3GPP TSG-RAN WG2 Meeting #113-e***R2-21xxxxx***

Electronic, January 25 – February 5, 2021

**Agenda item:** 5.5

**Source:** Qualcomm Incorporated

**Title:** Summary of Email discussion [AT113-e][603][POS] NR Rel-15 positioning CRs

**Document for:**  Discussion and Decision

# 1. Introduction

This document summarizes the following email discussion.

* [AT113-e][603][POS] NR Rel-15 positioning CRs (Qualcomm)

      Scope: Discuss and conclude on R2-2101380/R2-2101381, R2-2101465, R2-2101468, R2-2100397, R2-2100398/R2-2100399, R2-2100400/R2-2100401, R2-2101816/R2-2101817, and R2-2101926/R2-2101927

      Intended outcome: Agreed CRs

      Deadline:  Monday 2021-02-01 1200 UTC

References:

[1] R2-2100397, "Remove the NOTE in architecture figure in TS38.305", CATT
 CR Rel-15, 38.305, 5.7.0, 0054 , F, NR\_newRAT-Core.

[2a] R2-2100398, "Corrections on the indication for the not provided assistance data and location information in TS38.305", CATT
 CR Rel-15, 38.305, 15.7.0, 0055, F, NR\_newRAT-Core.

[2b] R2-2100399, "Corrections on the indication for the not provided assistance data and location information in TS38.305", CATT
 CR Rel-16, 38.305, 16.3.0, 0056, A, NR\_newRAT-Core.

[3a] R2-2100400, "Corrections on the descriptions of RequestLocationInformation message in TS38.305", CATT
 CR Rel-15, 38.305, 15.7.0, 0057, F , NR\_newRAT-Core.

[3b] R2-2100401, "Corrections on the descriptions of RequestLocationInformation message in TS38.305", CATT
 CR Rel-16, 38.305, 16.3.0, 0058, A, NR\_newRAT-Core.

[4a] R2-2101465, "Support OTDOA assistance data for case of NR serving cell", Qualcomm Incorporated, Ericsson CR Rel-15, 38.305, 15.7.0, 0061, F, NR\_newRAT-Core.

[4b] R2-2101468, "Support OTDOA assistance data for case of NR serving cell", Qualcomm Incorporated, Ericsson CR Rel-16, 38.305, 16.3.0, 0062, F, NR\_newRAT-Core.

[5a ] R2-2101815, "Clarification on E-CID and NR E-CID", Huawei, HiSilicon
 discussion, Rel-15, NR\_newRAT-Core

[5b] R2-2101816, "Correction to E-CID-R15", Huawei, HiSilicon
 CR Rel-15, 38.305, 15.7.0, 0063, F, NR\_newRAT-Core

[5c] R2-2101817, "Correction to E-CID-R16", Huawei, HiSilicon
 CR Rel-16, 38.305, 16.3.0, 0064, A, NR\_newRAT-Core

[6a] R2-2101926, "Correction on the description for UE capability transfer-R15", Huawei, HiSilicon
 CR Rel-15, 38.305, 15.7.0, 0066, F, NR\_newRAT-Core

[6b] R2-2101927, "Correction on the description for UE capability transfer-R16", Huawei, HiSilicon
 CR Rel-16, 38.305, 16.3.0, 0067, A, NR\_newRAT-Core

[7a] R2-2101928, "Correction to 5G support for NB-IOT positioning-R15", Huawei, HiSilicon
 CR Rel-15, 38.305, 15.7.0, 0068, F, NR\_newRAT-Core

[7b] R2-2101929, "Correction to 5G support for NB-IOT positioning-R16", Huawei, HiSilicon
 CR Rel-16, 38.305, 16.3.0, 0069, A, NR\_newRAT-Core

[8a] R2-2101379, "GNSS RTK observations resolution indication", Ericsson
 discussion, Rel-15

[8b] R2-2101380, "Correction of A-GNSS Assistance Data RTK Observation", Ericsson
 CR Rel-15, 37.355, 15.1.0, 0285, F, NR\_newRAT-Core.

[8c] R2-2101381, "Correction of A-GNSS Assistance Data RTK Observation", Ericsson
 CR Rel-16, 37.355, 16.3.0, 0286, A, NR\_newRAT-Core

# 2. Discussion

## 2.1 38.305: Remove the NOTE in architecture figure (R2-2100397 [1])

Reason for change: In RAN3 LS R2-2008514/ R3-205719 LS on the NOTE in architecture figure in TS 38.305, RAN3 mentioned

 *RAN3 have discussed the note in the architecture figure of stage-2 TS 38.305 section 5.1, which reads “Proprietary interface possible”. RAN3 is of the opinion that such a note is not needed in the stage-2 NG-RAN architecture figure and does not add clarity. Furthermore, RAN3 believes that such archietcture details are in the RAN3 domain*.

 RAN3 therefore respectfully asks RAN2 to take the above into account and consider removing the note.

Summary of change: Remove the note for the figure Figure 5.1-1.

Rapporteur's Comments:

- The NOTE in the architecture Figure 5.1-1 was removed in the Rel-16 version of the specification (CR#0037) at RAN2#112e, but not in the Rel-15 version.

- The mentioned RAN3 LS (R2-2008514/R3-205719) was related to the Rel-16 NR Positioning WI (NR\_pos-Core) and not NR\_newRAT-Core.

**Question 1-1:** Do you agree that a Rel-15 correction is needed according to the Reason for Change provided in R2-2100397 [1]?

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| Company | Yes/No | Comments |
| Intel | No | R16 CR in R2-2009000 has been agreed in last meeting. In RAN3 LS, RAN3 only mentioned R16 since there is no UE impact. Therefore R15 CR is not needed. |
| Ericsson | No | Agree with Intel |
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**Question 1-2:** If your answer to Question 1-1 was "Yes", do you agree with the CR in [1]?

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## 2.2 38.305: Corrections on the indication for the not provided assistance data and location information (R2-2100398, R2-2100399) [2]

Reason for change: According to the LPP error detection in the error handling procedures in TS37.355:

 1> if the message type is an *LPP RequestAssistanceData* or *RequestLocationInformation* and some or all of the requested information is not supported:

 2> return any information that can be provided in a normal response, which includes indications on other information that is not supported.

 It specifies that if some or all of the requested information is not supported for the assistance data or location information transfer procedure, LMF or UE will reture any information that can be provided in an LPP message, which includes indications on the information that is not provided.

 However, as for the assistance data transfer procedure for A-GNSS, OTDOA, Barometric Pressure Sensor, WLAN and TBS positioning methods in TS38.305, it only specifies the case that when all of the requested assistance data is not supported, LMF will return any information that can be provided in an LPP message, which includes indications on the assistance data that is not provided. As for the case that some of the requested assistance data is not provided, what LMF should to do is unclear.

 Besides, as for the location information transfer procedure for A-GNSS, OTDOA, E-CID, Barometric Pressure Sensor, WLAN, Bluethooth, TBS and Motion Sensor positioning methods in TS38.305, it only specifies the case that when all of the requested assistance data is not supported, UE will return any information that can be provided in an LPP message, which includes indications on the assistance data that is not provided. As for the case that some of the requested assistance data is not provided, what UE should to do is unclear.

Summary of change: 1. For the assistance data transfer procedure for A-GNSS, OTDOA, Barometric Pressure Sensor, WLAN and TBS positioning methods in TS38.305, add a clarification that If some of the UE requested assistance data cannot be provided by the LMF, return any information that can be provided in an LPP message of type Provide Assistance Data which includes a cause indication for the not provided assistance data.

 2. For the assistance data transfer procedure for A-GNSS, OTDOA, E-CID, Barometric Pressure Sensor, WLAN, Bluethooth, TBS and Motion Sensor positioning methods in TS38.305, add a clarification that If some of the requested measurement information cannot be provided by the UE, the UE returns any information that can be provided in an LPP message of type Provide Location Information which includes a cause indication for the not provided location information.

NOTE: Similar CRs for TS 36.305 (Rel-14 – Rel-16) are also proposed in AI 4.4 (R2-2100394, R2-2100395, R2-2100396)

Rapporteur's Comments:

- This Stage 2 text is available since Rel-9 and seems has not created problems/misunderstandings so far. It is also unclear how this issue can result in "positioning accuracy decrease or even positioning failure", as mentioned in the "Consequences if Not Approved" section.

- The Rel-15 and Rel-16 CRs are not exact mirrors (there are more affected clauses in the Rel-16 version compared to the Rel-15 version); i.e., both CRs (if needed) should probably be Cat F.

**Question 2-1:** Do you agree that a correction is needed according to the Reason for Change provided in R2-2100398/R2-2100399 [2]?

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| Company | Yes/No | Release15/16/both | Comments |
| Intel | No | both | Change 1: the only thing is not covered in stage 2 is “If any of the UE requested assistance data in step (1) are not provided in step 2, “the LMF also needs to indicate the error cause. But no essential since anyway the UE will be implemented based on stage 3. Change2, do not see the problem. Current text is “before any of the requested measurements have been obtained”, shall already cover “UE can only provide some of the requested information” |
| Ericsson | No | Both |  |
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**Question 2-2:** If your answer to Question 2-1 was "Yes", do you agree with the CRs in [2a] and/or [2b]?

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## 2.3 38.305: Corrections on the descriptions of RequestLocationInformation message (R2-2100400, R2-2100401) [3]

Reason for change: 1. According to the IE *A-GNSS-RequestLocationInformation* in LPP *RequestLocationInformation* message in TS37.355, the positioning mode of UE-based and UE- assisted is indicated within the *RequestLocationInformation* message but not within the positioning instructions of A-GNSS.

 However, the current specification specifies that there include positioning mode of UE-based, UE-assisted and Standalone within the positioning instructions of A-GNSS, which is conflict with TS37.355.

 2. According to the LPP RequestLocationInformation message in TS37.355, there is not include positioning instructions for WLAN, Bluethooth, TBS, Motion Sensor and Barometric Pressure Sensor positioning methods. Besides, the positioning mode indicated within the *RequestLocationInformation* message do not include Standalone mode.

 However, the current specification specifies that there include Standalone positioning mode within the positioning instructions for WLAN, Bluethooth, TBS, Motion Sensor and Barometric Pressure Sensor positioning methods, which is conflict with TS37.355.

 3. A-GNSS positioning method supporte standlone mode as described in clause 8.1. However, there lacks of A-GNSS positioning methods in the general descriptions of positioning methods supported in standlone mode in clause 4.3.1.

 4. According to the LPP RequestLocationInformation message in 37.355, the positioning mode can also be indicated within the RequestLocationInformation message for the DL-AOD, DL- TDOA as well as multi-RTT positioning methods, which does not described in the corresponding location information transfer procedure in current TS38.305.

Summary of change: 1.For the location information transfer procedure of A-GNSS, remove the positioning mode from the description of the positioning instructions and clarify the corresponding positioning mode can be indicated within the *RequestLocationInformation* message.

 2. For the location information transfer procedure of WLAN, Bluethooth, TBS, Motion Sensor and Barometric Pressure Sensor positioning methods, delete the description of the positioning instructions and clarify the corresponding positioning mode can be indicated within the *RequestLocationInformation* message.

 3. Add A-GNSS positioning method in the general descriptions of positioning methods supported in standlone mode in clause 4.3.1.

 4. For the location information transfer procedure of DL-AOD, DL-TDOA and multi-RTT positioning methods, clarify that the corresponding positioning mode can be indicated within the RequestLocationInformation message.

NOTE: The Rel-15 [3a] and Rel-16 [3b] CRs are not identical:
Change #3 above is only proposed for the Rel-15 version;
Change #4 above is only proposed for the Rel-16 version.
(For simplicity, the Reason/Summary of Change has been merged in the description above; please see the actual CRs in [3]).

Rapporteur's Comments:

- "Positioning Instructions" in Stage 2 are used in a generic sense which does not necessarily refer to specific LPP IEs. "Positioning Instructions" generally include common and positioning method specific instructions.

- Assisted-GNSS was not included in the list of methods supported in standalone mode below Table 4.3.1-1 on purpose. Assisted-GNSS per se is not standalone. Clause 8.1 describes "GNSS positioning methods" incl. A-GNSS and autonomous (standalone) mode.

- Since Rel-15 and Rel-16 CRs are not exact mirrors, both CRs (if needed) should probably be Cat F.

**Question 3-1:** Do you agree that a correction is needed according to the Reason for Change provided in R2-2100400/R2-2100401 [3]?

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| Company | Yes/No | Release15/16/both | Comments |
| Intel | No | Both  | 1 and 2, in stage 3 postioning mode is reflected based on “locationInformationType” in CommonIEsRequestLocationInformation.Stage 2 used “positioning instructions”, it does not mean the fields “gnss-PositioningInstructions”. Therefore nothing wrong. 3 seems correct. But the change is not essential; |
| Ericsson | Partly | Rel-16 | 3. is OK since GNSS can be in standalone |
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**Question 3-2:** If your answer to Question 3-1 was "Yes", do you agree with the CRs in [3a] and/or [3b]?

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## 2.4 38.305: Support OTDOA assistance data for case of NR serving cell (R2-2101465, R2-2101468) [4]

Reason for change: 1. When the UE is served by a NR cell, and the LMF requests the UE to perform measurements for OTDOA positioning, the LMF may provide assistance data including optionally timing information to enable the UE to quickly acquire the LTE reference cell. However the LMF is not aware of timing relationships between the LTE and NR cells because it does not receive the SFN Initialization Time for NR cells, although it is of course able to do so for LTE cells.

 RAN3 has agreed a Rel-15 NRPPa CR (R3-207173, with Rel-16 mirror in R3-207174) whereby the OTDOA Information Exchange procedure is used towards gNBs in order to enable the LMF to retrieve timing and access point location information for cells in a gNB. With this, it becomes possible for the LMF to construct the assistance data in LPP related to LTE-NR timing offset.

 However stage 2 is not aligned to this.

 2. There is a remaining Editor's Note in clause 8.2.3.2.2 which has been removed in the Rel- 16 version (CR#0053) but not in the Rel-15 version of the specification.

 3. In clause 8.10.3.2.3, 8.13.3.3a, 8.14.3.3a: in the description of each bullet point (2) there is a wrong reference to the MAC specification.

Summary of change: 1. OTDOA Positioning support includes potential interaction with gNBs, and this is captured in relevant sections.
 A new section is introduced under clause 8.2.2 to list the information that may be transferred from the gNB to LMF.
 The detail on Assistance Data Delivery between LMF and ng-eNB for OTDOA is generalized (i.e. ng-eNB is replaced by NG-RAN node wherever applicable).

 2. Obsolete Editor's Note is deleted.

 3. In clause 8.10.3.2.3, 8.13.3.3a, 8.14.3.3a: in the description of each bullet point (2) the reference to the MAC specification 38.321 is corrected.

NOTE: The Rel-15 [4a] and Rel-16 [4b] CRs are not identical:
Change #2 is only proposed for the Rel-15 version;
Change #3 is only proposed for the Rel-16 version.
(For simplicity, the Reason/Summary of Change has been merged in the description above; please see the actual CRs in [4]).

Rapporteur's Comments:

- The OTDOA Information Exchange procedure towards gNBs has been added to NRPPa Rel-15 by RAN3.

**Question 4-1:** Do you agree that a correction is needed according to the Reason for Change provided in R2-2101465/R2-2101468 [4]?

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| Company | Yes/No | Release15/16/both | Comments |
| Intel | Yes | Both | Agree to align with RAN3 changes. |
| Ericsson | Yes | Both | Relevant alignment and clarification |
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**Question 4-2:** If your answer to Question 4-1 was "Yes", do you agree with the CRs in [4a] and/or [4b]?

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| Company | Yes /Yes with Modification | Comments |
| Intel | Yes |  |
| Ericsson | Yes |  |
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## 2.5 38.305: Correction to E-CID (R2-2101815, R2-2101816, R2-2101817) [5]

Reason for change: The specification support in Rel-15 for a gNB to report E-UTRA measuremrent as E-CID is not included in the WID NR\_newRAT, and is also contradicting in the current stage-2 specification. A Rel-16 CR has already removed the support, but the Rel-15 spec has not been changed accordingly.

Summary of change: 1. The sentence “In the case of a serving gNB, E-CID positioning can be supported using E- UTRA measurements provided by a UE to the serving gNB” is removed from clause 4.3.4.

 2. Remove the E-UTRA measurement from the list transferred from gNB to LMF in clause 8.3.2.3.

Rapporteur's Comments:

- Cover Sheet: The Rel-16 version has no CR number; both CRs have no revision number (should be "-").

- Both CRs (if needed) should probably be Cat F.

**Question 5-1:** Do you agree that a correction is needed according to the Reason for Change provided in R2-2101816/R2-2101817 [5]?

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| Company | Yes/No | Release15/16/both | Comments |
| Intel |  |  | Just for my clarification, So, the gNB can only report CGI to the LMF for Rel-15 ECID? |
| Ericsson | No |  | Even though it is not explcit in WID, we do not see the need to revert the previous agreements. |
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**Question 5-2:** If your answer to Question 5-1 was "Yes", do you agree with the CRs in [5b] and/or [5c]?

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## 2.6 38.305: Correction on the description for UE capability transfer (R2-2101926, R2-2101927) [6]

Reason for change: In Sectoin 7.1.2.1, the description for capability transfer refers the whole section to the LTE positioning stage2 spec for more detials. While in 36305, the description is for E-SMLC server instead of LMF.

 7.1.2.1 Capability transfer

 A UE request for capability from E-SMLC or delivery of the E-SMLC capability to the UE is not supported in this version of the specification.

 Capabilities in an LPP context refer to the ability of a target or server to support different position methods defined for LPP, different aspects of a particular position method (e.g. different types of assistance data for A-GNSS) and common features not specific to only one position method (e.g. ability to handle multiple LPP transactions). These capabilities are defined within the LPP protocol and transferred between the target and the server using LPP transport.

 The exchange of capabilities between a target and a server may be initiated by a request or sent as "unsolicited" information. If a request is used, the server sends an LPP Request Capabilities message to the target device with a request for capability information. The target sends an LPP Provide Capabilities message.

 Revised paragraph similar to section 7.1.2.5 needs to be added to revise for the description of LMF.

Summary of change: Add a complete description for capability transfer for NR E-CID instead of refering to the LTE spec.

Rapporteur's Comments:

- The term "E-SMLC" appears only in the first sentence of the referenced description. This sentence seems generally not wrong also for 38.305.

- Cover Sheet: Both CRs have no revision number (should be "-").

**Question 6-1:** Do you agree that a correction is needed according to the Reason for Change provided in R2-2101926/R2-2101927 [6]?

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| Company | Yes/No | Release15/16/both | Comments |
| Intel | No | Both | No inter-operability issue. Not essential. |
| Ericsson | No | Both | Agree with Intel |
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**Question 6-2:** If your answer to Question 6-1 was "Yes", do you agree with the CRs in [6a] and/or [6b]?

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## 2.7 38.305: Correction to 5G support for NB-IOT positioning (R2-2101928, R2-2101929) [7]

Reason for change: In the legacy LTE stage2 spec for positioning, the following paragraph has been specified for NB-IOT positioning.

 7.1.3 UE positioning measurements in idle state for NB-IoT

 […]

 While for NR spec, the above description is not given. In our understanding, NB-IOT supported in NR is under the scope of NB-IoT connected to 5GC and is supported for the current network architecture for positioning.

Summary of change: Add a paragraph for the description for NB-IOT positioning in 5G.

Rapporteur's Comments:

- Cover Sheet: Both CRs have no revision number (should be "-"); clauses affected are missing (the proposed new clause should be mentioned).

- 36.305 has the NB-IoT text in clause 7.1.3. For 38.305, clause 7.x seems more appropriate than the proposed 5.3.x (if the CR is needed).

**Question 7-1:** Do you agree that a correction is needed according to the Reason for Change provided in R2-2101928/R2-2101929 [7]?

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| Company | Yes/No | Release15/16/both | Comments |
| Intel |  |  | No strong opinion. But if we do capture NB-IOT for option5. Then we need to clarify it is only applicable for ng-eNB. |
| Ericsson |  |  | No strong Opinion. Agree with Intel that it should be clarified that is for ng-eNB. |
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**Question 7-2:** If your answer to Question 7-1 was "Yes", do you agree with the CRs in [7a] and/or [7b]?

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## 2.8 37.355: Correction of A-GNSS Assistance Data RTK Observation (R2-2101379, R2-2101380, R2-2101381) [8]

Reason for change: The GNSS RTK observations IE was introduced based on the RTCM MSM messages. These messages come in two different resolutions, standard and high, while RTK-Observations only represents in the high resolution. This means that the device cannot determine the resolution of the original MSM message. Therefore, a resolution indicator standard/high would makes the representation complete.

 Such a resolution indication can be used by the device to assess uncertainty together with the RTK residuals, and also in case the messages are translated back internally in the device to RTCM MSM messages to use a legacy positioning engine that supports RTCM MSM messages.

Summary of change: An optional resolution indicator is added to the GNSS-RTK-Observations IE.

Rapporteur's Comments:

- Unclear how a resolution indication "can be used by the device to assess uncertainty".

- LPP value range allows for the high-resolution, which includes the low-resolution as special cases.

- The low-resolution fields would also need a different scale factor.

- Work Item code seems wrong; should be LCS\_LTE\_acc\_enh-Core (if a CR is needed).

**Question 8-1:** Do you agree that a correction is needed according to the Reason for Change provided in R2-2101380/R2-2101381 [8]?

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| Company | Yes/No | Release15/16/both | Comments |
| Intel |  |  | Not quite sure whether different RTCM Multiple Signal Messages (MSM) is handled by different engine? If yes, then additional indication is needed to distinguish different MSM messages. |
| Ericsson | Yes | Both | Typically, legacy positioning engines states which MSM messages they support. Therefore, needed for complete reproduceability of the original information in RTCM.Regarding questions from the rapporteur:- The observation quantization error depends on the representation and whether the original values were provided with standard or high resolution. To some extent this is addressed by the residual IEs (only defined for GPS and GLONASS, but they are not always provided and are not addressing all attributes)- high and standard resolution can both be represented, and therefore it is not possible for the target device to disclose whether the original information was provided with high or standard resolution.- the existing scaling factors are enough to define the observation itself, but can be good to describe the standard representation granularity in the field description - Agree – it should have been LCS\_LTE\_acc\_enh-Core as work item code |
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**Question 8-2:** If your answer to Question 8-1 was "Yes", do you agree with the CRs in [8b] and/or [8c]?

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| --- | --- | --- |
| Company | Yes /Yes with Modification | Comments |
| Ericsson | Yes with modification | Update based on rapporteur comments:- field description to define the standard resolution granularity- Change the work item code to LCS\_LTE\_acc\_enh-Core |
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# 3. Summary