**3GPP TSG-RAN WG2 Meeting #119 electronic R2-220xxxx**

**Online, August, 2022**

**Source: vivo**

**Title:** **Summary of [AT119-e][504][V2X/SL] 38.321 corrections (vivo)**

**Agenda Item:** **5.2.3**

**Document for:** **Discussion and Decision**

# Introduction

This contribution summarizes the Phase-1 discussion of the following offline discussion:

* [AT119-e][504][V2X/SL] 38.321 corrections (vivo)

**Scope:** Discuss proposed corrections in R2-2207659, R2-2207661, R2-2207663/R2-2207664/R2-2207666, R2-2208047, and the agreement made from R2-2208352 (including need of corrections and detailed wording).

**Intended outcome:** 38.321 CR on SL-BSR format in R2-2208840/R2-2208841, 38.321 CR on other corrections in R2-2208842/R2-2208843, and discussion summary in R2-2208844 (if needed). Email approval.

**Deadline**: 8/23 13:00 (UTC)

# Discussion on SL MAC CE handling ([1][2])

**Necessity of Change**

As per [1], the reason for change is cited as follows:

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| ***Reason for change:*** | SL CSI reporting MAC CE carries the information used by L1. Thus, when the MAC entity receives the SL CSI reporting MAC CE, the information included should be indicated to the lower layer. However, in the current MAC Spec, the handling of the SL CSI reporting MAC CE upon reception by the MAC entity is missing.  In Rel-15, there were similar discussions on whether to specifiy how the MAC entity handles the received DL MAC CEs that were introduced by RAN1 to carry MIMO related information used in L1 (e.g. SP CSI-RS/CSI-IM Resource Set Activation/Deactivation MAC CE, Aperiodic CSI Trigger State Subselection MAC CE, etc.). The final decision was to specify the UE behaviour for the handling of these DL MAC CE carrying L1 information, when they are received by the MAC entity, as currently specified in subclause 5.18. Hence, similar to those DL MAC CEs carrying L1 information related to MIMO, how the MAC entity handles the SL CSI reporting MAC CE received in sidelink also needs to be specified in the MAC Spec. |

And as per [2] (mirror of [1]), Inter-UE Coordination Information MAC CE and Inter-UE Coordination Request MAC CE introduced in Rel-17 are facing the same situation.

The key point here is that the handling of a received SL MAC CE faces the same situation as the reception of a DL MAC CE carrying L1 information (e.g. those for MIMO). With Rel-15 having decided to specify UE behaviors on how to handle these DL MAC CEs, same principle should be applied to those SL MAC CEs carrying L1 info as well.

**Question 1-1:**  Do you agree that it is necessary to specify the UE behavior on how to handle the received SL MAC CE for SL CSI Reporting MAC CE (R16&R17), for Inter-UE Coordination Information MAC CE (R17) and for Inter-UE Coordination Request MAC CE (R17)?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments if any** |
| OPPO | No | Seems not necessary since it is UE internal behavior |
| xiaomi | No | We think this is some kind of inter UE action between PHY and MAC. Can be left to UE implementation. No specification change is needed. |
| vivo | Yes | Proponent. But fine to follow the majority’s view. |
| Lenovo | No | Can be left to UE implementation |
| Apple | No | It is fine to just left to UE implementation. Nothing is really broken. |
| NEC | Yes | It would be good to make the spec clearer and easy to read/understand. |
| Qualcomm | No | Share the view expressed by Apple and Lenovo |
| CATT | Yes | The same principle should be followed. |
| LG | No | Agree with OPPO |

**Views on the CRs**

**Question 1-2:**  If “Yes” is selected for Q1-1, can the changes proposed in [1] and [2] be agreed?

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| **Company** | **Use a “√” to select one of the below** | | | **Suggested changes**  **(if you think the CRs need revising or are not agreeable)** |
| **Agreeable w/o revision** | **Agreeable with revision** | **Not agreeable** |
| NEC | **√** |  |  |  |
| CATT | **√√** |  |  |  |
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# Discussion on *sl-HARQ-FeedbackEnabled* ([3][4])

**Necessity of Change**

As per [3][4], the reason for change is cited as follows:

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| ***Reason for change:*** | In subclause 5.22.1.4.1.2, the condition on the SL LCP restriction for sl-HARQ-FeedbackEnabled is now specified as a sub-level condition under the umbrella of the SL LCP restriction for SL CG sl-AllowedCG-List. This means that the condition on the SL LCP restriction for sl-HARQ-FeedbackEnabled only takes effect in SL CG case, and depends on whether the condition on the SL LCP restriction for sl-AllowedCG-List is satisfied or not.  However, this is obviously not the case, as the SL LCP restriction for sl-HARQ-FeedbackEnabled is not subject to the SL CG case, but applies to dynamic SL grant as well. That is to say, the current condition on the SL-LCP restriction for sl-HARQ-FeedbackEnabled is specified at a wrong level, and should have been specified at the same level as all the other SL LCP restrictions (i.e. at the level “2>”). |

The key point here is that the condition on SL LCP restriction *sl-HARQ-FeedbackEnabled* is now specified at a wrong level, as if it is a sub-level condition depending on the SL LCP restriction *sl-AllowedCG-List.*

**Question 2-1:**  Do you agree that the condition of SL LCP restriction *sl-HARQ-FeedbackEnabled* is now specified at a wrong level and thus needs to be corrected?

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| **Company** | **Yes/No** | **Comments if any** |
| OPPO | Yes |  |
| xiaomi | No | Based on our understanding, when all the level 2 condition is satisfied, UE will check the HARQ condition. It does not mean the HARQ condition only applies to CG, e.g., if CG is not configured and the other two level 2 conditions are all fulfilled, UE will also check this HARQ condition. Please note we use “and” and there is “if configured” in the last two level 2 conditions.    Also, if the HARQ condition removes as proposed, the “else” is confused as there are many parallel level 2 conditions and it is not clear which condition does “else” refer to, e.g., based on the proposed change, even if SL data is not available for a LCH, UE will enter the else brunch and *sl-HARQ-FeedbackEnabled* is set to disabled, which is not correct. |
| vivo | Yes | Even if the situation is as what Xiaomi explained above, it is still desirable to change the level of the conditions of the *sl-HARQ-FeedbackEnabled* to the right level, as it is obvious that those conditions should be at the same level as other LCP restrictions (level “2>”), but are now put at a wrong level (even if just literally speaking). |
| Lenovo | No | Firstly, our understanding is that current text is not broken consider the operation is per-SL grant:   1. If the SL grant is for non-CG: then *sl-AllowedCG-List* condition will not be fulfilled 2. If the SL grant is for CG: then CG conditions may be fulfilled   So if the SL grant is for DG, the feedback setting procedure can be entered.  On the other hand, for the level of the condition, we are fine to have at the same level as other restrictions (level 2) as other restrictions. |
| Apple | Yes | Agree with OPPO and vivo |
| NEC | Yes |  |
| Qualcomm | No | We share views expressed above (we do not see the current spec is broken). |
| CATT | Yes | The current level for SL LCP restriction sl-HARQ-FeedbackEnabled should be promoted. |
| LG | No | Because there is “if configured” in 2nd if level, current text covers DG case. |

**Views on the CRs**

**Question 2-2:**  If “Yes” is selected for Q2-1, can the changes proposed in [3] and [4] be agreed?

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| **Company** | **Use a “√” to select one of the below** | | | **Suggested changes**  **(if you think the CRs need revising or are not agreeable)** |
| **Agreeable w/o revision** | **Agreeable with revision** | **Not agreeable** |
| OPPO | **√** |  |  |  |
| Apple | Yes |  |  |  |
| NEC | **√** |  |  |  |
| CATT | **√** |  |  |  |
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# Discussion on SL-BSR format ([5]-[9])

**Necessity of Change**

As per the observations listed in [5], the problem is identified by Observation 3 cited as follows:

**Observation 3 If the number of Buffer Size fields that is reported in a SL-BSR or a Truncated SL-BSR is zero, only one Octet is needed, which cannot be covered by the format currently specified in Figure 6.1.3.33-1 for Oct 2N.**

In summary, it means that “*the NOTE in subclause 6.1.3.33 is incompatible with the current SL-BSR/Truncated SL-BSR formats specified in Figure 6.1.3.33-1*” (see below).

|  |
| --- |
| 6.1.3.33 Sidelink Buffer Status Report MAC CEs  Sidelink Buffer Status Report (SL-BSR) MAC CEs consist of either:  - SL-BSR format (variable size); or  - Truncated SL-BSR format (variable size).  SL-BSR and Truncated SL-BSR MAC control elements consist of one Destination Index field, one LCG ID field and one corresponding Buffer Size field per reported target group.  The SL-BSR formats are identified by MAC subheaders with LCIDs as specified in in Table 6.2.1-2.  The fields in the SL-BSR MAC CE are defined as follows:  - Destination Index: The Destination Index field identifies the destination. The length of this field is 5 bits. The value is set to one index corresponding to *SL-DestinationIdentity* associated to same destination reported in *SL-TxResourceReqList*. The value is indexed sequentially from 0 in the same ascending order of *SL-DestinationIdentity* in *SL-TxResourceReqList* as specified in TS 38.331 [5];  - LCG ID: The Logical Channel Group ID field identifies the group of logical channel(s) whose SL buffer status is being reported. The length of the field is 3 bits;  - Buffer Size: The Buffer Size field identifies the total amount of data available according to the data volume calculation procedure in TSs 38.322 [3] and 38.323 [4] across all logical channels of a logical channel group of a destination after the MAC PDU has been built (i.e. after the logical channel prioritization procedure, which may result the value of the Buffer Size field to zero). The amount of data is indicated in number of bytes. The size of the RLC headers and MAC subheaders are not considered in the buffer size computation. The length of this field is 8 bits. The values for the Buffer Size field are shown in Table 6.1.3.1-2, respectively. For the Truncated SL-BSR format the number of Buffer Size fields included is maximised, while not exceeding the number of padding bits.  Buffer Sizes of LCGs are included in decreasing order of the highest priority of the sidelink logical channel having data avaialble for transmission in each of the LCGs irrespective of the value of the Destination Index field.  NOTE: The number of the Buffer Size fields in the SL-BSR and Truncated SL-BSR format can be zero.    **Figure 6.1.3.33-1: SL-BSR and Truncated SL-BSR MAC control element** |

**Question 3-1:**  Do you agree that the NOTE in 6.1.3.33 is incompatible with the current SL-BSR/Truncated SL-BSR formats specified in Figure 6.1.3.33-1 (i.e. current specified formats cannot support a reported SL-BSR/Truncated SL-BSR w/o any BS field)?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments if any** |
| OPPO | Yes |  |
| xiaomi | See comments | Not sure if there is anything really broken but are fine to follow the majority. |
| vivo | Yes | Proponent. Just to clarify more: the SL-BSR/Truncated SL-BSR format now included in current Figure 6.1.3.33-1 only supports even number of bits (i.e. 2N), and the can only “*consist of one Destination Index field, one LCG ID field and one corresponding Buffer Size field* ***per reported target group***” (see **paragraph 2** in the above citation).  So once a UE reports a SL-BSR/Truncated BSR, it can neither report a one-byte SL-BSR/Truncated BSR, nor a SL-BSR/Truncated BSR that includes only DST Index and LCG ID w/o BS field. This is contradictory to the above NOTE, which however says a SL-BSR/Truncated SL-BST w/o BS field is allowed. So a change is necessary to eliminate such contradiction (no matter Opt 1 or 2). |
| Lenovo | Yes |  |
| Apple | Yes |  |
| NEC | Yes |  |
| Qualcomm | See comment | Share the view expressed by Xiaomi |
| CATT | Yes |  |
| LG | Yes |  |

**Views on the CRs**

Two options are provided in [5], respectively corresponding to CRs in [6][7] (Opt.1) and CRs in [8][9] (Opt.2).

Option 1 keeps the NOTE and adds a new SL-BSR/Truncated SL-BSR format, with the purpose to adapt the SL-BSR/Truncated SL-BSR formats to the NOTE. Option 2 removes the NOTE, with the purpose to adapt the description texts to the current SL-BSR/Truncated SL-BSR formats.

**Question 3-2:**  If “Yes” is selected for Q3-1, which option do you prefer to fix the issue in Q3-1?

* **Option 1**: Keep the NOTE and add a new SL-BSR/Truncated SL-BSR format, with only one byte including a pair of {DST Index, LCG ID}.
* **Option 2**: Remove the NOTE and keep the current SL-BSR/Truncated SL-BSR format in Figure 6.1.3.33-1.

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| **Company** | **Option Selection** | **Comments, if you prefer other options** |
| OPPO | Option 2 |  |
| xiaomi | Option 2 | If companies would like to have some change, we slightly prefer option 2. |
| Lenovo | Option 2 |  |
| Apple | Option 2 |  |
| NEC | Option 2 |  |
| Qualcomm | Option 2 | Agree with Xiaomi |
| CATT | Option2 |  |
| LG | Option 2 |  |

Depending on the option one prefers, the following questions are to check whether the related CRs are agreeable or not.

**Question 3-3:**  If “Option 1” is selected for Q3-2, can the changes proposed in [6] and [7] be agreed?

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| **Company** | **Use a “√” to select one of the below** | | | **Suggested changes**  **(if you think the CRs need revising or are not agreeable)** |
| **Agreeable w/o revision** | **Agreeable with revision** | **Not agreeable** |
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**Question 3-4:**  If “Option 2” is selected for Q3-2, can the changes proposed in [8] and [9] be agreed?

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| **Company** | **Use a “√” to select one of the below** | | | **Suggested changes**  **(if you think the CRs need revising or are not agreeable)** |
| **Agreeable w/o revision** | **Agreeable with revision** | **Not agreeable** |
| OPPO | **√** |  |  |  |
| xiaomi |  | **√** |  | One case is missing in the inter-operability analysis, i.e., one UE implements this CR while the other UE not. |
| Lenovo |  | **√** |  | Xiaomi has a point |
| Apple |  | **√** |  |  |
| NEC |  | **√** |  |  |
| CATT | **√** |  |  |  |

# Discussion on multiple TX pool handling ([10][11])

**Necessity of Change**

As per [10][11], the reason for change is cited as follows:

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| ***Reason for change:*** | RAN1 has sent RAN2 a LS of R2-2002507, where the constraint when a UE operations in multiple resource pools simultaneously is as follows:   |  | | --- | | • **Question 3**: Whether an NR V2X mode 2 UE can select multiple resource pools on single carrier from RAN1 perspective?  - **Answer**: An operation of the sensing, resource (re-)selection, and related procedures occurs in a single resource pool for transmission. A UE can be (pre-)configured with multiple resource pools in SL BWP on a carrier. The UE may perform the operations in multiple resource pools simultaneously, but can only transmit one PSCCH/PSSCH in one of them in a SL slot. On the other hand, a UE should be able to receive in multiple resource pools in SL BWP on a single carrier. |   However, this constraint has not yet been captured in spec. Considering this constraint is important from the perspective of UE development as well as operation, it should be captured in MAC spec. |

The key point here is whether there is a need to clarify how the UE transmits on the Physical channels PSCCH/PSSCH in the MAC Spec when multiple mode-2 TX pools are configured.

**Question 4-1:**  Do you think a clarification is needed in the MAC Spec on how the UE transmits on PSCCH/PSSCH when it is configured with multiple mode-2 TX pools?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments if any** |
| OPPO | No with comments | We agree that there is a restriction that UE cannot perform simultaneously transmission in the same slot, but the simultaneously transmission in the same slot issue has been discussed in RAN1 before, and whether/how to capture this restriction in specification is concluded as no-conclusion. So we understand we should not re-open the discussion at this stage, and rely on UE implementation. |
| xiaomi | No | Seems should be captured in RAN1 spec since PHY finally decides the “transmission”. |
| vivo |  | We can follow the majority’s view. |
| Lenovo | No | Agree with OPPO and Xiaomi |
| Apple | No | This needs to be added in PHY spec. |
| NEC |  | No strong view, can follow majority view. |
| Qualcomm | No |  |
| CATT | Yes | The question is NR V2X mode 2 UE can select multiple resource pools on single carrier. This is related to the procedure of resource allocation ,it captures in R2 spec.  But with R1’s reply, they added one additional condition which is not in R2 scope (but can only transmit one PSCCH/PSSCH in one of them in a SL slot).  In general, we can accept to capture this change. |
| LG | No | Agree with OPPO |

**Views on the CRs**

**Question 4-2:**  If “Yes” is selected for Q4-1, can the changes proposed in [10] and [11] be agreed?

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| **Company** | **Use a “√” to select one of the below** | | | **Suggested changes**  **(if you think the CRs need revising or are not agreeable)** |
| **Agreeable w/o revision** | **Agreeable with revision** | **Not agreeable** |
| CATT | **√** |  |  |  |
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# Discussion on the Spec impact due to UL skipping

This subclause is to deal with the left-over issue on the below agreement reached on Monday session:

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| R2-2208352 Discussion on UL skipping and SL BSR ASUSTeK discussion Rel-16 38.321 5G\_V2X\_NRSL-Core  Proposal 1A: RAN2 confirm UL skipping can be supported with sidelink UE.  Proposal 1B: RAN2 conclude that UL skipping is not allowed to be enabled in sidelink UE and capture the conclusion in meeting minutes.  [Vivo, LG, OPPO, MediaTek, Qualcomm]: UL skipping is a kind of optimization. It is not applied to SL. [Qualcomm]: No need of any correction.   * UL skipping is not applied to SL |

Specifically, the discussion is about whether any Spec impact is needed to support above agreement. It is observed from current TS 38.321 that whether UL TX skipping is enabled or not is controlled by the indicators *enhancedSkipUplinkTxDynamic* and *enhancedSkipUplinkTxConfigured* (see below citation). So strictly speaking, if there is an intention to disable this feature thoroughly for a UE with mode-1, it should be clairified in the field descriptions of the above indicators that mode-1 UE cannot be configured with them. However, somebody may be also thinking of leaving this to NW implementation, and some instructions/common understanding written down in the meeting minutes already suffice.

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| --- |
| 1. if the MAC entity is configured with *enhancedSkipUplinkTxDynamic* with value *true* and the grant indicated to the HARQ entity was addressed to a C-RNTI, or if the MAC entity is configured with *enhancedSkipUplinkTxConfigured* with value *true* and the grant indicated to the HARQ entity is a configured uplink grant:   2> if there is no UCI to be multiplexed on this PUSCH transmission as specified in TS 38.213 [6]; and  2> if there is no aperiodic CSI requested for this PUSCH transmission as specified in TS 38.212 [9]; and  2> if the MAC PDU includes zero MAC SDUs; and  2> if the MAC PDU includes only the periodic BSR and there is no data available for any LCG, or the MAC PDU includes only the padding BSR:  3> not generate a MAC PDU for the HARQ entity. |

**Question 5-1:**  Do you think any Spec impact is needed to support the agreement “=> UL skipping is not applied to SL” reached on Monday?

* **Option 1**: Clarify in the field description of *enhancedSkipUplinkTxDynamic* and *enhancedSkipUplinkTxConfigured* that they will not be set as “true” for a UE configured with Mode-1.
* **Option 2**: No need of any Spec impact. Current agreement in the meeting minutes is enough.
* Others. Please clarify the details.

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| **Company** | **Option Selection** | **Comments, if you prefer other options** |
| OPPO | Option 2 | This is already discussed in online session. |
| Xiaomi | Option 1 | Some clarification is needed. |
| Vivo | Option 1 | We’ve slightly preference on Option 1, but can follow majority’s view. |
| Lenovo | Option 1 | Some clarification is needed. |
| Apple | See comment | WE think this can be clarified with a NOTE. |
| NEC | Option 2 |  |
| Qualcomm | Option 2 | We see no compelling reason to change the online session agreement |
| CATT | Option 2 | Same view as QC |
| LG | Option 2 | This is already discussed in online session. |

# Conclusions

# References

1. R2-2207659 CR on SL MAC CE handling vivo CR Rel-16 38.321 16.9.0 1328 - F 5G\_V2X\_NRSL-Core
2. R2-2207660 CR on SL MAC CE handling vivo CR Rel-17 38.321 17.1.0 1329 - A 5G\_V2X\_NRSL-Core
3. R2-2207661 Correction on SL LCP restriction for sl-HARQ-FeedbackEnabled vivo CR Rel-16 38.321 16.9.0 1330 - F 5G\_V2X\_NRSL-Core
4. R2-2207662 Correction on SL LCP restriction for sl-HARQ-FeedbackEnabled vivo CR Rel-17 38.321 17.1.0 1331 - A 5G\_V2X\_NRSL-Core
5. R2-2207663 Discussion on the Buffer Size field in the Sidelink BSR formats vivo discussion
6. R2-2207664 Clarification on the Buffer Size field in the Sidelink BSR formats (Option 1) vivo CR Rel-16 38.321 16.9.0 1332 - F 5G\_V2X\_NRSL-Core
7. R2-2207665 Clarification on the Buffer Size field in the Sidelink BSR formats (Option 1) vivo CR Rel-17 38.321 17.1.0 1333 - A 5G\_V2X\_NRSL-Core
8. R2-2207666 Clarification on the Buffer Size field in the Sidelink BSR formats (Option 2) vivo CR Rel-16 38.321 16.9.0 1334 - F 5G\_V2X\_NRSL-Core
9. R2-2207667 Clarification on the Buffer Size field in the Sidelink BSR formats (Option 2) vivo CR Rel-17 38.321 17.1.0 1335 - A 5G\_V2X\_NRSL-Core
10. R2-2208047 Clarification on UE handling when performing operations on multiple RPs Huawei, HiSilicon CR Rel-16 38.321 16.9.0 1364 - F 5G\_V2X\_NRSL-Core
11. R2-2208048 Clarification on UE handling when performing operations on multiple RPs Huawei, HiSilicon CR Rel-17 38.321 17.1.0 1365 - A 5G\_V2X\_NRSL-Core