**3GPP TSG-RAN WG2 Meeting #118 electronic R2-22xxxxx**

**e-Meeting, 9th May – 20th May 2022**

Source: vivo

Title: Report of [AT118-e][636][POS] Proposals for discussion from RRC\_INACTIVE summary

Agenda Item: 6.11.2.2

Document for: Discussion and Decision

# Introduction

This document is the report of the following offline discussion:

* [AT118-e][636][POS] Proposals for discussion from RRC\_INACTIVE summary (vivo)

 Scope: Discuss P1/P2b/P4a/P5a/P5b from R2-2206052 and attempt to conclude. P2b should be checked for compatibility with SDT.

 Intended outcome: Report to Monday week 2 session in R2-2206257

 Deadline: Friday 2022-05-13 1800 UTC

This email discussion is based on the summary R2-2206052 [10] of companies’ contributions [1]-[8] and the remaining proposals to be further discussed are as follows:

Handling of SRS configuration upon TAT expires

**Proposal 1: Discuss whether to follow the SDT mechanism to keep the positioning SRS configuration for RRC\_INACTIVE when the *inactivePosSRS-TimeAlignmentTimer* expires to support delta configuration. If yes, agree on R2-2204693.**

Handling of SRS configuration upon cell re-selection

**Proposal 4a: Agree on R2-2205580 to remove the description of the UE behavior when performing connection resumption in a different cell than the cell where *srs-PosRRC-InactiveConfig* was configured.**

**Proposal 4b: Agree on R2-2205580 to add the description of the UE behavior upon cell reselection, i.e., to instruct MAC to stop the *srs-TimeAlignmentTimer*.**

Pathloss derivation for TA validation

**Proposal 2b: Discuss whether to add a new clause for pathloss derivation for posSRS transmission and CG-SDT in RRC\_INACTIVE to RRC spec. If yes, agree on R2-2205013 as a baseline.**

LS from SA2 and potential impact on RAN2

**Proposal 5a: If RAN2 would reply to the LS to SA2 on positioning in RRC\_INACTIVE, add the suggestion of deleting the pre-condition “when the UE is in RRC INACTIVE state”.**

**Proposal 5b: Discuss whether to add a new *nr-UL-RequestAssistanceData* IE in the *RequestAssistanceData* to support UE initiated SRS configuration request for UL only positioning.**

# Contact Points

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| Company | Name | Email Address |
| Huawei, HiSilicon | Yinghao Guo | yinghaoguo@huawei.com |
| Intel | Yi Guo | Yi.guo@intel.com |
| ZTE | Yu Pan | pan.yu24@zte.com.cn |
| Xiaomi | Xiaolong Li | lixiaolong1@xiaomi.com |
| OPPO | Liu yang | liuyangbj@oppo.com |
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# Discussion

## Handling of SRS configuration upon TAT expires

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| CATT [3] | Proposal 1: Upon the expiry of *inactivePosSRS-TimeAlignmentTimer*, the positioning SRS for RRC\_INACTIVE is not released. |

CATT suggests keeping the positioning SRS configuration for RRC\_INACTIVE even if the *inactivePosSRS-TimeAlignmentTimer* expires to support delta configuration, which follows the principle for CG-SDT configuration. The corresponding change requests are as follows:

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| **Text Proposal for TS 38.321**The MAC entity shall:~~1> when the~~ *~~inactivePosSRS-TimeAlignmentTimer~~* ~~expires:~~~~2> notify RRC to release Positioning SRS for RRC\_INACTIVE configuration(s).~~ |
| **Text Proposal for TS 38.331**~~Upon receiving a positioning SRS configuration for RRC\_INACTIVE release request from lower layers, the UE shall:~~~~1> release the configured~~ *~~srs-PosRRC-InactiveConfig~~*~~.~~ |

**Q1-a: Do companies agree to follow the SDT mechanism to keep the SRSp configuration for RRC\_INACTIVE when the *inactivePosSRS-TimeAlignmentTimer* expires to support delta configuration?**

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| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | No | No need to keep the configuration. This is an optimization instead of a CR. We have not discussed on the delta signalling for SRS config before. |
| Intel | Yes | This is same as SDT mechanism.  |
| ZTE | No | We support to follow SDT mechanism on TA timer, but not agreed to follow the delta configuration. Agree with HW that this is an optimization |
| Xiaomi | No | In my understanding, for SDT, if timer is expired before UE performing SDT procedure, the UE will not release the SDT configuration, if timer is expired during the SDT procedure, UE will go to idle and the SDT configuration is released. Regarding positioning, the UE is sending SRS when the timer is expired for periodic SRS, so the UE should release SRS configuration even if follows the SDT mechanism.  |
| OPPO |  | We are OK to keep. But before reception of delta configuration, the current SRSp configuration should not be used for SRS transmission |
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**Q1-b: If your answer to Q1-a is yes, do you agree with the above change requests?**

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| **Company** | **Agree as is /** **Agree with changes** | **Comments** |
| Intel | Yes |  |
| OPPO | Yes but | Clarification of not transmission of SRSp using current SRSp configuration should be made.  |
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## Handling of SRS configuration upon cell re-selection

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| vivo [7] | Proposal 1: Remove the description of the UE behavior when performing connection resumption in a different cell than the cell where srs-PosRRC-InactiveConfig was configured.Proposal 2: Add the description of the UE behavior upon cell reselection, i.e., to instruct MAC to stop the srs-TimeAlignmentTimer. |

Regarding the SRS configuration during mobility, there are two overlapping agreements in RAN2#116bis-e and RAN2#117-e:

Agreement in RAN2#116bis-e

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.

Agreement in RAN2#117-e:

Proposal 6: TA timer configuration of SRS for positioning (SRSp) is invalidated upon any cell reselection (i.e. even if the UE does not initiate the RRC resume procedure) (11/12)

In the current 38331 CR, the UE will release the SRSp configuration upon cell re-selection. As a consequence, the procedure to release the SRSp configuration when performing RRC resumption in a different cell will never happen. To address the overlapping issue, vivo suggests removing the description of the UE behavior when performing connection resumption in a different cell than the cell where *srs-PosRRC-InactiveConfig* was configured in section 5.3.13.2.

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| 5.3.13.2 Initiation---------------------------------------------start of change----------------------------------~~1> if the UE performs connection resumption in a different cell than the cell where~~ *~~srs-PosRRC-InactiveConfig~~* ~~was configured;~~~~2> release~~ *~~srs-PosRRC-InactiveConfig,~~* ~~if configured;~~~~Editor's Note: This agreement/clause may not be needed because we have this agreement TA timer configuration is invalidated upon any cell reselection; see 5.7.15.~~ |

During the online discussion, Intel proposed another option to not release the SRSp configuration but just stop the TAT when performing cell reselection, and shall release the SRSp configuration when the UE resumes in a different cell than the cell where srs-PosRRC-InactiveConfig was configured. The change request may be as follows:

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| 1> else if cell reselection occurs when *srs-PosRRC\_InactiveConfig* is configured:2> indicate to the lower layer to stop *srs-TimeAlignmentTimer* transmission in RRC\_INACTIVE;~~2> release the~~ *~~srs-PosRRC-InactiveConfig~~*~~.~~ |

The intention is to restart the TAT and continue to use the SRSp configuration when UE moves back to the cell where SRSp was configured. For this option, the rapporteur thinks some extra description is needed, i.e., the UE shall restart the TAT when UE moves back to the cell where *srs-PosRRC-InactiveConfig* was configured. However, in this case, the TA timers of the UE and NW are not aligned. If the NW would schedule the resource for SRSp after the TA timer at the NW side expires, then a conflict may occur when UE moves back to the cell. Further, when the UE moves to another cell and stops the SRSp transmission, the TRP will report measurement failure and LMF may reconfigure SRSp to the UE. In conclusion, the rapporteur thinks this optimization is not essential.

**Q2: As to the handling of SRSp configuration upon cell reselection, which option do you prefer?**

* **Option 1: UE shall release the SRSp configuration upon cell re-selection. Correspondingly, remove the description of the UE behavior when performing connection resumption in a different cell than the cell where *srs-PosRRC-InactiveConfig* was configured.**
* **Option 2: UE shall save the SRSp configuration upon cell re-selection and only stop the TAT, and shall release the SRSp configuration when resumes in a different cell than the cell where *srs-PosRRC-InactiveConfig* was configured. Correspondingly, remove the description of UE behavior for releasing the srs-PosRRC-InactiveConfig upon cell re-selection, and add the description of restarting the TAT when UE moves back to the** **cell where *srs-PosRRC-InactiveConfig* was configured.**
* **Option 3: Others, please specify.**

Note: as no contribution for Option 2, companies who choose Option 2 or 3 are suggested to clarify the detailed spec change for the CR rapporteur to capture.

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| **Company** | **Option** | **Comments** |
| Huawei,HiSilicon | Option1 | This has already been captured in the RRC rapp CR.invalidated TA does not mean TA expiry.  |
| Intel | Option 2 | To align with SDT handling.  |
| ZTE | Option 1 | We had two RAN2 agreements: ‘TA timer configuration of SRS for positioning (SRSp) is invalidated upon any cell reselection.’ ‘The SRSp configuration is considered as invalid if TA is not valid.’this means SRS configuration is invalid when cell reselection. So option 1 is better |
| Xiaomi | Option 1 | We just would like to confirm that the SRS configuration will not be released when UE performs the RRC resume procedure in the cell who provides the SRS configuration.  |
| OPPO | Option 1 | Option 2 will cause the misalignment of the TA timers between UE and network, which needs further solution. |
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## Pathloss derivation for TA validation

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| Huawei [4] | **Text Proposal for TS 38.321**1/ Remove the pathloss derivation and add reference to TS 38.133.2/ Remove the beam consolidation procedure and cite the RRC spec |
| Huawei [5] | **Text Proposal for TS 38.331**1/ Add a new clause for pathloss derivation for posSRS transmission and CG-SDT in RRC\_INACTIVE2/ Add description for the fields in SIB2 for pathloss derivation3/ Remove the field srs-NrofSS-BlocksToAverage-r17 |

In the discussion of CG-SDT, it has been agreed that the *nrofSS-BlocksToAverage* configuration in SIB2 is reused for the RSRP change based TA validation. HW suggests following the same procedure of CG-SDT in [4][5]. The proposed changes to MAC were agreed during the online discussion.

For the change request to RRC spec, the main change is to add a new clause for pathloss derivation for posSRS transmission and CG-SDT in RRC\_INACTIVE.

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| **Text Proposal for TS 38.331**5.7.X Derivation of pathloss reference for TA validation of Positioning SRS transmission and CG-SDT in RRC\_INACTIVEUpon request from lower layer for pathloss reference derivation for TA validation for Positioning SRS transmission or CG-SDT in RRC\_INACTIVE, the UE shall:1> if *nrOfSS-BlocksToAverage* is not configured; or 1> if *absThreshSS-BlocksConsolidation* is not configured or the highest beam measurement quantity value is below or equal to *absThreshSS-BlockConsolidation*, if a*bsThreshSS-BlcoksConsolidation* is configured:2> derive the downlink pathloss reference RSRP for TA validation as the highest beam measurement quantity value, where each beam measurement quantity is described in TS 38.215 [24].1> else:2> derive the downlink pathloss reference RSRP for TA validation as the linear average of the power values of up to *nrOfSS-BlocksToAverage* of the highest beam measurement quantity values above *absThreshSS-BlocksConsolidation*, where each beam measurement quantity is described in TS 38.215 [24]. |

**Q3-a: Do companies agree to add the above new clause for pathloss derivation for TA validation of SRSp transmission and CG-SDT in RRC\_INACTIVE?**

Note: this question is related to SDT and companies are suggested to check with their SDT colleagues for compatibility.

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| **Company** | **Agree as is/** **Agree with changes/ Disagree** | **Comments** |
| Huawei, HiSilicon | Yes | This is needed since the current pathloss derivation is only within the chapter for RRM measurement. MAC spec cannot refer to that clause. This is also needed for SDT |
| Intel | Yes | Ok.  |
| ZTE | Yes |  |
| Xiaomi | Yes |  |
| OPPO | Yes |  |
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Another change request is to add a description for the fields in SIB2 for pathloss derivation as follows.

| ***SIB2* field descriptions** |
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| ***absThreshSS-BlocksConsolidation***Threshold for consolidation of L1 measurements per RS index. This field is also used for deriving cell level pathloss reference for TA validation of CG-SDT and positioning SRS transmission in RRC\_INACTIVE. If the field is absent, the UE uses the measurement quantity as specified in TS 38.304 [20]. |
| ***nrofSS-BlocksToAverage***Number of SS blocks to average for cell measurement derivation. This field is also used for deriving cell level pathloss reference for TA validation of CG-SDT and positioning SRS transmission in RRC\_INACTIVE. If the field is absent the UE uses the measurement quantity as specified in TS 38.304 [20]. |

**Q3-b: Do companies agree to add the above description for the fields in SIB2 for pathloss derivation for TA validation of SRSp transmission and CG-SDT in RRC\_INACTIVE?**

Note: this question is related to SDT and companies are suggested to check with their SDT colleagues for compatibility.

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| **Company** | **Agree as is/** **Agree with changes/ Disagree** | **Comments** |
| Huawei,HiSilicon | Yes | Editorial corections for the field description |
| Intel | Yes |  |
| ZTE | Yes |  |
| Xiaomi | Yes |  |
| OPPO | Yes |  |
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## LS from SA2 and potential impact on RAN2

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| CATT [1][2] | Proposal 1: Delete the sentence “when the UE is in RRC INACTIVE state” in the first step of “Low Power Periodic and Triggered 5GC-MT-LR Procedures with SDT” for DL-only and RAT-Independent positioning, for UL-only positioning, and for UL+DL positioning.Proposal 2: Reply an LS to SA2 to notice the suggestion of deleting the sentence “when the UE is in RRC INACTIVE state” in the first step of “Low Power Periodic and Triggered 5GC-MT-LR Procedures with SDT” for DL-only and RAT-Independent positioning, for UL-only positioning, and for UL+DL positioning. |
| vivo [7] | Proposal 3: The UE should be able to request UL configuration for positioning in RRC\_INACTIVE when the previous configuration turns invalid.Proposal 4: Add a new nr-UL-RequestAssistanceData IE in the RequestAssistanceData. |

In the LS reply from SA2 [9], and“Low Power Periodic and Triggered 5GC-MT-LR Procedures with SDT” for DL-only and RAT-Independent positioning, UL-only positioning, and UL+DL positioning, are agreed to be captured in TS 23.273.

In the agreed CR, there is a sentence “when the UE is in RRC INACTIVE state” in the first step of these three added positioning procedures.

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| At step 16 in clause 6.3.1, the LMF indicates to the UE that DL positioning, RAT Independent positioning or no positioning will be used for subsequent location reporting events when the UE is in RRC INACTIVE state. |

CATT thinks that “When the UE is in RRC INACTIVE state” is not a pre-condition configured by LMF as RAN2 already agreed the RRC state of the UE is not exposed to the LMF. Thus, CATT suggests to LS to SA2 to remove the pre-condition [1][2].

**Q4-a: Do companies agree to reply to the LS to SA2 on positioning in RRC\_INACTIVE?**

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| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | No | The “when the UE is in RRC\_INACTIVE” is only for UE and does not imply that LMF knows UE’s RRC state |
| Intel | No | Fine with the clarification from Huawei. |
| ZTE | No | Agree with HW that ‘when the UE is in RRC\_INACTIVE’is to declare the condition of this step, rather than LMF knows the UE’s RRC state |
| Xiaomi | No | There is a note to clarity that LMF is not aware of whether the UE is in RRC\_INACTIVE state, so we are fine with the clarification from Huawei. |
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If we agree to reply to the LS, the draft LS [2] can be baseline as follows:

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| **1. Overall Description:**RAN2 thanks SA2 for the reply LS on positioning in RRC\_INACTIVE state. In the CR which has been agreed, for the first step of these three added positioning procedures, there is a sentence of “when the UE is in RRC INACTIVE state” as follows.

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| 2. The UE enters RRC INACTIVE state some time before an event is detected at step 22 or step 31 in clause 6.3.1. If the UE is not in RRC INACTIVE state when an event is detected at step 22 or step 31 in clause 6.3.1, then the UE follows the procedure described for steps 22-31 in clause 6.3.1 to report the event to the LMF and to the LCS Client or AF.NOTE 2: The LMF is not aware of whether the UE is in RRC INACTIVE state. This allows the LMF to follow the procedure described here or the procedure described in clause 6.3.1 for event reporting. With the procedure described here, a UE that was initially in RRC INACTIVE state can remain in RRC INACTIVE state after the procedure is complete. With the procedure in clause 6.3.1, a UE that was initially in RRC INACTIVE state could be moved into RRC CONNECTED state during the procedure in clause 6.3.1. |

But “When the UE is in RRC INACTIVE state” is not a pre-condition configured by LMF, as:1. It was agreed in RAN2 that the RRC state of the UE is not exposed to the LMF for INACTIVE UL and DL positioning.
2. Any uplink LCS or LPP message can be transported in RRC\_INACTIVE from RAN2 perspective. It depends on conditions configured by RAN node if SDT is used. No addition condition is introduced for positioning in RRC\_INACTIVE.
3. The UE is allowed to be in RRC\_INACTIVE state or not in RRC\_INACTIVE for subsequent location reporting according to the CR in SA2 LS.

RAN2 suggest removing the sentence “when the UE is in RRC INACTIVE state” in the corresponding descriptions for Periodic and Triggered 5GC-MT-LR Procedure in RRC INACTIVE state.**2. Actions:****To SA2:****ACTION:** RAN2 kindly ask SA2 to take the above information into account for future work. |

**Q4-b: If your answer to Q4-a is yes, do you agree with the above draft LS?**

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| **Company** | **Agree as is/** **Agree with changes** | **Comments** |
| Huawei, HiSIlicn | No |  |
| Intel | No |  |
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Besides, vivo noticed that step 4 in UL+DL positioning and UL only positioning are not aligned. To be specific, for the UL+DL positioning, in step 4, the UE includes an LPP positioning message in the supplementary services event report message that includes a request for a UL Configuration to support the UL+DL positioning method. However, for the UL positioning, in step 4, the UE does not include an LPP positioning message in the supplementary services event report message as there is no RequestAssistanceData for UL only positioning. vivo proposes to add a new *nr-UL-RequestAssistanceData* IE in the RequestAssistanceData as follows:

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| RequestAssistanceData-r9-IEs ::= SEQUENCE { commonIEsRequestAssistanceData CommonIEsRequestAssistanceData OPTIONAL, a-gnss-RequestAssistanceData A-GNSS-RequestAssistanceData OPTIONAL, otdoa-RequestAssistanceData OTDOA-RequestAssistanceData OPTIONAL, epdu-RequestAssistanceData EPDU-Sequence OPTIONAL, ..., [[ sensor-RequestAssistanceData-r14 Sensor-RequestAssistanceData-r14 OPTIONAL, tbs-RequestAssistanceData-r14 TBS-RequestAssistanceData-r14 OPTIONAL, wlan-RequestAssistanceData-r14 WLAN-RequestAssistanceData-r14 OPTIONAL ]], [[ nr-Multi-RTT-RequestAssistanceData-r16 NR-Multi-RTT-RequestAssistanceData-r16 OPTIONAL, nr-DL-AoD-RequestAssistanceData-r16 NR-DL-AoD-RequestAssistanceData-r16 OPTIONAL, nr-DL-TDOA-RequestAssistanceData-r16 NR-DL-TDOA-RequestAssistanceData-r16 OPTIONAL ]] [[ nr-UL-RequestAssistanceData-r17 NR-UL-RequestAssistanceData-r17 OPTIONAL, ]]}NR-UL-RequestAssistanceData-r17 ::= SEQUENCE { nr-PhysCellID-r16 NR-PhysCellID-r16 OPTIONAL, nr-AdType-r16 BIT STRING { ul-srs (0) } (SIZE (1..8)), ...,} |

**Q5: Do companies agree to add the above new *nr-UL-RequestAssistanceData* IE in the *RequestAssistanceData* to support UE initiated SRS configuration request for UL only positioning?**

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| **Company** | **Agree as is/** **Agree with changes/ Disagree** | **Comments** |
| Huawei, HiSIlicon | No | Not sure what is the use for this. SRS is not configured by LMF and it is not clear why the UE should request SRS AD in LPP message. LMF knows which positioning method to be performed in the UE by UE capability.  |
| Intel | No  | Agree with Huawei |
| ZTE | No | This changes the UL-TDOA logic since usually UL-TDOA does not even require UE to support LPP |
| Xiaomi | See comment  | It depends how to implement the step 5 (NRPPa Positioning Information Request).For the case without anchor gNB relocation, if step 5 is mandatory when LMF receives the LCS report, there is no need to add the above new IE since anyway the LMF will request the SRS configuring. If step 5 is optional, there may be an issue since the LMF may think the pervious SRS is still valid and don’t perform the step 5, but the UE has performed the cell reselection and released SRS configuration, in this case, the request from UE may be needed. |
| OPPO | No  | Agree with Huawei. After LMF determines which positioning method to be used by the UE, the LMF could ask the gNB to configure the SRS for the UE. |
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# Conclusion

Easy agreement

For online discussion

# Reference

1. R2-2204691 Further consideration on Periodic and Triggered 5GC-MT-LR Procedure in RRC INACTIVE state CATT
2. R2-2204692 [Draft] Rely LS on Positioning in RRC\_INACTIVE CATT
3. R2-2204693 Consideration on positioning SRS configuration for RRC\_INACTIVE CATT
4. R2-2205012 Correction to beam consolidation for posSRS in RRC\_INACTIVE Huawei, HiSilicon
5. R2-2205013 [H572] Correction for beam consolidation for TA validation in RRC\_INACTIVE Huawei, HiSilicon
6. R2-2205368 Corrections on Maintenance of Uplink Time Alignment Xiaomi
7. R2-2205580 Discussion on the remaining issue about positioning in RRC\_INACTIVE vivo
8. R2-2204999 [H570] Correction for cell reselection for SRS in RRC\_INACTIVE Huawei, HiSilicon
9. R2-2204521 Reply LS on Positioning in RRC\_INACTIVE State
10. R2-2206052 Summary of AI 6.11.2.2 on RRC\_INACTIVE vivo