3GPP TSG-RAN WG2 Meeting #115-e ***R2-21xxxxx***

Electronic Meeting, August 16 – 27, 2021

**Agenda item:** 8.11.5

**Source:** Qualcomm Incorporated

**Title:** Summary on agenda item 8.11.5 on GNSS positioning integrity

**Document for:**  Discussion

# 0. Introduction

This document summarizes the following contributions submitted for Agenda Item 8.11.5 "GNSS positioning integrity":

[1] R2-2107095, "Discussion on positioning integrity", ZTE .

[2] R2-2107136, "Discussion on Integrity KPIs impact and draft LS", CATT.

[3] R2-2107147, "UE-aided detection of threat to GNSS systems and assistance data signaling", Fraunhofer IIS; Fraunhofer HHI; Ericsson.

[4] R2-2107398, "Discussion on supporting positioning integrity in RAN", OPPO.

[5] R2-2107499, "Discussion on positioning integrity", Huawei, HiSilicon.

[6] R2-2107503, "Text Proposal for GNSS integrity", Huawei, HiSilicon.

[7] R2-2107646, "Discussion on signalling and procedures for GNSS positioning integrity", vivo.

[8] R2-2107688, "Discussion on procedures and signalling for GNSS positioning integrity", InterDigital, Inc.

[9] R2-2108024, "Positioning Integrity Support in LPP", Nokia, Nokia Shanghai Bell.

[10] R2-2108176, "Discussion on GNSS positioning integrity", Xiaomi.

[11] R2-2108340, "Bounding GNSS errors for positioning integrity", ESA, Nokia, Nokia Shanghai Bell.

[12] R2-2108385, "Considerations on GNSS positioning integrity support", Qualcomm Incorporated .

[13] R2-2108396, "GNSS positioning integrity", Ericsson.

[14] R2-2108474, "Discussion on GNSS Integrity Assistance Data", Swift Navigation, Ericsson, Mitsubishi Electric Corporation.

[15] R2-2108475, "Text Proposal on GNSS Integrity Assistance Data", Swift Navigation, Ericsson, Mitsubishi Electric Corporation.

[16] R2-2108770, "Consideration on the signalling design for Positioning Integrity", Samsung Electronics.

[17] R2-2107989, "Email Summary [Post114-e][601][POS] GNSS integrity assistance information, KPIs, and reporting of integrity results (Swift)", Swift Navigation.

# 1. "Feared Event" Considerations

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| ZTE [1] | Proposal 1: For positioning integrity, support to take feared events in the GNSS Assistance Data, feared events during positioning data transmission, GNSS feared events and UE feared events into consideration. |
| Huawei [5] | Proposal1: We assume reliable transport of LPP message that there is no need to define feared events for assistance data transmissionProposal 2: For UE-based positioning integrity, the integrity assistance information transferred from LMF to UE includes Feared events in the GNSS Assistance Data, and GNSS feared events.Proposal 3: For LMF-based positioning integrity, the integrity assistance information transferred from UE to LMF includes UE feared events. |
| InterDigital [8] | Proposal 1: For UE-based positioning integrity, the assistance data transferred from LMF to UE contains at least the following information: Feared events in the GNSS assistance data and GNSS feared events. FFS on feared events during positioning data transmission.  |
| Xiaomi [10] | Proposal 2: For the UE assisted positioning integrity, UE feared events should not be specified and should be left to UE implementation, UE can send an indication to LMF when the UE feared events is detected. |
| Ericsson [13] | Proposal 9: RAN2 to discuss the need of checksum in LPP layer for improved reliability and if need be a simple checksum with maximum one octet be defined for carrying Integrity related information.  |
| Samsung [16] | Proposal 1: Consider the following feared events as the basis for the GNSS positioning method integrity justification:GNSS feared events such as satellite feared events, atmospheric feared events and local Environment feared events UE feared events such as GNSS receiver measurement error.Proposal 2. RAN2 discuss if feared events in positioning data transmission is necessary for GNSS positioning integrity justification or not.  |

- The above Topic and Proposals were already discussed in the [Post114-e] email discussion [17] and are essentially repetitions of individual company input to Question1 and Question 2 (Phase 2) in [17].

- Corresponding conclusions and proposals will be discussed in RAN2 as part of the email discussion report [17].

- Therefore, no further Proposal is formulated here.

## 1.1 Local Environment "Feared Events"

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| Fraunhofer [3] | Observation 1 The location server can crowd-source information about regional errors such as multipath, interference, jamming and spoofing using configured measurements and observations from capable UEs.Observation 2 Since the measurements and observations are regional and localized, the UEs needs to be configured to report both measurements, obeservations or derived indications as one part, as well as positioning estimates as another part.Observation 3 Based on crowd-sourced data, the location server can provide regionalized integrity information to UEs entering a specific region to inform about local GNSS and UE feared eventsObservation 4 Multipath, jammers and spoofers are major threat for positioning integrity. Moving jammers and spoofers, and satellite movements cause the affected area to change dynamically.Observation 5 Integrity event(s) can be bounded within a given area at a given occurrence time...Observation 6 Detecting and signaling integrity events to an LCS client can be time critical depending on application.Observation 7 A UE can be a major source of detecting GNSS local environment feared events and can aid the network to monitor the GNSS local environment.Observation 8 The device monitoring may be associated to specific capabilities.Proposal 1 RAN2 shall support reporting by the UE integrity information relating to GNSS local environment feared events the information includes at least of:• Timestamp• Position estimate• GNSS local environment feared event type (FFS)• Specific GNSS local environment feared event information (FFS)Proposal 2 RAN2 shall specify a signaling mechanism to enable a configured UE to report the detected GNSS local environment feared events and to enable LMF to provide GNSS local environment feared event assistance data to UEs.Proposal 3 RAN2 shall specify a signaling mechanism to enable LMF to provide GNSS local environment feared event AD to UEs. |

- There seem two aspects involved in the above proposal:

(a) UE measurements related to "GNSS local environment feared event type" and "Specific GNSS local environment feared event information".

(b) Providing the GNSS local environment "feared event" assistance data to UEs.

- (a) Seem to require new UE measurement information; and (b) seem to require an a-priori UE location.

- (a) and (b) may be connected to provide a crowdsourcing solution.

- Crowdsourcing procedures and functionality is currently supported in OMA LPPe 2.0, but not explicitly in LPP and seem to require bigger changes.

- The UE measurements in order to characterize the local environment "feared events" are FFS.

**Proposal 0:** Study further the integrity information that can be detected by the UE in order to characterize the local environment "feared events",

# 2. Architecture Model and General Concepts

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| vivo [7] | Proposal 1: Positioning methods (i.e., LMF-based and UE-based positioning) are decoupled with integrity methods (i.e., LMF-based and UE-based integrity).Proposal 2: LMF decides whether to choose LMF-based or UE-based positioning integrity mode except for MO-LR with UE-based positioning integrity mode. |
| Qualcomm [12] | Proposal 1: The support of GNSS integrity is enabled using the existing NG-RAN positioning architecture. In particular, no "GNSS Correction Provider (GCP)" or similar architectural/functional entities (such as "Integrity Computing Entities (ICE)", etc.) need to be introduced.Proposal 2: The means for an LMF to obtain A-GNSS assistance data (incl. integrity assistance data) remains up to deployment. |

- It is not clear to the rapporteur how "positioning" and "integrity" can be decoupled.

- As a baseline, rapporteur would suggest to use the exiting architectural model, functions, concepts, terminology (e.g., UE-based, UE-assisted positioning), definitions, etc. as currently used and defined (e.g., in TS 23.273, TS 38.305).

**Proposal 1:** The support of GNSS integrity is enabled by using existing NG-RAN positioning architecture.

**Proposal 2:** Any additional functional elements, positioning/integrity modes, etc. should be introduced only when needed.

# 3. Stage 2 Aspects

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| Huawei [5][6] | Proposal 6: Adopt the TP of on-demand PRS for TS 38.305 in the Appendix as a baseline. |

Contribution [6] contains a detailed text proposal for Stage 2. It is proposed in [6] to define separate "A-GNSS Positioning Integrity Procedures":

- LMF-based Positioning Integrity Procedure

- UE-based Positioning Integrity Procedure

**Proposal 3:** RAN2 to discuss and decide whether there is a need to define separate procedures for "A-GNSS Positioning Integrity" as proposed in R2-2107503 or whether the existing A-GNSS (and general location) Procedures are applicable/sufficient.

# 4. Location Information Transfer Aspects

## 4.1 General Aspects

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| ZTE [1] | Proposal 3: Support to embed integrity results and KPIs into CommonIEsRequestLocationInformation and CommonIEsProvideLocationInformation. |
| OPPO [4] | Proposal 1: RAN2 to agree that LCS service request and LCS service response msg should be used to transmit the integrity KPI and integrity results between the LMF and the LCS client.Proposal 2: RAN2 to agree that LPP msg RequestLocationInformation and ProvideLocationInformation should be used to transmit the integrity KPI and integrity results between RAN and LMF, respectively. |
| vivo [7] | Proposal 3: For MO-LR with UE-based positioning integrity mode, - Assistance Data Transfer procedure (i.e., RequestAssistanceData and ProvideAssistanceData) can be enhanced to transfer positioning integrity assistance information(i.e, Feared events) from LMF to UE.Proposal 4: For MT-LR with LMF-based positioning integrity mode,- Location Information Transfer procedure(i.e., RequestLocationInformation and ProvideLocationInformation) or Capability Transfer procedure(i.e., RequestCapabilities and ProvideCapabilities) can be enhanced to transfer positioning integrity assistance information(i.e, Feared events) from UE to LMF.Proposal 5: For MT-LR with UE-based positioning integrity mode, - Assistance Data Transfer procedure(i.e., RequestAssistanceData and ProvideAssistanceData) can be enhanced to transfer positioning integrity assistance information(i.e, Feared events) from LMF to UE.- LPP RequestLocationInformation can be enhanced to transfer KPI from LMF to UE.- LPP ProvideLocationInformation can be enhanced to transfer integrity results from UE to LMF.Proposal 6: For MO-LR with LMF-based positioning integrity mode, - Location Information Transfer procedure(i.e., RequestLocationInformation and ProvideLocationInformation) or Capability Transfer procedure(i.e., RequestCapabilities and ProvideCapabilities) can be enhanced to transfer positioning integrity assistance information(i.e, Feared events) from UE to LMF.Proposal 7: The common integrity assistance data that doesn’t include private information can be transmitted by posSIB. |
| InterDigital [8] | Proposal 4: LPP Location information transfer procedure and signalling, including the LPP RequestLocationInformation and/or LPP ProvideLocationInformation messages, are used for transferring the integrity KPIs for UE-based (MT-LR) and UE-assisted (MO-LR) positioning integrityProposal 6: LPP Location Information transfer procedure and signalling, including LPP RequestAssistanceData and/or LPP ProvideAssistanceData messages, are used for transferring the integrity result for UE-based (MT-LR) and UE-assisted (MO-LR) positioning integrity |
| Nokia [9] | Proposal 5: Enhance LPP RequestLocationInformation and LPP ProvideLocationInformation messages with new IEs for Positioning Integrity support. |
| Xiaomi [10] | Proposal 5： The signalling procedures for GNSS positioning integrity in the above table should be considered. |
| Qualcomm [12] | Proposal 3: The support of GNSS integrity is enabled using the existing LPP A-GNSS transactions and procedures. |
| Ericsson [13] | Proposal 4: Design signalling, procedures and information element additions/extensions with both GNSS and other positioning methods in mind.Proposal 5 As baseline, use existing procedures, messages and information elements with extensions to accommodate positioning integrity. |

- The common aspect of the above Proposals is to use/enhance existing LPP Request/Provide Location Information and Assistance Data procedures.

- At RAN2#114 we made the following agreement on Capability Procedures:

 "RAN2 confirms that LPP messages RequestCapabilities and ProvideCapabilities are used to transfer capability information of GNSS positioning integrity support. FFS the contents of capability information for GNSS positioning integrity support."

- Therefore, it is suggested to confirm the same for Location Information and Assistance Data transfer. Certainly, enhancements are needed to add the additional/agreed functionality.

**Proposal 4:** RAN2 confirms that LPP messages RequestLocationInformation and ProvideProvideLocationInformation are used to transfer integrity results for GNSS positioning.

**Proposal 5:** RAN2 confirms that LPP messages RequestAssistanceData and ProvideAssistanceData are used to transfer integrity assistance data for GNSS positioning.

## 4.2 Integrity Request Information

### 4.2.1 Integrity and "Quality Of Service"

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| CATT [2] | Observation 1: QoS in LPP follows the LCS Quality of Service which is used to characterise the location request. But the detail value may not be defined by LCS Quality of Service, such as responseTime.Proposal 1: RAN2 to agree LS sent to SA1 to inform RAN2 agreements about the integrity KPIs. And agree the draft LS provided in the Annex as baseline. |
| Qualcomm [12] | Proposal 5: Any need for additional "LCS Quality of Service" parameter should be discussed in SA1 and SA2. |
| Ericsson [13] | Proposal 1: RAN2 to agree on defining integrity level classification for integrity support. The UE and the network may report their supported levels in the signalling with associated QoS.Proposal 2: RAN2 to liase with SA1, SA2 and CT4 to provide signalling of Integrity based upon associated QoS as specified in R2-2105973.Proposal 3: RAN2 to allow a generic Integrity description to be captured by SA1, SA2 and CT4 specification. |

- Rapporteur's understanding is that "integrity" and "quality of service" are different concepts. A particular QoS can be influenced/requested; integrity is a "matter of fact" based on the current status of the positioning system ("Integrity is the measure of the trust that can be placed in the correctness of the information supplied by a navigation system.")

- This aspect has also been discussed in [Post114-e] email discussion [17], Question 7 (Phase 1) and Questions 8 and 9 (Phase 2).

- However, the aspect of whether to involve SA1 in the discussion or not has not been resolved.

**Proposal 6:** Send an LS to SA1 requesting them to study and evaluate any potential LCS Quality of Service aspects for positioning integrity support.

## 4.3 Integrity Request Information

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| InterDigital [8] | Proposal 3: Integrity KPIs transferred to UE (for UE-based) or LMF (for UE-assisted) for positioning integrity includes at least AL, TIR, TTA |
| Nokia [9] | Proposal 4: LPP should be enhanced to support positioning integrity requirement (a.k.a. KPIs) information including AL, TTA, and TIR for the sake of PL derivation. Integrity Availability is not needed. |
| Qualcomm [12] | Proposal 4: The Integrity Request Information should include the Target Integrity Risk (TIR); the Integrity Result Information should include the computed horizontal and vertical Protection Level (PL) computed for the given TIR. |

- This aspect has also been discussed in [Post114-e] email discussion [17], Question 6 (Phase 1).

- The particular request information depends on what should be included in the integrity result information (aka "mode 1" and "mode 2" integrity reporting).

- Therefore, no further Proposal is formulated here.

## 4.4 Integrity Result Information

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| ZTE [1] | Proposal 4: For reporting integrity results, support option 3, do not support option 2 and option 4, further study is needed for option 1. |
| OPPO [4] | Proposal 4: kindly ask RAN2 to discuss the timer-related implementation for the mode 2 of Integrity Result Reporting for deriving the system availability result at UE, taking into account of PL computation, AL and TTA timer. |
| Huawei [5] | Proposal 4: Support both Mode1 and Mode2 for integrity results reporting in LCS response.Proposal 5: For Mode2, refine the integrity results to indicate the degrees of integrity risk (e.g. Extremely High/High/Low/No risk) with different alarm levels. |
| InterDigital [8] | Proposal 5: Support both Mode 1 (i.e. PL) and Mode 2 (i.e. integrity flag) for integrity result reporting for UE-based and UE-assisted positioning integrity |
| Ericsson [13] | Proposal 6: Support both mode 1 and 2 for integrity result reporting. |
| Nokia [9] | Proposal 3: LPP should be enhanced to support positioning integrity result request and delivery, and at least the following new signalling should be specified:1. Integrity result reporting request (with an indication of reporting mode)2. Signalling for PL value (for Reporting Mode 1 in TR 38.857)3. Signalling for integrity event flagging (For Reporting Mode 2 in TR 38.857) |
| Xiaomi [10] | Proposal 3: Mode 1 is sufficient for integrity result reporting and it will be more complicated when both Mode 1 and Mode 2 are supported.Proposal 4：It is not necessary to report the TIR, AL, TTA which were used in the integrity calculation when reports the integrity results. |
| Samsung [16] | Proposal 3: RAN2 agree to design the signaling for positioning integrity assistance data providing and the positioning integrity result reporting on the given KPI and feared event information by considering result reporting on some condition or with adjustable interval. |

- This aspect has also been discussed in [Post114-e] email discussion [17], Question 9 (Phase 1).

- Above Proposals are essentially repetitions of individual company inputs to Question 9 (Phase 1) and Questions 11, 12 and 13 (Phase 2) in [17].

- Therefore, no further Proposal is formulated here.

# 5. Integrity Assistance Data Aspects

## 5.1 General

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| OPPO [4] | Proposal 3: RAN2 to agree that feared event to be transmitted via LPP assistance data transfer procedure. |
| InterDigital [8] | Proposal 2: LPP assistance data transfer procedure and signalling, including LPP RequestAssistanceData and/or LPP ProvideAssistanceData messages, are used for transferring information on feared events for UE-based and UE-assisted positioning intergity |

- Rapporteur believes that the above proposals are essentially covered by Rapporteur 's Proposal 5 in section 4.1.

- The required/sufficient content (e.g., "feared event") of assistance data need to be discussed separately (see 5.4 below).

## 5.2 Prioritization of Work

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| Nokia [9] | Proposal 1: RAN2 should prioritize the assistance information that are commonly applicable to both RAT-I and RAT-D as part of assistance information. |
| Swift [14] | Proposal 2: Prioritize state-domain representation of the integrity parameters. |

- Rapporteur believes we do not need (and cannot) prioritize the definition of RAT-I and RAT-D common assistance data, since even for "RAT-Independent" methods, only GNSS positioning is in scope according to the Work Item Description.

- Rapporteur also believes that there is no need to prioritize state-domain representation of the integrity parameters at this stage. It also seems that [Post114-e] email discussion [17] concluded that all A-GNSS positioning techniques in LPP should support positioning integrity, which also includes Rel-9 A-GNSS according to Rapporteur's understanding.

- In any case, whether prioritization is needed or not depends on general progress towards completion of the work item objectives and should be discussed once the completion of the objective is at risk.

## 5.3 Suffcient/Existing integrity information and backwards compatibility

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| ZTE [1] | Proposal 2: An identification of each feared event in the assistance data is enough for the PL calculation. |
| Nokia [9] | Proposal 2: RAN2 should identify the feared events that the existing IEs in LPP cannot support, and wait for RTCM’s development in order to determine what new IEs for assistance information should be introduced. |
| Xiaomi [10] | Proposal 1: If the external corrections provider can provide indication to LMF when feared events in the GNSS Assistance Data is detected, the GNSS-RealTimeIntegrity can be reused by LMF to indicate UE not to use the GNSS assistance data any more. |
| Ericsson [13] | Proposal 8: RAN2 to discuss whether the existing SSR quality indicators are sufficient for protection level assessments as part of integrity procedures. |
| Swift [14] | Proposal 3: Agree that the new integrity IEs to be defined in LPP must be compatible with the A-GNSS assistance data IEs already supported in LPP. |

- In order to identify which integrity functionality can or cannot be supported by existing IEs, and whether functionality can be added compatible with the A-GNSS assistance data IEs already supported in LPP, it is suggested to identify what assistance data are needed to support integrity first (see 5.4 below).

## 5.4 Integrity Assistance Data

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| ESA [11] | Proposal 1. Add at least the quality indicator (standard deviation or variance) to each GNSS SSR IE in the Rel17 of LPP. Additional parameters are FFS at this moment. |
| Qualcomm [12] | Proposal 6: The assistance information that will be used to support integrity determination comprise quality indicators which can either be added to the SSR assistance data IEs or defined as a separate new IE:- Uncertainty of the satellite orbit;$ σ\_{SV orbit}^{2}$ - Uncertainty of the satellite clocks; $ σ\_{SV clocks}^{2}$- Uncertainty of the GNSS signal code bias; $σ\_{code bias}^{2}$ - Uncertainty of the GNSS signal phase bias; $σ\_{phase bias}^{2}$- Uncertainty of the ionosphere model; $σ\_{Iono}^{2}$- Uncertainty of the troposphere model; $σ\_{Tropo}^{2}$Proposal 7: Additional GNSS assistance data (compared to Proposal 6) that may be used to support integrity determination (if any) should be considered in future Releases once an RTCM integrity standard is available. |
| Swift [14] | Observation 1: GNSS error sources and their associated feared events cannot be assumed to have a zero-mean Gaussian distribution. For positioning integrity, we need alternative methods to account for the real-world error distributions, such as error overbounding.Observation 2: Integrity assistance data parameters are primarily intended to communicate the statistical distribution of errors that the user can assume after corrections are applied. The distribution should be conservative, i.e. “overbounding” the true distribution.Observation 3: True error distributions are typically not well modeled by a zero-mean Gaussian distribution, leading to an over-inflated Protection Level.Observation 4: The well-known Paired Overbounding technique may be used to achieve a tighter bound without sacrificing the overbounding property.Proposal 1: Agree that the Paired Overbounding technique will be used as baseline for integrity. |
| Swift [15] | "Text Proposal on GNSS Integrity Assistance Data", Swift Navigation, Ericsson, Mitsubishi Electric Corporation.Proposal 1: RAN2 agrees to consider the text proposal presented in R2-2108475 for defining the A-GNSS integrity assistance information in Release 17. |

From the above contributions, the following assistance data categories to address the GNSS feared events have been proposed:

(1) Standard deviations, quality indicators, variances of the GNSS error sources.

(2) Mean values of the GNSS error sources.

(3) Information describing the time variation of the GNSS error sources.

(4) Probability of satellite fault.

(5) Probability of constellation fault.

(6) "Do Not Use" assistance data alerts

(7) "Do Not Use" SV and/or GNSS constellation alerts

 **Important Remark:** Some information above has been inferred from the Text Proposal in [15], which however, was not accompanied with sufficient background/justification information. Therefore, the list above may not be exhaustive.

From the submitted contributions/Proposals, item (1) (Standard deviations, quality indicators, variances) seem to be common:

**Proposal 7:** The assistance information that will be used to support integrity determination include at least quality indicators (standard deviation or variance) of the GNSS error sources.

 NOTE: The GNSS error sources include at least satellite orbits/clock, signal code/phase bias, ionosphere and troposphere errors.

**Proposal 8:** Study further whether additional assistance information need to be supported. The additional assistance data may include:
- Mean values of the GNSS error sources.

 **-** Information describing the time variation of the GNSS error sources.

 **-** Probability of satellite fault.

 **-** Probability of constellation fault.

 **-** "Do Not Use" assistance data alerts

 **-** "Do Not Use" SV and/or GNSS constellation alerts

NOTE: This does not preclude additional assistance data categories.

Stage 3 details (e.g., encoding of the assistance information, etc.) as e.g. proposed in [15] should be discussed once the required integrity assistance data information has been agreed.

# 6. Other Aspects

Following Proposals are considered being enhancements according to the Work Item Description and should be discussed when time permits.

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## 6.1 Mechanism for recovering from potential integrity failure condition

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| InterDigital [8] | Proposal 7: Support mechanisms for recovering from integrity failure conditions/feared events detectable at UE |

## 6.2 GNSS RTK observations resolution indication

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| Ericsson [13] | Observation 4 : It is not possible to determine if an IE GNSS-RTK-Observations-r15 originates from MSM4 or MSM6, of from MSM5 or MSM7.Observation 5 Devices that internally translates the obtained GNSS-RTK-Observations-r15 into corresponding MSM cannot correctly do that.Proposal 7: Add an optional indicator in the IE GNSS-RTK-Observations-r15 for the attribute resolution of the origin MSM message. |

# 7. Summary

**Proposal 0:** Study further the integrity information that can be detected by the UE in order to characterize the local environment "feared events",

**Proposal 1:** The support of GNSS integrity is enabled by using existing NG-RAN positioning architecture.

**Proposal 2:** Any additional functional elements, positioning/integrity modes, etc. should be introduced only when needed.

**Proposal 3:** RAN2 to discuss and decide whether there is a need to define separate procedures for "A-GNSS Positioning Integrity" as proposed in R2-2107503 or whether the existing A-GNSS (and general location) Procedures are applicable/sufficient.

**Proposal 4:** RAN2 confirms that LPP messages RequestLocationInformation and ProvideProvideLocationInformation are used to transfer integrity results for GNSS positioning.

**Proposal 5:** RAN2 confirms that LPP messages RequestAssistanceData and ProvideAssistanceData are used to transfer integrity assistance data for GNSS positioning.

**Proposal 6:** Send an LS to SA1 requesting them to study and evaluate any potential LCS Quality of Service aspects for positioning integrity support.

**Proposal 7:** The assistance information that will be used to support integrity determination include at least quality indicators (standard deviation or variance) of the GNSS error sources.

 NOTE: The GNSS error sources include at least satellite orbits/clock, signal code/phase bias, ionosphere and troposphere errors.

**Proposal 8:** Study further whether additional assistance information need to be supported. The additional assistance data may include:
- Mean values of the GNSS error sources.

 **-** Information describing the time variation of the GNSS error sources.

 **-** Probability of satellite fault.

 **-** Probability of constellation fault.

 **-** "Do Not Use" assistance data alerts

 **-** "Do Not Use" SV and/or GNSS constellation alerts

NOTE: This does not preclude additional assistance data categories.