**3GPP TSG-RAN WG2 Meeting #117 R2-220xxxx**

**Electronic Meeting, February 21 – March 3, 2022**

**Agenda item:** 8.11.2.2

**Source:** InterDigital Inc.

**Title:** Email discussion report on [Pre117-e][609][POS] Open issues on positioning in RRC\_INACTIVE (InterDigital)

**Document for:**  Discussion

# 1. Introduction

This document summarizes the following email discussion:

* [Pre117-e][609][POS] Open issues on positioning in RRC\_INACTIVE (InterDigital)

The expected output of this offline discussion will include:

- Proposals related to Stage 2 and 3 running CRs

- Proposals addressing the remaining issues identified by the open issue list

**Deadline for comments (companies inputs/views):** Monday 2022-02-14 1800 UTC;

**Proposals for review (feedback from companies on Moderator’s proposals):** Thursday 2022-02-17 1200 UTC.

Please provide the contact information in the following Table:

|  |  |  |
| --- | --- | --- |
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# 2. Mapping between Open Issues and Questions in email discussion

The following shows the questions in this email discussions that are intended to address the open issues on positioning in RRC INACTIVE.

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| --- | --- | --- | --- | --- |
| **Topic** | **Open issues**  **Note:** Open Issues should be defined for aspects that need to be closed, important to make already agreed functionality work in a reasonable way. Not yet agreed optimizations that may not be needed shall not be listed as Open Issues. | **Related to the completion of WI?**  **The topic has to be removed from Rel-17 scope if the corresponding open issues cannot be resolved.** | **Remark** | **Corresponding Questions in this email discussion** |
| **Stage 2** | Stage 2: what should be captured in the stage 2 specification  Any impact on SA2 stage 2, e.g. LPP/LCS transmission in SDT | ? | **Status**: Discussion see R2-2201772; | **Question 1** |
| All LCS service types are allowed to use SDT | ? | **Status**: Discussion see R2-2201772; | **Question 2** |
| **UL positioning related issues** | UL positioning related issues:  1 How to introduce SRS configuration in RRCRelease message, e.g. which IE should be contained, srs-Config, BWP-Uplink or UplinkConfig | Yes | **Status**: check the status of RRC email discussion 116bis-631  RAN2#116bis Agreements | **Covered under RRC running CR discussion** |
| UL positioning related issues:  2 How to send SP-SRS activation/deactivation MAC CE? | Yes | **Status**: check SDT discussion, Coordination with SDT WI is needed | **Questions 3a and 3b** |
| 3 The validity of SRS configuration, e.g. upon change of cell? TA timer expires? | Yes | **Status**: check the status of MAC email discussion 116bis-632  check the status of RRC email discussion 116bis-631  RAN2#116bis Agreements | **Question 4** |
| 4 How to maintain the TA for SRS transmission;?  4.1 The details of TA timer configuration;  4.2 Where to configure TA timer configuration;  4.3 Validity of TA, e.g. additional RSRP based validation;  4.4 Validity of TA timer configuration, same as SRS configuration?  FFS if the TA timer configuration is invalidated upon any cell reselection. | Yes | **Status**: check the status of MAC email discussion 116bis-632  check the status of RRC email discussion 116bis-631  RAN2#116bis Agreements | **Question 4** |
| 5 Need to clarify AP SRS cannot be configured for the UE in RRC\_INACTIVE; | Yes | **Status**: resolved. check the status of RRC email discussion 116bis-631  RAN2#116bis Agreement |  |
|  | Editor’s NOTE: FFS UE behaviour during RAR window and contention resolution window  Editor’s NOTE: FFS triggering/cancellation of the MAC CE  Editor’s NOTE: FFS whether to follow CG-SDT for (a) RSRP derivation for positioning SRS TA validation, (b) definition of stored downlink pathloss reference RSRP value at the very first positioning SRS transmission  Editor’s NOTE: FFS whether to use LCID or eLCID for MAC CE for MG/PPW activation/deactivation request and MAC CE for MG/PPW activation/deactivation command. | Yes | **Stage 3 MAC** | **Question 5** |
| **UE capability** | UE capabilities on positioning in RRC\_INACTIVE in RAN1 feature lists | Yes | **Status:** check the status of RAN1 feature list and the discussion in R2-2201767; | **To be discussed in RAN2 under UE capabilities discussion** |
| UL capability  Wait for RAN1 decision on whether UL related RRC\_INACTIVE specific capabilities (27-15, 27-16, 27-19) should be captured in RRC or LPP. | Yes | **Status:** check the status of RAN1 feature list and the discussion in R2-2201767;  RAN1 has agreed:  RRC: 27-15, 27-15a,  FFS on LPP: 27-15, 27-15a, | **To be discussed in RAN2 under UE capabilities discussion** |
| **gNB awareness** | Assistance data in gNB | ? | **Status: no further discussion in RAN2.**  RAN2#116bis |  |

# 3. Discussion

The scope of this email discussion is to discuss the Stage 2 and Stage 3 open issues on positioning in RRC\_INACTIVE. The open issues are based on the list identified in the following documents:

* [1] R2-2202005, [Post116bis-e][634][POS] Report of email discussion, Positioning open issues list (Intel)
* [2] R2-2201772, [AT116bis-e][617][POS] Remaining issues on positioning in RRC\_INACTIVE (Ericsson)

The list of open issues on positioning in RRC\_INACTIVE is provided in Appendix A.

## 3.1 Details to be captured in the Stage 2 specification

In the previous email discussion in [2] one of the remaining issues discussed is on whether the following procedures are to be captured in Stage 2:

1. Assistance Data Delivery with SDT
2. LPP PDU and LCS Message Transfer with SDT
3. Overall procedure for DL, UL and UL+DL positioning in RRC INACTIVE

The status of the discussion on the procedures:

For (a), several companies (7/13) have indicated to add the assistance data delivery procedure in Stage 2. Other companies (6/13) have indicated that adding a clarification note instead of the procedure would be sufficient.

For (b), 5/13 companies have indicated to capture the procedure in Stage 2, another 5/13 companies indicated a clarification note is sufficient and remaining 3/13 indication no clear preference.

For (c), 6/13 companies have indicated to capture the procedure in Stage 2 and another 6/13 companies indicated a clarification note is sufficient. 2/13 companies mentioned that for the deferred MT-LR procedure, an LS can be sent to SA2 to let SA2 decide the spec impacts.

In general, the views are split, and it was challenging to reach consensus on the specific procedure to be captured in Stage 2 TS 38.305.

The agreements relevant to this open issue made during RAN2#114-e [3], as mentioned by some companies during the previous discussion in [2], are as follows:

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.

This issue has been discussed for several meetings without a clear consensus. The consequence of not converging on this discussion is that it will not be clear how LPP PDU and LCS message are transmitted in RRC INACTIVE state in Stage 2. For avoiding the consequence of not having Stage 2 description, the moderator believes it would be beneficial to consider and discuss on whether an addition of a clarification note as a possible wayforward for addressing this open issue.

**Note: Positioning may be performed when a UE is in RRC\_INACTIVE state. LPP PDU and 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).**

**Question 1: Do companies agree that adding the above clarification note is sufficient for addressing the open issue on the details to be captured in the Stage 2 specification? Otherwise, please briefly describe the alternative approach (e.g. capture a specific procedure in Stage 2) or changes to the clarification note for addressing this issue.**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments and suggested changes** |
| Xiaomi | Yes with comment | We are fine to add a note to address the positioning in RRC\_INACTIVE. For the note, we think the previous agreements can be captured directly.  **Note: Positioning may be performed when a UE is in RRC\_INACTIVE state. Any uplink LCS or LPP message can be transported in RRC\_INACTIVE. If the UE initiated data transmission using UL SDT, the network can send DL LCS, LPP message and RRC message 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.** |
| Huawei, HiSilicon | Yes with comments | But from R2 perspective, the stage2 baseline procedure still needs to be determined since within the procedure, there are quite some details that are only related to RAN not SA. |
| vivo | For procedure a) and b), yes;  For procedure c), no. | For DL positioning in RRC\_INACTIVE, LS to SA2 to let SA2 decide the spec impacts.  For UL and UL+DL positioning in RRC\_INACTIVE, capture the procedures in stage 2 spec as the UL SRS configuration for RRC\_INACTIVE will introduce stage 3 impact and the overall procedure is not straightforward. |
| Qualcomm | See comments | Depends on what we want/can achieve in this Release for the WI objective.  All what can be supported with the current set of agreements is LPP and LCS PDU transfer using SDT – this alone does not allow "positioning in RRC\_INACTIVE state". So only the 2nd sentence of the proposed Note seems to be correct, but for LPP messages only. Not all LCS messages are transferred between UE and LMF, some are transferred between UE and AMF only.  The Note does not cover, e.g., how "positioning" (RAT-dependent/RAT-independent) is configured in the UE, how SRS transmission in RRC\_INACTIVE is supposed to work, how SRS in RRC\_INACTIVE can work together with DL measurements, etc. Note, a LPP/NRPPa session is always instigated by an LMF (see e.g., 23.273, section 6.11), so without proper LCS procedures, "positioning in RRC\_INACTIVE" using SDT cannot work. |
| ZTE | Yes | Supporting SRS in RRC\_INACTIVE can also be a note in stage 2. we think QC mentioned issues are more related with RRC spec rather than stage 2 |
| CATT | See comments | It is too general to add a NOTE only for positioning in RRC\_INACTIVE. In order to give a better understanding of positioning in RRC\_INACTIVE, we prefer to at least capture a) and b) in stage 2. |
| Lenovo, Motorola Mobility | See comments | Share CATT’s view that the note may tend to simplify all the Positioning procedures. We are also fine to capture a), b) and c) in the Stage 2 spec. |
| Intel | Yes | No strong opinion on Rapporteur’s version or Xiaomi’s version. |
| Apple | Yes | We support the rapporteur’s text. Some additional stage-2 changes may be required, though. |
| Samsung | Yes | We support the rapporteur’s proposal. |
| Ericsson | Yes | We support the rapporteur’s proposal. |
| OPPO | Yes with comments | We are fine with the above clarification note, while a stage2 procedure may help from spec completeness perspective. |
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### 3.1.1 Moderator’s summary

[To be updated after discussion]

## 3.2 LCS service types allowed with SDT

In the previous email discussion in [2] another Stage 2 open issues discussed is on which LCS service types (e.g. MT-LR, MO-LR, NI-LR and deferred MT-LR) can be supported in SDT active period.

During this discussion in [2], 6/13 companies have indicated deferred MT-LR while the remaining 7/13 indicated all service types/procedures are in scope. One of the companies mentioned that it adds more complexity if we limit it to only deferred MT-LR. Another company mentioned that we may not have sufficient time to discuss further on other service types apart from deferred MT-LR.

The agreements relevant to this issue are the same as those indicated in Section 2.1 above. Given the companies’ inputs during the previous discussion in [2], it appears that all LCS service types may be supported and can be allowed with SDT. Moreover, all LCS service types can be supported while ensuring that the RRC state of the UE is not exposed to the LPP layer of the UE. In this regard, the following is to be discussed:

**Question 2: Do companies agree that all LCS service types are supported if SDT is initiated by UE? Otherwise, please briefly describe why any restriction is necessary for addressing this issue.**

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| **Company** | **Yes/No** | **Comments and suggested changes** |
| Xiaomi | Yes | Based on the agreements made during RAN2#114-e, we think all service types can be supported. |
| Huawei, HiSIlicon | No | We think that immediate MT-LR and NI-LR cannot be supported in R17 because R17 SDT only supports MO-SDT while MT-SDT is not supported in R17 and will be discussed only in R18. While for the assumption in the question that SDT is initiated by the UE and at exactly the same duration, the network initiates immediate MT-LR and NI-LR, we think the case is quite a corner case and the majority of the situation is that there is no on-going SDT and the network initiates immediate MT-LR and NI-LR. Hence, it is not that worthwhile to address theses scenario.  Other than the above, we think it is not feasible to support MO-LR in R17. It can be shown that, if we only reuse the current stage3 and do not introduce other stage3 changes, UL positioning for MO-LR in RRC\_INACTIVE has to be supported by MT-SDT. While, MT-SDT is not part of the scope in R17 SDT and will only be supported in R18. Hence, we think the discussion for MO-LR in RRC\_INACTIVE should be postponed to R18. |
| vivo | Yes | However, we think the note in Q1 is sufficient. That is, no need to further clarify whether all LCS services types are supported in RRC\_INACTIVE if no consensus. |
| Qualcomm | No | No LCS service type is currently supported with SDT. See TS 23.273 for the specification of LCS. Only deferred MT-LR with LTE EDT can currently be supported in SA2. |
| ZTE | Yes | Agree with Xiaomi that the former agreements has already supported all LCS service types at least in RAN side. since LMF does not know the UE’s RRC state, so if any LCS service types can be supported in RAN side, it should be supported by LMF either |
| CATT | Yes | We had agreed:  Any uplink LCS or LPP message can be transported in RRC\_INACTIVE from RAN2 perspective.  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.  So we think it is enough with these above agreements. We don’t need to further clarify the supported LCS service types for positioning in RRC\_INACTIVE. |
| Lenovo, Motorola Mobility | Yes | Prefer that all LCS service types are supported, although we are also fine to indicate at least deferred MT-LR and MO-LR LCS service types may be supported via SDT if that is fine with the majority. |
| Intel | Yes | If we add the limitation, e.g. only support MO-LR, then the LMF has to be aware of UE RRC state before triggering MT-LR which contradict with RAN2 agreement. |
| Apple | Yes | Also agree with vivo that this agreement should not result in any specification changes. |
| Samsung | Yes | Same view with vivo. |
| OPPO | Yes |  |
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### 3.2.1 Moderator’s summary

[To be updated after discussion]

## 3.3 Handling of SP-SRS activation/deactivation

One of the open issues identified in [1] is on “UL positioning related issues: 2 How to send SP-SRS activation/deactivation MAC CE?”. In this regard, the previous agreements made in RAN2#116-e [4] are the following:

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)

From the agreement, SP-SRSp (Semi-Persistent SRS for Positioning) can be configured in UE with RRCRelease with SuspendConfig. However, it was not agreed in RAN2 on how to send the activation/deactivation MAC CE for triggering transmission of SP-SRSp. Also, in Rel-17 SDT WI the network is unable to send DL MAC CE if SDT has not been initiated by UE.

In a previous email discussion during RAN2#116-e (Proposals from RRC\_INACTIVE positioning [5]), the following options were indicated by vivo for sending the activation/deactivation MAC CE to UE which can be used as the starting point for this discussion:

* For sending activation MAC CE for SP-SRSp:
  + Solution 1: If there is ongoing SDT, the network can send SRS activation command to the UE in INACTIVE. Otherwise, the network shall transition the UE to RRC\_CONNECTED.
  + Solution 2: Send the Activation MAC CE along with the SRS configuration when gNB releases the UE to RRC\_INACTIVE.
* For sending deactivation MAC CE for SP-SRSp:
  + Solution 1: If there is ongoing SDT, the network can send SRS deactivation command to the UE in INACTIVE. Otherwise, the network shall transition the UE to RRC\_CONNECTED.
  + Solution 2: gNB can choose not to send the SP Positioning SRS Deactivation MAC CE command to the UE in RRC\_INACTIVE and only wait for the TA timer to expire.

**Question 3a:** **Please provide your preference on whether any of the following options may be supported for sending the activation DL MAC CE to UE for indicating to start the transmission of SP-SRSp:**

* **Option a: If there is ongoing SDT, the network can send SRS activation command to the UE in INACTIVE. Otherwise, the network shall transition the UE to RRC\_CONNECTED.**
* **Option b: Send the Activation MAC CE along with the SRS configuration when gNB releases the UE to RRC\_INACTIVE**
* **Option c: Other (please describe the procedure/signalling)**

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| **Company** | **Option a/b/c** | **Comments/Suggested changes** |
| Xiaomi | Option b | Option a can’t work if there isn’t ongoing SDT, so at least the option b should be supported. |
| Huawei, HiSilicon | Option b |  |
| vivo | Option b | When the gNB would turn the UE to RRC\_INACTIVE and realize the SRS type is semi-persistent, the gNB shall postpone the RRC state transition and transmission of SP-SRSp configuration until receiving the activation request from LMF. In this way, the activation MAC CE can be sent along with SP-SRSp configuration. |
| Qualcomm | a, b | If only b is supported, why do we then need semi-persistent SRS? I.e., what's the difference compared to periodic SRS then? |
| ZTE | a | Agree with QC that semi-persistent SRS should be different from periodic SRS. Semi-persistent SRS is just a feasible solution in RRC\_INACTIVE but gNB is not compulsively required to schedule it. It is just an additional scheduling option |
| CATT | a | Agree with QC and ZTE. According to current procedure, gNB is requested to configure SRS configuration at first, then it is requested to activate SRS configuration based on LMF request. gNB doesn’t know when the LMF requests it to activate SRS configuration in advance. So gNB has to send SRS configuration to UE whenever it decides the resource for SRS, before sending the activation MAC CE to UE.  In addition, we think option b is a special case of option a. |
| Lenovo, Motorola Mobility | a,b | Configuration and activation may happen at different time instances. Both options seem feasible. |
| Intel | A, b | Option b should be supported naturally. Agree with QC and ZTE on the benefit of a. |
| Apple | A and B |  |
| Samsung | A, b | Both are needed. |
| Ericsson | Only option b | It seems very inefficient to transit UE to connected mode; just to provide a SP UL SRS config; i.e to send DL MAC CE.  Only option b is sufficient, or it is ok to leave the SP activation from Rel.-17. |
| OPPO | a, b | We think both options can be supported according to the current agreements and legacy spec. There are no restrictions on sending DL MAC CE during ongoing SDT procedure. |
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**Question 3b:** **Please provide your preference on whether any of the following options may be supported for sending the deactivation DL MAC CE to UE for indicating to stop the transmission of SP-SRSp:**

* **Option a: If there is ongoing SDT, the network can send SRS deactivation command to the UE in INACTIVE. Otherwise, the network shall transition the UE to RRC\_CONNECTED.**
* **Option b: gNB can choose not to send the SP Positioning SRS Deactivation MAC CE command to the UE in RRC\_INACTIVE and only wait for the TA timer to expire.**
* **Option c: Other (please describe the procedure/signalling)**

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| **Company** | **Option a/b/c** | **Comments/Suggested changes** |
| Xiaomi | Option c | We prefer to combine option a and option b as following:  If there is ongoing SDT, gNB can send SRS deactivation command to the UE in INACTIVE, otherwise, the gNB can choose not to send the SP Positioning SRS Deactivation MAC CE command to the UE in RRC\_INACTIVE and only wait for the TA timer to expire. |
| Huawei, HiSilicon | Option b | When TA timer expires, the UE will release SRS configuration and the SP SRS transmission can be naturally stopped. |
| vivo | Option b with comments | If the target UE is configured with the SP-SRSp configuration associated with a valid timer, the last serving gNB can choose not to send the deactivation MAC CE to UE immediately upon receiving the deactivation request from LMF. If the UE would update the inactivePosSRS TA timer after the gNB receive the deactivation request, e.g., during SDT, the gNB can send the deactivation MAC CE to deactivate the SP-SRSp. |
| Qualcomm | a | Only option a seems applicable, since b is not semi-persistent SRS. |
| ZTE | a | Since deactivation command comes from LMF(POSITIONING DEACTIVATION), we think option a is more appropriate |
| CATT | a | Agree with QC and ZTE. |
| Lenovo, Motorola Mobility | a | Share QC, ZTE and CATT’s view, SPS by nature requires a explicit deactivation command as in the context of positioning is sent by the LMF. |
| Intel | A+b | Agree with Xiaomi. |
| Apple | A and B |  |
| Samsung | A , B |  |
| Ericsson | Option b | Option b is sufficient. |
| OPPO | a, b | We think both options can be supported according to the current agreements and legacy spec. There are no restrictions on sending DL MAC CE during ongoing SDT procedure. |
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### 3.3.1 Moderator’s summary

[To be updated after discussion]

## 3.4 TA timer configuration validation due to cell reselection

In last RAN2#116bis meeting, an FFS was captured in the agreements as “FFS if the TA timer configuration is invalidated upon any cell reselection”. This FFS also reflected as editor’s note in running CR for 38.331 (R2-2202048).

The agreements relevant to this issue, made during RAN2#116bis [6], are as follows:

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.

From the agreements on Proposal 4 and Proposal 5 (indicated above), the TA timer configuration for SRSp and the SRSp configuration are released when the UE sends RRCResumeRequest to a cell other than the cell where it is released to RRC\_INACTIVE state. However, it is not clear whether the TA timer configuration is invalidated upon any cell reselection, even if the UE does not initiate the RRC Resume procedure. In this regard, the following is to be discussed:

**Question 4: Do companies agree that the TA timer configuration is invalidated upon cell reselection even if the UE does not initiate the RRC resume procedure?**

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| **Company** | **Yes/No** | **Comments and suggested changes** |
| Xiaomi | Yes | If UE performs cell reselection, the SRS configuration should be released since the SRS is cell specific. |
| Huawei, HiSilicon | Yes | Follow CG-SDT and PUR solution. |
| vivo | No strong view | OK to follow CG-SDT solution. However, if the UE can maintain the SRSp configuration and TA timer configuration upon cell reselection, the SRS configuration may turn valid again when it moves back to the validity area. |
| ZTE | Yes |  |
| CATT | Yes |  |
| Lenovo, Motorola Mobility | Yes | Ok to follow the CG-SDT mechanism |
| Intel | Yes |  |
| Apple | Yes |  |
| Samsung | Yes |  |
| Ericsson | Yes |  |
| OPPO | Yes | Align with SDT. |
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### 3.4.1 Moderator’s summary

[To be updated after discussion]

## 3.5 RSRP-based TA validation for SRSp

The open issue regarding the use of RSRP-based TA validation for SRSp are (a) how RSRP derivation can be done for TA validation for SRSp and (b) which DL pathloss reference RSRP should be used.

In the running CR for 38.321 (R2-2202011), the following editor’s note related to whether to use CG-SDT approach was added under Clause 5.Z (Positioning SRS transmission in RRC\_INACTIVE).

* Editor’s NOTE: FFS whether to follow CG-SDT for (a) RSRP derivation for positioning SRS TA validation, (b) definition of stored downlink pathloss reference RSRP value at the very first positioning SRS transmission

The agreements made in SDT session in previous meetings, which may be relevant to the open issue are as follows:

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| **Agreements**  **RAN2#112e:**  3. A new TA timer for TA maintenance specified for configured grant based small data transfer in RRC\_INACTIVE should be introduced. FFS on the procedure, the validity of TA, and how to handle expiration of TA timer. The TA timer is configured together with the CG configuration in the RRCRelease message.  **RAN2#113e:**  5. TAT-SDT is started upon receiving the TAT-SDT configuration from gNB, i.e. RRCrelease message, and can be (re)started upon reception of TA command.  6. From RAN2 point of view, assume similar to PUR, that we introduce a TA validation mechanism for SDT based on RSRP change, i.e. RSRP-based threshold(s) are configured. Ask RAN1 to confirm. FFS on how to handle CG configuration when TA expires or when is invalid due to RSRP threshold. Details of the TA validation procedure can be further discussed.  9. UE releases CG-SDT resources when TAT expires in RRC\_Inactive state  **RAN2#115e:**  4. UE should release CG-SDT resource (if stored) when UE initiates RRC resume procedure from another cell which is different from the cell in which the RRCRelease is received.  **RAN2#116e:**  11. The following CG-SDT configurations are per UE:  - The new TA timer in RRC\_INACTIVE  - The RSRP change threshold for TA validation mechanism in SDT  - The SSB RSRP threshold for beam selection  22. Highest N SSBs of all SSBs actually transmitted as indicated in SIB1 is used for RSRP based TA validation  **RAN2#116bis-e:**   1. For CG-SDT resource validation, the UE compares the RSRP at the time of initiating CG-SDT procedure with the RSRP stored at the time when RRCRelease message is received 2. RSRP-based TA validation is only applicable for initial CG-SDT and not needed for retransmission of the initial CG-SDT |

**Question 5:** **Do companies agree to follow the CG-SDT solution for (a) RSRP derivation for positioning SRS TA validation, and (b) definition of stored downlink pathloss reference RSRP value at the very first positioning SRS transmission?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments and suggested changes** |
| Xiaomi | Yes | UE use the CG-SDT resource to perform positioning, so the cG-SDT solution should be followed. |
| Huawei, HiSilicon | Yes | Same as CG-SDT and the CG-SDT solution can be reused. |
| vivo | Yes | Follow the CG-SDT solution. |
| ZTE | Yes |  |
| CATT | Yes with a | We support to follow CG SDT solution. But in CG-SDT, the stored RSRP is the one when RRCRelease message is received. So if the similar solution is applied, the stored downlink pathloss reference RSRP value for positioning SRS TA validation is the one when RRCRelease message is received too. |
| Lenovo, Motorola Mobility | Yes |  |
| Intel | Yes | Follow CG-SDT solution. |
| Apple | Yes |  |
| Samsung | Yes |  |
| Ericsson | Yes | Follow CG-SDT solution. |
| OPPO | Yes |  |
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### 3.5.1 Moderator’s summary

[To be updated after discussion]

## 3.6 Other Open Issues

**Question 7: Please provide any other open issue that not discussed in the above questions that companies are interested in discussing:**

|  |  |  |
| --- | --- | --- |
| **Company** | **Open Issue** | **Comments** |
| vivo | Whether the inactivePosSRS-TAT will be restarted when a Timing Advance Command is received during SDT. | In the running CR, the inactivePosSRS-TAT can be restarted only when the configuration for inactivePosSRS-TAT is received. However, the CG-SDT TAT will be restarted when a Timing Advance Command MAC CE is received. We are wondering whether the solutions shall be aligned. |
| ZTE | Duplicated SRS config in POS running CR and SDT running CR  [Intel] We can follow SDT | After checking SDT running CR, the CG-SDT resource in RRCRelease with Suspend Config contains SRS config for SDT initial BWP. We are wondering whether these two SRS configs are duplicated and may cause confusion to UE |
| OPPO | Whether SRS for positioning in RRC\_INACTIVE state can be configured through RRC reconfiguration message. | Currently, SRS configuration can be carried in either RRC reconfiguration message or RRC release message, and both of the RRC message types have not been excluded based on the agreements made in positioning session.  Meanwhile, SDT has made the restriction on the RRC message that supported during an SDT procedure, that is, no RRCReconfiguration and RRCReconfigurationComplete are allowed during SDT session.  As positioning in RRC\_INACTIVE relies on the SDT for positioning related message transmission, it is suggested to align positioning agreements with SDT, i.e. SRS for positioning in RRC\_INACTIVE state can only be configured through RRC release message. |
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# 4 Summary

The following is the summary containing the proposals derived from the discussion above:

# 5 Appendix

The following contains the details of the open issues for positioning in RRC\_INACTIVE identified in [1]

**Table 4.1: Open issue lists for positioning in RRC\_INACTIVE**

|  |  |  |  |
| --- | --- | --- | --- |
| **Topic** | **Open issues**  **Note:** Open Issues should be defined for aspects that need to be closed, important to make already agreed functionality work in a reasonable way. Not yet agreed optimizations that may not be needed shall not be listed as Open Issues. | **Related to the completion of WI?**  **The topic has to be removed from Rel-17 scope if the corresponding open issues cannot be resolved.** | **Remark** |
| **Stage 2** | Stage 2: what should be captured in the stage 2 specification  Any impact on SA2 stage 2, e.g. LPP/LCS transmission in SDT | ? | **Status**: Discussion see R2-2201772;   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]**   Suggest to down prioritize the discussion considering companies have different view on what should be capture.  RAN2 should prioritize the discussion stage 3; |
| All LCS service types are allowed to use SDT | ? | **Status**: Discussion see R2-2201772;  Suggest, stop the discussion since no majority and original agreements is sufficient, i.e. any LPP/LCS messages can be transmitted in RRC\_INACTIVE using SDT;  *6 companies prefer that only deferred MT-LR is in the scope whereas 7 companies prefer that all the procedures are in scope. There is also general view that previous agreement made by RAN2 that any LCS message can be transmitted using SDT still holds even when the procedure is described limited to deferred MT-LR Procedure. One of the companies expresses the view that it adds more complexity if we limit it to only deferred MT-LR. It may so happen that there is no time to discuss further other service types etc; and the use case is only for deferred MT-LR; there is no problem so far described as why for other service type it may not work and as there is already RAN2 agreement to support LCS msg transfer for all messages in RRC Inactive; it is proposed that.*  ***Proposal 10 All LCS service types are allowed to use SDT.*** |
| **UL positioning related issues** | UL positioning related issues:  1 How to introduce SRS configuration in RRCRelease message, e.g. which IE should be contained, srs-Config, BWP-Uplink or UplinkConfig | Yes | **Status**: check the status of RRC email discussion 116bis-631  RAN2#116bis:  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 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. |
| UL positioning related issues:  2 How to send SP-SRS activation/deactivation MAC CE? | Yes | **Status**: check SDT discussion, Coordination with SDT WI is needed |
| 3 The validity of SRS configuration, e.g. upon change of cell? TA timer expires? | Yes | **Status**: check the status of MAC email discussion 116bis-632  check the status of RRC email discussion 116bis-631  RAN2#116bis:  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. |
| 4 How to maintain the TA for SRS transmission;?  4.1 The details of TA timer configuration;  4.2 Where to configure TA timer configuration;  4.3 Validity of TA, e.g. additional RSRP based validation;  4.4 Validity of TA timer configuration, same as SRS configuration?  FFS if the TA timer configuration is invalidated upon any cell reselection. | Yes | **Status**: check the status of MAC email discussion 116bis-632  check the status of RRC email discussion 116bis-631  RAN2#116bis:  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. |
| 5 Need to clarify AP SRS cannot be configured for the UE in RRC\_INACTIVE; | Yes | **Status**: resolved. check the status of RRC email discussion 116bis-631  RAN2#116bis:  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**.”.** |
|  | Editor’s NOTE: FFS UE behaviour during RAR window and contention resolution window  Editor’s NOTE: FFS triggering/cancellation of the MAC CE  Editor’s NOTE: FFS whether to follow CG-SDT for (a) RSRP derivation for positioning SRS TA validation, (b) definition of stored downlink pathloss reference RSRP value at the very first positioning SRS transmission  Editor’s NOTE: FFS whether to use LCID or eLCID for MAC CE for MG/PPW activation/deactivation request and MAC CE for MG/PPW activation/deactivation command. | Yes | **Stage 3 MAC** |
| **UE capability** | UE capabilities on positioning in RRC\_INACTIVE in RAN1 feature lists  27-6 DL PRS processing capabilities in RRC inactive state  27-15 Support of positioning SRS transmission in RRC\_INACTIVE state [for initial BWP]  27-16 OLPC for positioning SRS in RRC\_INACTIVE state  27-17 Support of [PRS measurement in RRC\_INACTIVE]  27-18a Support of PRS measurement in RRC\_INACTIVE state for DL-TDOA  27-18b Support of PRS measurement in RRC\_INACTIVE state for DL-AoD  27-18c Support of PRS measurement in RRC\_INACTIVE state for Multi-RTT  27-19 Spatial relation for positioning SRS in RRC\_INACTIVE state | Yes | **Status:** check the status of RAN1 feature list and the discussion in R2-2201767;  Follow RAN2 agreements “RRC state is transparent to LMF and no different handling on PRS for different RRC state”, RAN2 should avoid to optimize these aspects even if RAN1 agrees to introduce RRC\_INACTIVE specific LPP capabilities (27-6, 27-16, 27-17, 27-18a, 27-18b, 27-18c, 27-19).  **RAN1 feature lists in** R1-2200767;  FFS on LPP: 27-17, 27-18a, 27-18b, 27-18c  FFS on RRC: 27-17, 27-18a, 27-18b, 27-18c  LPP: 27-6  Note from RAN1 on 27-6: Having the PRS processing capabilities in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state [, but instead LMF may set the response time assuming a specific RRC state during the PRS measurement and inform the gNB on the assumed RRC state, while the actual RRC state is still determined by UE/gNB that take the response time requirement and assumed RRC state into account.] |
| UL capability  Wait for RAN1 decision on whether UL related RRC\_INACTIVE specific capabilities (27-15, 27-16, 27-19) should be captured in RRC or LPP. | Yes | **Status:** check the status of RAN1 feature list and the discussion in R2-2201767;  **RAN1 feature lists in** R1-2200767;  RAN1 has agreed:  RRC: 27-15, 27-15a,  FFS on LPP: 27-15, 27-15a, |
| **gNB awareness** | Assistance data in gNB | ? | **Status: no further discussion in RAN2.**  RAN2#116bis  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). |

# 6 Reference

1. R2-2202005, [Post116bis-e][634][POS] Report of email discussion, Positioning open issues list (Intel)
2. R2-2201772, [AT116bis-e][617][POS] Remaining issues on positioning in RRC\_INACTIVE (Ericsson)
3. RAN2 chairman notes RAN2#114-e, May 2021
4. RAN2 chairman notes RAN2#116-e, Nov 2021
5. R2-2111379, [AT116-e][625][POS] Proposals from RRC\_INACTIVE positioning
6. RAN2 chairman notes RAN2#116bis-e, January 2022