SSB index is present; otherwise, the octet is absent; |

An editorial change is also included in the CR:

|  |
| --- |
| 6.1.3.36 SP Positioning SRS Activation/Deactivation MAC CE- C: This field indicates whether the octets containing Resource Serving Cell ID field(s) and Resource BWP ID field(s) within the field Spatial Relation for Resource ID i are present, except for Spatial Relation Resource IDi with DL-PRS or SSB. When A/D is set to 1, if this field is set to 1, the octets containing Resource Serving Cell ID field(s) and Resource BWP ID field(s) in the field Spatial Relation for Resource IDi are present, otherwise if this field is set to 0, they are not present. When A/D is set to 0, this field is always set to 0 that they are not present; |

**Rapporteur’s comments:**

Rapporteur thinks the changes are correct to avoid the misunderstanding of UE/gNB when performing the behaviour.

**Q5: Do companies agree with the Rel-16/Rel-17 MAC CRs [8] and [9]?**

|  |  |  |
| --- | --- | --- |
| companies | Yes/No | comments |
| ZTE | Yes |  |
| vivo | No | Both words ‘absent’ and ‘omitted’ are used in MAC spec and share the same meaning. |
| OPPO | Yes | It is better to use “absent” to correspond to “present”. |
| CATT | Yes | Avoid unnecessary misunderstanding. |
| Ericsson | No | That is not correct. Ommitted here means NW will not include those fields; which is equivalent to say absent. |
| Intel | No | Not essential |
| Huawei, HiSilicon | No | The spec is specified grom the UE’s perspective. It does not matter how the NW sets the field but the UE should ignore it. The MAC CE should be byte aligned and not sure what does it mean by absent |
| Lenovo | Partly | * 1st change: We wonder about the interpretation that the opposite of “If the field is set to 1, the octet … is present” implies that the NW is expected to include the octet in the MAC CE. To our understanding “omitted” and “absent” are equivalent.
* 2nd change: ok
 |
| Qualcomm | No | Not essential. Current text seems not wrong.  |
| MediaTek | Second change only | We understand that “absent” and “omitted” mean the same thing here. The second (editorial) change is OK. |
| Xiaomi | Yes |  |
| Samsung | Second change only | For the first change, we share the view with other companies that both “absent” and “omitted” are used having the same meaning in MAC. |
| LG | Yes but | It is fine to use “absent” but current word “omitted” is not wrong. We can go with majority view.  |
| Nokia | No | Not essential. Typos fixes can be merged with another agreed MAC CR, if one is available. |

Rapporteur summary:

14 companies participated in the discussion, in which:

(5/14) support to change ‘omit’ to ‘absent’;

(9/14) does not support to change ‘omit’ to ‘absent’;

(13/14) support the second editorial change.

Based on companies feedback, there are opposite views on the understanding of UE behaviour on ‘omit’.

Some companies think the ‘omit’ is equal to‘absent’, both of them mean gNB does not include the octet at all, when UE decoding, UE assumes the octet as absent;

Some companies think the ‘omit’ is not equal to ‘absent’, omit means gNB sends the octet and UE ignores the value in the octet(but the octet is there as a placeholder, which will not lead to misaligned decoding), absent means gNB does not send the octet at all, when UE decoding, UE assumes the octet as absent.

The key problem is how the product is currently worked, since the different understanding on ‘omit’ between UE and gNB shall cause IOT issue. After some offline discussion, since the CR may cause NBC issue, it is essential to let companies check internally to see if there is a unified understanding, then we can decide whether and how to make the change. So rapporteur suggests to postpone the discussion to next meeting.

***Proposal 4: Postpone the CR R2-2303501 and R2-2303502 to next meeting.***

**Q5-1: Do companies agree with revised Rel-16 and Rel-17 CR?**

|  |  |  |
| --- | --- | --- |
| Companies  | Agree/disagree | Comments  |
|  |  |  |
|  |  |  |
|  |  |  |

# Summary

***Proposal 1: Agree Rel-16 RRC CR R2-2302985 and Rel-17 RRC CR R2-2302986.***

***Proposal 2: Revise the Rel-17 CR R2-2302990, changing ‘TOA’ to ‘RSTD’, changing CR category to cat F, changing WI code to NR\_pos\_enh-Core.***

***Proposal 3:Revise the Rel-17 CR R2-2304048, adding the missing change in section 6.5.2.2, changing CR category to cat F, changing WI code to NR\_pos\_enh-Core.***

***Proposal 4: Postpone the CR R2-2303501 and R2-2303502 to next meeting.***