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

**Electronic meeting, Jan 25th – Feb 05th, 2021**

**Agenda item:** 4.4

**Source:** CATT

**Title:** Summary of email discussion[AT113-e][602][POS] LTE Rel-15 positioning CRs

**Document for:** Discussion and Agreement

# 1 Introduction

This document is to kick off the following email discussion:

* [AT113-e][602][POS] LTE Rel-15 positioning CRs (CATT)

      Scope: Discuss and conclude on R2-2100391/R2-2100392/R2-2100393, R2-2100394/R2-2100395/R2-2100396, and R2-2101819/R2-2101818

      Intended outcome: Agreed CRs

      Deadline:  Monday 2021-02-01 1200 UTC

In this offline discussion, we will discuss and conlcde based on the prescribed scope related with LTE Rel-15 positioning stage2 and stage 3 CRs. The tdocs under this discussion are:

R2-2100391 Corrections on the descriptions of RequestLocationInformation message in TS36.305 CATT CR Rel-14 36.305 14.3.0 0094 - F UTRA\_LTE\_iPos\_enh2-Core

R2-2100392 Corrections on the descriptions of RequestLocationInformation message in TS36.305 CATT CR Rel-15 36.305 15.5.0 0095 - A UTRA\_LTE\_iPos\_enh2-Core

R2-2100393 Corrections on the descriptions of RequestLocationInformation message in TS36.305 CATT CR Rel-16 36.305 16.2.0 0096 - A UTRA\_LTE\_iPos\_enh2-Core

R2-2100394 Corrections on the indication for the not provided assistance data and location information in TS36.305 CATTCR Rel-14 36.305 14.3.0 0097 - F UTRA\_LTE\_iPos\_enh2-Core

R2-2100395 Corrections on the indication for the not provided assistance data and location information in TS36.305 CATT CR Rel-15 36.305 15.5.0 0098 - A UTRA\_LTE\_iPos\_enh2-Core

R2-2100396 Corrections on the indication for the not provided assistance data and location information in TS36.305 CATT CR Rel-16 36.305 16.2.0 0099 - A UTRA\_LTE\_iPos\_enh2-Core

R2-2101818 Correction to the basic production for positioning AD broadcast-R16 Huawei, HiSilicon CR Rel-16 37.355 16.3.0 0289 - A LCS\_LTE\_acc\_enh-Core

R2-2101819 Correction to the basic production for positioning AD broadcast-R15 Huawei, HiSilicon CR Rel-15 37.355 15.1.0 0290 - F LCS\_LTE\_acc\_enh-Core

# 2 Discussion

To make it easier to find the correct contact delegate in each company for potential follow-up questions, the rapporteur encourages the delegates who provide their contact information in this table:

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| Company | Delegate contact |

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Companies are requested to add their comments for each of the treated CRs of this email discussion in the boxes below.

## 2.1 Corrections on what can be requested within *RequestLocationInforamtion*

2.1.1 Positioning instructions supported within RequestLocationInformation

According to the LPP *RequestLocationInformation* message in TS36.355 [9], positioning instructions are not included in WLAN, Bluethooth, TBS and Barometric Pressure Sensor positioning methods. However, the current specification of stage 2 specifies that Standalone is included in positioning mode within the positioning instructions for WLAN, Bluethooth, TBS and Barometric Pressure Sensor positioning methods, which is conflict with TS36.355 [9]. Thus, the CRs of [1], [2] and [3] propose to delete the descriptions of positioning instructions from what can be requested within the location information transfer procedure for positioning methods of WLAN, Bluethooth, TBS and Barometric Pressure Sensor.

**Proposal 1: RAN2 to discuss to delete the positioning instructions from what can be requested within the location information transfer procedure for WLAN, Bluethooth, TBS and Sensor-based positioning method.**

Based on the above contributions, the following correction in clause 8.6.3.1 of TS36.305 is shown below high light in yellow. Other corrections in clause 8.7.3.1.1, 8.8.3.1.1, 8.9.3.1.1, 8.10.3.1[1] [2][3]are similar with it, which are not listed here.

============================CHANGE BEGINS===================================

8.6.3.1 E-SMLC initiated Location Information Transfer Procedure

Figure 8.6.3.1-1 shows the Location Information Transfer operations when the procedure is initiated by the E-SMLC.

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**Figure 8.6.3.1-1: E-SMLC-initiated Location Information Transfer Procedure**

(1) The E-SMLC sends a LPP Request Location Information message to the UE for invocation of barometric pressure sensor positioning. This request includes an indication of the positioning mode (UE-assisted, UE-based), specific requested UE measurements if any, and quality of service parameters (accuracy, response time).

(2) The UE performs the requested measurements and possibly calculates its own position. The UE sends an LPP Provide Location Information message to the E-SMLC before the Response Time provided in step (1) elapsed. If the UE is unable to perform the requested measurements, or if the Response Time provided in step 1 elapsed before any of the requested measurements have been obtained, 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.

===============================CHAGNE ENDS==================================

**Q1: Please provide your views on proposal 1 of deleting the positioning instructions from what can be requested within the location information transfer procedure for WLAN, Bluethooth, TBS and Sensor-based positioning method.**

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| **Company name** | **Agree/Disagree** | **Comments** |
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The CRs of [1], [2] and [3] also propose to remove the positioning mode from the description of the positioning instructions within the location information transfer procedure of A-GNSS. They pointed out that according to TS36.355 [9], although there is a positioning instruction for A-GNSS positioning method within the *A-GNSS-RequestLocationInformation* in *RequestLocationInformation* message, there is not any indication of the positioning mode for A-GNSS within the *GNSS-PositioningInstructions* of *A-GNSS-RequestLocationInformation* in *RequestLocationInformation* message. However, the current specification specifies that there is positioning mode within the positioning instructions of A-GNSS, which is conflict with TS36.355 [9].

-- ASN1START

GNSS-PositioningInstructions ::= SEQUENCE {

gnss-Methods GNSS-ID-Bitmap,

fineTimeAssistanceMeasReq BOOLEAN,

adrMeasReq BOOLEAN,

multiFreqMeasReq BOOLEAN,

assistanceAvailability BOOLEAN,

...,

**Proposal 2: RAN2 to discuss to remove the positioning mode from the description of the positioning instructions within the location information transfer procedure of A-GNSS.**

Based on the above contributions, the following correction has been proposed high light in yellow.

============================CHANGE BEGINS===================================

8.1.3.3.1 E-SMLC initiated Location Information Transfer Procedure

Figure 8.1.3.3.1-1 shows the Location Information Transfer operations for the network-assisted GNSS method when the procedure is initiated by the E-SMLC.

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**Figure 8.1.3.3.1-1: E-SMLC-initiated Location Information Transfer Procedure**

(1)The E-SMLC sends a LPP Request Location Information message to the UE for invocation of A-GNSS positioning. This request includes an indication of the positioning mode (UE-based, UE-assisted) and positioning instructions such as the positioning methods (GPS, Galileo, Glonass, BDS, etc. and possibly non-GNSS methods, such as downlink positioning or E-CID), specific UE measurements requested if any, such as fine time assistance measurements, velocity, carrier phase, multi-frequency measurements, and quality of service parameters (accuracy, response time).

(2) The UE performs the requested measurements and possibly calculates its own location. The UE sends an LPP Provide Location Information message to the E-SMLC before the Response Time provided in step (1) elapsed. If the UE is unable to perform the requested measurements, or if the Response Time provided in step 1 elapsed before any of the requested measurements have been obtained, 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.

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**Q2: Please provide your views on proposal 2 of removing the positioning mode from the description of the positioning instructions within the location information transfer procedure of A-GNSS.**

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| **Company name** | **Agree/Disagree** | **Comments** |
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2.1.2 Positioning mode indicated within *RequestLocationInformation*

The CRs of [1], [2] and [3] propose to clarify what positioning mode can be indicated within the *RequestLocationInformation* message for A–GNSS, WLAN, Bluethooth, TBS and Sensor-based positioning method. Within *CommonIEsRequestLocationInformation* of the *RequestLocationInformation* message as specified in TS36.355 [9], there is an indication of the requested information type, i.e., measurement information only, location estimate only, or location estimate and measurement information both supported, which may imply the positioning method, i.e., measurement information only corresponding to the UE-assisted positioning mode, while location estimate only as well as location estimate and measurement information both supported imply the UE-based positioning method. However, there is not any indication of the standalone positioning method within *RequestLocationInformation* message.

**Proposal 3: RAN2 to discuss to add a clarification of what positioning mode can be indicated within the *RequestLocationInformation* message for A-GNSS, WLAN, Bluethooth, TBS and Sensor-based positioning method.**

Based on the above contributions, the following correction in clause 8.6.3.1 of TS36.305 is shown below high light in yellow. Other corrections in clause 8.7.3.1.1, 8.8.3.1.1, 8.9.3.1.1, 8.10.3.1[1][2][3] are similar with it, which are not listed here.

============================CHANGE BEGINS===================================

8.6.3.1 E-SMLC initiated Location Information Transfer Procedure

Figure 8.6.3.1-1 shows the Location Information Transfer operations when the procedure is initiated by the E-SMLC.

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**Figure 8.6.3.1-1: E-SMLC-initiated Location Information Transfer Procedure**

(1) The E-SMLC sends a LPP Request Location Information message to the UE for invocation of barometric pressure sensor positioning. This request includes an indication of the positioning mode (UE-assisted, UE-based), specific requested UE measurements if any, and quality of service parameters (accuracy, response time).

(2) The UE performs the requested measurements and possibly calculates its own position. The UE sends an LPP Provide Location Information message to the E-SMLC before the Response Time provided in step (1) elapsed. If the UE is unable to perform the requested measurements, or if the Response Time provided in step 1 elapsed before any of the requested measurements have been obtained, 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.

===============================CHAGNE ENDS==================================

**Q3: Please provide your views on proposal 3 of adding a clarification of what positioning mode can be indicated within the *RequestLocationInformation* message for A-GNSS, WLAN, Bluethooth, TBS and Sensor-based positioning method.**

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| **Company name** | **Agree/Disagree** | **Comments** |
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## 2.2 Standalone mode supported

According to CR [1], CR [2] and CR [3], A-GNSS positoing method also support standalone mode. However, there lacks of A-GNSS positioning methods in the general descriptions of positioning methods supported in standlone mode in clause 4.3. Thus they propose to add the A-GNSS positioning method in the descriptions of the standalone mode supported positioning method.

**Proposal 4: RAN2 to discuss to add A-GNSS positioning method in the general descriptions of positioning methods supported in standlone mode in clause 4.3 of TS36.305.**

Based on the above contributions, the following correction has been proposed high light in yellow.

============================CHANGE BEGINS===================================

4.3 Standard UE Positioning Methods

The standard positioning methods supported for E-UTRAN access are:

- network-assisted GNSS methods;

- downlink positioning;

- enhanced cell ID method;

- uplink positioning;

- barometric pressure sensor method;

- WLAN method;

- Bluetooth method;

- Terrestrial Beacon System method.

Hybrid positioning using multiple methods from the list of positioning methods above is also supported.

Standalone mode (e.g. autonomous, without network assistance) using one or more methods from the list of positioning methods above is also supported.

These positioning methods may be supported in UE-based, UE-assisted/E-SMLC-based, eNB-assisted, and LMU-assisted/E-SMLC-based versions. Table 4.3-1 indicates which of these versions are supported in this version of the specification for the standardised positioning methods.

**Table 4.3-1: Supported versions of UE positioning methods**

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| --- | --- | --- | --- | --- | --- |
| **Method** | **UE-based** | **UE-assisted, E-SMLC-based** | **eNB- assisted** | **LMU-assisted/ E-SMLC-based** | **SUPL** |
| A-GNSS | Yes | Yes | No | No | Yes  (UE-based and UE-assisted) |
| Downlink Note1 | No | Yes | No | No | Yes (UE-assisted) |
| E-CID | No | Yes | Yes | No | Yes (UE-assisted) |
| Uplink | No | No | No | Yes | No |
| Barometric | Yes | Yes | No | No | No |
| WLAN | Yes | Yes | No | No | Yes |
| Bluetooth | No | Yes | No | No | No |
| TBS Note 2 | Yes | Yes | No | No | Yes (MBS) |
| NOTE 1: This includes TBS positioning based on PRS signals.  NOTE 2: In this version of the specification only for TBS positioning based on MBS signals. | | | | | |

A-GNSS, Barometric pressure sensor, WLAN, Bluetooth, and TBS positioning methods based on MBS signals are also supported in standalone mode, as described in the corresponding sections.

===============================CHAGNE ENDS==================================

**Q4: Please provide your views on proposal 4 of adding A-GNSS positioning method in the general descriptions of positioning methods supported in standlone mode in clause 4.3 of TS36.305.**

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| **Company name** | **Agree/Disagree** | **Comments** |
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## 2.3 Supported handling when some of the requested assistance or location information not supported

According to the LPP error detection in the error handling procedures as specificed in TS36.355 [9]:

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| 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, E-SMLC or UE will reture any information that can be provided in an LPP message, which includes indications on the information that is not provided.

The CR [4], CR [5] and CR [6] point out that as for description of the assistance data transfer procedure for A-GNSS, OTDOA, Sensor-based, WLAN and TBS positioning method in TS36.305 [10], it only specifies the case that when all of the requested assistance data is not supported, E-SMLC 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 E-SMLC should to do is unclear. Thus, they propose to add a clarification about how to handle the case that only some of the requested assistance information is not supported.

**Proposal 5: RAN2 to discuss to add a clarification about how to handle the case that only some of the requested assistance information is not supported.**

Based on the above contributions, the following correction in clause 8.1.3.2.2 of TS36.305 is shown below high light in yellow. Other corrections in clause 8.2.3.2.1.2, 8.6.3.3.2, 8.7.3.2.1, 8.9.3.2.2[4] [5][6] are similar with it, which are not listed here.

============================CHANGE BEGINS===================================

8.1.3.2.2 UE initiated Assistance Data Transfer

Figure 8.1.3.2.2-1 shows the Assistance Data Transfer operations for the network-assisted GNSS method when the procedure is initiated by the UE.

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**Figure 8.1.3.2.2-1: UE-initiated Assistance Data Transfer Procedure**

(1) The UE determines that certain A-GNSS assistance data are desired (e.g., in case the UE requires its own location with autonomous self location or as part of a positioning procedure when the E-SMLC provided assistance data are not sufficient for the UE to fulfill the request) and sends a LPP Request Assistance Data message to the E-SMLC. This request includes an indication of which specific A-GNSS assistance data are requested for each GNSS, possibly together with additional information (e.g., for which GNSS signal types, or satellites, or times the assistance is requested, etc.). Additional information concerning the UE's approximate location and serving and neighbour cells may also be provided in the Request Assistance Data message and/or in an accompanying Provide Location Information message to help the E-SMLC provide appropriate assistance data. This additional data may include the UE's last known location if available, the cell IDs of the UE serving eNodeB and possibly neighbour eNodeBs, as well as E-CID measurements.

(2) The E-SMLC provides the requested assistance data in a LPP Provide Assistance Data message, if available at the E-SMLC. The entire set of assistance data may be delivered in one or several LPP messages, e.g., one message per GNSS. In this case, this step may be repeated by the E-SMLC several times. If any of the UE requested assistance data in step (1) are not provided in step 2, the UE shall assume that the requested assistance data are not supported, or currently not available at the E-SMLC. If some or none of the UE requested assistance data in step (1) can be provided by the E-SMLC, 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.

===============================CHAGNE ENDS==================================

**Q5: Please provide your views on proposal 5 of adding a clarification about how to handle the case that only some of the requested assistance information is not supported.**

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| **Company name** | **Agree/Disagree** | **Comments** |
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The CR [4], CR [5] and CR [6] point out that as for description of the location related information transfer procedure for A-GNSS, OTDOA, E-CID, Sensor-based, WLAN, Bluethooth and TBS positioning method in TS36.305 [10], it only specifies the case that when all of the requested location information is not supported, UE will return any information that can be provided in an LPP message, which includes indications on the location related information that is not provided. As for the case that some of the requested location information is not provided, what UE should to do is unclear. Thus, they propose to add a clarification about how to handle the case that only some of the requested location related information is not supported.

**Proposal 6: RAN2 to discuss to add a clarification about how to handle the case that only some of the requested location related information is not supported.**

Based on the above contributions, the following correction in clause 8.1.3.3.1 of TS36.305 is shown below high light in yellow. Other corrections in clause 8.2.3.3.1, 8.3.3.3.1, 8.6.3.1, 8.7.3.1.1, 8.8.3.1.1, 8.9.3.1.1, 8.10.3.1[4] [5] [6] are similar with it, which are not listed here.

============================CHANGE BEGINS===================================

8.1.3.3.1 E-SMLC initiated Location Information Transfer Procedure

Figure 8.1.3.3.1-1 shows the Location Information Transfer operations for the network-assisted GNSS method when the procedure is initiated by the E-SMLC.

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**Figure 8.1.3.3.1-1: E-SMLC-initiated Location Information Transfer Procedure**

(1)The E-SMLC sends a LPP Request Location Information message to the UE for invocation of A-GNSS positioning. This request includes positioning instructions such as the GNSS mode (UE-assisted, UE-based, UE-based preferred but UE-assisted allowed, UE-assisted preferred, but UE-based allowed, standalone), positioning methods (GPS, Galileo, Glonass, BDS, etc. and possibly non-GNSS methods, such as downlink positioning or E-CID), specific UE measurements requested if any, such as fine time assistance measurements, velocity, carrier phase, multi-frequency measurements, and quality of service parameters (accuracy, response time).

(2) The UE performs the requested measurements and possibly calculates its own location. The UE sends an LPP Provide Location Information message to the E-SMLC before the Response Time provided in step (1) elapsed. If the UE is unable to perform the requested measurements, or if the Response Time provided in step 1 elapsed before all of the requested measurements have been obtained, 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.

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**Q6: Please provide your views on proposal 6 of adding a clarification about how to handle the case that only some of the requested location related information is not supported.**

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## 2.4 List of parameters for the basic production of broadcast AD

According to CR [7] and CR [8], the list of parameters for the basic production of broadcast AD in LPP spec is not complete, which lacks the A-GNSS, TBS, as well as sensor related assistance data. If some of the parameters are not correctly refered in the basic production, the syntac for ASN.1 will be wrong and the ASN.1 coding may not be successfully generated for broadcast AD. Thus, they propose to complete the list of parameters for the basic production of broadcast AD in LPP spec by add A-GNSS, TBS, as well as sensor related assistance data.

**Proposal 7: RAN2 to discuss to further add A-GNSS, TBS, as well as sensor related assistance data into the list of parameters for the basic production of broadcase AD in LPP spc.**

Based on the above contributions, the following correction has been proposed high light in yellow.

============================CHANGE BEGINS===================================

7.4.1 Basic production

This clause defines the LPP broadcast information elements which are encoded as 'basic production' for system Information broadcast purposes (see TS 36.331 [12], TS 38.331 [35]) .

The 'basic production' is obtained from their ASN.1 definitions by use of Basic Packed Encoding Rules (BASIC-PER), Unaligned Variant, as specified in ITU-T Rec. X.691 [22]. It always contains a multiple of 8 bits.

– LPP-Broadcast-Definitions

This ASN.1 segment is the start of the LPP Broadcast definitions.

-- ASN1START

LPP-Broadcast-Definitions

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

OTDOA-ReferenceCellInfo,

OTDOA-NeighbourCellInfoList,

NR-TRP-LocationInfo-r16,

NR-DL-PRS-BeamInfo-r16,

NR-RTD-Info-r16,

GNSS-IonosphericModel,

GNSS-EarthOrientationParameters,

GNSS-RTK-ReferenceStationInfo,

GNSS-RTK-CommonObservationInfo,

GNSS-RTK-AuxiliaryStationData,

GNSS-SSR-CorrectionPoints,

GNSS-TimeModelList,

GNSS-DifferentialCorrections,

GNSS-NavigationModel,

GNSS-RealTimeIntegrity,

GNSS-DataBitAssistance,

GNSS-AcquisitionAssistance,

GNSS-Almanac,

GNSS-UTC-Model,

GNSS-AuxiliaryInformation,

BDS-DifferentialCorrections,

BDS-GridModelParameter,

GNSS-RTK-Observations,

GLO-RTK-BiasInformation,

GNSS-RTK-MAC-CorrectionDifferences,

GNSS-RTK-Residuals,

GNSS-RTK-FKP-Gradients,

GNSS-SSR-OrbitCorrections,

GNSS-SSR-ClockCorrections,

GNSS-SSR-CodeBias,

GNSS-SSR-URA,

GNSS-SSR-PhaseBias,

GNSS-SSR-STEC-Correction,

GNSS-SSR-GriddedCorrection,

NavIC-DifferentialCorrections,

NavIC-GridModelParameter,

Sensor-AssistanceDataList,

TBS-AssistanceDataList

FROM LPP-PDU-Definitions;

-- ASN1STOP

===============================CHAGNE ENDS==================================

**Q7: Please provide your views on proposal 7 of adding A-GNSS, TBS, as well as sensor related assistance data into the list of parameters for the basic production of broadcase AD in LPP spc.**

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| **Company name** | **Agree/Disagree** | **Comments** |
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# 3 Conclusion

TBD

# 4 References

1. R2-2100391 Corrections on the descriptions of RequestLocationInformation message in TS36.305 CATT CR Rel-14 36.305 14.3.0 0094 - F UTRA\_LTE\_iPos\_enh2-Core
2. R2-2100392 Corrections on the descriptions of RequestLocationInformation message in TS36.305 CATT CR Rel-15 36.305 15.5.0 0095 - A UTRA\_LTE\_iPos\_enh2-Core
3. R2-2100393 Corrections on the descriptions of RequestLocationInformation message in TS36.305 CATT CR Rel-16 36.305 16.2.0 0096 - A UTRA\_LTE\_iPos\_enh2-Core
4. R2-2100394 Corrections on the indication for the not provided assistance data and location information in TS36.305 CATT CR Rel-14 36.305 14.3.0 0097 - F UTRA\_LTE\_iPos\_enh2-Core
5. R2-2100395 Corrections on the indication for the not provided assistance data and location information in TS36.305 CATT CR Rel-15 36.305 15.5.0 0098 - A UTRA\_LTE\_iPos\_enh2-Core
6. R2-2100396 Corrections on the indication for the not provided assistance data and location information in TS36.305 CATT CR Rel-16 36.305 16.2.0 0099 - A UTRA\_LTE\_iPos\_enh2-Core
7. R2-2101818 Correction to the basic production for positioning AD broadcast-R16 Huawei, HiSilicon CR Rel-16 37.355 16.3.0 0289 - A LCS\_LTE\_acc\_enh-Core
8. R2-2101819 Correction to the basic production for positioning AD broadcast-R15 Huawei, HiSiliconCR Rel-15 37.355 15.1.0 0290 - F LCS\_LTE\_acc\_enh-Core
9. 3GPP TS 36.355: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)" v15.6.0
10. 3GPP TS 36.305: "Stage 2 functional specification of User Equipment (UE) positioning in E-UTRAN" v16.2.0