3GPP TSG RAN WG2 Meeting #116-e R2-210xxxx

**Electronic meeting, 1st -12th November 2021**

**Agenda item:** 8.11.1

**Source:** Intel Corporation

**Title:** Report of email discussion [Post115-e][609][POS] RAT-dependent stage 2 CR (Intel)

**Document for:**  Discussion and decision

# Introduction

This is the email discussion report for following email discussion:

* [Post115-e][609][POS] RAT-dependent stage 2 CR (Intel)

      Scope: Progress the CR to 38.305 for RAT-dependent positioning to reflect decisions up to this meeting.

      Intended outcome: Endorsable CR

      Deadline:  Long

Rapporteur would like to split the discussion in two phases:

**Phase 1**: To check the proposals from Rapporteur and the draft TP; The **deadline for this 1st phase** of email discussion is **Wednesday Oct 13 , 0900 UTC.**

**Phase 2**: To finalize the draft running CR; The **deadline for this 2nd phase** of email discussion is **Wednesday Oct 20 , 0900 UTC.**

# Annex: companies’ point of contact

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| **Company** | **Point of contact** | **Email address** |
| Intel Corporation | Yi Guo | Yi.guo@intel.com |
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# Phase 1the draft on how to capture meeting agreements

The agreements on latency reduction, Positioning in RRC\_INACTIVE, On-demand PRS request and PRU are captured in section 6. The scope of this email discussion is to discuss how to capture agreements of these items into stage 2, TS38.305.

## How to capture the agreements on Latency reduction

For latency reduction, so far scheduled location time, storing capability in AMF are on the table. RAN2 concluded that support pre- configuration of assistance data, however the impact of stage 2 will be discussed in [Post115-e][605][POS]. In addition, it is still open on whether scheduled location time is transparent to UE/RAN or not.

For storing capability in AMF, it is unclear what RAN impact should be. RAN2 has sent LS to SA2 on variability of UE positioning capability. We have to wait for the further inputs from SA2.

In general, we should copy every details from TS23.273 into TS38.305. As discussed in [1], section 7.3 service layer support using combined LPP and NRPPa procedures could be a good place to capture changes due to scheduled location time and storing capability in AMF;

Rapporteur provides following TP based on the information/agreements we had so far:

### TS38.305 TP on latency reduction (scheduled location time and storing capability in AMF)

1. 7.3.2 NI-LR and MT-LR Service Support

Figure 7.3.2-1 shows the sequence of operations for an NI-LR or MT-LR location service, starting at the point where the AMF initiates the service in the LMF.

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**Figure 7.3.2-1: UE Positioning Operations to support an MT-LR or NI-LR**

1. The AMF sends a location request to the LMF for a target UE and may include associated QoS, the scheduled location time and the UE positioning capabilities.

2. The LMF may obtain location related information from the UE and/or from the serving NG-RAN Node. In the former case, the LMF instigates one or more LPP procedures to transfer UE positioning capabilities, provide assistance data to the UE and/or obtain location information from the UE. The UE may also instigate one or more LPP procedures after the first LPP message is received from the LMF (e.g., to request assistance data from the LMF). If scheduled location time is provided in step 1, the LMF may provide pre-configuration of assistance data to the UE far before when the location is needed, and indicate the UE to utilize the pre-configured assistance data via the LPP Request Location Information message occur at or near to the scheduled location time. The LPP procedures to transfer UE positioning capabilities may be skipped if the LMF already obtained the UE positioning capabilities from the AMF in step 1.

3. If the LMF needs location related information for the UE from the NG-RAN, the LMF instigates one or more NRPPa procedures. Step 3 is not necessarily serialised with step 2; if the LMF and NG-RAN Node have the information to determine what procedures need to take place for the location service, step 3 could precede or overlap with step 2. If scheduled location time is provided in step 1, the LMF may schedule location measurements by the NG-RAN to occur at or near to the scheduled location time.

4. The LMF returns a location response to the AMF with any location estimate obtained as a result of steps 2 and 3.

Editor's Note: The scheduled location time and storing UE positioning capabilities in AMF may be updated based on further inputs from SA2 and further discussion in RAN, e.g. when/whether LMF forwards UE positioning capabilities to AMF, transparent of scheduled location time, criterion of preconfigured AD ,etc.

1. 7.3.3 MO-LR Service Support

Figure 7.3.3-1 shows the sequence of operations for an MO-LR service, starting at the point where an LCS Client in the UE or the user has requested some location service (e.g., retrieval of the UE's location or transfer of the UE's location to a third party).

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**Figure 7.3.3-1: UE Positioning Operations to support an MO-LR**

1. The UE sends an MO-LR location service request message included in a UL NAS TRANSPORT message as specified in TS 24.501 [29] to the AMF. The MO-LR location service request message may carry an LPP PDU to instigate one or more LPP procedures to transfer capabilities, request assistance data, and/or transfer location information and a scheduled location time.

2. The AMF invokes the Nlmf Determine Location Request service operation towards the LMF as specified in TS 29.572 [33] and includes any LPP PDU and scheduled location time received in step 1.

3. The LMF may obtain location related information from the UE and/or from the serving NG-RAN node. In the former case or if an immediate response is needed to any LPP procedure instigated by the UE in step 1 (e.g., a request for assistance data), the LMF instigates one or more LPP procedures to transfer UE positioning capabilities, provide assistance data to the UE and/or obtain location information from the UE. The UE may also instigate further LPP procedures after the first LPP message is received from the LMF (e.g., to request assistance data or to request further assistance data). If scheduled location time is provided in step 2, the LMF may provide pre-configuration of assistance data to the UE far before when the location is needed, and indicate the UE to utilize the pre-configured assistance data via the LPP Request Location Information message occur at or near to the scheduled location time. The LPP procedures to transfer UE positioning capabilities may be skipped if the LMF already obtained the UE positioning capabilities from the AMF in step 2.

4. If the LMF needs location related information for the UE from the NG-RAN, the LMF instigates one or more NRPPa procedures. Step 4 may also precede step 3 or occur in parallel with it. If scheduled location time is provided in step 2, the LMF may schedule location measurements by the NG-RAN to occur at or near to the scheduled location time.

5. The LMF invokes the Nlmf Determine Location Response service operation towards the AMF as specified in TS 29.572 [33] which includes any location estimate obtained as a result of steps 3 and 4.

6. If the UE requested location transfer to a third party the AMF transfers the location received from the LMF in step 5 to the third party as defined in TS 23.273 [35].

7. The AMF sends an MO-LR location service response message included in a DL NAS TRANSPORT message as specified in TS 24.501 [29].

Editor's Note: The scheduled location time and storing UE positioning capabilities in AMF may be updated based on further inputs from SA2 and further discussion in RAN, e.g. when/whether LMF forwards UE positioning capabilities to AMF, transparent of scheduled location time, criterion of preconfigured AD ,etc.

1. 7.3.4 Deferred MT-LR Event Reporting Support

Figure 7.3.4-1 shows the sequence of operations for an Deferred MT-LR Event Reporting starting at the point where the UE reports an event to the LMF.

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**Figure 7.3.4-1: UE Positioning Operations to support a Deferred MT-LR**

1. The UE sends a supplementary services event report message to the LMF as described in TS 24.571 [41] which is transferred via the serving AMF and is delivered to the LMF using an Namf\_Communication\_N1MessageNotify service operation. The event report may indicate the type of event being reported and may include an embedded positioning message which includes any location measurements or location estimate.

2. If LMF determines no positioning procedure is needed, steps 3 and 4 are skipped.

3. The LMF may utilize any location information received in step 1. The LMF may also retrieve location related information from the UE and/or from the serving NG-RAN Node. In the former case, the LMF instigates one or more LPP procedures to provide assistance data to the UE and/or obtain location information from the UE. The UE may also instigate one or more LPP procedures after the first LPP message is received from the LMF (e.g., to request assistance data from the LMF).

4. If the LMF needs location related information for the UE from the NG-RAN, the LMF instigates one or more NRPPa procedures. Step 3 is not necessarily serialised with step 2; if the LMF and NG-RAN Node have the information to determine what procedures need to take place for the location service, step 3 could precede or overlap with step 2.

5. The LMF invokes an Nlmf\_Location\_EventNotify service operation towards the GMLC with an indication of the type of event being reported and any location estimate obtained as a result of steps 2 and 3.

Editor's Note: The scheduled location time and storing UE positioning capabilities in AMF may be updated based on further inputs from SA2 and further discussion in RAN, e.g. when/whether LMF forwards UE positioning capabilities to AMF, transparent of scheduled location time, criterion of preconfigured AD ,etc.

**Companies are invited to provide your view on the TP shown as above. Also please indicate if anything is missing. E.g. different sections, etc.**

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| **Company’s name** | **Agree or not** | **Comments, if any** |
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## How to capture the agreements on positioning in RRC\_INACTIVE

In last meeting, based on email discussion [3] RAN2 discussed how to capture positioning in RRC\_INACTIVE into stage 2, and concluded that

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".

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".

However there is no consensus on whether the procedure shown in Annex A, Annex B and Annex C in [3] should be captured into stage 2 specification or not since quite some companies have concern to capture SDT details into stage 2.

As mentioned in [1],

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| There are two options to capture positioning in RRC\_INACTIVE into stage 2.**Option 1 (as shown in email discussion by email discussion Rapporteur), update all relevant procedures to address message transmission via SDT in RRC\_INACTIVE**, e.g. * Introduce new section 6.4.3 for LPP PDU transmission using SDT;
* Introduce new section 6.4.4 for LCS transmission using SDT;
* Introduce new section for Low Power Periodic and Triggered 5GC-MT-LR Procedure with SDT on DL/RAT independent positioning, UL positioning and UL+DL positioning;

**Option 2: introduce new section 5.2.1 Positioning in RRC\_INACTIVE under 5.2 UE Positioning Operations to capture general statement on positioning in RRC\_INACTIVE, e.g.** 5.2.1 Positioning in RRC\_INACTIVEPositioning may be performed when a UE is in RRC\_INACTIVE. LPP PDU, LCS message can be transferred between the UE and the LMF when the UE is in RRC\_INACTIVE state and supports Small Data Transmission (SDT).As agreed in RAN2#114, RRC state is transparent to LPP and LMF. The LPP and LMF do not need to be aware whether SDT is used or not. If we follow option 1, i.e. copy every SDT details which is under the discussion in SDT WI, that means we have to update positioning stage 2 whenever the additional changes are made for SDT.Option 2 is the simplest way to clarify SDT framework is used instead of copying SDT details in LPP procedure. We should avoid duplicated work and should decouple the discussion between two WIs as much as possible. **Proposal 3: introduce new section 5.2.1 Positioning in RRC\_INACTIVE to capture general statement on positioning in RRC\_INACTIVE instead of copying every SDT details in all relevant procedures.** |

Rapporteur would suggest to go with option 2 first, and decide later whether detailed procedure is needed.

### TS38.305 TP on positioning in RRC\_INACTIVE

5.2.x Positioning in RRC\_INACTIVE

Positioning may be performed when a UE is in RRC\_INACTIVE. LPP PDU, LCS message may be transferred between the UE and the LMF when the UE is in RRC\_INACTIVE state and Small Data Transmission (SDT) is enabled.

**Companies are invited to provide your view on the TP shown as above. Also please indicate if anything is missing.**

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| **Company’s name** | **Agree or not** | **Comments, if any** |
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## How to capture the agreements on On-Demand DL-PRS transmission

In last meeting, based on email discussion [7] RAN2 discussed how to capture positioning in On-Demand DL-PRS transmission into stage 2, and concluded that

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.

Therefore Rapporteur would suggest to use the TP from [7] as baseline for further discussion.

Note: Rapporteur did small editorial changes, and added additional Editor note to mention open issues.

### TS38.305 TP on On-Demand DL-PRS transmission

## 7.x Procedures for On-Demand DL-PRS transmission

7.x.1 General

On-Demand DL-PRS transmission is to allow a UE or LMF to request the transmission or the change of DL-PRS resources for positioning measurements. Both UE and LMF can initiate the request of On-Demand DL-PRS transmission.

7.x.2 On-Demand DL-PRS transmission procedures

Figure 7.x.2-1 shows the general positioning procedure for On-Demand DL-PRS transmission.



**Figure 7.x.2-1: Procedures to support On-Demand DL-PRS transmission.**

1. The LMF may provide available DL-PRS configuration via LPP Provide Assistance Data message or via posSI.
2. The UE sends an on-Demand DL-PRS request to the LMF via LPP Request Assistance Data message.
3. The LMF determines the need of a new On-Demand DL-PRS configuration.
4. The LMF requests the serving and non-serving gNBs/TRPs for a new On-Demand DL-PRS configuration via NRPPa PRS CONFIGURATION REQUEST message.
5. The gNBs/TRPs provide the DL-PRS transmission update in the NRPPa PRS CONFIGURATION RESPONSE message accordingly.
6. LMF provides the On-Demand DL-PRS configuration via LPP Provide Assistance Data message or posSI to the UE.

NOTE 1: LMF may use existing positioning methods to obtain (ECID) SSB/CSI-RS RSRP measurements or (DL-AoD) DL-PRS RSRP measurements in order to assist step 3.

NOTE 2: 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.

Editor's Note: Depending upon RAN3 input, the above description may need to be updated especially for NRPPa procedure, e.g. the name of the message, exchange between RAN and LMF on allowed PRS configuration, etc.

Editor's Note: FFS if the UE can send the MO-LR to request On-Demand PRS.

Editor's Note: FFS on the condition when UE can trigger the On-Demand PRS request.

**Companies are invited to provide your view on the TP shown as above. Also please indicate if anything is missing.**

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| **Company’s name** | **Agree or not** | **Comments, if any** |
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## How to capture the agreements on PRU

Based on [10], RAN2 discussed PRU and concluded that

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.

Rapporteur provides following TP based on the information/agreements we had so far:

### TS38.305 TP on PRU

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

5GC 5G Core Network

5GS 5G System

A-AoA Azimuth-Angle of Arrival

ADR Accumulated Delta Range

AoA Angle of Arrival

AP Access Point

ARP Antenna Reference Point

BDS BeiDou Navigation Satellite System

BSSID Basic Service Set Identifier

CID Cell-ID (positioning method)

CLAS Centimetre Level Augmentation Service

DL-AoD Downlink Angle-of-Departure

DL-PRS Downlink Positioning Reference Signal

DL-TDOA Downlink Time Difference Of Arrival

E-SMLC Enhanced Serving Mobile Location Centre

E-CID Enhanced Cell-ID (positioning method)

ECEF Earth-Centered, Earth-Fixed

ECI Earth-Centered-Inertial

EGNOS European Geostationary Navigation Overlay Service

E-UTRAN Evolved Universal Terrestrial Radio Access Network

FDMA Frequency Division Multiple Access

FKP Flächenkorrekturparameter (Engl: Area Correction Parameters)

GAGAN GPS Aided Geo Augmented Navigation

GLONASS GLObal'naya NAvigatsionnaya Sputnikovaya Sistema (Engl.: Global Navigation Satellite System)

GMLC Gateway Mobile Location Centre

GNSS Global Navigation Satellite System

GPS Global Positioning System

GRS80 Geodetic Reference System 1980

HESSID Homogeneous Extended Service Set Identifier

LCS LoCation Services

LMF Location Management Function

LPP LTE Positioning Protocol

MAC Master Auxiliary Concept

MBS Metropolitan Beacon System

MO-LR Mobile Originated Location Request

MT-LR Mobile Terminated Location Request

Multi-RTT Multi-Round Trip Time

NG-C NG Control plane

NG-AP NG Application Protocol

NI-LR Network Induced Location Request

N-RTK Network – Real-Time Kinematic

NRPPa NR Positioning Protocol A

OTDOA Observed Time Difference Of Arrival

PDU Protocol Data Unit

posSI Positioning System Information

posSIB Positioning SIB

PPP Precise Point Positioning

PPP-RTK Precise Point Positioning – Real-Time Kinematic

PRS Positioning Reference Signal (for E-UTRA)

PRU Positioning reference unit

QZSS Quasi-Zenith Satellite System

RP Reception Point

RRM Radio Resource Management

RSRP Reference Signal Received Power

RSRQ Reference Signal Received Quality

RSSI Received Signal Strength Indicator

RSTD Reference Signal Time Difference

RTK Real-Time Kinematic

SBAS Space Based Augmentation System

SET SUPL Enabled Terminal

SIB System Information Block

SLP SUPL Location Platform

SP Semi-Persistent

SRS Sounding Reference Signal

SSID Service Set Identifier

SSR State Space Representation

STEC Slant TEC

SUPL Secure User Plane Location

TADV Timing Advance

TBS Terrestrial Beacon System

TEC Total Electron Content

TP Transmission Point

TRP Transmission-Reception Point

UE User Equipment

UL-AoA Uplink Angle of Arrival

UL-RTOA Uplink Relative Time of Arrival

UL-SRS Uplink Sounding Reference Signal

UL-TDOA Uplink Time Difference of Arrival

URA User Range Accuracy

WAAS Wide Area Augmentation System

WGS-84 World Geodetic System 1984

WLAN Wireless Local Area Network

Z-AoA Zenith Angles of Arrival

5.4.1 User Equipment (UE)

The UE may make measurements of downlink signals from NG-RAN and other sources such as E-UTRAN, different GNSS and TBS systems, WLAN access points, Bluetooth beacons, UE barometric pressure and motion sensors. The measurements to be made will be determined by the chosen positioning method.

The UE may also contain LCS applications, or access an LCS application either through communication with a network accessed by the UE or through another application residing in the UE. This LCS application may include the needed measurement and calculation functions to determine the UE's position with or without network assistance. This is outside of the scope of this specification.

The UE may also, for example, contain an independent positioning function (e.g., GPS) and thus be able to report its position, independent of the NG-RAN transmissions. The UE with an independent positioning function may also make use of assistance information obtained from the network.

The UE may also act as positioning reference unit (PRU), and provide its own known location coordinate information to the LMF based on the request from the LMF.

**Companies are invited to provide your view on the TP shown as above. Also please indicate if anything is missing.**

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| **Company’s name** | **Agree or not** | **Comments, if any** |
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# Summary report and proposals

Aiming to help with the meeting discussion/progress, the proposals are categorized starting with:

* [To agree] when there is large support and hence proposed for easy agreement.
* [To discuss] when there is substantial level of support and agreement may be possible.
* [FFS] when there is low support or companies propose new solutions or options to possibly consider further e.g. if there is sufficient support (understanding that these topic have not been discussed by all companies when providing their views in the different discussion points).

The proposals also start with a number: for the format [x], ‘x’ represents the number of supportive companies (i.e. these solutions are marked as FFS as the proposed solutions were not discussed by all companies) and, for the format [x/y], ‘x’ represents the number of supportive companies, and (y-x) the number of companies with different view.

The observations captured are the following:

**Observation 1.** xxxx.

The proposals captured are the following:

**Proposal 1.** **[To agree]**

The following list shows the proposals above organized based on the suggested priority aiming to help during its meeting discussion:

**Proposals for easy agreement**

**Proposal 1.** **[To agree]**

**Proposals for discussion (1st priority) or to be captured as FFS**

**Proposal 6.** **[To discuss]**

**Proposals for discussion (2nd priority) or to be captured as FFS**

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# Reference

1. R2-2107674 Consideration on stage 2 structure on RAT dependent positioning Intel Corporation
2. R2-2107680 "Summary of agenda 8.11.2 Latency enhancements" Intel Corporation
3. R2-2108383 Summary of [Post114-e][602][POS] Stage 2 procedure for deferred MT-LR in RRC\_INACTIVE Qualcomm Incorporated
4. R2-2108826 Summary of AI 8.11.3 for RRC INACTIVE positioning ZTE
5. R2-2108605 Way-forward for INACTIVE positioning Huawei, China Unicom, China Telecom, Futurewei, HiSilicon, Intel Corporation, Interdigital, Spreadtrum Communications, VIVO, Xiaomi, ZTE Corporation
6. R2-2108946 [AT115-e][615][POS] UL and UL DL positioning in RRC\_INACTIVE (Huawei) Huawei
7. R2-2108400 Report on [Post114-e][603][POS] Procedures and signalling for on-demand PRS (Ericsson) Ericsson
8. R2-2108827 Summary of Agenda Item 8.11.4 On-demand PRS CATT
9. Draft TS 38.305 g60-v3
10. R2-2108940 [AT115-e][610][POS] PRUs (CATT) CATT

# Annex-Agreements on RAT dependent positioning methods

## Latency reduction

### 3GPP TSG-RAN WG2 Meeting #114-e R2-21xxxxx Online, 19-27 May 2021

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.

### 3GPP TSG-RAN WG2 Meeting #115 electronic R2-2108835

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].

## RRC\_INACTIVE

### 3GPP TSG-RAN WG2 Meeting #113b-e R2-21xxxxx Online, 12-20 April 2021

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.

### 3GPP TSG-RAN WG2 Meeting #114-e R2-21xxxxx Online, 19-27 May 2021

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.

### 3GPP TSG-RAN WG2 Meeting #115 electronic R2-2108835

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.

## On demand PRS

### 3GPP TSG-RAN WG2 Meeting #113b-e R2-21xxxxx Online, 12-20 April 2021

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 C.

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

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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.

## PRU

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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.