3GPP TSG-RAN WG2 Meeting #121bis-e R2-230xxxx

Online Meeting, April 17th – 26th, 2023

**Agenda item: 4.4**

**Source: CATT**

**Title: LTE positioning corrections (CATT)**

**WID/SID: LCS\_LTE\_acc\_enh**

**Document for: Discussion and Agreement**

# 1 Introduction

This document is to kick off the following email discussion:

 [AT121bis-e][407][POS] LTE positioning corrections (CATT)

      Scope: Check the CRs in agenda item 4.4: R2-2302625 / R2-2302626 / R2-2302627 / R2-2302628 / R2-2302629 / R2-2302630 / R2-2302631 / R2-2302632 / R2-2302633 / R2-2302634 / R2-2302635 / R2-2302636.

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

      Deadline: Monday 2023-04-24 2359 UTC

In this email discussion the following CRs related to TS 37.355 will be discussed to decide if these contributions can be agreed.

1. R[2-2302625](file:///F%3A%5CRAN2%E4%BC%9A%E8%AE%AE%5C2.%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C121bis%5Cdoc%5CR2-2302625.zip) Miscellaneous Corrections on Section 4 Functionality of Protocol in TS 37.355 CATT CR Rel-15 37.355 15.3.0 0419 - F LCS\_LTE\_acc\_enh
2. R[2-2302626](file:///F%3A%5CRAN2%E4%BC%9A%E8%AE%AE%5C2.%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C121bis%5Cdoc%5CR2-2302626.zip) Miscellaneous Corrections on Section 4 Functionality of Protocol in TS 37.355 CATT CR Rel-16 37.355 16.10.0 0420 - A LCS\_LTE\_acc\_enh
3. R[2-2302627](file:///F%3A%5CRAN2%E4%BC%9A%E8%AE%AE%5C2.%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C121bis%5Cdoc%5CR2-2302627.zip) Miscellaneous Corrections on Section 4 Functionality of Protocol in TS 37.355 CATT CR Rel-17 37.355 17.4.0 0421 - A LCS\_LTE\_acc\_enh
4. R[2-2302628](file:///F%3A%5CRAN2%E4%BC%9A%E8%AE%AE%5C2.%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C121bis%5Cdoc%5CR2-2302628.zip) Miscellaneous Corrections on Section 5 LPP Procedures in TS 37.355 CATT CR Rel-15 37.355 15.3.0 0422 - F LCS\_LTE\_acc\_enh
5. R[2-2302629](file:///F%3A%5CRAN2%E4%BC%9A%E8%AE%AE%5C2.%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C121bis%5Cdoc%5CR2-2302629.zip) Miscellaneous Corrections on Section 5 LPP Procedures in TS 37.355 CATT CR Rel-16 37.355 16.10.0 0423 - A LCS\_LTE\_acc\_enh
6. R[2-2302630](file:///F%3A%5CRAN2%E4%BC%9A%E8%AE%AE%5C2.%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C121bis%5Cdoc%5CR2-2302630.zip) Miscellaneous Corrections on Section 5 LPP Procedures in TS 37.355 CATT CR Rel-17 37.355 17.4.0 0424 - A LCS\_LTE\_acc\_enh
7. R[2-2302631](file:///F%3A%5CRAN2%E4%BC%9A%E8%AE%AE%5C2.%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C121bis%5Cdoc%5CR2-2302631.zip) Corrections on the descriptions in Positioning methods IEs CATT CR Rel-15 37.355 15.3.0 0425 - F LCS\_LTE\_acc\_enh
8. R[2-2302632](file:///F%3A%5CRAN2%E4%BC%9A%E8%AE%AE%5C2.%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C121bis%5Cdoc%5CR2-2302632.zip) Corrections on the descriptions in Positioning methods IEs CATT CR Rel-16 37.355 16.10.0 0426 - A LCS\_LTE\_acc\_enh
9. R[2-2302633](file:///F%3A%5CRAN2%E4%BC%9A%E8%AE%AE%5C2.%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C121bis%5Cdoc%5CR2-2302633.zip) Corrections on the descriptions in Positioning methods IEs CATT CR Rel-17 37.355 17.4.0 0427 - A LCS\_LTE\_acc\_enh
10. R[2-2302634](file:///F%3A%5CRAN2%E4%BC%9A%E8%AE%AE%5C2.%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C121bis%5Cdoc%5CR2-2302634.zip) Corrections on positioning assistance data transfer CATT CR Rel-15 37.355 15.3.0 0428 - F LCS\_LTE\_acc\_enh
11. R[2-2302635](file:///F%3A%5CRAN2%E4%BC%9A%E8%AE%AE%5C2.%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C121bis%5Cdoc%5CR2-2302635.zip) Corrections on positioning assistance data transfer CATT CR Rel-16 37.355 16.10.0 0429 - A LCS\_LTE\_acc\_enh
12. R[2-2302636](file:///F%3A%5CRAN2%E4%BC%9A%E8%AE%AE%5C2.%E4%BC%9A%E8%AE%AE%E6%96%87%E7%A8%BF%5C121bis%5Cdoc%5CR2-2302636.zip) Corrections on positioning assistance data transfer CATT CR Rel-17 37.355 17.4.0 0430 - A LCS\_LTE\_acc\_enh

# 2 Contact Information

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |
| --- | --- |
| Company | Contact: Name (E-mail) |
| ZTE | Yu Pan(pan.yu24@zte.com.cn) |
| Nokia | mani.thyagarajan@nokia.com |
| Qualcomm | Sven Fischer (sfischer@qti.qualcomm.com) |
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# 3 Discussion

## 3.1 Miscellaneous Corrections on Section 4 Functionality of Protocol in TS 37.355

R2-2302625, R2-2302626 and R2-2302627 proposed serval corrections on section 4 Functionality of Protocol.

[1] R2-2302625 Miscellaneous Corrections on Section 4 Functionality of Protocol in TS 37.355 CATT CR Rel-15 37.355 15.3.0 0419 - F LCS\_LTE\_acc\_enh

[2] R2-2302626 Miscellaneous Corrections on Section 4 Functionality of Protocol in TS 37.355 CATT CR Rel-16 37.355 16.10.0 0420 - A LCS\_LTE\_acc\_enh

[3] R2-2302627 Miscellaneous Corrections on Section 4 Functionality of Protocol in TS 37.355 CATT CR Rel-17 37.355 17.4.0 0421 - A LCS\_LTE\_acc\_enh

The corrections are list as follow.

|  |  |
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| Correction 1 |  |
| Correction 2 | 3. When the acknowledgement for LPP message *N* is received and the included *ackIndicator* IE matches the sequence number sent in message *N*, Endpoint A sends the next LPP message *N+1* to Endpoint B when this message is available. |

It is stated that:

For correction 1, not only UE but also SET should be included in the Figure 4.1.1-1: LPP Configuration for Control- and User-Plane Positioning in E-UTRAN.

For correction 2, this is an editorial correction.

**Rapporteur’s comments**:

As specified in TS 38.305, “The LTE Positioning Protocol (LPP) is terminated between a target device (the UE in the control-plane case or SET in the user-plane case) and a positioning server (the LMF in the control-plane case or SLP in the user-plane case). It may use either the control- or user-plane protocols as underlying transport. In this specification, only control plane use of LPP is defined. User plane support of LPP is defined in [15] and [16].”. The target device SET should be added.

**Question 1-1**: Please provide comments below on the above corrections.

|  |  |  |
| --- | --- | --- |
| Company | Agreeable corrections (1/2) | Comments |
| ZTE | Agree both |  |
| Nokia | 1 | If adding SET to the figure is the only change to the figure, then it is OK but in R2-2302625 I noticed that SLP had been removed. Removing SLP is not OK.Correction 2 i.e., deleting “provided” is not essential. It is used bring out a conditional statement. |
| Qualcomm | None | 1: The CR in R2-2302625 adds "SET" to the UE but removes "SLP" from the server. Adding "SET" to the UE would be O.K. and can be merged into a Rel-17 "editorial CR".2: Current sentence is correct (meaning of 'provided' according to English dictionary: "on the condition or understanding that."). |
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**Summary:**

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| Correction 3 | 4.3.2 LPP Duplicate DetectionA sender may include a sequence number in all LPP messages sent for a particular location session. The sequence number shall be distinct for different LPP messages sent in the same direction in the same location session (e.g., may start at zero in the first LPP message and increase monotonically in each succeeding LPP message). Sequence numbers used in the uplink and downlink are independent (e.g., can be the same). |

It is stated that:

For this correction, Sequence Number is not mandatory present, i.e. this field may be included when LPP operates over the control plane and an lpp-MessageBody is included but shall be absent otherwise.

**Rapporteur’s comments:**

According to the field description of *sequenceNumber*, the IE will not present will not present when LPP operates over the user plane. “shall” is not applicable.

-- ASN1START

LPP-Message ::= SEQUENCE {

 transactionID LPP-TransactionID OPTIONAL, -- Need ON

 endTransaction BOOLEAN,

 sequenceNumber SequenceNumber OPTIONAL, -- Need ON

 acknowledgement Acknowledgement OPTIONAL, -- Need ON

 lpp-MessageBody LPP-MessageBody OPTIONAL -- Need ON

}

**Question 1-2**: Please provide comments below on this correction.

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| ZTE | Yes |  |
| Nokia | No | Sequence number is used for two purposes: a) Duplicate detection and b) Acknowledgement (and Retransmission). It shall be used for CP positioning but may or may not be used for UP positioning. So, having the field as optional is fine but it shall be included for CP positioning. |
| Qualcomm  | No | Current specification is correct.According to clause 4.3.1:"The following requirements in clauses 4.3.2, 4.3.3, and 4.3.4 for LPP reliable transport apply only when the capability is supported."I.e., the field shall be included for LPP duplicate detection. Otherwise, duplicate detection would not work as specified. |
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**Summary:**

**Question 1-3**: Which release do you prefer to change above corrections from if you agree one or all of corrections above? Please provide your comments.

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| --- | --- | --- |
| Company | Which release start from(Rel-15/16/17) | Comments |
| ZTE | From Rel-15 | Rel-15 f30 LPP spec already have the restriction that sequence number may be omitted. |
| Nokia | Rel-15 | Only the correction to the figure to add SET is needed. |
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**Summary:**

## 3.2 Miscellaneous Corrections on Section 5 LPP Procedures in TS 37.355

R2-2302628, R2-2302629 and R2-2302630 proposed serval corrections on section 5 LPP Procedures.

[4] R2-2302628 Miscellaneous Corrections on Section 5 LPP Procedures in TS 37.355 CATT CR Rel-15 37.355 15.3.0 0422 - F LCS\_LTE\_acc\_enh

[5] R2-2302629 Miscellaneous Corrections on Section 5 LPP Procedures in TS 37.355 CATT CR Rel-16 37.355 16.10.0 0423 - A LCS\_LTE\_acc\_enh

[6] R2-2302630 Miscellaneous Corrections on Section 5 LPP Procedures in TS 37.355 CATT CR Rel-17 37.355 17.4.0 0424 - A LCS\_LTE\_acc\_enh

The corrections are list as follow.

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| Correction #1 | 5.1 Procedures related to capability transferThe purpose of the procedures that are grouped together in this clause is to enable the transfer of capabilities from the target device to the server. Capabilities in this context refer to positioning and protocol capabilities related to LPP and the positioning methods supported by target.These procedures instantiate the Capability Transfer transaction from TS 36.305 [2]. |

It is stated that:

For correction #1, the provided positioning capabilities are the capabilities that are supported by the target device but not the LPP.

**Question 2-1**: Please provide comments below on correction #1.

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| ZTE | Yes |  |
| Nokia | No | Not essential. Existing text is clear which says, “enable the transfer of capabilities from the target device to the server”. The purpose of saying LPP here is to distinguish the UE capabilities as LPP level capabilities as opposed to radio capabilities at RRC level. |
| Qualcomm | No | Current specification is correct.Capabilities in this context refer to positioning and protocol capabilities related to LPP and the positioning methods supported by LPP (as defined in clause 4.1.3). (E.g., a target may also support positioning methods external to LPP (e.g., SUPL, LPPe)). |
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**Summary:**

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| Correction #2 | 5.3.2 Location Information Delivery procedureThe Location Information Delivery allows the target to provide unsolicited location information to the server. The procedure is shown in Figure 5.3.2-1.**Figure 5.3.2-1: LPP Location Information Delivery procedure**1. The target sends a *ProvideLocationInformation* message to the server to transfer location information. If step 2 does not occur, this message shall set the *endTransaction* IE to TRUE.2. The target may send one or more additional *ProvideLocationInformation* messages to the server containing additional location information data. The last message shall include the *endTransaction* IE set to TRUE.NOTE: the LPP Location Information Delivery procedure can only be piggybacked in the MO-LR request. |

For this correction, for the case that UE provide the LPP provide location information to LMF directly without request, this is only enabled in the MO-LR request case.

**Question 2-2**: Please provide comments below on this correction.

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| ZTE | No | The difference between different service types (e.g., MT-LR and MO-LR) is only reflected in the SA2’s spec. Different service types share the same LPP procedure |
| Nokia | No | Not essential. Adding a note about CN MO-LR detail just makes the specification complex. We don’t see any misalignment between stage-2 and stage-3. 38.305 does not mention anything about MO-LR in the UE initiated location information transfer procedure. |
| Qualcomm | No | The proposed change is not correct. A *ProvideLocationInformation* message may be provided unsolicited, e.g., together with a Request for Assistance Data, etc. See e.g., TS 38.305, clause 8 (e.g., "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 LMF provide appropriate assistance data.). |
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**Summary:**

**Question 2-3**: Which release do you prefer to change from if you agree one or all of corrections above? Please provide your comments.

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| Company | Which release start from(Rel-15/16/17) | Comments |
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**Summary:**

## 3.3 Corrections on the descriptions in Positioning methods IEs

R2-2302631, R2-2302632 and R2-2302633 proposed corrections on the descriptions in Positioning methods IEs.

[7] R2-2302631 Corrections on the descriptions in Positioning methods IEs CATT CR Rel-15 37.355 15.3.0 0425 - F LCS\_LTE\_acc\_enh

[8] R2-2302632 Corrections on the descriptions in Positioning methods IEs CATT CR Rel-16 37.355 16.10.0 0426 - A LCS\_LTE\_acc\_enh

[9] R2-2302633 Corrections on the descriptions in Positioning methods IEs CATT CR Rel-17 37.355 17.4.0 0427 - A LCS\_LTE\_acc\_enh

These corrections are listed as the following:

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| --- | --- |
| Correction 1 | 6.4.2 Common Positioning***additionalInformation***This IE indicates whether a target device is allowed to return additional information to that requested. If this IE indicates '*onlyReturnInformationRequested'* then the target device shall not return any additional information to that requested by the server. If this IE indicates '*mayReturnAditionalInformation'* then the target device may return additional information to that requested by the server. If a location estimate is returned, any additional information is restricted to that associated with a location estimate (e.g. might include velocity if velocity was not requested but cannot include measurements). If measurements are returned, any additional information is restricted to additional measurements (e.g. might include E-CID measurements if A-GNSS measurements were requested but not E-CID measurements). |
| Correction 3 (take one as example, similar corrections are in multiple places) |

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| ***systemFrameNumber***If the *delta-SFN* and *motionTimeSource* fields are not present, this field specifies the SFN of the RSTD reference cell containing the starting subframe of the PRS or NPRS positioning occasion if PRS or NPRS are available on the RSTD reference cell, or subframe of the CRS for RSTD measurements if PRS and NPRS are not available on the RSTD reference cell during which the most recent neighbour cell RSTD measurement was performed.In the case of more than a single PRS configuration on the RSTD reference cell, the first PRS configuration is referenced.If the *delta-SFN* and *motionTimeSource* fields are present, this field specifies the SFN of the RSTD reference cell when the TOA measurement for the RSTD reference cell has been made. |

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| Correction 4 |

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| ***multiPrbNprs***This field, if present, indicates that the target device supports NPRS configuration in more than one resource block (i.e., *maxCarrier* in *PRS-Info-NB* greater than 1). |

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It is stated that:

For correction 1, the wrong IE name is used within the field description “additionalInformation”.

For correction 3, the wrong IE name “deltaSFN” is used.

For correction 4, there is typo in the field description multiPrbNprs.

**Question 3-1**: Please provide comments below on the above corrections.

|  |  |  |
| --- | --- | --- |
| Company | Agreeable corrections (1/3/4) | Comments |
| ZTE | Agree 1,3,4 |  |
| Nokia | 1,3,4 | 1. We could correct this typo in the ASN.1 field name also but I guess this is just an alignment of procedure text to the ASN.1. So, OKAll editorial changes can be merged with some other CR. |
| Qualcomm | 1,3,4 | Editorial. Can be merged into a REL-17 CR. |
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**Summary:**

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| Correction 2 | 6.4.2 Common Positioning– *CommonIEsError*The *CommonIEsError* carries common IEs for an Error LPP message Type.-- ASN1STARTCommonIEsError ::= SEQUENCE { errorCause ENUMERATED { undefined, lppMessageHeaderError, lppMessageBodyError, epduError, incorrectDataValue, ..., lppSegmentationError-v1450 }}-- ASN1STOP

|  |
| --- |
| *CommonIEsError* field descriptions |
| *errorCause*This IE defines the cause for an error. '*lppMessageHeaderError*', '*lppMessageBodyError*' and '*epduError*' is used if a receiver is able to detect a coding error in the LPP header (i.e., in the common fields), LPP message body or in an EPDU, respectively. ‘*incorrectDataValue’* is used if a receiver is not able to detect a correct LPP message Type. '*lppSegmentationError*' is used if a receiver detects an error in LPP message segmentation. |

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It is stated that:

For this correction, there lacks field description on the error cause “incorrectDataValue”.

**Question 3-2**: Please provide comments below on this correction.

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| --- | --- | --- |
| Company | Yes/No | Comments |
| ZTE | Yes |  |
| Nokia | No | Not sure if incorrectDataValue relates to LPP message Type only. It could also be an incorrect value in any other fields in the message. Depends on how current implementations use this. |
| Qualcomm | No | *incorrectDataValue* may be used when an incorrect data value has been received (as the field name implies). If a receiver is not able to detect a correct LPP message Type, the *LPP-MessageBody* would not have been decoded correctly. |
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**Summary:**

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| Correction 5 |

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| ***rsrp-Result***This field specifies the reference signal received power (RSRP) measurement, as defined in TS 36.331 [12], TS 36.214 [17]. In the case the target device includes *rsrp-Result-v1470*, the target device shall set the corresponding *rsrp-Result* (i.e. without suffix) to value 0. Measurement report mapping is according to TS 36.133 [18]. |
| ***rsrq-Result***This field specifies the reference signal received quality (RSRQ) measurement, as defined in TS 36.331 [12], TS 36.214 [17]. In the case the target device includes *rsrq-Result-v1470*, the target device shall set the corresponding *rsrq-Result* (i.e. without suffix) to value 0 or 34. Measurement report mapping is according to TS 36.133 [18]. |

 |

It is stated that:

For correction 5, the RSRP or RSRQ measurement results for E-CID positioning method reported by UE is a mapping value, but not the real value, and the mapping table is defined in the TS36.133.

**Question 3-3**: Please provide comments below on correction 5.

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| --- | --- | --- |
| Company | Yes/No | Comments |
| ZTE | Yes | Ok to increase the readability |
| Nokia | No | Not essential. It is well known that RAN4 spec defines the measurement report mapping. |
| Qualcomm | No | Not essential. If considered useful, can be merged into a Rel-17 editorial CR. |
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**Summary:**

**Question 3-4**: Which release do you prefer to change from if you agree one or all of corrections above? Please provide your comments.

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| --- | --- | --- |
| Company | Which release start from(Rel-15/16/17) | Comments |
| ZTE | From Rel-15 |  |
| Nokia |  | We agree with only the editorial corrections 1,3, and 4. We leave it to the specification rapporteur to decide on how to handle the editorial corrections. |
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**Summary:**

## 3.4 Corrections on positioning assistance data transfer

R2-2302634, R2-2302635 and R2-2302636 proposed several corrections on positioning assistance data transfer,

[10] R2-2302634 Corrections on positioning assistance data transfer CATT CR Rel-15 37.355 15.3.0 0428 - F LCS\_LTE\_acc\_enh

[11] R2-2302635 Corrections on positioning assistance data transfer CATT CR Rel-16 37.355 16.10.0 0429 - A LCS\_LTE\_acc\_enh

[12] R2-2302636 Corrections on positioning assistance data transfer CATT CR Rel-17 37.355 17.4.0 0430 - A LCS\_LTE\_acc\_enh

The corrections are list as the following:

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| Correction 1 | 5.2.3 Transmission of LPP Request Assistance DataWhen triggered to transmit a *RequestAssistanceData* message, the target device shall:1> set the IEs for the positioning-method-specific request for assistance data to request the data;1> deliver the request to lower layers for transmission. |
| Correction 2 | 5.2.3 Transmission of LPP Request Assistance DataWhen triggered to transmit a *RequestAssistanceData* message, the target device shall:1> set the IEs for the positioning-method-specific request for assistance data to request the data;1> deliver the request to lower layers for transmission. |

It is stated that:

For correction 1, it is the layer which triggers/receives the positioning service request that initiate the procedure, i.e., it can either be the upper layers, i.e., application layer for MO-LR or by the LPP layer for MT-LR.

For correction 2, upon generation of the LPP request assistance data message by setting the IEs correspondingly, it should be delivered to the lower layer for transmission.

**Question 4-1**: Please provide comments below on the above corrections.

|  |  |  |
| --- | --- | --- |
| Company | Agreeable corrections (1/2) | Comments |
| ZTE | Agree both |  |
| Nokia | None | Nothing wrong with the current text in the specification. Not essential. |
| Qualcomm | None. | Current specification is correct. |
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**Summary:**

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| Correction 3 (take one as example, similar corrections are in multiple places) | 5.2.4 Reception of LPP Provide Assistance DataUpon receiving a *ProvideAssistanceData* message, the target device shall:1> for each positioning method contained in the message:2> deliver the related assistance data to upper layers and/or lower layers. |

It is stated that:

For correction 3, upon receiving of the LPP provide assistance data message or the posSIB carrying the positioning assistance data, the handling of the positioning assistance data depends on the positioning methods, i.e., for RAT-dependent positioning method, the assistance data should be delivered to low layers for measurement or transmission, while for RAT-independent positioning method, the positioning assistance data should be delivered directly to the upper layer, e.g., application layer.

**Question 4-2**: Please provide comments below on correction 3.

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| --- | --- | --- |
| Company | Yes/No | Comments |
| ZTE | Yes |  |
| Nokia | No | Not essential. |
| Qualcomm | No | Current specification is correct.The assistance data are delivered to "upper layer". "Lower layer" may get some specific (implementation dependent) parameters out of the assistance data to enable e.g., signal measurements, etc. |
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**Summary:**

**Question 4-3**: Which release do you prefer to change from if you agree one or all of corrections above? Please provide your comments.

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| Company | Which release start from(Rel-15/16/17) | Comments |
| ZTE | Rel-15 |  |
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**Summary:**

# 4 Conclusion

TBC