**3GPP TSG-RAN WG2 Meeting #116bis-e R2-220xxxx**

**Electronic Meeting, January 17 – 25, 2022**

**Agenda item:** 8.11.1

**Source:** InterDigital Inc.

**Title:** Email discussion report on [Post116bis-e][627][POS] 36.305/38.305 integrity running CRs (InterDigital)

**Document for:**  Discussion

# 1. Introduction

This document summarizes the following email discussion:

* [Post116bis-e][627][POS] 36.305/38.305 integrity running CRs (InterDigital)

      Scope: Check and endorse the running CRs considering decisions of RAN2#116bis-e.

      Intended outcome: Endorsed CRs

      Deadline:  Friday 2022-01-28 0800 UTC

The draft running CRs are attached with this email discussion.

Please provide the contact information in the following Table:

|  |  |  |
| --- | --- | --- |
| **Company** | **Point of contact** | **Email address** |
| Qualcomm | Sven Fischer | sfischer@qti.qualcomm.com |
| Swift Navigation | Grant Hausler | grant@swiftnav.com |
| CATT | Jianxiang Li | Jianxiang Li (lijianxiang@catt.cn) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

# 2. Discussion

The scope of this email discussion is to discuss the Stage 2 description included in the running CRs for TS 38.305 and TS 36.305, in [1] and [2], respectively.

The previously submitted running CRs (prior to start of RAN2#116bis-e meeting) are [3] and [4].

## 2.1 Discussion

The text proposal provided in the running CRs are based on the descriptions discussed during [AT116bis-e][611][POS] discussions [3][4] and agreed during RAN2#116bis-e meeting [5].

Given the agreements in [5] and the open issues/FFS listed in [AT116bis-e][611][POS] GNSS integrity - Extended Discussion (Stage 3) [4], the following parameters related to Integrity alerts, and orbit and clock integrity bounds are excluded from Table 8.1.2.1b-1 (Mapping of Integrity Parameters) in the running CRs:

* Integrity Alerts
	+ Service DNU, Constellation DNU, Satellite Vehicle DNU
* Integrity Bounds (Mean)
	+ Mean Orbit Clock Residual Error Shape Vector, Mean Orbit Clock Residual Rate Error Shape Vector, Mean Orbit Clock Residual Error Scale Factor, Mean Orbit Clock Residual Rate Error Scale Factor
* Integrity Bounds (StdDev)
	+ Covariance Orbit Clock Residual Error Shape Matrix, Covariance Orbit Clock Residual Rate Error Shape Matrix, Covariance Orbit Clock Residual Error Scale Factor, Covariance Orbit Clock Residual Rate Error Scale Factor

The open issues related to the above parameters, provided in [4], are as follows:

* **Proposal 3 (Open Issue): RAN2 to discuss whether to modify the existing GNSS-RealTimeIntegrity IE or create a new IE to accommodate the Alerts for the satellite/constellation specific DNUs under *GNSS-GenericAssistData*.**
	+ **Discuss whether a Constellation DNU and per-signal DNU should be included in addition to the SV DNU.**
* **Proposal 5 (Open Issue): RAN2 to discuss whether or not the cross-covariance should be included for the Orbit and Clock integrity bounds and whether these bounds should be included as a new IE or within the existing SSR Orbit and Clock IEs.**

Q1: Please provide your comments on the CRs, as well as your suggested changes and corresponding clause/section where the comments/changes may apply.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Company** | **Comments** | **Suggested Changes** | **Clause/Section** | **Moderator’s Views** |
| Qualcomm | Section 3.1, Definition of "Positioning integrity" could be improved. The relation between "integrity" and "warning messages" is confusing/unclear. E.g., who provides these warnings? Are these the DNU flags? | Exclude signalling of messages from the integrity definition. E.g., just:"A measure of the trust in the accuracy of the position-related data". | 3.1 |  |
| Table 8.1.2.1-1: Integrity Residual Risk Parameters and Integrity Orbit Clock Error Bounds need an FFS/Editor's Note, since not clear yet whether this will be new assistance data or integrated into existing SSR assistance data. | Add FFS/Editor's Note. | Table 8.1.2.1-1 |  |
| Integrity Residual Risk Parameters can also be integrated into existing assistance data per agreement:Proposal 5: RAN2 agrees to include the Integrity Residual Risk Parameters into their existing corresponding GNSS IEs (as per Appendix A (R2-2201761). This discussion is also subject to the Stage 3 outcomes regarding which IEs and associated fields to define for integrity. | Include Integrity Residual Risk description in sections 8.1.2.1.25/26. Or add an Editor's Note for now. | 8.1.2.1.31 |  |
| Editorial: 3GPP styles need to be used |  | All text seems Normal Style (even headings and Notes), use justified paragraphs, etc. (see 21.801 for 3GPP styles).  |  |
| Huawei, HiSilicon | Definitions for error, bound, DNU, residual risk, irMax,Min | Put the definitions under the clause 3.1  | 8.1.1a |  |
| Huawei, HiSilicon | Two notes at the end of 8.1.1a | Should not be put under NOTE | 8.1.1a |  |
| Swift Navigation | Agree with QC that we could be more specific about the Alerts in the positioning integrity definition | **Positioning integrity:** A measure of the trust in the accuracy of the position-related data and the ability to provide associated Alerts (e.g. DNU) | 3.1 |  |
| Agree with QC on adding FFS to Orbit/Clock Alerts and Bounds in Table 8.1.2.1b-1 | We proposed track changes to the draft CR for 38.305 | Table 8.1.2.1b-1 |  |
| Agree with QC on also integrating residual risks into the STEC and Gridded Correction Descriptions 8.1.2.1.25/26 | 8.1.2.1.25/26 |  |
| In Table 8.1.2.1b-1 the word ‘Static’ needs to be removed from the ‘…Vertical Wet Delay…’ fields (this was an error in the initial Table) | Table 8.1.2.1b-1 |  |
| The Mean Duration parameters from Table 3.2-2 need to be added to the Residual Risks column in Table 8.1.2.1b-1, as per Proposal 6 (R2-2201765). | Table 8.1.2.1b-1 |  |
| We made some minor editorials in 8.1.1a to tighten the wording and grammar etc. If it’s too late to include, that’s ok, but hopefully it helps overall. | 8.1.1a |  |
| In Section 8.1.1a (Principle of Operation) the text and equations will need to be updated if we adopt the combined orbit/clock covariance approach, to show how the bound can be computed using the covariance matrix, FFS. | FFS | 8.1.1a |  |
| CATT | Agree with QC. Integrity Residual Risk Parameters IE should be deleted or add FFS/Editor's Note. Since this IE will be included in the existing GNSS IEs. | Delete or add add FFS/Editor's Note. | able 8.1.2.1-1 |  |
| The SSR STEC Corrections IE also provides Ionosphere Range Error Correlation Time and Ionosphere Range Rate Error Correlation Time information according to Table 8.1.2.1b-1. | Include integrity correlation times description. | 8.1.2.1.25 |  |
| SSR Gridded Correction also provides the Troposphere Range Error Correlation Time and Troposphere Range Rate Error Correlation Time information according to Table 8.1.2.1b-1. | Include integrity correlation times description. | 8.1.2.1.26 |  |
| The description of the Mean Fault Duration parameters should be kept, but not in the Integrity Residual Risk Parameters IE. RAN2 agrees to include the Integrity Residual Risk Parameters into their existing corresponding GNSS IEs. This clause should be deleted. | Delete clause 8.1.2.1.31 and move the description of the Mean Fault Duration parameters to the suitable clause. | 8.1.2.1.31 |  |
| It is better to indicate the Protection Level in the integrity results, since RAN2 agrees that the PL will be reported in the Integrity Results. | Include the PL in the description. | 8.1.3.3.1 |  |
|  |  |  |  |  |

## 2.2 Moderator’s Summary

The moderator thanks the companies for providing comments and suggested changes. The following are the topics that the companies have commented/suggested for changes:

1. **Definition of "Positioning integrity" (Section 3.1)**
* Qualcomm had concerns on relation between "integrity" and "warning messages” and suggested improving the definition.
* Swift shared similar views with Qualcomm and suggested to change by replacing “warning messages” with “Alerts (e.g. DNU)” in the definition

Moderator’s view: The discussion on definition of positioning integrity was handled over several rounds (discussion captured in R2-2110997 and R2-2111378) during previous meeting in RAN2#116bis. During RAN#116bis-e meeting the agreement on Proposal 3 (R2-2201761) [5][7] related to integrity alerts has been made. Given the inputs from companies and agreement in this meeting, the suggested change from Swift provides a good compromise. The definition below will be captured in the updated version of the running CRs.

**Positioning integrity:** A measure of the trust in the accuracy of the position-related data and the ability to provide associated alerts

1. **Entries in Table 8.1.2.1-1**
* Qualcomm mentioned that it is unclear on whether the Integrity Residual Risk Parameters and Integrity Orbit Clock Error Bounds will be new assistance data or included in existing SSR assistance data.
* CATT shared same view with Qualcomm
* Swift also agreed with Qualcomm and indicated for adding FFS to Orbit/Clock Alerts and Bounds in Table 8.1.2.1b-1

Moderator’s view: Given the justification from Qualcomm and the open issue identified in Proposal 7 in R2-2201765, the corresponding editor’s notes are to be added under Table 8.1.2.1-1 and Table 8.1.2.1b-1 on the inclusion of the parameters in the updated version of running CR.

1. **Description on Integrity Residual Risk in sections 8.1.2.1.25 and 8.1.2.1.26**
* Qualcomm mentioned including description on Integrity Residual Risk Parameters as per the agreement on Proposal 5 (R2-2201761) [5][7]
* Swift shared same understanding with Qualcomm and provided revised text proposal to sections 8.1.2.1.25/26

Moderator’s view: Given that the description from Swift captures the aspects from the agreement in Proposal 5 (R2-2201761) [5][7], the revised description will be captured in the updated version of running CR

1. **Description on Integrity Correlation Times in sections 8.1.2.1.25 and 8.1.2.1.26**
* CATT mentioned including the description on Correlation Times related to Ionosphere and Troposphere in sections 8.1.2.1.25/26

Moderator: Given the comments from CATT and related agreement on Proposal 8 (R2-2201765), the Integrity Correlation Time is to be added to sections 8.1.2.1.25/26 in the in the updated version of running CR

1. **Mean Duration parameters**
* Swift mentioned to include the Mean Duration parameters under the Residual Risks column in Table 8.1.2.1b-1, as per agreement per Proposal 6 (R2-2201765).
* CATT mentioned that the description of the Mean Fault Duration parameters should be kept, but not in the Integrity Residual Risk Parameters IE.

Moderator’s view: Given the agreement on Proposal 6 (R2-2201765) [5][7] which includes the TP on Integrity Residual Risk Parameters, no further changes are foreseen at this stage for section 8.1.2.1.31 of the running CR. Given comments from Swift, the mean duration parameters will be added into Table 8.1.2.1b-1 in the updated version of running CR.

1. **PL description**
* CATT mentioned to indicate the Protection Level in the integrity results, given previous RAN2 agreement

Moderator’s view: We think that the Stage 2 description of the PL needs to be agreed for possible inclusion in the running CR. This can be discussed in the next RAN2 meeting, if necessary.

1. **Description under Principle of Operation (Section 8.1.1a)**
* Swift mentioned that the text and equations in Section 8.1.1a (Principle of Operation) needs to be updated if combined orbit/clock covariance approach is adopted.

Moderator’s view: Given the comments from Swift and corresponding open issue identified on Proposal 5 (R2-2201765) [6][7], an editor’s note is to be added under Section 8.1.1a in the updated version of running CR

1. **Editorial changes**
* Qualcomm: To use 3GPP styles
	+ Moderator: Thank you for the comment and providing the related reference. The formatting in running CR is now changed to 3GPP style
* Huawei: Definitions in sections 8.1.1a to be included under the clause 3.1
	+ Moderator: As discussed in R2-2201761, for terms that are used locally, they can be defined locally and kept within 8.1.1a.
* Huawei: Two notes at the end of 8.1.1a should not be included as notes
	+ Moderator: The notes are removed and moved to the paragraph following Equation 8.1.1a-1
* Swift: The word ‘Static’ to be removed in Table 8.1.2.1b-1
	+ Moderator: Table 8.1.2.1b-1 is revised based on comments
* Swift: Editorial changes to Section 8.1.1a
	+ Moderator: Section 8.1.1a is revised based on comments

# 3 Summary

The following is the summary containing the companies and rapporteur’s views derived from the discussion above:

1. **Definition of "Positioning integrity" (Section 3.1)**

Given company inputs and agreement made during RAN2#116bis-e the definition below will be captured in the updated version of the running CRs.

**Positioning integrity:** A measure of the trust in the accuracy of the position-related data and the ability to provide associated alerts

1. **Entries in Table 8.1.2.1-1**

Given the justification from Qualcomm and the open issue identified in Proposal 7 in R2-2201765, the corresponding editor’s notes are to be added under Table 8.1.2.1-1 and Table 8.1.2.1b-1 on the inclusion of the parameters in the updated version of running CR.

1. **Description on Integrity Residual Risk in sections 8.1.2.1.25 and 8.1.2.1.26**

Given that the description from Swift captures the aspects from the agreement in Proposal 5 (R2-2201761) [5][7], the revised description will be captured in the updated version of running CR

1. **Description on Integrity Correlation Times in sections 8.1.2.1.25 and 8.1.2.1.26**

Given the comments from CATT and related agreement on Proposal 8 (R2-2201765), the Integrity Correlation Time is to be added to sections 8.1.2.1.25/26 in the in the updated version of running CR

1. **Mean Duration parameters**

Given the agreement on Proposal 6 (R2-2201765) [5][7] which includes the TP on Integrity Residual Risk Parameters, no further changes are foreseen at this stage for section 8.1.2.1.31 of the running CR. Given comments from Swift, the mean duration parameters will be added into Table 8.1.2.1b-1 in the updated version of running CR

1. **PL description**

We think that the Stage 2 description of the PL needs to be agreed for possible inclusion in the running CR. This can be discussed in the next RAN2 meeting, if necessary.

1. **Description under Principle of Operation (Section 8.1.1a)**

Given the comments from Swift and corresponding open issue identified on Proposal 5 (R2-2201765) [6][7], an editor’s note is to be added under Section 8.1.1a in the updated version of running CR

# 4 Reference

1. R2-220xxxx, Running CR of 38.305 GNSS Positioning Integrity (InterDigital, Inc), Jan 2022
2. R2-220xxxx, Running CR of 36.305 GNSS Positioning Integrity (InterDigital, Inc), Jan 2022
3. R2-2201390, Running CR of 36.305 for GNSS Positioning Integrity (InterDigital, Inc), Jan 2022
4. R2-2201391 Running CR of 38.305 for GNSS Positioning Integrity (InterDigital, Inc), Jan 2022
5. R2-2201761, Report of [AT116bis-e][611][POS] GNSS integrity (Swift)
6. R2-2201765, [AT116bis-e][611][POS] GNSS integrity - Extended Discussion (Stage 3) (Swift)
7. RAN2 chairman notes RAN2#116bis-e, January 2022