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

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

Source: vivo

Title: Summary of AI 6.11.2.2 on RRC\_INACTIVE

Agenda Item: 6.11.2.2

Document for: Discussion and Decision

# Introduction

This document provides a summary of the following contributions submitted to AI 6.11.2.2 on RRC\_INACTIVE:

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

# Discussion

## Handling of SRS configuration

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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~~*~~.~~ |

Rapporteur understands we already agreed to reuse the SDT TA timer mechanism for TA validation. However, the delta configuration is an optimization and we shall discuss whether to introduce it in POS WI.

Proposals for discussion:

**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.**

## Beam consolidation for posSRS

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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] | 1/ Add a new clause for pathloss derivation for posSRS transmission and CG-SDT in RRC\_INACTIVE  2/ Add descritpion for the fields in SIB2 for pathloss derivation  3/ 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 remove the field *srs-NrofSS-BlocksToAverage-r17* have been captured by the RRC rapporteur, thus we think [4] can be agreed as a baseline of corresponding MAC changes.

For the MAC spec, the main changes are as follows:

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| **Text Proposal for TS 38.321** 5.26.2 TA validation for SRS transmission in RRC\_INACTIVE RRC configures the following parameters for validation for SRS transmission in RRC\_INACTIVE:  - *inactivePosSRS-RSRP-ChangeThreshold*: RSRP threshold for the increase/decrease of RSRP for time alignment validation.  The MAC entity shall:  1> if the UE is configured with *measObject* for the Serving Cell where the UE receives configuration for SRS transmission in RRC\_INACTIVE:  2> store the RSRP of the downlink pathloss reference derived based on the *measObject* configured for the Serving Cell as in TS 38.331 [5].  The MAC entity shall consider the TA to be valid when the following conditions are fulfilled:  1> The RSRP values for the stored downlink pathloss reference and the current downlink pathloss reference are valid according to TS 38.133 [11].  1> Compared to the stored downlink pathloss reference RSRP value, the current RSRP value of the downlink pathloss reference calculated as in TS 38.331 [5] has not increased/decreased by more than *inactivePosSRS-RSRP-ChangeThreshold*, if configured.  1> *inactivePosSRS-TimeAlignmentTimer* is runnning. |

For the RRC spec, the main change is to add a new clause for pathloss derivation for posSRS transmission and CG-SDT in RRC\_INACTIVE. Rapporteur thinks it has an impact on multiple WIs and shall be further discussed.

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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\_INACTIVE  Upon 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]. |

Proposals for discussion:

**Proposal 2a: Agree on R2-2205012 as a baseline to remove the detailed pathloss derivation and beam consolidation procedure, and only add the reference to 38.133 and 38.331.**

**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.**

## Maintenance of uplink time alignment

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| Xiaomi [6] | Propoal: If inactivePosSRS-TimeAlignmentTimer is configured, UE still needs to start or restart the timeAlignmentTimer when a Timing Advance Command MAC CE is received. |

According to the TS38.321 V17.0.0, if UE receives a Timing Advance Command MAC CE, and if *inactivePosSRS-TimeAlignmentTimer* is configured and there is ongoing Positioning SRS Transmission in RRC\_INACTIVE, UE will not start or restart the *timeAlignmentTimer*.

Xiaomi thinks the procedure is not correct since UE should also start or restart the *timeAlignmentTimer* when UE receives a Timing Advance Command MAC CE and the main changes are as follows:

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| The MAC entity shall:  1> when a Timing Advance Command MAC CE is received, and if an NTA (as defined in TS 38.211 [8]) has been maintained with the indicated TAG:  2> apply the Timing Advance Command for the indicated TAG;  2> start or restart the timeAlignmentTimer associated with the indicatd TAG.  2> if *inactivePosSRS-TimeAlignmentTimer* is configured and there is ongoing Positioning SRS Transmission in RRC\_INACTIVE as in clause 5.25:  3> start or restart the *inactivePosSRS-TimeAlignmentTimer* associated with the indicated TAG.  2> if CG-SDT procedure triggered as in clause 5.27 is ongoing:  3> start or restart the cg-SDT-TimeAlignmentTimer associated with the indicated TAG. |

Rapporteur thinks this change request is right but the punctuation needs to be fixed, i.e., from ‘.’ To ‘;’.

Proposals for discussion:

**Proposal 3: Agree on R2-2205368 to update the maintenance of the uplink time alignment procedure, with revised punctuation.**

## 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 SRS configuration for positioning upon cell re-selection. As a consequence, the procedure to release the SRS 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 |

Besides, to align the MAC and RRC specs, the following change is proposed:

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| 5.7.15.2 Actions Related to SRS for Positioning at Cell Re-selection in RRC\_INACTIVE  The UE shall:  1> if cell reselection occurs when *srs-PosRRC-InactiveConfig* is configured:  2> consider the Timing Advance value for SRS for Positioning transmission to be invalid;  2> instruct MAC to stop the *srs-TimeAlignmentTimer*;  2> release the *srs-PosRRC-InactiveConfig*. |

Proposals for discussion:

**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*.**

## Stage2 procedure in SA2 and potential impact in 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 [8], 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, and suggests to LS to SA2 to remove the pre-condition [1][2]. Rapporteur understands this change requests make sense but are stage 2 impact. However, if we are going to reply to the LS, the change request can be included.

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 as follows. 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)),  ...,  } |

Proposals for discussion:

**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.**

# Conclusion

Easy agreement

**Proposal 2a: Agree on R2-2205012 as a baseline to remove the detailed pathloss derivation and beam consolidation procedure, and only add the reference to 38.133 and 38.331.**

**Proposal 3: Agree on R2-2205368 to update the maintenance of the uplink time alignment procedure, with revised punctuation.**

**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*.**

For further discussion

**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.**

**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.**

**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.**

# Reference

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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. R2-2204521 Reply LS on Positioning in RRC\_INACTIVE State