3GPP TSG-RAN WG2 #111-e Draft R2-2008262

Electronic Meeting, August 17 - 28, 2020

Agenda Item: 8.11.3.1

Source: Swift Navigation

Title: [AT111-e][607][POS] Summary of email discussion on Integrity definitions, KPIs, and use cases (Swift)

Document for: Discussion, Decision

# 1 Introduction

This document extends the initial email discussion from R[2-2008256](file:///E%3A%5CWORK%5C1%203GPP%5CMeeting%5CRAN2%20111-e%5C2%20During%5CDocs%5CR2-2008256.zip) [1] as follows:

* [AT111-e][607][POS] Integrity definitions, KPIs, and use cases (Swift)

 Scope: Discuss proposals and attempt to reach consensus on definitions, KPIs, and use cases for positioning integrity.

 Intended outcome: Summary with potential agreeable TP, in R[2-2008256](file:///E%3A%5CWORK%5C1%203GPP%5CMeeting%5CRAN2%20111-e%5C2%20During%5CDocs%5CR2-2008256.zip). Extension to further converge and produce a text proposal in R2-2008262, with attention to anticipated specification impact.

 Deadline: Thursday 2020-08-20 1100 UTC – extended to Thursday 2020-08-27 1200 UTC

The following topics are proposed for agreement.

# 2 Integrity KPIs Definitions

The following agreement was made online for [1]:

Agreements:

* Start from the definitions of the four candidate KPIs. Additional definitions can be added when needed.

It was proposed to adopt the Target Integrity Risk (TIR), Alert Limit (AL), Protection Level (PL) and Time-to-Alert (TTA) as KPIs. However, the final definitions and the decision on whether these terms constitute KPIs within the context of 3GPP were both FFS.

The following definitions are therefore proposed. Please comment if you agree with the integrity definitions and whether to include the definitions as KPIs within the specification.

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**Target Integrity Risk (TIR)**

The probability that the positioning error exceeds the Alert Limit (AL) without warning the user within the Time-to-Alert (TTA).

**Alert Limit (AL)**

The maximum allowable positioning error such that the positioning system is available for the intended application. If the positioning error in any dimension or combination of dimensions (e.g. horizontal or vertical) is beyond the AL, operations are hazardous and the positioning system should be declared unavailable for the intended application to prevent loss of integrity.

**Protection level (PL)**

The PL is a bound on the positioning error that ensures that, the probability per unit of time of the true error being greater than the AL and the PL being less than or equal to the AL, for longer than the TTA, are both less than the required TIR.

**Time-to-Alert (TTA)**

The maximum allowable elapsed time from when the positioning error exceeds the Alert Limit (AL) until the equipment annunciates a corresponding alert.

NOTE: The TIR, AL and TTA are design parameters that are fixed and defined for a particular implementation, whereas the PL is a real time output of the positioning system.

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| **Company** | **Do you agree with Integrity Definitions? Please propose alternatives if not.** | **Do you agree that the Integrity Definitions are KPIs?** |
| CATT | **Target Integrity Risk (TIR)** The probability that the positioning error exceeds the Alert Limit (AL) without warning the user within the Time-to-Alert (TTA), required according to the location service.**Alert Limit (AL)**The maximum allowable positioning error such that the positioning system is available for the location service. If the positioning error in any dimension or combination of dimensions (e.g. horizontal or vertical) is beyond the AL, operations are hazardous and the positioning system should be declared unavailable for the intended application to prevent loss of integrity.NOTE: The TIR, AL and TTA are design parameters that are fixed and defined for service level, whereas the PL is a real time output of the positioning system. | Agree |
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Further, it was agreed that additional definitions can be added based on contribution-led priorities. Please identify additional definitions to be considered, and why.

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| **Company** | **Definitions** | **Why is the definition(s) relevant to the integrity study and protocol/specifications?** |
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# 3 Integrity Use Cases

It was proposed in [1] to illustrate the application of integrity to the safety-critical, liability-critical and commercial applications [e.g. TR 22.872], including Automotive, Industrial IOT and Rail, with additional use cases to be considered case-by-case.

Please indicate (e.g. (a) (c) etc) which of the following use cases should be prioritized for inclusion in the baseline TR:

1. **Automotive/Road**
2. **Industrial IoT**
3. **Rail**
4. **Aerial**
5. **Emergency and Mission Critical**
6. **Location Based Services**
7. **eHealth**
8. **Maritime**

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| **Company** | **Which use cases do you propose should be prioritized?** e.g. (a) (c) etc | **Additional use case suggestions?** |
| CATT | a, b, c, g, e, f |  |
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# 4 Protocol Impact

What are the protocol/specification implications that need to be addressed in the Study for the proposed Integrity Definitions and Use Cases?

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| **Company** | **Protocol/specification impacts to be addressed in the Study?** |
| CATT | 1. TS 22.261 section 7.3.2 should be updated to introduce the integrity requirement of service level.
2. Which positioning methods are supposed to support integrity (e. g The Table 4.3.1-1: Supported versions of UE positioning methods in TS38.305).
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# 4 Skeleton TR

The Skeleton TR was discussed in Agenda Item 8.11.1 with the following outcome:

* Skeleton to be addressed in the continuation of email discussion [607] (to be discussed later).

Taking into consideration the skeleton proposals in [2], [3, 4] and the email/online discussions from [1], an updated skeleton is proposed for consideration:

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9 Positioning integrity and reliability

*From objective 2: Includes solutions necessary to support integrity and reliability of assistance data and position information:*

9.1 Integrity Overview – Background Information

9.1.1 Integrity Definitions

9.1.2 Integrity Concepts

9.2 Use Cases

9.3 Positioning Integrity Error Categories

9.3.1 RAT-Independent

9.3.1 RAT-Dependent

9.4 Positioning Integrity Methods

9.4.1 RAT-Independent

9.4.1 RAT-Dependent

9.5 Procedure and protocol impact analysis

<------------------------------------------End of text proposal------------------------------------------->

# 5 Conclusion

# 6 References

1. R2-2008256 [AT111-e][607][POS] Summary of email discussion on Integrity definitions, KPIs,

and use cases, Swift Navigation.

1. R[2-2006671](file:///E%3A%5CWORK%5C1%203GPP%5CMeeting%5CRAN2%20111-e%5C2%20During%5CDocs%5CR2-2006671.zip) Skeleton proposals for TR38.857, CATT.
2. R[2-2006542](file:///E%3A%5CWORK%5C1%203GPP%5CMeeting%5CRAN2%20111-e%5C2%20During%5CDocs%5CR2-2006542.zip) Proposed table of contents - Section 9 (positioning integrity) - TR 38.857, Swift

Navigation, Ericsson, Intel Corporation.

1. R[2-2006541](file:///E%3A%5CWORK%5C1%203GPP%5CMeeting%5CRAN2%20111-e%5C2%20During%5CDocs%5CR2-2006541.zip) TP for Study on Positioning Integrity and Reliability, Swift Navigation, Deutsche

Telekom, u-blox, Ericsson, Mitsubishi Electric, Intel Corporation, CATT, UIC.