3GPP TSG-RAN WG2 Meeting #116bis ***R2-22xxxxx***

Electronic Meeting, January 17 – 25, 2022

**Agenda item:** 8.11.1

**Source:** Qualcomm Incorporated

**Title:** Summary of [Post116bis-e][628][POS] 37.355 running CR (Qualcomm)

**Document for:**  Discussion

# 1. Introduction

This document (with attachments) summarizes the following email discussion:

* [Post116bis-e][628][POS] 37.355 running CR (Qualcomm)

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

      Intended outcome: Endorsed CR

      Deadline:  Friday 2022-01-28 0800 UTC

# 2. Review Instructions

## 2.1 RAN1 Parameter and Agreements

- The file "From\_R1-2112976\_pos\_parameter\_v00.xlsx" contains the spreadsheet with the RAN1 parameters and agreements (only the Positioning sheet is included in the Excel file) as provided in R1 2112976 (R2-2200095).

- The file "R2-22xxxxx\_(37355 running CR)\_v3.docx" contains the proposed updated LPP baseline CR.

- The parameter and agreements summarized in this Excel sheet are implemented in the LPP running CR submitted to RAN2#116bis in tdoc R2-2200959. No changes related to the RAN1 parameter have been made in "R2-22xxxxx\_(37355 running CR)\_v3.docx" compared to the original submission.

- Column Q of this Excel sheet indicates where each RAN1 parameter/agreement can be found in the LPP baseline in "R2-22xxxxx\_(37355 running CR)\_v3.docx".

- Starting from Column R, companies are requested to provide their comments on "R2-22xxxxx\_(37355 running CR)\_v3.docx" for each row in the spreadsheet (where applicable). Please replace the "Company X" in the 1st row with your company name. Please be as concise as possible when providing comments and focus on potential errors/misalignments between RAN1 agreements and proposed LPP implementation in "R2-22xxxxx\_(37355 running CR)\_v3.docx".

- The Columns labelled "Rapporteur Comments" (blue) are intended to provide comments/answers etc. from the Rapporteur on the individual company comments.

- Note, that there are many FFS or [] in the spreadsheet/agreements. These parameters have an FFS and/or Editor's Note in "R2-22xxxxx\_(37355 running CR)\_v3.docx", highlighted in yellow.

- Please do not add comments directly in "R2-22xxxxx\_(37355 running CR)\_v3.docx".

- Please make no changes to the columns A-Q in the spreadsheet.

- Row 169 in the spreadsheet has been added for other comments related to the RAN1 agreements which do not fit into any of the rows 2-168.

- When uploading the spreadsheet with your comments, increase the version suffix (\_vxx) and add your short company abbreviation, as usual (e.g., \_v05\_QC).

## 2.1 RAN2 Agreements

- A first draft implementation of (some) RAN2 agreements is included in file "R2-22xxxxx\_(37355 running CR)\_v2.docx", on tvop of R2-2200959.

- These additions have been added as user "RAN2" and should show up in a different change bar colour in "R2-22xxxxx\_(37355 running CR)\_v2.docx".

- All the RAN2 agreements are summarized in the Annex of this document.

- RAN2 agreements made before January-21-2022-16:00Z are included in this Annex.

- RAN2 agreements made on January-24-2022 on-line session have been added to this Annex.

- The agreements with LPP impact and which are implemented in "R2-22xxxxx\_(37355 running CR)\_v3.docx" are highlighted in green in this Annex.

- The Excel spreadsheet with file name "RAN2-Agreements\_v00.xlsx" includes these RAN2 agreements in the first column. The second column in the Excel sheet indicates where this agreement is implemented in the draft LPP in "R2-22xxxxx\_(37355 running CR)\_v3.docx".

- The Excel spreadsheet with file name "RAN2-Agreements\_v01\_rap.xlsx" includes in addition the RAN2 agreements made on January-24-2022 on-line session, shown in gray shaded cells.

- These additions have been added as user "RAN2\_v3" and should show up in a different change bar colour in "R2-22xxxxx\_(37355 running CR)\_v3.docx".

- Starting from Column C, companies are requested to provide their comments on the RAN2 part of "R2-22xxxxx\_(37355 running CR)\_v3.docx" for each row in the spreadsheet (where applicable). Please replace the "Company X" in the 1st row with your company name. Please be as concise as possible when providing comments and focus on potential errors/misalignments between agreements and proposed LPP implementation in "R2-22xxxxx\_(37355 running CR)\_v3.docx".

- The Columns labelled "Rapporteur Comments" (blue) are intended to provide comments/answers etc. from the Rapporteur on the individual company comments.

- Note, since many RAN2 agreements are at rather high-level, the LPP implementation of these agreements is rapporteur's suggestion.

- Row 14 in the spreadsheet has been added for other comments related to the RAN2 agreements which do not fit into any of the rows 2-13.

# Annex A: RAN2 Agreements

## A.1 Latency Reduction

|  |
| --- |
| Agreement:  Send response LS R2-2104420 to SA2 on Scheduling Location in Advance to reduce Latency;  With regard to latency reduction related to the measurement gaps postpone the RAN2 discussion until more input/agreements from RAN1/RAN4 are available. |

Agreements:

Support pre-configuration of assistance data to the UE at least in an LPP session. Details of how to enable this are FFS (e.g. what additional functionality beyond deferred location procedure might be needed).

The LPP Request Location Information message can serve as an indication to the UE to utilize the pre-configured AD. FFS additional conditions/validity criteria for using the pre-configured AD.

Agreement:

Proposal 3: Regarding the validity conditions/criteria associated with pre-configured assistance data, consider at least the following options:

 Option A: Based on a validity area (e.g. a list of cells)

 Option B: Based on a (configured) validity timer or a numerical limit on number of times it is utilized

 Option C: Based on explicit modification or release from the LMF/NG-RAN

 Option D: Based on the UE’s current location and/or the time

Agreement:

Proposal 6 (modified): In response to the question asked by SA2 regarding UE positioning capability, ~~it is proposed to~~ capture that the positioning related UE capabilities can be variable.

NOTE: P6 was edited after agreement for clarity (deletion marked with strikeout). Checked in email discussion [AT115-e][600].

Agreements:

Proposal 1: Assistance data can be (pre-)configured independently of any given LPP positioning session and thus can be reused across multiple positioning sessions.

Proposal 2: It is suggested to agree that in order to reduce positioning latency associated with signaling of assistance data (via both broadcast or dedicated signaling), pre-configured assistance data can be considered valid for usage across multiple LPP positioning sessions.

FFS spec impact from these proposals.

Agreement:

Pre-configured assistance data (distinct from “pre-defined configuration” as discussed for on-demand PRS) refers to the DL-PRS assistance data (with associated validity criteria) that can be provided to the UE (before or during an ongoing LPP positioning session), to be then utilized for potential positioning measurements at a future time (e.g. for deferred MT-LR). FFS whether to capture this in a spec.

Agreement:

Proposal 8 (modified): Down-prioritize dynamic triggering of a preconfigured SRS at UE in connected mode by gNB for transmitting SRS based on measurement report provided by UE in Rel-17.

Agreements:

Proposal 1a (modified): Include a "Scheduled Location Time" with measurement time information in LPP CommonIEsRequestLocationInformation, defining the desired time when the location measurements or location estimate is to be obtained/valid. FFS if the information is an absolute time or a window.

Proposal 1d: Include the capability to support scheduled location in each method-ProvideCapabilities message, where 'method' can be any of the LPP positioning methods. The capability should indicate the time base(s) supported for scheduling location measurements.

Agreements:

Proposal 3a (modified): Pre-configured DL-PRS assistance data can be associated with a "validity area" at least in LPP. FFS on details and whether it would be included in RRC broadcast.

Agreements:

Proposal 5a: A new UL MAC CE for positioning measurement gap activation and deactivation request is introduced.

Proposal 5b: The new UL MAC CE for positioning measurement gap activation and deactivation request includes at least the ID of the pre-configured positioning measurement gap configuration for which the activation/deactivation is requested. Other parameter are FFS.

Proposal 5c (modified): A new DL MAC CE for positioning measurement gap activation and deactivation command is introduced for positioning latency reduction. LS to RAN1/4 indicating our conclusion, and confirming that DL MAC CE can also be used for positioning measurement gap deactivation as well as activation (to be drafted by email).

Proposal 5d: The new DL MAC CE for positioning measurement gap activation and deactivation command includes at least the ID of the pre-configured positioning measurement gap configuration which has been configured/activated by the gNB. Other parameter are FFS.

Proposal 5e: The Scheduling Request should be triggered when there is no PUSCH and UL MAC CE for positioning measurement gap activation/deactivation request is triggered.

Agreements:

Proposal 3.2.1.2-1: [Easy agreements] [8/9] For storing LPP capability in the AMF, do not introduce “variability indicator ” in LPP capability.

Proposal 3.2.1.3-1 (modified): [Easy agreements] [10/10] Include the capability to support validity area in each method ProvideCapabilities message, where “method” can be any of the LPP positioning methods that rely on DL-PRS. FFS on other validity criteria.

Agreements:

Proposal 4: The pre-configured Measurement Gap Configurations for Positioning are provided via RRCReconfiguration message. The pre-configured Measurement Gap Configurations for Positioning are included in IE MeasGapConfig.

Proposal 5: The content of the pre-configured Measurement Gap Configurations for Positioning includes at least the existing measurement gap parameters together with an ID identifying each Measurement Gap Configuration for Positioning.

Proposal 6: The existing RRC LocationMeasurementIndication procedure to request the positioning measurement gaps can still be used by a UE, even when pre-configured measurement gaps are provided to the UE.

Agreements:

Proposal 7: The PRS processing window configuration is provided via RRCReconfiguration message. Whether PRS processing window configuration is provided per BWP or not is up to RAN1 to decide.

Proposal 8: A new DL MAC CE for PRS Processing Window activation and deactivation command is introduced.

Proposal 9: The new DL MAC CE for PRS Processing Window activation and deactivation command includes at least the ID of the pre-configured PRS Processing Window configuration, at least in the case when multiple PRS Processing Windows can be configured.

Proposal 10: The UE behaviour related to the PRS Processing Window feature is captured in the MAC specification.

Agreement:

Proposal 3: Pre-configured DL-PRS assistance data can consist of multiple instances, where each instance is applicable to a different area within the network. FFS on additional specification impacts and whether this can already be supported with the agreement made that pre-configured DL-PRS assistance data can be associated with a "validity area". Single instance of AD is not excluded; FFS if there would be signalling for multiple area IDs in the same instance. Signalling details can be discussed in the LPP running CR discussion.

Agreements:

- On the concurrent measurement gap, RAN2 wait for further input from RAN1/RAN4.

- On the Network-Controlled Small Gap, RAN2 wait for further input from RAN1/RAN4.

- An LMF needs to provide "assistance information" to a gNB to support measurement gap (pre-)configuration.

- The information that needs to be transferred between LMF and gNB to support the positioning measurement gap (pre-)configuration can be decided by RAN3.

- Whether UL MAC CE can also be used for PRS processing window activation/deactivation should be decided by RAN1.

- The information that needs to be transferred between LMF and gNB to support the PRS Processing Windows configuration can be decided by RAN3.

## A.2 Positioning in RRC\_INACTIVE State

Agreements:

WA: Any uplink LCS or LPP message can be transported in RRC\_INACTIVE from RAN2 perspective, subject to the data volume supported by AS layers. I.e. RAN2 do not specify a restriction on message type.

FFS if LPP needs to select transport, i.e. if the message is just submitted to lower layers which decide how to deliver it (SDT, change state, etc.).

FFS if RRC state is exposed to LPP.

Agreements:

Any uplink LCS or LPP message can be transported in RRC\_INACTIVE from RAN2 perspective.

Follow Rel-17 SDT framework for INACTIVE UL and DL positioning:

 If the UE initiated data transmission using UL SDT, the network can send DL LCS, LPP message and RRC message (e.g. to configure SRS (TBD on what message is used), if UL positioning supported) to the UE.

 Otherwise, if UE did not initiate UL SDT, rely on legacy operation, i.e. the network shall transition the UE to RRC\_CONNECTED, e.g. based on RAN paging.

Agreements:

Exposure of the RRC state of the UE to the LPP layer of the UE for RRC\_INACTIVE UL and DL positioning will not be specified. This does not exclude cross-layer behaviour in implementations.

The RRC state of the UE is not exposed to the LMF for INACTIVE UL and DL positioning.

Agreements:

LPP PDU and LCS message transfer:

Proposal 1: The LPP PDU Transfer Procedure in Annex A is used as baseline for further work.

NOTE 1: Some details may depend on further progress of the SDT work item.

NOTE 2: Whether such a procedure needs to be captured in Stage 2 specification or not can be decided later when the procedure has been fully developed/agreed. That is, the procedure can be considered as "running baseline".

Proposal 2: The LCS Message Transfer Procedure in Annex B is used as baseline for further work.

NOTE 1: Some details may depend on further progress of the SDT work item.

NOTE 2: Whether such a procedure needs to be captured in Stage 2 specification or not can be decided later when the procedure has been fully developed/agreed. That is, the procedure can be considered as "running baseline".

Proposal 3: UL LPP message segmentation can also be used by the UE in RRC\_INACTIVE state; i.e., a LPP message body can be sent in several shorter LPP messages instead of one long LPP message by using the SDT "Subsequent Data Transmission" phase. FFS spec impact.

DL and RAT-independent positioning:

Proposal 4: The Deferred 5GC-MT-LR Procedure with SDT for DL-only and RAT-independent positioning in Annex C is used as baseline for further work.

NOTE 1: Some details may depend on further progress of SDT work item.

NOTE 2: Whether such a procedure needs to be captured in Stage 2 specification or not can be decided later when the procedure has been fully developed/agreed. That is, the procedure can be considered as "running baseline".

NOTE 3: Once the procedure is stable from RAN2 perspective, send an LS to SA2 including the baseline procedure.

Agreement:

(High priority)Proposal 1: Support all the RAT independent positioning methods in RRC\_INACTIVE state.

Agreement:

gNB can configure the UE with periodic SRS (assuming periodic SRS is supported in RRC\_INACTIVE) by RRCRelease with suspendConfig at least when periodic event is configured for deferred MT-LR. Other cases can be further discussed.

Agreement:

Proposal 1 (modified): The PRS configuration from LMF to UE is independent of the RRC state. That is, no impact on PRS configuration for RRC\_INACTIVE (13/15) from RAN2 perspective.

Agreement:

Proposal 4 (modified): For positioning in RRC\_INACTIVE state, the positioning assistance data can be delivered to UE through the following ways:

- positioning system information, i.e. posSIB;(12/13)

- pre-configure assistance data when UE in RRC\_CONNECTED state;(11/13)

- send to UE in RRC\_INACTIVE during ongoing SDT procedure. (9/13)

Agreement:

Proposal 6: SRS for positioning in RRC\_INACTIVE state can be configured through the following ways:

- RRCRelease with SuspendConfig (13/13)

- SDT DL RRC message, i.e. Msg B / Msg 4 of RA-SDT (9/13)

- WA: pre-configure positioning SRS in RRC\_CONNECTED (9/13)

FFS detailed signalling for these approaches.

Proposal 8: Support SP SRSp for positioning in RRC\_INACTIVE state. (12/13)

Proposal 9: SP Positioning SRS Activation/Deactivation MAC CE is reused for triggering SRSp transmission in RRC\_INACTIVE. (12/12)

Proposal 10: AP SRSp is not supported for positioning in RRC\_INACTIVE state. (11/13)

Agreements:

Proposal 1 (modified) To support UL positioning in RRC\_INACTIVE, reuse SDT TA timer mechanism (with a separate timer with similar function) for TA validation.

Proposal 2 To support UL positioning in RRC\_INACTIVE, reuse RSRP change based solution for TA validation

Proposal 3 The SRSp configuration is considered as invalid if TA is not valid.

Proposal 4 When cell reselection is performed and UE initiates RRC resume procedure to the cell which is different from the cell in which the SRSp is configured, the TA timer configuration for SRS should be released.

Proposal 5 (modified) The SRSp configuration is released when the UE sends RRCResumeRequest to a cell other than the cell where it is released to RRC\_INACTIVE state.

Proposal 6 BWP info together with the SRS-PosResourceSet IE is included in RRCRelease message for SRS configuration in RRC\_INACTIVE.

Proposal 7 RAN2 confirms RAN1 agreement that UE may be configured to transmit UL SRS for Positioning where the following parameters are additionally configured for the transmission of the SRS for Positioning during the RRC\_INACTIVE state: frequency location and bandwidth, SCS, CP length.

Proposal 8 Add the restriction on AP SRS in the field description of resourceType “The aperiodic is not applicable for the UE in RRC\_INACTIVE.”.

FFS if the TA timer configuration is invalidated upon any cell reselection.

Agreement:

RAN2 will not make additional effort to make the gNB aware of when to transit the UE to RRC\_INACTIVE (left to gNB implementation and RAN3 solution).

Agreements:

Proposal 3 The agreement with WA: pre-configure positioning SRS in RRC\_CONNECTED is removed.

Proposal 12 (modified) No indication is added in Rel-17 from NW to UE for the continuity of UL SRS Tx when transiting from one mode to other.

## A.3 On-demand DL-PRS

Agreements:

UE-initiated on-demand PRS request is enabled by enhancing LPP RequestAssistanceData. FFS how much control the network has over the UE request.

The UE-initiated mechanism is enabled by the UE request triggering a request from the LMF, and the actual PRS changes are requested by the LMF irrespective of whether the procedure is UE- or LMF-initiated.

Put the stage 2 description for UE-initiated and LMF-initiated PRS request under the same framework.

Agreements:

The network can signal predefined PRS configurations to the UE and the UE can select one to request. FFS if the UE can request a configuration with different parameters and exactly which parameters are flexible.

Agreements:

Proposal 2: Define a new LPP assistance data IE which can contain a set of possible on-demand DL-PRS configurations, where each on-demand DL-PRS configuration has an associated identifier.

Proposal 3 (modified): The new LPP assistance data IE from Proposal 2 can be included in an LPP Provide Assistance Data message and/or a new posSIB.

Agreement:

Proposal 4 (modified): The procedure(s) for on-demand DL-PRS should support at least the following functionality (up to RAN3 what is in NRPPa vs. OAM, etc.):

- Providing the requested on-demand DL-PRS configuration information from an LMF to the gNB (e.g., explicit parameter or identifier of a predefined DL-PRS configuration), and confirmation of the request by the gNB

- Provision of (possible/allowed) on-demand DL-PRS configurations that the gNB can support from a gNB to an LMF

- TRP capability transfer (e.g., whether the RAN node supports the reconfiguration of DL-PRS, etc.)

Agreements:

Before providing available DL-PRS configuration to the UE, the LMF may obtain configuration information on what DL-PRS can be supported from one or more TRPs via NRPPa.

Capture the steps provided above as a baseline, along with a note indicating it remains FFS if the UE can send the MO-LR to request on-demand PRS.

FFS if we indicate to SA2 that MO-LR can be used to trigger on-demand PRS procedure.

It is up to Network (LMF) implementation on the steps to follow (accept/reject/ignore) on receiving request from UE for changing the DL-PRS configurations.

Agreements:

Proposal 1: RAN2 to agree to support the UE originated request of on-demand PRS via MO-LR for autonomous self location. (11/14)

Proposal 3: RAN2 to agree that UE can send an MO-LR Request message included in an UL NAS TRANSPORT message to the serving AMF including an LPP Request Assistance Data message which is used for on-demand DL-PRS transmission, and the MOLR-Type of this MO-LR Request message is “assistanceData”. (12/14)

Proposal 4: RAN2 to agree the following general stage 2 procedure as baseline for UE initiated on-demand PRS via MO-LR. (13/14) [Figure 2 of R2-2109483, with the associated list of steps as given in section 5 of R2-2109483.] To be discussed in development of the running stage 2 CR (post-meeting) how much of this detail we need to capture in 38.305.

Agreements:

Proposal 1.1: The UE may initiate an on-demand PRS request per positioning method including DL-TDoA, DL-AoD and Multi-RTT, via the existing LPP RequestAssistanceData message.

Proposal 1.2: There is no need for introducing a new LPP message to carry the on-demand PRS request.

Agreements:

If the LMF indicates predefined configurations, the UE can request them via LPP RequestAssistanceData.

Agreement:

LPP signalling supports index-based and explicit request of DL-PRS parameters from the UE. The UE is not required to implement requesting explicit parameters and the LMF is not required to grant them if the UE does request.

Agreements:

Proposal 3.2.3-1: [Easy agreements] [10/10] For On-Demand PRS, introduce LPP capability on UE-initiated On-Demand PRS Request;

## A.4 GNSS Positioning Integrity

Agreement:

Proposal 1 (modified): 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.

Agreements:

Proposal 1: Agree that the GNSS feared events will be addressed in the WI.

Proposal 2 (modified): Agree that all for A-GNSS positioning methods, positioning integrity determination is supported in LPP.

Proposal 3: Agree that additional IEs are needed in LPP to support A-GNSS positioning integrity determination.

Proposal 4: The specific algorithms used for positioning integrity shall be up to implementation.

Proposal 5: For interoperability, the use of “hard-coded” parameters should be minimized and instead the needed parameters should be sent explicitly in the assistance data.

Proposal 6: RAN2 agrees that the PL will be reported in the Integrity Results. It is FFS whether Mode 2 and the TIR, AL, TTA that were used in the integrity calculation will also be reported in the integrity results.

Proposal 8: Agree that the UE feared events will be handled in the implementation for UE-based (network-assisted) methods of positioning integrity determination.

Proposal 10: Agree that the LMF feared events can be handled via implementation for the UE-based (network-assisted) and UE-assisted (LMF-based) methods of positioning integrity determination.

Proposal 11: RAN2 agrees to use Common Positioning IEs to transfer the KPIs and Integrity Results.

Proposal 12: RAN2 agrees that the LPP procedures can be used to transfer the KPIs and Integrity Results. For UE-assisted, the LCS procedures remain FFS in the case of MO-LR.

Agreements:

In Rel-17, we do not address the data transmission feared event (i.e. we rely on the system’s existing methods for assuring data integrity).

Agreements:

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.

Agreements:

Proposal 3 (modified): Separate procedures for "A-GNSS Positioning Integrity" as proposed in R2-2107503 will not be defined; the existing A-GNSS (and general location) Procedures are applicable/sufficient.

Proposal 4 (modified): RAN2 confirms that LPP messages RequestLocationInformation and ProvideLocationInformation are used to transfer integrity KPIs/results, respectively, for GNSS positioning at least for UE-based mode.

Proposal 5 (modified): RAN2 confirms that LPP messages RequestAssistanceData and ProvideAssistanceData are used to transfer integrity assistance data for GNSS positioning at least for UE-based mode.

Agreements:

Proposal 1. Request feedback from RTCM SC134 on the specific technical attributes:

- overbounding of GNSS errors: zero-mean assumption (provision of standard deviation only) or non-zero mean assumption (provision of mean in addition to standard deviation); paired overbounding vs single overbounding.

- additional items are FFS for now and depend on progress during RAN2 #116.

Proposal 2. RAN2 to proceed with the Rel-17 work scope. What is achieved is FFS and depends on contributions and proposals under discussions in R2-2110181.

Proposal 3. RAN2 agrees to leverage in the future on standards for GNSS integrity message produced by RTCM SC134 when this become available.

Proposal 4. Include in the draft LS all our agreements/conclusions dealing with GNSS integrity.

Agreements:

Proposal1-1 (modified): WA: The paired overbounding technique is supported for bounding the error probability distribution for GNSS integrity as a baseline.

Proposal1-2 (modified): Error representation by SSR is supported for GNSS integrity. FFS alignment with the assistance data for OSR in RTCM (also FFS alignment with SSR, if RTCM produce something in that direction in the Rel-17 time frame).

Agreements:

Proposal2-9: Assistance data for GNSS integrity can be sent periodically.

Proposal2-11: The assistance data in GNSS-RealTimeIntegrity can be reused for GNSS integrity in R17

Agreement:

Pursue LMF-based integrity on a best-effort basis in Rel-17.

Agreements:

Proposal 1: RAN2 agrees to add the Integrity Principle of Operation (Clause 8.1.1a) text from Appendix A (R2-2201761) into TS 36.305 and TS 38.305.

Proposal 2: Agree to add the descriptions from Appendix A (R2-2201761) for the SSR Code Bias (8.1.2.1.23), SSR Phase Bias (8.1.2.1.24), SSR STEC Corrections (8.1.2.1.25) and SSR Gridded Corrections (8.1.2.1.26) as baseline. Final wording is subject to the outcomes of Stage 3 and depends on which integrity IEs and associated fields are included in LPP.

Proposal 3: Agree to add the Integrity Service Parameters (8.1.2.1.29) and Integrity Alerts (8.1.2.1.30) descriptions from Appendix A (R2-2201761) into TS 36.305 and TS 38.305.

Proposal 4: RAN2 agrees to include the description for the Orbit Clock Error Bounds, as per Appendix A (R2-2201761), but the final description is FFS subject to the Stage 3 discussions on whether option (b), (c) or (d) is preferred (or another alternative):

(b) Duplicate within the SSR Orbit and Clock IEs (NW determines which to include).

(c) Add orbit and clock integrity bounds (mean, sigma) to the existing Orbit and Clock IEs (but without the full covariance).

(d) Define a separate message as a new IE (i.e. a combined message for the Orbit Clock Error Bounds).

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.

Proposal 6: Agree to add Section 8.1.2.1b-1 and Table 8.1.2.1b-1 (as per Appendix A (R2-2201761)) into TS 36.305 and TS 38.305. The field names in Table 8.1.2.1b-1 are subject to the outcomes of Stage 3 regarding which integrity IEs and associated fields to include in LPP.

Agreements:

Proposal 1: Agree to add a new IE for the Integrity Service Parameters which contains the irMinimum and irMaximum fields. The IE will be included under GNSS-CommonAssistData.

Proposal 2: Agree to add a new IE for Integrity Service Alerts under GNSS-CommonAssistData which contains the Ionosphere DNU and Troposphere DNU.

FFS on whether to also include the Service DNU.

Proposal 4: Agree to add the Mean and Standard Deviation parameters for the Integrity Bounds within the existing SSR-Code-Bias, SSR-Phase-Bias, SSR-STEC-Correction and SSR-GriddedCorrection IEs in LPP, as per Table 3.2-1 in R2-2201765.

Proposal 6: RAN2 agrees to update Stage 2 with a description of the Mean Fault Duration parameters. The following changes are proposed in addition to the Stage 2 text updates that were agreed in R2-2201765, for inclusion into the running Stage 2 CR:

[Chair’s note: See R2-2201765 for the properly formatted and change-marked version of this agreement]

8.1.2.1.31 Integrity Residual Risk Parameters

Integrity Residual Risk Parameters are used to provide the residual risk parameters related to the satellite, constellation, ionosphere and troposphere residual risk probabilities. These parameters include a Probability of Onset which is defined per unit of time and represents the probability that the feared event begins. The Mean Duration represents the expected mean duration of the corresponding feared event and is used to convert the Probability of Onset to a probability that the feared event is present at any given time, i.e.

P(Feared Event is Present)= Mean Duration\*Probability of Onset of Feared Event

Proposal 8: Agree to include the Integrity Correlation Times parameters from Table 3.2-3 (R2-2201765) within the SSR-STEC-Correction and SSR-GriddedCorrection IEs in LPP, with updated field names as follows:

tCorrelationIonosphere changed to ionoRangeErrorCorrelationTime

tCorrelationIonosphereRate changed to ionoRangeRateErrorCorrelationTime

tCorrelationTroposphere changed to tropoRangeRateErrorCorrelationTime

tCorrelationTroposphereRate changed to tropoRangeRateErrorCorrelationTime

Agreements:

Introduce a new posSIB for the new assistance data added for integrity.

## A.5 Other

## A.5.1 PRUs

Agreements:

Proposal 1 (modified): For purposes of RAN2 discussion, the PRU functionality as described in the RAN1 LS can be considered as UE with known location (to some degree of accuracy) at least (16/17).

PRU modelled as a gNB can be discussed in RAN3 (no RAN2 action).

Agreement:

RAN2 confirm that the PRU considered as a UE supports the normal LPP procedures for assistance data transfer and location information transfer.

Agreement:

Proposal 5: Regarding the handling of the PRU topic, agree the following way forward:

(1) Send an LS to SA2 asking SA2 whether the MT-LR or MO-LR location procedures as currently specified in TS 23.273 can be used to enable an LMF obtaining location measurements from PRUs (via LPP) and to trigger SRS transmission of PRUs (via NRPPa), or whether an LMF needs to be enabled to instigate location procedures for a PRU (e.g., LPP, NRPPa procedures) without receiving a location request for the PRU from an AMF (i.e., in the absence of an MT-LR or MO-LR for the PRU), and if so, whether support can be provided as part of Release 17.

(2) Send an LS to RAN1 asking RAN1 whether the LMF determined "correction information" obtained from PRU measurements need to be provided to target UEs for UE-based mode of operation, and if so, ask RAN1 to provide further details on the specific "correction information" which need to be provided to target UEs. In addition, ask RAN1 to provide further details on the "PRU antenna orientation information" which should be provided to an LMF.

LS to be progressed by email (extension of [AT116-e][615], to approve by email by EOM).

Agreements:

Proposal 3: RAN2 confirm that the PRU considered as a UE supports the normal LPP procedures for PRU capability transfer.

Proposal 1 (modified): RAN2 confirms that a PRU can support at least the following functionality (as described in the RAN1 LS), dependent on PRU capability:

- Provide the positioning measurements (e.g., RSTD, RSRP, Rx-Tx time differences) to an LMF.

- Transmit the UL SRS signals for positioning.

- FFS known location information and antenna orientation information

Agreement:

RAN2 will not discuss PRUs further without further guidance from RAN1 (LS or feature list).

## A.5.2 Positioning accuracy enhancements

Agreements:

Proposal 2.1-1: enhance LPP assistance data signalling to allow UE to request and LMF to provide TRP beam/antenna information.

Proposal 2.1-2: enhance LPP assistance data signalling to allow LMF to provide the association information of DL PRS resources with TRP Tx TEG ID.

Proposal 2.1-6: enhance LPP assistance data signalling to allow UE to request and LMF to provide the expected angle value and uncertainty.

Proposal 2.2-1: introduce in LPP RequestLocationInformation: request for UE Rx TEG ID, maximum number of Rx TEGs for the same PRS resource, request for UE Tx TEG ID, maximum number of RxTx TEGs for the same PRS resource, request for UE RxTx TEGD ID.

Proposal 2.2-2: introduce in LPP ProvideLocationInformation: UE Rx TEG IDs, UE Tx TEG IDs, and UE RxTx TEG IDs.

Proposal 2.2-3: introduce in LPP ProvideLocationInformation: multiple UE Rx-Tx time difference measurements (for N different UE Rx TEGs), and multiple UE Rx-Tx time difference measurements (for N different UE RxTx TEGs with the same UE Tx TEG).

Proposal 2.2-5: introduce support for an LMF to request and UE to report first path PRS RSRP for DL-AoD.

Proposal 2.2-6: introduce support for extended additional paths beyond 2.

Proposal 2.2-7: introduce support a LoS/NLoS indication per RSTD, RSRP and UE RxTx measurements.

Agreements:

Proposal 2.1-3: to include the association information of DL PRS resources with TRP Tx TEG ID in posSIB.

Proposal 2.1-4: include in the LPP assistance data the information about subset of PRS resources for the purpose of prioritization of DL-AOD reporting.

Proposal 2.1-5: include in the LPP assistance data the the boresight direction information.

For UL-TDOA, RRC signalling is used to convey the information about signalling for association of UL SRS resources with UE Tx TEGs ID to the gNB. For multi-RTT, LPP is used. FFS which RRC message(s) are used.