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

Electronic meeting, 2022-01-17 - 2021-01-25

**Agenda item: 8.11.3**

**Source: Ericsson**

**Title: [AT116bis-e][617][POS] Remaining issues on positioning in RRC\_INACTIVE (Ericsson)**

**Document for: Discussion and Agreement**

# 1 Introduction

This document is to kick off the following email discussion:

* [AT116bis-e][617][POS] Remaining issues on positioning in RRC\_INACTIVE (Ericsson)

 Scope: Discuss the remaining prioritised proposals from R2-2201068.

 Intended outcome: Report to CB session

 Deadline: Friday 2022-01-21 1600 UTC

The agreements so far in this area in RAN2#116bis-e have been provided below.

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).

# 2 Contact Information

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# 3 Discussions

## 3.1 Stage 2 Details

### 3.1.1 For UL Positioning procedure when to provide Event Report Ack

As provided comparison in [12] for UL-only positioning the difference between the Procedure shown in Figure 1 [12] and the Procedure 2 (R2-2108383, Huawei et al.) is essentially only when the LCS Event Report Acknowledgement is provided to the UE. For Procedure 2, the LCS Event Report Acknowledgement is sent immediately after the LCS Event Report has been received by an LMF.

For the Procedure proposed in Figure 1 [12], the LCS Event Report Acknowledgement is provided once the UL-positioning has been successfully configured at the UE and TRPs. This allows the procedure more reliably be completed in RRC\_INACTIVE state.

[7] mentions that “it should be emphasized that the step 5 (event report ack) and 7 (POSITIONING INFORMATION REQUEST) are not strictly serialized. Step 7 does not necessarily need to be sent after Step 5. When the gNB receives POSITIONING INFORMATION REQUEST, it would know that the UE is performing RRC\_INACTIVE uplink positioning and would not send *RRCRelease* to the UE at that immediate moment.

There can be two alternatives to solve this deadlock:

* A note can be added in procedure proposed by [7] saying Step 5 may appear after step 7.
* It is agreed that event report ACK is provided once the UL-positioning has been successfully configured at the UE and TRPs

Question 1: Which one of the below options on when to provide Event Report Ack.

1. A note can be added in procedure proposed by [7] saying Step 5 may appear after step 7
2. It is agreed that event report ACK is provided once the UL-positioning has been successfully configured at the UE and TRPs

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### 3.1.2 Assistance Data Delivery

[7] provides the view that how can the highlighted agreement be realized as there is no procedure to deliver this PRS to the UE during the SDT procedure.

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)

Hence, it is proposed to discuss further which of the two options

* **Option1: Revert the previous agreement: positioning assistance data cannot be delivered to the UE in RRC\_INATIVE during SDT procedure**
* **Option2: Add the positioning assistance data delivery during SDT procedure to the stage2 procedure**

Question 2: Which option should RAN2 to select?

Option A: to revert the agreement to provide AD during ongoing SDT procedure

Option B: add the procedure in stage2.

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[14] mention to revert the WA: pre-configure positioning SRS in RRC\_CONNECTED (9/13) that was made in RAN2#116-e.

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.

The paper says it is unclear as when the gNB will provide such configuration. UL SRS configuration for inactive depends upon several factors such as TA validity timer, RSRP thresholds, TA value and UL power to use for UL SRS Tx. It is beneficial if these configurations are provided as close as possible when UE is released to Inactive from connected mode. Further, there is already provision to provide UL SRS configuration via RRC Release message; in lieu of that and to minimize RRC specification impacts; there is no as such need to support pre-configuration of positioning SRS in RRC\_CONNECTED.

Question 3: Is the support of pre-configuration of positioning SRS in RRC\_CONNECTED needed?

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### 3.1.3 Stage 2 Specification

#### 3.1.3.1 How to capture the stage 2 details in specification

There are some proposals in this direction on how to specify DL, UL and UL+DL positioning in RRC Inactivate mode

1. It is not necessary to introduce the new positioning procedures in stage 2 specification for RRC inactive UE positioning [8]
2. Send LS to SA2 to let SA2 decide the spec impacts [12], [3]
3. Capture in TS 38.305 [12]

 [12] further allows the UE to include in the LCS Event Report an embedded LPP Request Assistance Data message with IE *NR-Multi-RTT-RequestAssistanceData* and *nr-AdType* set to '*ul-srs*' to request an UL-SRS for Multi-RTT positioning.

Question 4: How to capture the stage 2 details in specification

1. It is not necessary to introduce the new positioning procedures in stage 2 specification for RRC inactive UE positioning [8]
2. Send LS to SA2 to let SA2 decide the spec impacts [12, 3]. Use [R2-2200961] as baseline
3. Capture in TS 38.305 [12]

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#### 3.1.3.2 Baseline CR

If option C in section 3.1.3.1 is the preference, then companies are requested to provide further details

Question 5: If there is consensus to capture the stage 2 details in TS 38.305 then the baseline can be taken from [6] (Huawei et al.) paper.

Answer: Agree/Disagree

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#### 3.1.3.3 Common flow or separate

[12] shows that UL and UL+DL positioning procedures can be depicted using one common flow whereas [7] captures using two separateflows**.**

Question 6: If there is consensus to capture the stage 2 details in TS 38.305 then RAN2 to decide whether a common flow is used to depict UL and UL+DL positioning or separate flow is used.

Option A: Common

Option B: Separate

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#### 3.1.3.4 LCS Event Report with an embedded UL-SRS Request for Multi-RTT positioning

Question 7: If there is consensus to capture the stage 2 details in TS 38.305 then RAN2 to decide whether UE can include in the LCS Event Report an embedded LPP Request Assistance Data message with IE *NR-Multi-RTT-RequestAssistanceData* and *nr-AdType* set to '*ul-srs*' to request an UL-SRS for Multi-RTT positioning.

Option A: Yes, agree for such inclusion

Option B: No, not needed

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#### 3.1.3.5 LPP PDU and LCS Message Transfer

[12] further proposed; that the the LPP PDU and LCS message transfer procedures with SDT in RRC\_INACTIVE state are used as baseline. Since Stage 2 does currently not support LPP PDU and LCS message transfer in RRC\_INACTIVE state, the procedures should be captured in Stage 2 TS 38.305.

Question 8: [RAN2 to decide the need to capture LPP PDU and LCS message transfer procedures with SDT in RRC\_INACTIVE state in Stage 2 TS 38.305 [8].](#_Toc93136447)

Option A: Yes, agree to capture in TS 38.305

Option B: No, not needed

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## 3.2 Segmentation

[14] mentions that the LPP data should not be segmented by LPP layer to fit the content for using SDT. Segmentation in LPP is defined to overcome NAS limitations. It is function of RLC to perform segmentation based upon TBS.

[9] mentions the issue on the LPP segmentation considering SDT operation was also discussed in the last RAN2 #116-e meeting and prefers to select Option 1.

* **Option 1: The message size threshold for LPP segmentation is up to UE implementation and has no specification impact in RAN side.**
* **Option 2: The LMF provides segmentation configuration information to the UE for ensuring suitable LPP segmentation in RRC\_INACTIVE.**

Question 9: RAN2 to decide whether LPP Segmentation violates any architectural constrains (application layer segmenting data to enable a certain transport selection by lower layer) and if this should be allowed. Which of the option is preferred?

* **Option A: It is not allowed that LPP layer segments data to enable a certain transport selection by lower layer**
* **Option B: The message size threshold for LPP segmentation is up to UE implementation and has no specification impact in RAN side.**
* **Option C: The LMF provides segmentation configuration information to the UE for ensuring suitable LPP segmentation in RRC\_INACTIVE.**

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## 3.3 Scope of RRC Inactive

[1] proposes to support all location service types in SDT active period including MT-LR, MO-LR, NI-LR and deferred MT-LR.

Question 10: Which service types can be supported using SDT active period?

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[13], [15] provides Observation that UE-assisted DL NR E-CID measurements should be supported in RRC\_INACTIVE state at least in the case of SS-RSRP and SS-RSRQ measurements.

Question 11: Whether support of RRC\_INACTIVE reporting of RRM measurements along with other DL-based positioning methods is preferred?

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## 3.4 State Transition

[1] expresses the need for network to give UE an indication on whether to continue transmitting the periodic SRS in RRC\_INACTIVE state for power savings. The indication can be a 1 bit parameter with value 0 or 1. with this indication, UE may follow NW’s guidance on transmitting SRS efficiently.

[14] mentions UE UL SRS configuration applicability in various RRC modes should be discussed; when UE states Transition while configured to transmit UL SRS. Can UE continue UL SRS Tx that was configured for inactive mode when UE switches from Inactive mode to Connected mode.

Question 12: RAN2 to discuss whether UE UL SRS configuration provided in one mode is applicable in other

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Question 13: RAN2 to decide further (provided that UE UL SRS configuration in one mode is applicable in other; i.e the answer selected to question 12 is Yes); then whether an indication can be used from NW to UE to support such continuity.

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# 4 Conclusion

Based on the discussion in the previous sections we propose the following:

# 5 References

[1] R2-2200257 Discussion on positioning in RRC INACTIVE state ZTE discussion

[2] R2-2200280 Support of UL&UL+DL positioning in RRC\_INACTIVE Intel Corporation discussion Rel-17 NR\_pos\_enh-Core

[3] R2-2200295 Impact on SA2 with DL NR positioning in RRC\_INACTIVE CATT, Ericsson discussion Rel-17 NR\_pos\_enh-Core

[4] R2-2200296 Discussion on UL NR Positioning in RRC\_INACTIVE state CATT discussion Rel- 17 NR\_pos\_enh-Core

[5] R2-2200327 Discussion on positioning in RRC\_INACTIVE vivo discussion Rel-17 NR\_pos\_enh-Core

[6] R2-2200424 Way-forward for RRC\_INACTIVE positioning Huawei, CATT, China Unicom, CMCC, Fraunhofer, Futurewei, HiSilicon, Intel Corporation, Spreadtrum Communications, OPPO, VIVO, Xiaomi, ZTE Corporation discussion Rel-17 NR\_pos\_enh-Core

[7] R2-2200425 Remaining issues on RRC\_INACTIVE DL Postioning Huawei, HiSilicon discussion Rel-17 NR\_pos\_enh-Core

[8] R2-2200710 Discussion on positioning for UE in RRC Inactive Xiaomi discussion

[9] R2-2200731 Discussion on the measurement reporting in RRC\_INACTIVE Samsung discussion Rel-17 NR\_pos\_enh-Core

[10] R2-2200781 Discussion on Positioning in RRC\_INACTIVE state OPPO discussion Rel-17 NR\_pos\_enh-Core

[11] R2-2200957 Remaining Details for RRC\_INACTIVE Positioning in Uplink Fraunhofer IIS; Fraunhofer HHI discussion Rel-17 R2-2110249

[12] R2-2200963 Remaining issues for positioning of UEs in RRC\_INACTIVE State Qualcomm Incorporated discussion

[13] R2-2200989 Remaining aspects on RRC\_INACTIVE Positioning Lenovo, Motorola Mobility discussion Rel-17

[14] R2-2201065 Discussion on RRC Inactive mode Positioning Ericsson discussion Rel-17

[15] R2-2201186 Discussion on Positioning in RRC INACTIVE state InterDigital, Inc. discussion Rel- 17 NR\_pos\_enh-Core

[16] R2-2201528 Positioning in RRC\_INACTIVE Nokia Germany discussion Rel-17