**3GPP TSG-RAN WG2 Meeting #123** **R2-230**

**Toulouse , France, 21st Aug– 25th Aug, 2023**

**Title: Summary of  [Post123][414][POS] Rel-18 positioning MAC CRs (Huawei)**

**Source: Huawei, HiSilicon**

**Agenda item: 8.2.1**

**Document for: Discussion and Decision**

# Discussion

## 1.1 MAC CR for sidelink positioning

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| Company+index  (e,g, HW000) | Excerpted spec with issues | Comments |
| ZTE001 | **SL-PRS transmission information on dedicated resource pool:** SL-PRS transmission information on dedicated resource pool is included in an SCI for an SL-PRS transmission on dedicated resource pool for SL-PRS, consist of  - SL-PRS identification information, including cast type indicator, source ID and destination ID;  - SL-PRS transmission other information, including SL-PRS priority, SL-PRS request, SL-PRS resource ID and resource reservation period. | Should be Source Layer-1 ID and Destination Layer-1 ID  All the Source ID and destination ID in SCI should be declared as Source Layer-1 ID and Destination Layer-1 ID in the following text  [Rapp] this is the part that is different from SL communications and SL PRS transmission. For dedicated resource pool, R1 has agreed that there is only a single stage SCI (unlike PSSCH and PSCCH transmission in sidelink communications). Hence, there is no concept of L1/L2 ID for dedicated resource pool.  Basically, the idea of introducing this term is the same as in legacy for Sidelink Transmission Information, to put the contents in the SCI that are related to RAN2 into one umbrella. |
| ZTE002 | NOTE 3A: The MAC entity selects a value for the resource reservation interval which is larger than the remaining PDB of SL data or SL-PRS Delay Budget available in the logical channel. | Should be SL-PRS remaining Delay Budget  Same comment for other places where SL-PRS delay budget should be “SL-PRS remaining delay budget  [Rapp] Thanks, corrected |
| ZTE003 | RRC configures the following parameters when the configured grant Type 1 either configured on or not on dedicated resource pool for SL-PRS transmission is configured, as specified in TS 38.331 [5] or TS 36.331 [21]: | Yellow part is not needed, since the following details should be common for SL data and SL-PRS, and the following details have declared whether it can be configured in dedicated RP  [Rapp] OK， removed.  Corrected in the draft |
| ZTE004 | 1> initialise or re-initialise the configured sidelink grant to determine PSCCH duration(s) and PSSCH duration(s) and SL-PRS transmission occasions according to *sl-TimeOffsetCG-Type1* and *sl-TimeResourceCG-Type1*, and to reoccur with *sl-periodCG* for transmissions of multiple MAC PDUs and SL-PRSs according to clause 8.1.2 of TS 38.214 [7]. | SL-PRS is missing  Also, all SL-PRS in MAC should be “SL PRS” to align terminology across specifications. (RAN1 uses SL PRS after their discussion)  [Rapp] Thanks, corrected |
| ZTE005 | 1> if multiple SL-PRS transmissions have been triggered by the upper layer or by the reception of a SCI from a peer UE:  (omitted)  1> if a single SL-PRS transmission has been triggered by the upper layer or by the reception of a SCI from a peer UE: | We should not define how the MAC determines to select grant single/multiple SL-PRS based on what kind of trigger from higher layer. MAC just determines. So suggest to change the two bullet as follows, to reuse the wording for data transmission:   1. if the MAC entity has selected to create a selected sidelink grant corresponding to transmissions of multiple SL-PRS transmissions, and the trigger of the SL-PRS transmission is available:   (omitted)  1> if the MAC entity has selected to create a selected sidelink grant corresponding to transmissions of single SL-PRS transmission, and the trigger of the SL-PRS transmission is available:  [Rapp] Is it possible that the higher layer triggers multiple PRS transmission but the MAC layer determines to perform single PRS transmission or no PRS transmission. I think there is nothing based on which the MAC layer can determine to perform which type of PRS transmission.  Also, this part of spec is not resource allocation for scheme 2, so the wording “ MAC Layer has selected to create sidelink grant” is not correct.  [ZTE] in 5.22.1.1 section, this two bullets are only for scheme 2. see the common precondition of the two bullets:  If the MAC entity has been configured with Sidelink resource allocation mode 2 or resource allocation Scheme 2 using pool(s) of resources in a carrier as indicated in TS 38.331 [5] or TS 36.331 [21] based on full sensing, or partial sensing, or random selection or any combination(s), the MAC entity shall for each Sidelink process and SL-PRS transmission:  You also said even when multiple SL-PRS transmissions have been triggered by the upper layer, it is MAC’s decision on whether to have single SL-PRS transmission or multiple SL-PRS transmissions.  So the bullet should only say when MAC determines to have single SL-PRS transmissions(or have multiple SL-PRS transmissions), then how MAC chooses the grant. We should avoid to describe what upper layers’ request looks like  [Rapp] I am asking whether it is possible, and I don’t think it is possible that the MAC layer determines one shot/periodic transmission by itself. |
| ZTE006 | NOTE 3A: The MAC entity selects a value for the resource reservation interval which is larger than the remaining PDB of SL data or SL-PRS Delay Budget available in the logical channel. | SL-PRS delay budget should not be in front of ‘available in the logical channel’  Can be changed as:  NOTE 3A: The MAC entity selects a value for the resource reservation interval which is larger than the remaining PDB of SL data available in the logical channel,or SL-PRS Delay Budget.  [Rapp] Same comment as ZTE002?  [ZTE] no. This is to say that SL-PRS delay budget has nothing to do with logical channel. So the wording should be ‘ XXX which is larger than the remaining PDB of SL data **available in the logical channel, or SL-PRS Delay Budget.**’ rather than the original wording‘which is larger than the remaining PDB of SL data **or SL-PRS Delay Budget available in the logical channel**.’ |
| ZTE007 | 3> else if the selected resource pool is dedicated resource pool for SL-PRS transmission:  4> select the number of SL-PRS retransmissions;  4> indicate the SL-PRS delay budget to the lower layer. | Suggest to delete the yellow part.  Reason: MAC should give SL-PRS delay budget to the lower layer, but not in this step (note that in current spec: the reservation period, the frequency of SL-data, etc., they should also be given to PHY for selection purpose, but these procedures are not stated/written here)  [Rapp] kind of agree with your comments. indeed, in the legacy the PDB is not explicitly indicated to PHY. Altough RAN1 agreed that the delay budget should be indicated to PHY, it is OK for me to remove this.  Corrected |
| ZTE008 | The MAC entity shall for each PSCCH duration on dedicated resource pool:  1> if the MAC entity is not configured with multiple SL-PRS transmissions with resource allocation Scheme 2; or  1> if the MAC entity is configured with resource allocation Scheme 1:  2> set the resource reservation period to 0.  1> else if the MAC entity is configured with multiple SL-PRS transmission with resource allocation Scheme 2:  2> set the resource reservation period to the selected value.  1> set the Source ID and Destination ID to the Source ID and Destination ID corresponding to the SL-PRS transmission;  1> set the cast type indicator to one of broadcast, groupcast and unicast as indicated by upper layers;  1> set the SL-PRS priority as the value indicated by upper layer;  1> set the SL-PRS resource ID according to the trigger from the UE’s own higher layer or the trigger from another UE;  1> if the higher layer triggers SL-PRS transmission to the peer UE identified by the Destination ID:  2> set the SL-PRS request to *true*.  1> instruct the lower layer to transmit SL-PRS and SCI associated to the SL-PRS transmission information on dedicated resource pool.  Editor's NOTE: Collision handling between SL and UL for SCI and SL-PRS transmission.  Editor’s NOTE: FFS the SL-PRS ID from upper layer and its impacts to MAC  Editor's NOTE: FFS SL-PRS priority provided by the peer UE that triggers the SL-PRS transmission with lower layer signaling | For yellow part, if it is scheme 2, the SL-PRS ID is choosen by MAC itself, not given by higher layer  [Rapp] But how does the MAC layer chose the ID and based on what it choses the ID?  Now I have removed the part “provided by the upper layers” and leave an FFS in the editor’s NOTE. We can discuss more in the future id needed .  Corrected in the updated draft  [ZTE] for dedicated pool scheme 2, the SL-PRS resource ID is fixed configured in the pool configuration. I.e., the slot pattern of dedicated pool is configured by gNB’s RRC to UE’s RRC.  For scheme 1, it is reasonable that MAC gets SL-PRS resource ID from RRC layer; for scheme 2, MAC gets the SL-PRS resource ID according to what PHY has selected(SA) |
| ZTE009 | 3> if *sl-InterUE-CoordinationScheme1* enabling reception/transmission of preferred resource set and non-preferred resource set is not configured by RRC:  4> if transmission based on random selection is configured by upper layers:  5> if the selected resource pool is not dedicated resource pool for SL-PRS transmission:  6> randomly select the time and frequency resources for one transmission opportunity from the resource pool which occur within the SL DRX Active time if configured as specified in clause 5.28.2 of the destination UE selected for indicating to the physical layer the SL DRX Active time above, according to the amount of selected frequency resources and the remaining PDB of SL data available in the logical channel(s) allowed on the carrier;  Editor's NOTE: FFS the resource selection on shared resource pool when both data corresponding to logical channel with PDB and SL-PRS with delay budget are transmitted; or when there is no data corresponding to logical channel and there is only SL-PRS delay budget. The same issue also applies in the following paragraphs.  5> else if the selected resource pool is dedicated resource pool for SL-PRS transmission:  6> randomly select the time and frequency resources for one transmission opportunity from the resource pool which as specified in clause 5.28.2 of the destination UE selected, according to the remaining SL-PRS delay budget of the SL-PRS transmission. | Yellow part should be deleted since SL-PRS in dedicated pool does not agreed to consider destination UE’s SL DRX.  Same comment for all the ‘which as specified in clause 5.28.2 of the destination UE selected’ wording in the following text.  [Rapp] OK to remove it for now. Not sure whether this is related to the DRX discussion. but anyway, this part of text is not functional.  corrected |
| ZTE010 | 5.22.1.2a  2> else if the selected resource pool is dedicated resource pool for SL-PRS transmission:  3> randomly select the time and frequency resource from the resources indicated by the physical layer as specified in *[ffs\_RAN1\_spec]* for either the removed resource or the dropped resource, according to the selected number of SL-PRS retransmissions and the remaining SL-PRS delay budget, and that a resource can be indicated by the time resource assignment of an SCI for a retransmission according to clause 8.3.1.1 of TS 38.212 [9]  Editor's NOTE: FFS the relation in resource selection between remaining PDB and the remaining SL-PRS delay budget on shared RP. | For re-evaluation and pre-emption, the yellow part should be added. MAC should try it best to ensure the replaced resource can be indicated by the SCI  (only copy re-evaluation here, same comment for the following text for pre-emption)  [Rapp] this has not been discussed before either by RAN1/2. But I assume we can follow SL communication as a baseline. And I think it is reasonable, if cannot be indicated by SCI, the receiving UE cannot receive it. Then there is no point to select this resource and transmit PRS in the first place.  Corrected. |
| ZTE011 | 5.22.2.x SL-PRS reception on dedicated resource pool For each SL-PRS transmission occasion, the MAC entity shall:  1> if this SL-PRS transmission is associated to unicast:  2> if the destination ID in the corresponding SCI is equal to the UE's source ID and source ID in the corresponding SCI is equal to the UE's destination ID:  3> instruct the physical layer to perform SL-PRS reception on the SL-PRS transmission occasion.  1> else if this SL-PRS transmission is associated to broadcast or groupcast:  2> if the destination ID in the corresponding SCI is equal to the UE's source ID  3> instruct the physical layer to perform SL-PRS reception on the SL-PRS transmission occasion.  Note: for unicast, if the source ID in the corresponding SCI is 12 bit, UE should compare the source ID in the corresponding SCI with the 12 LSB of the UE’s destination ID | Comment 1:  Suggest to add the yellow note.  RAN1 agreed the source ID in SCI can be 12 or 24bit. So a note should be added when 12 bit compares with 24 bit, in unicast scenario.  Comment 2:  For groupcast/broadcast, it should be ‘if the destination ID in the corresponding SCI is equal to the UE's destination ID’  [Rapp] OK to add the Editor’s NOTE proposed by ZTE. Also OK with the second comment. Corrected in the updated draft |
| ZTE012 | 5.22.1.1  1> if a single SL-PRS transmission has been triggered by the upper layer or by the reception of a SCI from a peer UE:  （omitted）  3> if one or more SL-PRS retransmissions are selected and the selected resource pool is dedicated resource pool for SL-PRS transmission:  4> if transmission based on full sensing is configured by upper layers and there are available resources left in the resources indicated by the physical layer according to clause 8.1.4 of TS 38.214 [7] for more transmission opportunities; or  4> if transmission based on random selection is configured by upper layers and there are available resources left in the resource pool for more transmission opportunities:  5> randomly select the time and frequency resources for one or more transmission opportunities from the available resources, according to the selected number of retransmissions and the remaining SL-PRS delay budget and that a retransmission resource can be indicated by the time resource assignment of a prior SCI according to clause 8.3.1.1 of TS 38.212 [9];  5> use the randomly selected resource to select a set of periodic resources spaced by the resource reservation interval for transmissions of PSCCH and SL-PRS corresponding to the number of retransmission opportunities of SL-PRS;  4> consider the first set of transmission opportunities as the initial transmission opportunities and the other set(s) of transmission opportunities as the retransmission opportunities;  4> consider the sets of initial transmission opportunities and retransmission opportunities as the selected sidelink grant. | For single SL-PRS transmission, MAC should not select period resources. The yellow part should be deleted  [Rapp] OK, removed |
| IDC01 | If the MAC entity has been configured with Sidelink resource allocation mode 1 as indicated in TS 38.331 or the MAC entity has been configured with resource allocation Scheme 1 and the PDCCH is received for the resource allocation on shared resource pool for SL-PRS transmission [5], the MAC entity shall for each PDCCH occasion and for each grant received for this PDCCH occasion:  Editor's NOTE: FFS harmonization of the wording “Sidelink resource allocation mode1/2” in legacy sidelink spec and the “resource allocation Scheme 1/2” in sidelink positioning for shared resource pool when both data and SL-PRS are transmitted. | The term “resource allocation scheme” Even the RAN1 agreement use the resource allocation scheme 1 and 2, legacy RAN1 PHY, RAN2 MAC and stage-2 describe as resource allocation mode 1 and 2. In Physical spec 38.214 section 8)  *A UE can be configured by higher layers with one or more sidelink resource pools. A sidelink resource pool can be for transmission of PSSCH, as described in Clause 8.1, or for reception of PSSCH, as described in Clause 8.3 and can be associated with either sidelink resource allocation mode 1 or sidelink resource allocation mode 2.*  According to 38.300 section 5.7.2 *5.7.2 Sidelink resource allocation modes* *Two sidelink resource allocation modes are supported: mode 1 and mode 2. In mode 1, the sidelink resource allocation is provided by the network. In mode 2, UE decides the SL transmission resources in the resource pool(s).*  ………..  According to the description in stage 2, in a high-level view, resource allocation schemes 1/2 are same as the resource allocation modes 1/2. Do you consider that resource allocation schemes 1/2 and resource allocation modes 1/2 are totally different due to the different DCI/SCI formats using for SL positioning? Could you explain the difference?  I think it would be better to align the same (e.g., resource allocation mode 1 and 2) terms in the current PHY/MAC/stage-2 spec, if possible.  [Rapp] Thanks for the question, and we also would like to ask this question. That’s why we left it as FFS.  Maybe we should discuss on this issue, including the other FFSs listed as editor’s NOTE in the email discussion. Further clarifications can be made during the next meeting. |
| IDC02 | NOTE 3A: The MAC entity selects a value for the resource reservation interval which is larger than the remaining PDB of SL data available in the logical channel or remaining SL-PRS Delay Budget. | Just a question for my clarification.  How to determine the delay budget of the SL-PRS? It can be derived from sidelink positioning/ranging QoS? or other parameters? Could you clarify this?  [Rapp] This is also for further discussion and I have already added an Editor’s NOTE to it.  NOTE 3C: How the MAC entity determines the remaining PDB of SL data is left to UE implementation.  Editor's NOTE: how the MAC entity determines the SL-PRS delay budget.  My initial thinking is that it is also obtained from LCS QoS, similar for PDB that it is obtained from the PQI. |
| IDC03 | Editor's NOTE: FFS the details of number of SL-PRS retransmissions selection based on CBR and L1 priority, including the exact RRC fields, etc | If we mention L1 priority, is there any issue to misunderstand between legacy L1 priority for SL data and a new priority for SL-PRS. My point is that there are two kinds of L1 priorities in the SCI one is for SL data and the other is for SL-PRS.  How about to change SL-PRS priority instead of L1 priority?  [Rapp] It seems OK to change it for dedicated resource pool to SL-PRS priority. But for shared resource pool, there is a single priority as the following RAN1 agreement has indicated.  Agreement  For a slot, a single priority value is provided by higher layers to the physical layer and is used at least to determine the PSSCH and/or SL-PRS transmission power via the value of .   * For dedicated resource pool, this corresponds to the priority level of SL PRS. * Send an LS to RAN2 requesting them to take the above into consideration when defining priority levels for SL PRS and PSSCH that are multiplexed in the same slot of a shared resource pool.   So there will be single priority for PSSCH and SL-PRS when they are transmitted together. And to be backward compatible for shared resource pool, it is better to be called “L1 priority” |

## 1.2 MAC CR for LPHAP

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| Company+index  (e,g, HW000) | Excerpted spec with issues | Comments |
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# 2 Summary

NADA

# Annex

## Discussion during R2#123 for MAC CR for LPHAP

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| Company+index  (e,g, HW000) | Excerpted spec with issues | Comments |
| ERIC000 | The MAC entity shall not perform any uplink transmission except the Random Access Preamble and MSGA transmission when the *cg-SDT-TimeAlignmentTimer* is not running during the ongoing CG-SDT procedure as triggered in clause 5.27 and the *inactivePosSRS-TimeAlignmentTimer* or *srs-ValidityAreaTimeAlignmentTimer* is not running | These two timers are not running at the same time, so here should be "and" "are" instead of "or" "is"  [Rapp] Corrected |
| ERIC001 | 2> if there is ongoing Positioning SRS Transmission in RRC\_INACTIVE as in clause 5.26:  3> if SRS positioning validity area is configured:  4> start or restart the *srs-ValidityAreaTimeAlignmentTimer* associated with the indicated TAG.  3> else:  4> start or restart the *inactivePosSRS-TimeAlignmentTimer* associated with the indicated TAG.  2> if CG-SDT procedure is ongoing: | 3> if SRS positioning validity area is configured And UE is in validityArea as determined by upper layers:  We may need above??  [Rapp] agree the previous text is a bit ambiguous. The followig has been chagned  2> if there is ongoing Positioning SRS Transmission in RRC\_INACTIVE as in clause 5.26:  3> if *srs-ValidityAreaTimeAlignmentTimer* is configured:  4> start or restart the *srs-ValidityAreaTimeAlignmentTimer* associated with the indicated TAG.  3> else:  4> start or restart the *inactivePosSRS-TimeAlignmentTimer* associated with the indicated TAG. |
| ZTE001 | 1> when the indication is received from upper layer for stopping the *inactivePosSRS-TimeAlignmentTimer or srs-ValidityArea-TimerAlignmentTimer*:  2> stop the *inactivePosSRS-TimeAlignmentTimer or srs-ValidityArea-TimerAlignmentTimer*.  1> when the indication is received from upper layer for starting the *inactivePosSRS-TimeAlignmentTimer*:  2> start or restart the *inactivePosSRS-TimeAlignmentTimer*.  1> when instruction from the upper layer has been received for starting the *cg-SDT-TimeAlignmentTimer*:  2> start the *cg-SDT-TimeAlignmentTimer*. | Should add   1. when the indication is received from upper layer for starting the *inactivePosSRS-TimeAlignmentTimer or srs-ValidityArea-TimerAlignmentTimer*   2> start or restart the *inactivePosSRS-TimeAlignmentTimer* *or srs-ValidityArea-TimerAlignmentTimer*  [Rapp] Not clear which agreement supports this one. Currently we have only agreed to start the TAT when TA command is received. |
| ZTE | 2> if there is ongoing Positioning SRS Transmission in RRC\_INACTIVE as in clause 5.26:  3> if SRS positioning validity area is configured:  4> start or restart the *srs-ValidityAreaTimeAlignmentTimer* associated with the indicated TAG.  3> else:  4> start or restart the *inactivePosSRS-TimeAlignmentTimer* associated with the indicated TAG. | We should first agree with Rel-17 timer and Rel-18 timer cannot work together first  [Rapp] Did anyone propose to use them at the same time? |
| Lenovo000 | 2> if there is ongoing Positioning SRS Transmission in RRC\_INACTIVE as in clause 5.26:  3> if SRS positioning validity area is configured(excluding pre-configured SRS):  4> start or restart the *srs-ValidityAreaTimeAlignmentTimer* associated with the indicated TAG.  3> else:  4> start or restart the *inactivePosSRS-TimeAlignmentTimer* associated with the indicated TAG. | As the agreement made this meeting:  The following criterion needs to be defined for the start/re-start of the area-specific TA timer:  **Reception of RRCRelease message containing the SRS configuration (excluding pre-configured SRS).**  The SRS pre-configuration cannot be regarded as the start/restart conditions as the agreements, which should be captured in spec.  [Rapp] This is the agreement during this meeting and will be captured during the post meeting email discussion. |

## Discussion during R2#123 for MAC CR for sidelink positioning

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| Company+index  (e,g, HW000) | Excerpted spec with issues | Comments |
| vivo01 | Change 0  If the MAC entity has been configured with Sidelink resource allocation mode 1 as indicated in TS 38.331 or the MAC entity has been configured with resource allocation Scheme 2 and the PDCCH is received for the resource allocation on shared resource pool for SL-PRS transmission [5], | resource allocation Scheme 2 -> resource allocation mode 1  {Rapp} corrected to resource allocation scheme 1 |
| vivo02 | Editor's NOTE: FFS retransmission of PRS on shared and dedicated resource pool. | retransmission -> repetition?  **Conclusion**  Do not support ACK/NACK feedback for SL-PRS or lower-layer feedback-based retransmissions in Release 18.  [Rapp] Should be retransmission. |
| vivo03 | Editor's NOTE: FFS SL-PRS transmission on shared resource pool when the MAC PDU has been positively acked. | The intention of this FFS is not clear.  [Rapp] The intention is that if on shared RP, SL-PRS and data area transmitted together and data is acked with PSFCH, what should be done to SL-PRS |
| vivo04 | Editor's NOTE: FFS relation with HARQ for SL-PRS transmission on shared resource pool | See vivo02 |
| vivo05 | For each SL-PRS occasion, the MAC entity shall:  1> for each SCI valid for this SL-PRS occasion:  2> instruct the physical layer to perform SL-PRS reception on the SL-PRS occasion.  1> if this SL-PRS transmission is associated to unicast:  2> if the destination ID in the corresponding SCI is equal to the UE's source ID and source ID in the corresponding SCI is equal to the UE's destination ID:  3> instruct the physical layer to perform SL-PRS reception on the SL-PRS transmission occasion.  1> else if this SL-PRS transmission is associated to broadcast or groupcast:  2> if the destination ID in the corresponding SCI is equal to the UE's source ID  3> instruct the physical layer to perform SL-PRS reception on the SL-PRS transmission occasion. | Seems duplicated instruction to perform SL-PRS reception.  [Rapp] One is for unicast, another is for broadcast and groupcast. |
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