3GPP TSG-RAN WG2 #124 R2-23xxxxx

**Chicago, USA, 13th – 17th November 2023**

Agenda Item: 7.2.1

Source: Ericsson

Title: [Post123bis][410][POS] Rel-18 positioning RRC CR (Ericsson)

Document for: Discussion, Decision

# Introduction

This is to kick off the email discussion.

* [Post123bis][410][POS] Rel-18 positioning RRC CR (Ericsson)

 Scope: Review the running CR and develop an open issue list.

 Intended outcome: Draft CR and open issue list for next meeting

 Deadline: Medium (2 weeks)

# 2 Discussion

## 2.1 Sidelink CR

For Sidelink resource pool configuration ASN.1 implementation, there are two Options:

1) Reuse Legacy IE and update the field description: adding additional part into existing IEs

2) Create a new IE for SL positioning resource pool configuration

A document with both versions have been provided [here](https://www.3gpp.org/ftp/Email_Discussions/RAN2/%5BRAN2%23123bis%5D/%5BPost123bis%5D%5B410%5D%5BPOS%5D%20Rel-18%20positioning%20RRC%20CR%20%28Ericsson%29/Sidelink%20Positioning%20RRC%20Changes%20ASN1%20Option1%20Option2.docx).

Please provide your comments on which Option is preferred.

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| Company Name | Option 1 or Option 2 | Comments on preferred Option and additionally on the CR, if any: |
| ZTE | Option 2 |  |
| CATT | Option 2 |  |
| Lenovo | Option 2 | One aspect is that the dedicated SL-PRS resource pool has a separate structure to the legacy resource pool, e.g., no PSSCH and no PSFCH and therefore, it would be a cleaner design to have new IE for the dedicated resource pool. |
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## 2.2 Bandwidth Aggregation CR

Please provide your comments on the [CR](https://www.3gpp.org/ftp/Email_Discussions/RAN2/%5BRAN2%23123bis%5D/%5BPost123bis%5D%5B410%5D%5BPOS%5D%20Rel-18%20positioning%20RRC%20CR%20%28Ericsson%29/SRS%20Bandwidth%20Aggregation%20CR.docx).

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| Company Name | Comments |
| ZTE | For RRC INACTIVE, R1’s parameter list says to have an IE containing < Indicates the frequency information (e.g. point A, offset to carrier) of one or two additional carrier(s) with respective SRS configurations where the newly introduced carrier(s) and the carrier of the initial BWP should be intra-band contiguous carriers.>;And an IE containing < Provides positioning SRS configuration with SRS aggregation for UE in RRC\_INACTIVE state>.So we think these two should be saparately configured in RRCRelease, rather than quote SRS-PosResourceSetLinkedForAggBW. |
| ZTE | SRSPosIntraBandCCForAggBW-r18 ::= SEQUENCE { servCellIndexList-r18 SEQUENCE (SIZE(1.. maxNrOfLinkedSRS-PosResourceSet-r18)) OF ServCellIndex, cc-CombinationList-r18 SEQUENCE (SIZE(1.. maxNrOfLinkedSRS-PosResourceSet-r18)) OF UplinkDedicated}Does this IE necessary? SRS-PosResourceSetLinkedForAggBW already contains serving cell index  |
| ZTE | SRS-PosResourceSetLinkedForAggBW-r18 ::= SEQUENCE { srs-PosResourceSetLinked-r18 SRS-PosResourceSetId-r16,  carrier-r18 ARFCN-ValueNR, OPTIONAL, --Need M servingCellIndex-r18 ServingCellIndex OPTIONAL --Need M}This should also add UL BWP ID since SRS resource set ID is unique among a BWP. |
| Lenovo | 1. For the IE SRS-PosResourceSetLinkedForAggBW provides the SRS Positioning Resource Sets that are linked for bandwidth aggregation.

Add BWP ID in the field SRS-PosResourceSetLinkedForAggBW-r18 SRS-PosResourceSetLinkedForAggBW-r18 ::= SEQUENCE { srs-PosResourceSetLinked-r18 SRS-PosResourceSetId-r16,  carrier-r18 ARFCN-ValueNR, OPTIONAL, --Need M servingCellIndex-r18 ServingCellIndex OPTIONAL --Need M bwpid-r18 BWPID OPTIONAL --Need M}In the field description:bwpid: Indicates the SRS Positioning Resource set BWP ID that is linked for bandwidth aggregation.1. RRCReconfiguration: The new element below should be added by using a R18 NCE and not directly within RRCReconfiguration-v1700-Ies.

srs-PosResourceSetLinkedForAggBWList-r18 SetupRelease { SRS-PosResourceSetLinkedForAggBWList-r18 } OPTIONAL -- Need M1. Suffix “-r18” missing for constant maxNrOfLinkedSRS-PosResourceSet in the below IE:

SRS-PosResourceSetLinkedForAggBWList-r18 ::= SEQUENCE (SIZE(1..maxNrOfLinkedSRS-PosResourceSet)) OF SRS-PosResourceSetLinkedForAggBW-r181. IE SRS-PosResourceSetLinkedForAggBWList-r18 is defined twice: in RRCReconfiguration and RRCRelease messages.
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## 2.3 RedCaP CR

Please provide your comments on the [CR](https://www.3gpp.org/ftp/Email_Discussions/RAN2/%5BRAN2%23123bis%5D/%5BPost123bis%5D%5B410%5D%5BPOS%5D%20Rel-18%20positioning%20RRC%20CR%20%28Ericsson%29/RedCap%20CR.docx).

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| Company Name | Comments |
| Lenovo | 1. Suffix „-r18“ should be added for new constant maxNrOfHops. Furthermore, its definition in clause 6.4 is missing.

“TxHopping field descriptions” should say “"TxhoppingConfig field descriptions”. |
| Xiaomi | AgreementFor SRS Tx hopping, the configuration parameters values are:* For the hop bandwidth common to all hops
	+ Configuration re-uses C\_SRS
	+ The values of C\_SRS in legacy SRS for positioning such that the maximum bandwidth is: 104 PRBs, 48 PRBs, 132 PRBs, 64 PRBs, for 15,30,60,120 KHz respectively when B\_SRS equal 0.
* For the starting RB of the first hop in time domain:
	+ Configuration re-uses the IE freqDomainShift
	+ The range is {0,268} RBs
* For the single overlap common to all hops for the SRS resource
	+ The value can be 0,1,2,4 RBs
	+ Note: This is a new IE
* For the starting slot offset and starting symbol for the SRS resource with tx hopping (first hop in time)
	+ The value range is {0,1,2…, nrof slot in periodicity} in slots for the slot offset
		- Note: this is for the periodic [and semi-persistent] SRS
	+ Starting symbol: {0,1,2,…13} in symbol
	+ Starting slot reuses the SRS-PeriodicityAndOffset IE
	+ Starting symbol reuses the starting position *startPosition* in the IE resourceMapping
* The starting slot offset and symbol for each of the hops following the first hop in time,
	+ FFS: The value range is {0,1,2…, nrof slot in periodicity} in slots for the slot offset
		- Note: this is for the periodic [and semi-persistent] SRS
	+ Starting symbol: {0,1,2,…13} in symbol
	+ this is a new IE
* The number of consecutive symbols in a hop common to all hops
	+ Values are 1,2,4,8 and 12 symbols
	+ Configuration re-uses the IE *nrofsymbols* in *resourcemapping*
* The number of hops
	+ Values are 2,3,4,5,6
	+ This is a new IE

TxhoppingConfig-r18 ::= SEQUENCE { overlapValue-r18 INTEGER(number of PRBs), numberOfHops-r18 INTEGER(1..FFS), hopStartPositionlist-r18 SEQUNECE (1..maxNrOfHops) of HopStartPosition, txHoppingPointA-r18 ARFCN-ValueNR, ...}HopStartPosition-r18 ::= SEQUENCE { relativeStartSlotOffset-r18 CHOICE { scs15-r18 INTEGER (0..9), scs30-r18 INTEGER (0..19), scs60-r18 INTEGER (0..39), scs120-r18 INTEGER (0..79) },  startSymbolIndex-r18 INTEGER (0..13) }}We think the current running CR is not inline wth the RAN1 agreements. |
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## 2.4 CPP CR

For CPP CR, Pls provide your view:

1) No RRC Impact

2) Agree that there is RRC impact and Please provide your comments on the [CR](https://www.3gpp.org/ftp/Email_Discussions/RAN2/%5BRAN2%23123bis%5D/%5BPost123bis%5D%5B410%5D%5BPOS%5D%20Rel-18%20positioning%20RRC%20CR%20%28Ericsson%29/Carrier%20Phase%20Positioning%20CR.docx).

3) Wait for RAN1 Guidance

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| Company Name | Option 1/2/3 | Comments |
| CATT | Option 3 |  |
| Lenovo | Option 1 | We understand that RAN1 has identified the parameters of the time window to enable LMF to request the serving gNB and neighboring gNBs of a UE to measure the UL SRS resources within the indicated time window(s). Those parameters are used by the gNBs to perform the UL SRS measurement, No RRC impacts are identified from gNB to UE. |
| Xiaomi | Option 1 |  |
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## 2.5 LPHAP

Please provide your comments on the LPHAP [CR](https://www.3gpp.org/ftp/Email_Discussions/RAN2/%5BRAN2%23123bis%5D/%5BPost123bis%5D%5B410%5D%5BPOS%5D%20Rel-18%20positioning%20RRC%20CR%20%28Ericsson%29/LPHAP%20CR.docx).

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| Company Name | Comments |
| ZTE | **5.3.13.2 Initiation**The UE initiates the procedure when upper layers or AS (when responding to RAN paging, upon triggering RNA updates while the UE is in RRC\_INACTIVE, for NR sidelink communication/discovery/V2X sidelink communication as specified in clause 5.3.13.1a, upon SRS request or activation in RRC\_INACTIVE) requests the resume of a suspended RRC connection or requests the resume for initiating SDT as specified in clause 5.3.13.1b. |
| ZTE | 1> else if cell reselection occurs when *srs-PosRRC-InactiveValidityArea* is configured and if the cell is included in the *srs-PosConfigValidityArea*:2> if *autonomousTA-AdjustmentEnabled* is configured;3> autonomously adjusts the time advance value.3> autonomously adjusts the stored RSRP for TA validation. |
| ZTE | MAC spec has the procedure to store the RSRP. We think RRC spec does not need to say it again.

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| 38.321:The MAC entity shall:1> if the UE receives configuration for SRS transmission in RRC\_INACTIVE:2> store the RSRP of the downlink pathloss reference with the current RSRP value of the downlink pathloss reference as in TS 38.331 [5].Q |
| 331 running CR:1> acquire *SIB2,* if stored version is invalid;1> if *nrofSS-BlocksToAverage* or *absThreshSS-BlocksConsolidation* is not present or if a*bsThreshSS-BlocksConsolidation* is present and the highest beam measurement quantity value is below or equal to *absThreshSS-BlocksConsolidation*: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];2> store the derived RSRP; |

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| ZTE | inactivePosSRS-ValidityAreaTAT-r18 ENUMERATED {ms1280, ms1920, ms2560, ms5120, ms10240, ms20480, ms40960, infinity}this IE should be optional with need M |
| ZTE | R1’s parameter list says: pathlossReferenceRS-Pos may or may not be present. When pathloss RS is absent in the configuration, the UE determines the pathloss RS using a RS resource obtained from the SS/PBCH block of the camping cell that the UE uses to obtain MIB as the pathloss RS.Does this need to be captured in the field description in RRC? |
| CATT | This modification has not been agreed yet. Under what condition the lower layer will indicate SRS release request to RRC layer is not clear

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| Upon receiving a positioning SRS configuration for RRC\_INACTIVE release request from lower layers, the UE shall:1> release the configured *srs-PosRRC-Inactive*, if configured;1> release the configured *srs-PosRRC-InactiveValidityArea*, if configured. |

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| CATT | We wonder whether the usage of resume cause of the the RRC connection resumption should be limited to UE reselect out of the validity area. According to the modifications in the running CR, the following conditions may occur:When UE reselects out of the validity area, the UE resume the RRC connection to request SRS, even if it does not detect a positioning event.The UE keep staying in the validity area, and the configured SRS becomes invalid, it cannot request updated SRS with this resume cause.We think the trigger(s) of UE sending the new resume cause to request SRS configuration does not need to be reflected in the stage 3 procedure. Because it is not when UE reselects out of the validity area, it should request SRS with the resume cause. From our perspective, the trigger(s) of UE sending the new resume cause to request SRS configuration can be captured in stage 2 spec. And the stage 3 spec can be modified as follow.1> else if the resumption of the RRC connection is triggered due to request *srs-PosConfigValidityArea*:2> set the *resumeCause* to *srs-RequestOrActivation*; |
| CATT |

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| The following agreement for TA in the parameter list R1-2310694 from RAN1 need to be reflected in RRC spec. The possible impact on RRC spec is that RRC needs indicate that to lower layer. And the field descriptiom of *autonomousTA-AdjustmentEnabled* also need to be updated.For the determination of UL timing to transmit SRS for positioning by UEs in RRC\_INACTIVE state within the SRS positioning validity area, support the following to determine a valid TA:• The DL reference timing follows the DL timing of current camping cell.• By default, UE maintains the TA from the last serving cell.o UE can adjust its UL timing according to the change in DL reference timing.• If configured by the network, subject to UE capability, UE autonomously adjusts the TA, when cell-reselection happens. |

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| CATT | The following modifications are not needed. They are already captured in the MAC spec.

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| 1> if *nrofSS-BlocksToAverage* or *absThreshSS-BlocksConsolidation* is not present or if a*bsThreshSS-BlocksConsolidation* is present and the highest beam measurement quantity value is below or equal to *absThreshSS-BlocksConsolidation*: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];2> store the derived RSRP;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];2> store the derived RSRP. |

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| CATT | Update the remaining bit number.ResumeCause ::= ENUMERATED {emergency, highPriorityAccess, mt-Access, mo-Signalling, mo-Data, mo-VoiceCall, mo-VideoCall, mo-SMS, rna-Update, mps-PriorityAccess, mcs-PriorityAccess, srs-RequestOrActivation, spare1, spare2, spare3, spare4 } |
| Lenovo | 1. RAN2#123bis Agreement should be revised: Rely on network explicit release as a baseline for release of the SRS configuration in Rel-18. FFS if any other solution is needed. This agreement does not revert the existing agreement about ~~release of the SRS configuration~~ stopping the area-specifc TA timer when the UE reselects out of the validity area.
2. 6.2.2 SRS-PosRRC-InactiveValidityAreaConfig field descriptions

*autonomousTA-AdjustmentEnabled：*This field indicates that UE may adjust the stored RSRP autonomously after cell reselection within a validity area if configured.1. 5.3.13.2: in the condition below field srs-PosConfigValidityArea does not exist in ASN.1. The same applies in 5.3.13.6.

1> else if *srs-PosRRC-InactiveValidityArea* is configured and the resumption of the RRC connection is triggered due to cell reselection to a cell that is not included in *srs-PosConfigValidityArea*:1. 6.3.2: in IE ResumeCause suffix “-v18xy” should be added to new cause value srs-RequestOrActivation.
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| Xiaomi | 5.3.12 UE actions upon PUCCH/SRS release requestUpon receiving a positioning SRS configuration for RRC\_INACTIVE release request from lower layers, the UE shall:1> release the configured *srs-PosRRC-Inactive*, if configured;1> release the configured *srs-PosRRC-InactiveValidityArea*, if configured.We are wondering how to handle the *inactivePosSRS-ValidityAreaTAT* when releases the SRS configuration? We understand UE should stop the TAT timer if the timer is running, maybe some description is needed here. |
| Xiaomi | 1> else if *srs-PosRRC-InactiveValidityArea* is configured and the resumption of the RRC connection is triggered due to cell reselection to a cell that is not included in *srs-PosConfigValidityArea*:2> set the *resumeCause* to *srs-RequestOrActivation*;RAN 2 made following WA:WA: The resume cause introduced for the SRS configuration request can be reused for the activation indication of the pre-configuration SRS.At this stage, we are not clear whether *srs-PosRRC-InactiveValidityArea* represent preconfigured SRS as well, if yes, the above descriptioni is not inline with the WA since the UE could send activation indication of the pre-configuration SRS when UE is still in the valdity area. |
| Xiaomi | Upon request from lower layer for pathloss reference derivation for TA validation for SRS for Positioning transmission or CG-SDT in RRC\_INACTIVE, the UE shall:1> acquire *SIB2,* if stored version is invalid;1> if *nrofSS-BlocksToAverage* or *absThreshSS-BlocksConsolidation* is not present or if a*bsThreshSS-BlocksConsolidation* is present and the highest beam measurement quantity value is below or equal to *absThreshSS-BlocksConsolidation*: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];2> store the derived RSRP;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];2> store the derived RSRP.We think the above section is for Rel-17 positioning in RRC inactive and the update is not needed,For Rel-18 SRS with validity area, if *autonomousTA-AdjustmentEnabled is not configured, UE stores the RSRP derived from the last serving cell, but the above description is for UE deriving stored RSRP from the current serving cell.* |
| Xiaomi | ***srs-PosPreConfigNUL***SRS for Positioning preconfiguration valid in RRC\_INACTIVE state in Normal Uplink Carrier in a validity area.***srs-PosPreConfigSUL***SRS for Positioning preconfiguration valid in RRC\_INACTIVE state in Supplementary Uplink Carrier in a validity area.We are failed to find the corresponding ASN.1 for the above two fileds. |

## Open Questions for LPHAP

1) whether SRS configuration will be released after UE moves out of validity area or only the timer is stopped.;

1> else if cell reselection occurs when *srs-PosRRC-InactiveValidityArea* is configured and if the cell is not included in the *srs-PosConfigValidityArea*:

 2> indicate to the lower layer to stop *inactivePosSRS-ValidityAreaTAT*;

 2> release the srs-PosRRC-InactiveValidityArea.

Please provide your view on above:

1) Yes the release cause is fine

2) No the release cause is not needed

3) Other: should be discussed via contributions

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| Company Name | Yes/No/Other |  |
| ZTE | 2 or 3 | Prefer to not release the SRS configuration only due to moving out of validity area. In Rel-17 UE releases when cell-reselection, and to address the issue that UE moves out of the cell and quickly switches back, RRC has add a note to say gNB will always provide full SRS configuration in RRC\_INACTIVE. To avoid patching in Rel-18, we should allow UE keep the SRS configuration when UE moves out of area |
| CATT | 2) and 3) | If UE release SRS when the *inactivePosSRS-ValidityAreaTAT* is stopped/expired, when UE restart this timer, all the gNBs within the validity area need to know that, there may need signalling enhancement on Xn and NRPPa message. More seriously, when the UE adjust TA autonomously, whether the timer need to be restarted and how RAN know that need to be discussed.If UE release SRS when it reselect out of the validity area, when UE reselect back to the validity area, it cannot use the configured SRS, and the UE needs to request SRS again. This is against with the goal of low power of LPHAP. And if delta configuration is used, there maybe some problems, because the NW does not know the UE released the SRS configuration.In summary, both of these two release causes are not suitable for SRS configuration with validity area. From our prespective, this issue needs to be discussed in next meeting with high priority. |
| Lenovo | 3) Other | We prefer to have further discussion on the release condition of area-specifc SRS configuration for positioning since there was still controversy during online sessions.From our side, UE releases the area-specific SRS configuraion whenmoves out of the validity area or the area-specific TAT timer expires. |
| Xiaomi | 3 | We suggest futher discuss the issue based on the contributions. |
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**2)** Currently, there is an FFS on how to distinguish between preconfigured SRS validity area configuration and normal SRS configuration with validity area and further when to start/stop the timer.

2> if *srs-PosRRC-InactiveValidityArea* is configured:

3> apply the configuration and instruct MAC to start the *inactivePosSRS-ValidityAreaTAT*;

Editor’s Note: For preconfigured SRS, there is no need to start the *inactivePosSRS-ValidityAreaTAT* immediately. But for Periodic SRS the above clause would be needed. Agreement says: “Periodic SRS is supported to be configured with validity area. This agreement does not affect preconfigured SRS.” How to differentiate normal and preconfigured SRS. FFS How to start/stop the timer.

Rapporteur suggests that this should be resolved with contribution to next meeting.

## 2.6 Any other comments

Please provide any other comments below.

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| Company Name | Comments |
| CATT | Based on our second comment for LPHAP CR, we would like to discuss whether the new resume cause for requesting SRS configuration can also be used for the case when UE stay in the validity area and the SRS becomes invalid. |
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# Conclusion

In the previous sections we made the following observations:

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

# References