3GPP TSG-RAN WG2 #112-e R2-200xxxx

**Electronics, 26 October – 13 November, 2021**

**Agenda item: 6.4.3**

**Source: LG Electronics Inc. (Rapporteur)**

**Title: [POST111-e][707][V2X] CR update to new RAN1 decisions**

**Document for: Discussion and decision**

# Introduction

In this document, we trigger Phase 1 discussion of the following email discussion:

* [POST111-e][707][V2X] CR update to new RAN1 decisions (LG)

Discuss necessary changes to new RAN1 decisions and prepare agreeable MAC CR. Also can include unresolved issues from the discussion [AT111-e][705][V2X] and [AT111-e][706][V2X].

Intended outcome: Report

Deadline: Long

**Deadline of Phase 1 discussion: October 8, 2020, 23:59 UTC**

Note that the recent RAN1 agreements impacting on MAC specification are numbered by Rapporteur for RAN2 discussion.

# New RAN1 agreements impacting on MAC specification

##### Agreement #1:

* *For CG, when the maximum number of HARQ retransmissions for a TB is reached, the UE reports ACK/NACK based on the contents of PSFCH (i.e., the same behaviour as if the maximum number of retransmissions had not been reached).*
  + *No RAN1 spec impact is expected.*

The agreement #1 is related to clause 5.22.1.3.2 of TS38.321 as shown below. Rapporteur thinks that the agreement #1 is only applied to transmission of a MAC PDU for which HARQ feedback is enabled due to ‘based on the contents of PSFCH’. No change to 38.321 is required for transmission of a MAC PDU for which HARQ feedback is disabled.

|  |
| --- |
| 5.22.1.3.2 PSFCH reception …  1> else if a MAC PDU has been obtained for a sidelink grant associated to the PUCCH transmission occasion in clause 5.22.1.3.1, the MAC entity shall:  2> if the most recent transmission of the MAC PDU was not prioritized as specified in clause 5.22.1.3.1a:  3> instruct the physical layer to signal a negative acknowledgement on the PUCCH according to clause 16.5 of TS 38.213 [6].  2> else if HARQ feedback has been disabled for the MAC PDU and next retransmission(s) of the MAC PDU is not required:  3> instruct the physical layer to signal a positive acknowledgement corresponding to the transmission on the PUCCH according to clause 16.5 of TS 38.213 [6].  2> else if HARQ feedback has been disabled for the MAC PDU and no sidelink grant is available for next retransmission(s) of the MAC PDU, if any:  3> instruct the physical layer to signal a negative acknowledgement corresponding to the transmission on the PUCCH according to clause 16.5 of TS 38.213 [6]  2> else:  3> instruct the physical layer to signal an acknowledgement corresponding to the transmission on the PUCCH according to clause 16.5 of TS 38.213 [6].  1> else:  2> instruct the physical layer to signal a positive acknowledgement on the PUCCH according to clause 16.5 of TS 38.213 [6]. |

Rapporteur thinks that if HARQ feedback is enabled, UE shall go to the green step. Thus, no change is required to reflect the agreement #1.

**Proposal 1: No change to 38.321 is required to reflect the agreement #1:**

Question 1A: Do you agree with Proposal 1?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| OPPO | No | We agree the part here does not need to be changed, but change is needed on other places as clarified in Q-1B below. |
| HW | Yes | Agree with rapporteur |
| CATT | Yes | Agree with rapporteur.  We also fine with OPPO’s following proposal. But we think it can be discussed in a separate proposal. |
| Intel | Yes | We are ok with the proposal |
| Ericsson | Yes with comment | We are fine with the principle, but we also agree with OPPO that clarification in other places may need to be done in the spec. We can check the actual changes in the phase 2 regarding the CRs.  Regarding OPPO comment/proposal (in Q-1B), our understanding is that it is not necessary or, at most, can be considered as an optimization. In all cases, the gNB has enough information for deciding whether to schedule additional retransmissions or not. |
| Qualcomm | Yes | Agree with rapporteur. |
| Samsung | Yes | Agree with Rapporteur |
| Apple | Yes | Agree that the current spec is OK. |
| ZTE | Yes | Agree with rapporteur |

Question 1B: If no, what/how should 38.321 need to be revised?

|  |  |  |
| --- | --- | --- |
| Company | Clause in 38.321 | Proposed revision |
| OPPO | 5.22.1.3.1a | In the following part:  1> if *sl-MaxTransNum* corresponding to the highest priority of the logical channel(s) in the MAC PDU has been configured in *sl-CG-MaxTransNumList* for the sidelink grant by RRC and the maximum number of transmissions of the MAC PDU has been reached to *sl-MaxTransNum*; or  1> if a positive acknowledgement to a transmission of the MAC PDU has been received according to clause 5.22.1.3.2; or  1> if negative-only acknowledgement was enabled in the SCI and no negative acknowledgement was received for the most recent (re-)transmission of the MAC PDU according to clause 5.22.1.3.2:  2> flush the HARQ buffer of the associated Sidelink process.  Based on the green part, as long as maximum re-tx number is reached, the buffer would be flushed, but according to RAN1 agreement, the UE may still report NACK to network, which means network may still schedule re-transmission SL grant, they are contradictory since that will lead to a case that the TX-UE has an empty buffer but has to send re-transmission since NACK is received from Rx-UE and re-tx grant is provided by network. So good to restrict it to HARQ disabled case, i.e.  1> if HARQ feedback has been disable and *sl-MaxTransNum* corresponding to the highest priority of the logical channel(s) in the MAC PDU has been configured in *sl-CG-MaxTransNumList* for the sidelink grant by RRC and the maximum number of transmissions of the MAC PDU has been reached to *sl-MaxTransNum*; or |
|  |  |  |

##### Agreement #2:

* *Conclusion:*
  + *RAN1 expects the remaining PDB provided by higher layers is smaller than the resource reservation period (not including 0ms) provided by higher layers*
    - *No RAN1 specification impact*

The agreement #2 is related to LS in R2-2005977 from RAN2 related to the following RAN2 agreement:

47: RAN2 expects that RAN1 will discuss whether ReTX resources of a MAC PDU are reserved neither right on nor after new TX resource of the next MAC PDU for a configured sidelink grant reserved for a particular Sidelink process.

To Rappoteur’s understanding, RAN1 expects that a retransmission of MAC PDU only occurs within a resource reservation period with the agreement #2 because selection window for resource selection in PHY should be confined within the resource reservation period. Thus, RAN2 could agree that ReTX resources of a MAC PDU are reserved neither right on nor after new TX resource of the next MAC PDU for a configured sidelink grant reserved for a particular Sidelink process.

**Proposal 2-1: ReTX resources of a MAC PDU are reserved neither right on nor after new TX resource of the next MAC PDU for a configured sidelink grant reserved for a particular Sidelink process.**

Question 2A: Do you agree with Proposal 2-1?

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| --- | --- | --- |
| Company | Yes/No | Comment |
| OPPO | Yes |  |
| HW | Yes |  |
| CATT | Yes |  |
| Intel | Yes | From RAN1 agreement, they seem to confirm the RAN2 understanding (provided that the PDB that dictates the selection of the retransmission resources is smaller than the selected resource reservation period). |
| Ericsson | Yes |  |
| Qualcomm | No | RAN1 agreement enforces a requirement on the entire candidate set. Proposal 2-1 is specific only to the selected resources. This could lead to problems when the all resources in the candidate set are after the beginning of the next resource reservation period. |
| Samsung | Yes |  |
| Apple | No | PDB is measured based on the packet arrival time in MAC layer, not based on the “TX resource” of the packet. Proposal 2-1 is wrong. The correct wording is “**ReTX resources of a MAC PDU are reserved neither right on nor after tha expected arrival of the next MAC PDU for a configured sidelink grant reserved for a particular Sidelink process** |
| ZTE | Yes |  |

In addition, we could clarify in 5.22.1.1 of 38.321 that the remaining PDB should be smaller than the resource reservation period (not including 0ms) when the MAC entity creates a selected sidelink grant corresponding to transmissions of multiple MAC PDUs. Note that the agreement #2 is only applicable to transmissions of multiple MAC PDUs.

**Proposal 2-2: The change to selection of the resource reservation interval is required to reflect the agreement #2:**

Question 2B: Do you agree with Proposal 2-2?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| OPPO | Yes |  |
| HW | Yes |  |
| CATT | Yes |  |
| Intel | Yes |  |
| Ericsson | Yes |  |
| Samsung | Yes |  |
| Apple | Yes |  |
| ZTE | Yes |  |

Question 2C: If Yes in 2B, do you agree with the following change to 38.321?

|  |
| --- |
| **5.22.1.1 SL Grant reception and SCI transmission**  …  1> if the MAC entity has selected to create a selected sidelink grant corresponding to transmissions of multiple MAC PDUs, and SL data is available in a logical channel:  …  2> if the TX resource (re-)selection is triggered as the result of the TX resource (re-)selection check:  3> select one of the allowed values configured by RRC in *sl-ResourceReservePeriodList* which are equal to or larger than the remaining PDB of SL data available in the logical channel and set the resource reservation interval, 𝑃rsvp\_TX, with the selected value; |

|  |  |  |
| --- | --- | --- |
| Company | Yes (possibly with revision) or No | Comment |
| OPPO | No | With the existing NOTE,  NOTE 4: How the MAC entity determines the remaining PDB of SL data is left to UE implementation.  It would be sufficient to revise it to reflect the agreement#2, e.g.,  NOTE 4: How the MAC entity determines the remaining PDB of SL data is left to UE implementation, which is expected to be *smaller than the resource reservation period (not including 0ms)*. |
| HW | No | According to the RAN1 agreement, the selected value of the period can only be larger than the remaining PDB of the SL data available in the logical channel. If the selected value is equal to the remaining PDB then the last retransmission may be overlapped with the new transmission of the next MAC PDU. |
| CATT | No | Agree with OPPO’s proposal that updated Note is enough to reflect RAN1 agreement. |
| Intel | No | We are fine with OPPO’s proposal to capture it in the note, since anyway how to determine the remaining PDB is up to UE implementation. |
| Ericsson | Yes with comment | We are okay to capture this in the procedural text.  However, if company wants to go with OPPO suggestion, a cleaner solution would be to capture the green part in a separate note. How the note reads now is a bit confusing. |
| Qualcomm | No | Agree with OPPO |
| Samsung | No | We are fine with OPPO’s proposal. |
| Apple | NO | The proposed change is incorrect. The reservation interval is not supposed to be dynamically adjusted based on the remaining PDB value. OPPO suggestion is ok to us. |
| ZTE | No | Agree with OPPO’s modification on the existing note. |

##### Agreement #3:

* *If periodic reservation is in use by a UE, and if pre-emption is enabled in a resource pool, the UE checks pre-emption for resources provided by MAC layer to L1, according to specified procedures*
  + *L1 expects that MAC layer provides resources intended for transmission of one TB, which can fit to resource selection window of current TB of the UE, and for which the relevant priority is available*
  + *If a resource is pre-empted, a re-selection for the pre-empted resource is triggered based on the specified step 1 and step 2 procedures,* 
    - *with details up to UE implementations, including whether/how to set the reservation period in the re-selected resource*
  + *FFS in TP phase how/where to capture this in specification*
    - *During the pre-emption checking, j is up to Cresel-1*

Rapporteur thinks that according to yellow part of the agreement #3, UE checks pre-emption only for resources reserved for transmission of one TB i.e. a MAC PDU created by LCP. Namely, UE is not expected to check pre-emption for any reserved resources reserved for potential MAC PDUs not created by LCP yet.

**Proposal 3: UE checks pre-emption only for resource(s) reserved for one MAC PDU created by LCP.**

Question 3A: Do you agree with Proposal 3?

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| --- | --- | --- |
| Company | Yes/No | Comment |
| OPPO | No | Based on the bullet below   * *FFS in TP phase how/where to capture this in specification*   + *During the pre-emption checking, j is up to Cresel-1*   We believe the collision check for premption is not limited to a single MAC PDU, but has to be for “*j is up to Cresel-1*”, i.e., multiple MAC PDUs.  The text “*MAC layer provides resources intended for transmission of one TB*” is just to say that the target resource provided to L1 is limited to the current TB, but when collision check is performed, it has to consider the subsequent repetitions on different value of *j*. |
| HW | No | According to RAN1 agreement, there is no restriction that the TB must be already created by LCP but the relevant priority being available is enough. Therefore as when to create a MAC PDU is all up to UE implementation and even before the TB is generated the UE is able to know the priority of this TB as long as the UE knows which LCH(s) are going to be multiplexed in the TB but actually the TB has not been created. |
| CATT | No | After checking with our RAN1 colleague, we share the same view as OPPO that the collision check for pre-emption is continually perform for the subsequent resource reservation. |
| Intel | Yes | We have the same understanding as the rapporteur based on input from our RAN1 colleagues. |
| Ericsson | No | We agree with HW |
| Qualcomm | Yes |  |
| Samsung | No | We understand RAN1’s intention as that resource selection window T2 is determined based on PDB and this PDB information should be provided to PHY from MAC for resource reselection caused by pre-emption. This is not about whether pre-emption is applied for one MAC PDU or MAC PDUs. |
| Apple | No | Agree with OPPO and HW |
| ZTE | No | Agree with OPPO and Huawei, as mentioned in RAN1 agreement: with details up to UE implementations, including whether/how to set the reservation period in the re-selected resource. RAN1 clearly means that resource reselection due to pre-emption can reserve resources for multiple TBs. |

Question 3B: If Yes in 3A, do you agree with the following change to 38.321?

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| --- |
| 5.22.1.2 TX resource (re-)selection check …  1> if a resource(s) of the selected sidelink grant is indicated for re-evaluation by the physical layer as specified in clause 8.1.4 of TS 38.214 [7]; or  1> if any resource(s) of the selected sidelink grant for which a MAC PDU has been obtained in clause 5.22.1.3.1 is indicated for pre-emption by the physical layer as specified in clause 8.1.4 of TS 38.214 [7]; or |

|  |  |  |
| --- | --- | --- |
| Company | Yes (possibly with revision) or No | Comment |
| OPPO | No | As replied to Q-3B |
| HW | No | See comments above. |
| CATT | No | We don’t think the above change is correct. Prefer to keep the original text. |
| Intel | Yes |  |
| Ericsson | No with comment | If majority of companies prefer to capture something anyway, our suggestion is the following:  1> if any resource(s) of the selected sidelink grant for which a reserving SCI has been transmitted is indicated for ~~re-evaluation or~~ pre-emption by the physical layer as specified in clause 8.1.4 of TS 38.214 [7]; or |
| Qualcomm | Yes |  |
| Samsung | No | We do not see a need to change. |
| Apple | No |  |
| ZTE | No |  |

In addition, RAN1#98bis previously made some agreements on re-evaluation and pre-emption as follows:

* *Agreements on re-evaluation before transmission of SCI with reservation (resource allocation mode 2)*
* *Resource (re-)selection procedure supports re-evaluation of Step 1 and Step 2 before transmission of SCI with reservation*
* *The re-evaluation of the (re-)selection procedure for a resource reservation signalled in a moment ‘m’ is not required to be triggered at moment > ‘m – T3’ (i.e. resource reselection processing time needs to be ensured)*
* *Agreements on pre-emption mechanism (resource allocation mode 2)*
* *Support a resource pre-emption mechanism for Mode-2*
* *A UE triggers reselection of already signaled resource(s) as a resource reservation in case of overlap with resource(s) of a higher priority reservation from a different UE and, SL-RSRP measurement associated with the resource reserved by that different UE is larger than an associated SL-RSRP threshold*
  + *Only the overlapped resource(s) is/are reselected*

As agreed in RAN1#98bis, re-evaluation is triggered for a resource which has been not indicated by a prior SCI while pre-emption is triggered for a resource which has been indicated by a prior SCI. The difference between re-evaluation and pre-emption was not specified in RAN1 specifications. Since both re-evaluation and pre-emption lead to reselection of the concerned resource, Rapporteur propose to clarify difference between re-evaluation and pre-emption in 38.321.

Question 3C: Do you agree with the following change to 38.321 to clarify difference between re-evaluation and pre-emption?

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| --- |
| 5.22.1.2 TX resource (re-)selection check …  1> if a resource(s) of the selected sidelink grant is indicated for re-evaluation by the physical layer as specified in clause 8.1.4 of TS 38.214 [7] and has been not indicated by a prior SCI; or  1> if any resource(s) of the selected sidelink grant for which a MAC PDU has been obtained in clause 5.22.1.3.1 is indicated for pre-emption by the physical layer as specified in clause 8.1.4 of TS 38.214 [7] and has been indicated by a prior SCI; or |

|  |  |  |
| --- | --- | --- |
| Company | Yes (possibly with revision) or No | Comment |
| OPPO | No | We believe that “indicated for re-evaluation by the physical layer as specified in clause 8.1.4 of TS 38.214 [7]” has included the pre-condition that the grant “has been not indicated by a prior SCI”, i.e., otherwise, for a grant has been indicated by a prior SCI, it should not be “indicated for re-evaluation” by physical layer. The same logic applies for pre-emption, i.e., “indicated for pre-emption by the physical layer as specified in clause 8.1.4 of TS 38.214 [7]” has included the pre-condition that the grant “has been indicated by a prior SCI”.  So a suggested change can be as follows  1> if a resource(s) of the selected sidelink grant which has not been indicated by a prior SCI is indicated for re-evaluation by the physical layer as specified in clause 8.1.4 of TS 38.214 [7]; or  1> if any resource(s) of the selected sidelink grant which has been indicated by a prior SCI is indicated for pre-emption by the physical layer as specified in clause 8.1.4 of TS 38.214 [7]; or |
| HW | Yes | We think OPPO and the rapporteur have the same understanding but the detailed wording is little bit different. We slightly prefer OPPO’s wording. |
| CATT | Yes | We are OK with rapporteur proposed change. We also fine with OPPO’s suggestion. We think either way can work. |
| Intel | Yes | We also think that the rapporteur proposed change and that by OPPO can both work. |
| Ericsson | Yes | Fine with both proposals. |
| Qualcomm | Yes with revision | Suggest a modification of the proposed as follows:  1> if a resource(s) ~~of the selected sidelink grant~~ has not been indicated by a prior SCI, the resource(s) is indicated for re-evaluation by the physical layer as specified in clause 8.1.4 of TS 38.214 [7] ~~and has been not indicated by a prior SCI~~; or  1> if any resource(s) ~~of the selected sidelink grant for which a MAC PDU has been obtained in clause 5.22.1.3.1~~ has not been indicated by a prior SCI, the resource(s) is indicated for pre-emption by the physical layer as specified in clause 8.1.4 of TS 38.214 [7] ~~and has been indicated by a prior SCI~~; or |
| Samsung | Yes | We are fine to clarify the wording as OPPO. |
| Apple | Yes | Slightly prefer OPPO version |
| ZTE | Yes | We are fine with OPPO’s version. |

##### Agreement #4:

According to the agreed CR to 38.212 in R1-2007453, SCI format 2-A including Cast type indicator is used with HARQ operation when HARQ-ACK information includes ACK or NACK, when HARQ-ACK information includes only NACK, or when there is no feedback of HARQ-ACK information, while SCI format 2-B including Zone ID and communication range is used with HARQ operation when HARQ-ACK information includes only NACK, or when there is no feedback of HARQ-ACK information.

Thus, NACK-only HARQ feedback can be indicated by SCI not including Zone ID and communication range. Rapporteur thinks that change to clause 5.22.2.2.2 of TS38.321 is required for RX UE accordingly.

**Proposal 4: The following change to 38.321 is required to reflect the agreement #4 for RX UE:**

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| --- |
| 5.22.2.2.2 Sidelink process …  1> if HARQ feedback is enabled by the SCI:  2> if negative-only acknowledgement is indicated by the SCI according to clause 8.4.1 of TS 38.212 [9]:  3> if UE's location information is available and distance beteween UE's location and the central location of the nearest zone indicated by the *Zone\_id* in the SCI is smaller or equal to the communication range requirement in the SCI; or  3> if none of *Zone\_id* and communication range requirement is indicated by the SCI; or  3> if UE's location information is not available:  4> if the data which the MAC entity attempted to decode was not successfully decoded for this TB and the data for this TB was not successfully decoded before:  5> instruct the physical layer to generate a negative acknowledgement of the data in this TB. |

Question 4A: Do you agree with Proposal 4?

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| --- | --- | --- |
| Company | Yes (possibly with revision) or No | Comment |
| OPPO | Yes |  |
| HW | Yes |  |
| CATT | Yes | We share the same view as Rapporteur‎ that NACK-only HARQ feedback can be indicated by SCI‎ independently with Zone ID and communication range‎. |
| Intel | Yes |  |
| Ericsson | Yes with comment | Our understanding is that it also works for the case when either Zone\_ID or communication range is not available.  Hence, maybe one should change this to:  3> if at least one of Zone\_id and communication range requirement is not indicated by the SCI; or  **RAN1#101b-e:**  **Conclusion:**   * It is feasible from L1 signaling perspective to use Groupcast option 1 (i.e., NACK only feedback) when **Zone ID or Communication range requirement is not provided**, if RAN2 decides to support this operation.   + No action in RAN1 unless RAN2 informs RAN1 about their decision (to support or not)   + Note that if RAN2 decides to support it, RAN1 needs to further discuss   **RAN1#102-2**  Agreements:   * HARQ feedback Option 1 (i.e., NACK only) without distance-based feedback is supported from the physical layer perspective.   + A value of Cast type indicator in SCI format 2-A is used to indicate groupcast HARQ feedback option 1 without distance-based feedback |
| Qualcomm | Yes |  |
| Samsung | Yes |  |
| Apple | Yes |  |
| ZTE | Yes |  |

Question 4B: If no in 4A, what/how should 38.321 need to be revised for RX UE?

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| --- | --- | --- |
| Company | Clause in 38.321 | Proposed revision |
|  |  |  |
|  |  |  |

##### Any other new RAN1 agreement impacting on MAC specifications?

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| --- | --- | --- |
| Company | Concerned RAN1 agreement | Impacted clause and proposed revision |
|  |  |  |
|  |  |  |

# Unresolved Issues from [AT111-e][705][V2X]

#### Issue A: SL\_RESOURCE\_RESELECTION\_COUNTER

SL\_RESOURCE\_RESELECTION\_COUNTER is a UE variable used to reserve a selected sidelink grant for transmissions of multiple MAC PDUs in Sidelink resource allocation mode 2. This NR counter inherited from the LTE counter for the same purpose. Like in LTE, if PSSCH transmission corresponds to the last transmission of a MAC PDU, the Sidelink process decrements *SL\_RESOURCE\_RESELECTION\_COUNTER* by 1 in NR. However, unlike in LTE sidelink resource allocation mode 4, HARQ feedback can be enabled in NR sidelink resource allocation mode 2. Thus, we would need to take into account the case when transmission of a MAC PDU terminates based on HARQ ACK, e.g. as pointed out in R2-2007094.

For NR sidelink, HARQ feedback can be based on either NACK-only or ACK-NACK. Thus, when HARQ feedback is enabled, transmission of a MAC PDU can be terminated by one of the following cases:

if a positive acknowledgement to a transmission of the MAC PDU has been received; and

if a negative-only acknowledgement was enabled in the SCI and no negative acknowledgement was received for the most recent (re-)transmission of the MAC PDU

Rapporteur proposes to discuss whether the above cases can decrement *SL\_RESOURCE\_RESELECTION\_COUNTER* by 1 in Sidelink resource allocation mode 2.

Question A1: Do you agree to support the following behaviour?

**If a positive acknowledgement to a transmission of the MAC PDU has been received, the Sidelink process decrements *SL\_RESOURCE\_RESELECTION\_COUNTER* by 1.**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| OPPO | Yes for behaviour but no need for spec change | By reading the “reason for change” in R2-2007094,  *“For the case when HARQ feedback is enabled, the UE will not be able to determine which transmission is the last transmission when packet is transmitted, so UE shall decrement the counter when ACK/NACK is received”,*  we understand the existing condition of “*if this transmission corresponds to the last transmission of the MAC PDU*” has included not only the last transmission is due to ACK or no NACK received, but also the case where the maximum re-transmission number is reached (e.g., due to congestion control restriction) even though NACK is received from Rx-UE, so there is no need for this change. |
| HW | Yes |  |
| CATT | Yes | Agree with OPPO that no need for spec change. |
| Intel | Yes | We agree with the principle that HARQ FB should be taken into account when decrementing the counter |
| Ericsson | Yes | Whether to change the spec or not, we can go with majority view. |
| Qualcomm | Yes |  |
| Samsung | Yes |  |
| Apple | Yes | The current spec will lead to wrong UE implementation because the statement of evaluating “last transmission” happens before the evaluating of HARQ ACK/NACK in a procedure which describes the sequential step-by-step UE behavior for the generation of a sidelink transmission. This problem needs to be fixed. |
| ZTE | Yes | Agree with OPPO that we may not need to change any spec, since the wording ”last transmission” can have the meaning that ACK is received in HARQ feedback enable re-transmission or maximum number of re-TX has been reached. |

Question A2: Do you agree to support the following behaviour?

**If a negative-only acknowledgement was enabled in the SCI and no negative acknowledgement was received for the most recent (re-)transmission of the MAC PDU, the Sidelink process decrements SL\_RESOURCE\_RESELECTION\_COUNTER by 1.**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| OPPO | Yes for behaviour but no need for spec change | As replied above. |
| HW | Yes |  |
| CATT | Yes | As replied above. |
| Intel | Yes | Same comment as above |
| Ericsson | Yes | Same as previous questions |
| Qualcomm | Yes |  |
| Samsung | Yes |  |
| Apple | Yes |  |
| ZTE | Yes | See comments as above. |

Question A3: If yes in A1 and/or A2, how do you want to specify them in 38.321?

**Option 1: No change is needed because ‘the last transmission’ in 5.22.1.3.1a of 38.321 already includes the last transmission terminated by HARQ feedback.**

1> if this transmission corresponds to the last transmission of the MAC PDU:

2> decrement *SL\_RESOURCE\_RESELECTION\_COUNTER* by 1, if available.

**Option 2: the behaviour(s) in A1 and/or A2 should be clearly specified in 38.321, e.g.:**

1> if a positive acknowledgement to a transmission of the MAC PDU has been received according to clause 5.22.1.3.2; or

1> if a negative-only acknowledgement was enabled in the SCI and no negative acknowledgement was received for the the most recent (re-)transmission of the MAC PDU according to clause 5.22.1.3.2:

2> decrement *SL\_RESOURCE\_RESELECTION\_COUNTER* by 1, if available.

**Option 3: Move the decrement of the counter to the place after HARQ feedback is processed and juxtaposed with the HARQ buffer flush as shown below,:**

**Graphical user interface, text, application

Description automatically generated.**

|  |  |  |
| --- | --- | --- |
| Company | Preferred option | Comment |
| OPPO | 1 | As replied above. |
| HW | Option 1 | We think “last transmission” already covers the above mentioned two cases. No additional changes are needed. |
| CATT | Option 1 | As replied above. |
| Intel | Option 1 | We think it is simpler to support option 1, since as HW mentioned, it should cover both cases |
| Ericsson | Option 1 |  |
| Qualcomm | Option 1 |  |
| Samsung | Option 1 | We agree that A1 and A2 are covered by ‘the last transmission’ |
| Apple | Option 2 or Option 3 | As explained in Q-A1, I think the logic of the current spec is very confusing. If the ambiguous “last transmission” phrase is good enough to cover all the possible cases resulting to the required COUNTER change, then why the conditions to trigger “flush HARQ buffer” is listed explicitly as three different sub-bullets in the same procedure? If companies prefer to cover all cases leading to the COUNTER change in a single place, then this needs to be put as the same condition leading to the flush of HARQ buffer at the end of this procedure, as indicated in Option 3. |
| ZTE | Option 1 |  |

#### Issue B: Selection of retransmission resource(s)

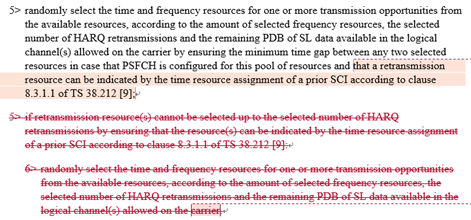
It has been specified in 38.321 how to select resources in case retransmission resource(s) cannot be selected up to the selected number of HARQ retransmissions by ensuring that the resource(s) can be indicated by the time resource assignment of a prior SCI, how to select the time and frequency resources for one or more transmission opportunities from the available resources.

As discussed in R2-2008332, some company thinks that this behaviour can be left to UE implementation. One way to specify the concerned selection of retransmission resources is to replace the following normative text by a new NOTE:

**Proposed new NOTE in 5.22.1.1 of 38.321:**

If retransmission resource(s) cannot be selected up to the selected number of HARQ retransmissions by ensuring that the resource(s) can be indicated by the time resource assignment of a prior SCI, how to select the time and frequency resources for one or more transmission opportunities from the available resources is left for UE implementation.

**Proposed removal of the normative text from 5.22.1.1 of 38.321**



Note that this issue was discussed but finally noted at RAN2#111-e:

*Proposal 3: Agree the following NOTE5 by removing the related normative text as captured in the CR. Or, RAN2 does not remove the related normative text in 5.22.1.1.*

* *Noted.*

Question B1: Do you support removal of the concerned normative text (as shown in the red box above) and addition of the following NOTE?

***NOTE: If retransmission resource(s) cannot be selected up to the selected number of HARQ retransmissions by ensuring that the resource(s) can be indicated by the time resource assignment of a prior SCI, how to select the time and frequency resources for one or more transmission opportunities from the available resources is left for UE implementation.***

**Option Yes: Remove the concerned normative text and add the above NOTE.**

**Option No: We keep the current normative text i.e. do not remove it.**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| OPPO | Yes with comment on the NOTE | The change on the current text is needed:   1. We understand the text is used to capture RAN1#101 agreement on “*Step 2, a UE should/shall select resources so that HARQ retransmission resources can be reserved by a prior SCI, except that in case no resource can be found for reservation (e.g., based on the identified candidate set after Step 1) for a retransmission of a TB, the re-transmission can be transmitted on a resource that is not reserved*”, but the two level-5 bullets are contradictory to each other, since the first one is to require the UE to ensuringthe condition of “*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*”, yet the second is to handle the case where the condition **cannot** be ensured, which leads to a level-6 bullet which is exactly the same as the first level-5 bullet except the condition which cannot be ensured. 2. Furthermore, it is strange why the other condition “*by ensuring the minimum time gap between any two selected resources in case that PSFCH is configured for this pool of resources*” is missing in the level-6 bullet.   So we believe the key point here is: The UE has to fulfil the requirement “*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*” as much as possible, while keeping the other requirement as it was – so there is no need to differentiate the two cases for whether the condition can be achieved or not, i.e., the condition can be addressed separately without touching the other requirements.   1. W.r.t. how to address the condition separately, we are open to the way either in R2-2008332 or the NOTE as proposed by rapporteur. If we go for the NOTE, one small comment as follows - Since the issues here seems independent of the number of re-transmission?   ***NOTE: If retransmission resource(s) cannot be selected ~~up to the selected number of HARQ retransmissions~~ by ensuring that the resource(s) can be indicated by the time resource assignment of a prior SCI, how to select the time and frequency resources for one or more transmission opportunities from the available resources is left for UE implementation.***   1. Furthermore, the change has to be applied to 5.22.1.2 as well |
| HW | No | This note is not correct as according to RAN1 agreement, even though the condition “***If retransmission resource(s) can be selected up to the selected number of HARQ retransmissions by ensuring that the resource(s) can be indicated by the time resource assignment of a prior SCI***” cannot be fulfilled, the other conditions still need to be satisfied, e.g., the minimum time gap etc. Therefore, in this case, how to select the resource cannot be left to UE implementation. In addition, to solve the condition contradictory issue proposed by OPPO in R2-206585, We think we can update the text as below |
| CATT | Yes with comment on the Note | We think Huawei’s intention is correct, but the proposed change by Huawei has a little bit redundant.  Thus, we think the NOTE proposed by Rapporteur‎ can be updated as following to address Huawei’s concern. Meanwhile, the concerned normative text can be removed.  ***NOTE: If retransmission resource(s) cannot be selected ~~up to the selected number of HARQ retransmissions~~ by ensuring that the resource(s) can be indicated by the time resource assignment of a prior SCI, how to select the time and frequency resources for one or more transmission opportunities from the available resources is left for UE implementation*** ***by ensuring the minimum time gap between any two selected ‎resources in case that PSFCH is configured for this pool of ‎resources.*** |
| Intel | Yes with comment | We agree with CATT that Huawei’s proposed change is ok in principle, but we think that if we go with the proposed note, we still need to capture the minimum time gap condition for the case when PSFCH is configured, since it should apply regardless of whether the retransmission resources can be selected or not. So, we think the modification by CATT makes the most sense.  We also think the same should apply for 5.22.1.2. |
| Ericsson | Yes with comment | Same comment as Intel. |
| Qualcomm | Yes |  |
| Samsung | Yes with comment | We are fine with the text proposal by CATT. |
| Apple | Yes with comment | We prefer the NOTE change proposed by CATT. |
| ZTE | Yes with comment | We are fine with the NOTE proposed by rapporteur, since |

#### Issue C: Flushing soft buffer

RAN2 previously agreed the following in RAN2#108:

*The Rx UE can flush the buffer of the HARQ process and consider it as available when a new transmission SCI is received for this HARQ process (for the existing source, destination ids, cast type and HARQ process id).*

Thus, in 38.321, if the NDI has been toggled compared to the value of the previous received transmission or this is the very first received transmission, when there is a Sidelink process associated with the Sidelink identification information and the Sidelink process ID of the SCI, RX UE considers the Sidelink process as unoccupied and flushes the soft buffer for the Sidelink process.

|  |
| --- |
| 5.22.2.2.1 Sidelink HARQ Entity … |

Meanwhile, as discussed in R2-2008332, some company thinks that ‘flush the soft buffer’ in 5.22.2.2.1 can be removed because RX UE will anyway replace an old TB by a new TB in the soft buffer, even without flushing. However, according to RAN2 agreement, both flushing and considering as unoccupied are needed.

Note that this issue was discussed but finally noted at RAN2#111-e:

*Proposal 5: Confirm specification of ‘flush the soft buffer for the Sidelink process’ in 5.22.2.2.1 considering RAN2 agreement.*

* *Noted.*

Question C1: Can we confirm the following RAN2 agreement and keep ‘flush the soft buffer of the Sidelink process’ in 38.321?

***The Rx UE can flush the buffer of the HARQ process and consider it as available when a new transmission SCI is received for this HARQ process (for the existing source, destination ids, cast type and HARQ process id).***

**Option Yes: We should keep ‘flush the soft buffer of the Sidelink process’ in 38.321’.**

**Option No: We can remove ‘flush the soft buffer of the Sidelink process’ in 38.321’.**

|  |  |  |  |
| --- | --- | --- | --- |
| Company | Yes/No | Comment | |
| OPPO | No | If checking the spec for downlink HARQ handling, there is no such harq buffer flushing operation, so we wonder what is the benefit to have this operation for sidelink, and thus wonder the reason for this agreement.  Unless we identify some negative effect that motivates this difference between DL-Rx and SL-Rx, we suggest to revert the agreement and remove the flushing operation here. | |
| HW | Yes | We support to keep this bullet to better reflect the agreement. According to the agreement achieved in RAN2#108 meeting, both flushing and considering as unoccupied are needed.  *The Rx UE can flush the buffer of the HARQ process and consider it as available when a new transmission SCI is received for this HARQ process (for the existing source, destination ids, cast type and HARQ process id).*  We don’t think there is any problem to keep this bullet and if this bullet is deleted, we should firstly revisit the agreement and the proponents should give out some reasonable arguments to revisit the agreement and clarify if there is any significant bad impact on the functionality if flushing behaviour is kept. | |
| CATT | Yes | | Following the previous agreement is fine for us. |
| Intel | Yes | | We do not see any issue in confirming the RAN2 agreement and keeping the bullet. |
| Ericsson | Yes | |  |
| Qualcomm | Yes | | No strong view |
| Samsung | Yes | | We prefer to keep the agreement. |
| Apple | Yes | |  |
| ZTE | Yes | |  |

# Unresolved Issues from [AT111-e][706][V2X]

#### Issue D: UL/SL prioritization

Uplink transmission may overlap with V2X sidelink communication and/or NR sidelink communication, which requires intra-UE UL/SL prioritization. It has been understood since specification of LTE sidelink that UE should first check whether uplink transmission is prioritized and then if uplink transmission is not prioritized or UE cannot perform UL and SL simultaneously, UE should check whether sidelink transmission is prioritized.

Thus, UE should first check whether uplink transmission is prioritized in 5.4.2.2 of 38.321 for UL/SL prioritization. Then, if uplink transmission is not prioritized or UE cannot perform UL and SL simultaneously, UE should check whether sidelink transmission is prioritized in 5.22.1.3.1a of 38.321.

Question D1: Can we confirm the following UL/SL prioritization procedure is correct?

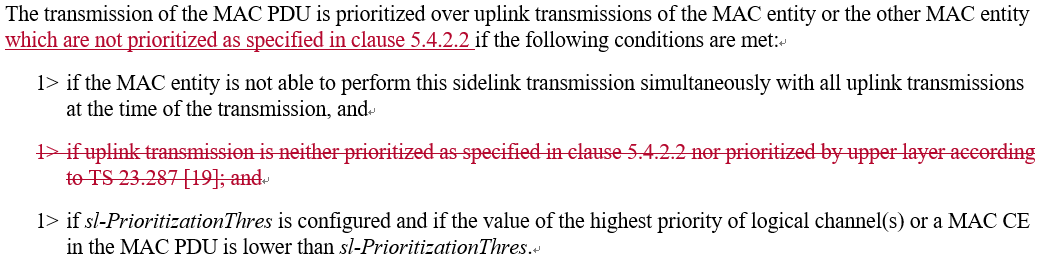
***UE should first check whether uplink transmission is prioritized in 5.4.2.2 of 38.321 for UL/SL prioritization. Then, if uplink transmission is not prioritized or UE cannot perform UL and SL simultaneously, UE should check whether sidelink transmission is prioritized in 5.22.1.3.1a of 38.321.***

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| OPPO | Yes |  |
| HW | No | We don’t see strong motivation to clearly specify this order, we think this can be left to UE implementation whether to firstly check if UL is prioritized or if SL is prioritized |
| CATT | No | We agree the Rapporteur’s intention. But we don’t think anything needs to be confirmed.  By the way, the “or” should be “and” in the above text as following:  ***UE should first check whether uplink transmission is prioritized in 5.4.2.2 of 38.321 for UL/SL prioritization. Then, if uplink transmission is not prioritized ~~or~~and UE cannot perform UL and SL simultaneously, UE should check whether sidelink transmission is prioritized in 5.22.1.3.1a of 38.321.*** |
| Intel | No | Agree with HW that even if the intention is correct, there is no need to capture/confirm anything in the specification. |
| Ericsson | Yes | We think it makes sense to check first if the uplink transmission is prioritized and, if not, which one to prioritize between NR and V2X sidelink. |
| Qualcomm | No | Based on prior agreements, it seems the first sentence in the proposed text is sufficient,  ***UE should first check whether uplink transmission is prioritized in 5.4.2.2 of 38.321 for UL/SL prioritization. ~~Then, if uplink transmission is not prioritized or UE cannot perform UL and SL simultaneously, UE should check whether sidelink transmission is prioritized in 5.22.1.3.1a of 38.321.~~*** |
| Samsung | No | We agree with HW that the order does not have to be specified. |
| Apple | Yes | I think the above understanding is correct. |
| ZTE | No | Agree with rapporteur’s intention for solving this issue, but agree with other companies that the order is not necessary to be specified, different UEs can have different orders, but each UE must always follow its pre-determined order. |

Question D2: If yes in D1, do you think that we need to clarify the procedure in D1 in 38.321?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| OPPO | No |  |
| CATT | No |  |
| Ericsson | No with comment | Not sure we need to capture anything in the spec, but probably we can capture a RAN2 understanding or just an agreement on this. |
| Apple | No |  |

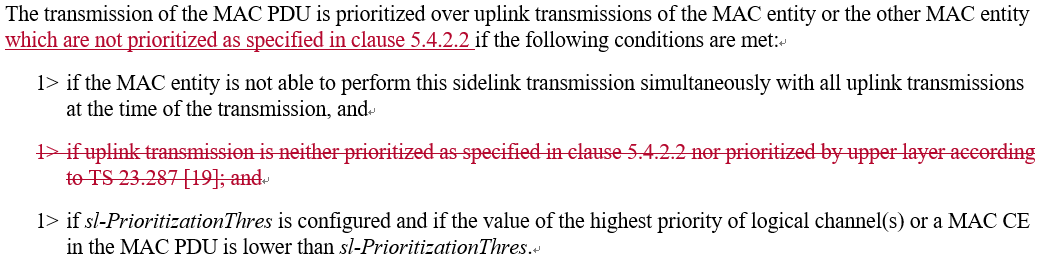
Question D3: If yes in D2, do you agree the following change in 38.321?



|  |  |  |
| --- | --- | --- |
| Company | Yes (possibly with revision) or No | Comment |
| OPPO | No | If we add this sentence, then this condition are repeated 3 times which is not necessary |
| CATT | No |  |

In addition, when/how UL is prioritized is currently specified in 5.4.2.2 of 38.321, except the case when UL is prioritized by upper layer according to TS 23.287 which is specified in 5.22.1.3.1a of 38.321. This seems not aligned with other cases specified in 5.4.2.2 where UL is prioritized over SL.

Thus, we could change to 5.22.1.3.1a of 38.321 as follows and add the case when UL is prioritized by upper layer according to TS 23.287 to 5.4.2.2:



**Proposal D: Specify ‘UL prioritization by upper layer according to TS 23.287’ in 5.4.2.2 of TS 38.321 and remove ‘the UL prioritization by upper layer’ from 5.22.1.3.1a of TS 36.321.**

Question D4: Do you agree with Proposal D?

|  |  |  |
| --- | --- | --- |
| Company | Yes / No | Comment |
| OPPO | No | The condition “uplink transmission is not prioritized as specified in clause 5.4.2.2” should be removed because this has been addressed in following sentence in same clause:  1> if there is a MAC PDU to be transmitted for this duration in uplink, except a MAC PDU obtained from the Msg3 buffer or prioritized as specified in clause 5.4.2.2, and the sidelink transmission is prioritized over uplink transmission:  but the condition “prioritized by upper layer according to 23.287[19]” should be kept because this part should be applied for both intra and inter-RAT case |
| HW | No | We do see there is some problem here as in section 5.4.2.2 when determining UL is prioritized over SL we refer to section 5.22.1.3.1 to check if SL is prioritized which according to current spec refers back to section 5.4.2.2 to check if UL is prioritized. But we still prefer to keep current modelling i.e., do not clearly specify the order the UE determines the UL prioritization and SL prioritization. But some update on the text as shown below can be adopted. |
| CATT | No | 1. We think the condition “uplink transmission is not prioritized as specified in clause 5.4.2.2” should be kept, which reflects the following agreement:  *For between SL-data and UL-data/SRB, the SL transmission is prioritized if the highest priority value of UL LCH(s) with available data is larger than the UL priority threshold and the highest priority value of SL LCH(s) with available data is lower than the SL priority threshold. Otherwise the UL transmission is prioritized.*  We don’t think OPPO’s comment to delete this condition is valid. Because the context listed by Rapporteur‎ is related with UL/SL prioritization mechanism, but the context listed by OPPO is focus on how to transmit a MAC PDU.  We also don't agree Huawei’s proposed change, since there are a lot of reasons leading to the condition “uplink transmission is not prioritized” in clause 5.4.2.2. Thus this condition cannot be limited into “the UL priority is lower than *ul-PrioritizationThres*”.  2. For the condition “prioritized by upper layer according to 23.287[19]”, we also prefer to keep it, because this part should be applied for both intra and inter-RAT case. |
| Intel | No | When considering both section 5.22.1.3.1a and section 5.4.2.2, we think that the only problematic condition is the one that HW has mentioned, i.e. “*the value of the highest priority of the logical channel(s) in the MAC PDU is lower than ul-PrioritizationThres if ul-PrioritizationThres is configured*” in case the MAC entity is not able to simultaneously perform UL and SL transmission. So, this can explicitly be captured in 5.22.1.3.1a. On the other hand, the reference to 23.287 for UL prioritization by upper layer should be kept as is. |
| Ericsson | No |  |
| Qualcomm | No |  |
| Samsung | No | We think that the text update in 5.22.1.3.1a by HW seems more clear than referring to 5.4.2.2.  The condition **‘the UL prioritization by upper layer’** should be kept in 5.22.1.3.1a. |
| Apple | See comment | According to rapporteur, the condition “**UL prioritization by upper layer according to TS 23.287”** is supposed to be moved to 5.4.2.2, then we still need a condition to check “uplink transmission is not prioritized as specified in clause 5.4.2.2” in 5.22.1.3.1a because this is a prerequisite for allowing SL transmission here. Then why the whole sentence is removed? |
| ZTE | No |  |

Question D5: If yes in D4, can we also have the same change in 36.321 for UL prioritization by upper layer?

|  |  |  |
| --- | --- | --- |
| Company | Yes / No | Comment |
| OPPO | No |  |
| CATT | No |  |

Question D6: What else can be revised in 38.321 for UL/SL prioritization (if your proposal has already been discussed in [AT111-e][706][V2X])?

|  |  |  |
| --- | --- | --- |
| Company | Clause in 38.321 | Proposed revision |
| OPPO | 5.4.2.2 and 5.22.1.3.1a | For 5.4.2.2, according to 5.22.1.3.1a, if MAC entity can already simultaneously transmit uplink and sidelink, then NR sidelink will be deprioritized. So the redundant condition should be cleared. In addition we think the 2nd and 3rd change in CR R2-2008632 are not correct and should be revised due to same logic. |
|  |  |  |

# Conclusion and recommendation

In conclusion…