**3GPP TSG-RAN WG2 Meeting #109 electronic R2-20xxxxx**

**24 Feb – 6 Mar 2020**

**Agenda item: 6.4.2.1**

**Source: Huawei (Rapporteur)**

**Title: Report for the offline discussion on Category-2 proposals in RRC summary**

**Document for: Discussion and Decision**

# Introduction

This document includes the offline discussion #702 on the related issues and proposals which were discussed in the RRC summary submitted in R2-2002093 [1]. According to the scope clarified during the on-line discussion on Monday, only the Proposal C-2 and proposals in Category 2, i.e. “Proposal that need further discussion [FFS]” in [1] are within the scope of this offline discussion. Note that original proposal C-3 and C-3a which are related to MAC reset aspects will be handled by MAC related offline discussion, not here.

R2-2002093 Summary document for AI 6.4.2.1 - RRC aspects Huawei (Rapporteur) discussion Rel-16 5G\_V2X\_NRSL-Core

* Proposal C-1 is agreed.
* Proposal C-2b will be discussed in offline.
* Proposal C-11 is agreed.
* Proposal C-2 to proposal C-10a will be discussed in offline (may exclude some proposals, Proposal C-3 will be discussed in MAC related offline.).
* [Offline Disc#702]: To discuss the proposals identified in the above for further offline discussion (Huawei, R2-2001965) (Comeback Thurs.)
* [Offline Disc#703]: To update and agree 38.331/36.331 CR (Huawei, R2-2001966 for 38.331 CR, R2-2001967 for 36.331 CR) (Comeback Thurs. or next Wed.)

# Discussions

### Discussion on Proposal C-2/C-2a/C-2b – SL-RSRP reporting

The below questions are to collect companies’ views of proposal C-2 and C-2a in [1]. It is about SL-RSRP reporting and what is specifically going to be discussed is “whether to introduce a “delta” measurement result for the event triggered SL-RSRP reporting from the RX UE to the TX UE, or even more trigger events are needed (e.g. TX UE triggered RX UE reporting)”. The specific technical issue is that, if only relying on the A1-like and A2-like events agreed in the last meeting for even-triggered SL-RSRP from the RX UE to the TX UE, i.e. reporting if the absolute SL-RSRP result becomes above/below an threshold, there may be the case that the SL-RSRP keeps on staying above/below the corresponding threshold, so that the TX UE cannot get any SL-RSRP result, thus unable to carry out power control as RAN1 expected.

* **Question 1**: Should an event based on “delta” SL-RSRP measurement results be supported for the event triggered SL-RSRP reporting at the RX UE?

1. Yes, if the delta value between the current measured SL-RSRP and the last reported SL-RSRP exceeds a threshold, then the SL-RSRP reporting is triggered;
2. No, it is not needed.
3. Need further analysis in RAN1/ 2

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 1** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| OPPO | a) | Obviously periodical triggering is not efficient, and the current A1/A2 like events are not useful for the RSRP reporting for SL, which is mainly used for power control, i.e., TX power has to be adjusted when the RSRP change is larger than a threshold. Similar trigger has been defined for PHR, following the same spirit. |
| Huawei | a) | Similar view as OPPO. |
| Ericsson | a) only if TX triggered RSRP report is not supported in Q2 | We also see the current A1/A2 like events are not enough for the RSRP reporting. Two solutions in Q1 and Q2 can work:   * #1 RSRP report triggered by “delta” SL-RSRP measurement in Q1 * #2 TX UE triggered SL-RSRP measurement in Q2   Different than NR-Uu, SL TX UE can adapt the power for reference signalling, and the last SL-RSRP measurement becomes invalid. Then, it is natural that TX UE can trigger another SL-RSRP report when the transmission power changes as solution#2.  For solution#1, it might not work properly if the measured SL-RSRP changes slowly, e.g. the “delta” value is small but last for long time.  Thus, in our view, we prefer #2 in Q2. |
| Qualcomm | a) |  |
| Interdigital | a) | Same view as OPPO |
| Apple | a) | Agree that A1/A2 like event triggers are not suitable for this SL unicast scenario, a step-wise threshold is preferred |
| vivo | b) | We prefer option-b to make it simple at this release, because we think it is a kind of optimization for this issue. To be more specific, firstly, the change for SL-RSRP may be the result of the TX transmission power change or the TX UE moving fast, but not the evaluation criteria to do the power control. Secondly, it is not clear that how long will it take for the SL-RSRP to change a quantity by a ‘delta’ value, if it takes some time then the SL-RSRP report based on this ‘delta’ would be not in time and meaningless.  And last but not least, the TX UE can anyway configure periodic SL-RSRP report to RX UE to know the change of SL-RSRP if it wants and there would be no problem for the system to work well. |
| Samsung | b | Given the limited time in Rel-16, we think it seems not essential/critical to be supported. We prefer to discuss this delta feature in a later release. |
| Spreadtrum | b) | We think that periodic triggered SL-RSRP reporting can work well because we have HARQ retransmission to guarantee the data transmission even though TX power control is not in time. Further, SL RSRP may change quickly in many V2X scenarios, this new event will increase much signaling overhead but little gain. |
| ZTE | a) |  |
| LG | b) | We don’t see the motivation of such delta SL-RSRP measurement, since we already have A1, A2 based event trigger SL-RSRP reporting. If the criterion of A1 or A2 (i.e., threshold) is properly configured, it will rarely happen that the UE fails to report SL-RSRP to TX UE. Also, even though RX UE may stay in certain SL-RSRP boundary, it is ok for RX UE to report SL-RSRP result to TX UE frequently.  Furthermore, due to the nature of V2X UE with high absolute speed, it is rarely happen for UE to stay deep fading channel. |
| Nokia | b) | While event-based triggering based on “delta RSRP” value can make SL-RSRP reporting by the RX UE more efficient, even the “delta trigger” can not solve the above mentioned problem in principle i.e. “there may be the case that the SL-RSRP keeps on staying above/below the corresponding delta threshold, so that the TX UE cannot get any SL-RSRP result, thus unable to carry out power control”. To avoid this, the delta-RSRP value needs to be decreased, effectively mimicking quasi periodic reporting at the end. |
| CATT | Check with RAN1 | SL-RSRP is mainly used for RAN1 power control, we prefer to send LS to RAN1 to ask whether they need this enhancement from RAN1 perspective. |
| Xiaomi | b | Tx UE could update A1/A2 threshold when receiving the RSRP measurement report. |
| Intel | a) with comments | In general, we understand that additional triggers might be needed since a single threshold-based trigger would not cover the case of smaller variations in RSRP. In this case, we think the proposed mechanism is ok, but we think that this should at the very least be checked with RAN1, since we originally defined such RSRP reporting based on RAN1 requirement and it would be good to check with them if it is really essential and whether or not any additional triggers would be required |
| Convida | Check with RAN1 | Same view as CATT above |
| Lenovo, MM | c) | At the first look it seems that finer power control possibilities on PC5 will be helpful to increase the “PC5 system” efficiency. However, undeniably this comes at the cost of increased signaling. So, we would like to see results from the proponents for heavy traffic/ deployment case at least. |
| MediaTek | a) | Agree with OPPO. Having only the absolute thresholds is not well suited for the application to power control. |
| ASUSTeK | a) |  |

**Result and Conclusion of Q1:**

Option a): 10

Option b): 6

Option c): 1

Others (check RAN1): 2

Rapporteur understands that that solution related to measurement and reporting framework can be directly determined by RAN2. Among the companies who choose “yes” or “no”, there seems to be a majority of the companies (10:6) that think such “delta” measurement based event is needed, as the “absolute” value based events are not sufficient. Thus, rapporteur proposes RAN2 to have a quick check on whether option a can be agreed, and proposal.

**Proposal 1: RAN2 try to agree that an event based on delta SL-RSRP measurement is supported for event-triggered SL-RSRP reporting, i.e. if the delta value between the current measured SL-RSRP and the last reported SL-RSRP exceeds a threshold, the SL-RSRP reporting is triggered. If agreeable, further details are up to running CR discussion.**

* **Question 1a**: On top of the events already agreed, are there even more events that need to be specified for the event triggered SL-RSRP reporting from the RX UE to the TX UE?

1. Yes, TX-triggered SL-RSRP reporting for the RX UE is needed. If this option is selected, please detail the standard impacts (i.e. how TX UE decides whether/when the SL-RSRP reporting needs to be triggered, what message is used to inform the RX UE if triggered, etc.)
2. No, it is not needed.

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 1a** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| OPPO | b) | According to the running CR, the triggering of RSRP reporting is configured by Tx-UE via PC5-RRC (either timer triggered or event triggered), following the same approach used by Uu interface. Under the current framework, after adding the “delta” event, we believe no additional event needed. |
| Huawei | b) | Similar view as OPPO. Also, the TX-triggered event has overlapped motivation as the “delta” based event, but is with much more unclear impacts that need further discussion. |
| Ericsson | a) | Same comment as in Q1 |
| Qualcomm | b) |  |
| Interdigital | b) | Specifying delta-based events should be sufficient and this would not be needed. |
| Apple | b) |  |
| vivo | b) |  |
| Samsung | b | Given the limited time in Rel-16, we think it seems not essential/critical to be supported. We prefer to discuss this additional feature in a later release. |
| Spreadtrum | b) |  |
| ZTE | b) |  |
| LG | b) |  |
| Nokia | a) | Even the event-based trigger using “delta RSRP” value can lead to the situation that the SL RX UE does not report any SL-RSRP to the SL TX UE, because the SL-RSRP is constantly below the configured delta-RSRP value (->TX UE unaware of the RSRP at the RX UE). Furthermore, in case there is no transmission from TX UE to RX UE, RX UE can not determine SL-RSRP. So, in addition to time-based and event-based triggering at SL-RX UE, TX UE should be able to request SL-RSRP report. |
| CATT | Check with RAN1 | It’s better to further check with RAN1 as comments in Q1. If not, we prefer b. |
| Xiaomi | b) |  |
| Intel | b) | We do not think any additional triggers are needed at this time. |
| Convida | Check with RAN1 | Same view as CATT above |
| Lenovo, MM | b) | Assuming that delta based reporting is the most relevant candidate for improving PC5 performance w.r.t. measurements, we would like to keep the PC5 (UE behavior) simple. |
| MediaTek | a) | We see value in allowing the Tx UE to trigger an RSRP report for occasions when there is no transmission available to carry a reference signal. It was observed in online discussion that the upper-layer keep-alive could guarantee that there is “always” some transmission, but the periodicity of the keep-alive could be quite long compared to the time scale of power control. |
| ASUSTeK | b) |  |

**Result and Conclusion of Q1a:**

Option a): 3

Option b): 14

Others (check RAN1): 2

It is clearly seen from companies’ input that the TX-triggered SL-RSRP reporting is not needed by selecting option b). So this is proposed as follows.

**Proposal 2: No support of TX-triggered SL-RSRP reporting mechanism at the RX UE.**

The below question is to collect companies’ views of proposal C-2b in [1]. It is about SL-RSRP reporting and the issue to be addressed is “what if the SL-RSRP result is not available at each periodic SL-RSRP reporting occasion, due to no-ongoing SL transmission on the corresponding SL-RSRP reporting period”. Based on the on-line discussion on Monday, the candidates include that the UE does not perform SL-RSRP reporting in such case, and that it is up to UE implementation how to deal with this situation.

* **Question 2** For a reporting occasion in periodic SL-RSRP reporting, if the SL-RSRP measurement result is unavailable in the latest reporting period, due to no ongoing reporting SL transmission, how should the UE behave at this reporting occasion?

1. The SL-RSRP reporting is not carried out by the UE at this specific reporting occasion
2. It is up to UE implementation, and a NOTE is captured in the TS 38.331.
3. It is up to UE implementation, and not any standard impact is needed.

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 2** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| OPPO | C | As commented online, the problem may also happen in R15 system, e.g., CSI-RS pre-empted by SSB, so we believe the legacy specification can already handle the situation, so no standard impact is needed. |
| Huawei | a) |  |
| Ericsson | a) |  |
| Qualcomm | a) |  |
| Interdigital | c) | We think this can be handled by UE implementation without the need to specify anything. |
| Apple | C | Left to UE implementation |
| vivo | c | In our understanding, the issue is similar for NR-U. and in NR-U discussions, it was agreed that *NR licensed specification in Rel-15 are considered as a baseline for NR-U*, and *There is no consensus in RAN1 to introduce a mechanism to handle missing RLM-RS.*  Therefore we think we need to do nothing for this specific scenario and just leave it to UE implementation. |
| Samsung | a | It seems sufficient to follow the current draft CR i.e. RX UE only includes SL-RSRP measurement result if it is available. No further specification impact seems needed. |
| Spreadtrum | c) |  |
| ZTE | c) | We think it is up to UE implementation, and there should be no standard impact. |
| LG | c) | We don’t see that RX UE reports nothing at each reporting occasion due to no ongoing SL transmission. Actually, it is corner case when UE don’t have SL-RSRP reporting result, since SL-RSRP is reported after L3-filtered. (i.e., no ongoing SL transmission for a long time) Even though UE has no SL-RSRP result at the latest reporting occasion due to no ongoing SL transmission, UE can report L3-filtered SL-RSRP using past SL-RSRP results because L3-filter RSRP process use RSRP sample from the past to the present.  Therefore, in order to handle corner case (i.e., when UE don’t have SL-RSRP samples result due to no ongoing transmission for a long time), we are ok to “RX UE reports nothing”. However, if not, RX can report SL-RSRP using recently measured SL-RSRP values. |
| Nokia | a) | SL RX UE should not report RSRP, if no RSRP measurement is available. |
| CATT | a) | The UE behavior for this case needs to be somehow specified. |
| Xiaomi | a) | The UE behavior should be specified and option a is the only choice. |
| Intel | c) | We think option c can cover option a) as well |
| Convida | a) | Same comment as CATT above |
| Lenovo, MM | a) |  |
| MediaTek | a) | We acknowledge that it would be possible to leave this to UE implementation and have the UE potentially report some value (same as last report? extrapolated from previous reports? minimum value?), but it seems to make the RSRP reports less meaningful because they don’t actually reflect what was received by the UE. Accordingly, we would prefer to specify that the UE does not report information it doesn’t have. |
| ASUSTeK | a) |  |

**Result and Conclusion of Q2:**

Option a): 11

Option b): 0

Option c): 8

There is no clear majority’s view on this issue. It seems that Option a) is something that needs to introduce extra specification impact. Though it can yield some benefits of avoiding unnecessary reporting and corresponding resource wastage, it cannot be concluded at this moment. So there is no proposal given for this issue, leaving no extra standard change for it accordingly.

### Discussion on Proposal C-4/C-4a/C-4b – Mode-2 TX pool selection

The below questions are to collect companies’ views on Proposal C-4/C-4a/C-4b in [1]. It is about mode-2 TX resource pool selection, and the reason why this issue is discussed as one of the RRC aspects is that in LTE V2X SL, it is RRC layer of the UE which selects the specific mode-2 TX pool used at a given time and instructs the selected TX pool to the lower layers. As per proposal C-4, there could be three options, i.e. zone-based selection, HARQ FB based selection and UE implementation based selection, as indicated in the below Question 3.

Rapporteur would like to note that besides the per-pool configurations in LTE V2X SL, e.g. CBR-priority lookup table, speed-priority look-up table, etc., even more factors have been agreed by RAN1 to be configured in a per-pool manner in NR SL, e.g. applicable MCS table. As a result, it seems not enough to consider only some isolated factors like zone, HARQ FB resources, priority, CBR, etc., separately for the selection of a resource pool; instead, all above potential should be taken into account. It is obvious not desirable to specify how the UE exhaust all of above factors in the standard, and thus the simplest way is to leave the mode-2 TX resource pool selection to UE implementation which is going to take into consideration all above factors and make the best choice.

* **Question 3**: How is mode-2 TX resource pool selection performed, in case multiple pools are (pre-)configured?

1. Zone-based resource pool selection – the UE selects resource pool(s) associated with its current geo-location;
2. HARQ FB based resource pool selection – the UE selects the resource pool based on whether there is an SLRB with HARQ FB enabled and whether the resource pools have PSFCH resources;
3. Resource pool selection is up to UE implementation – no standardization efforts, simplest way.
4. No pool selection is done in RRC. MAC layer conducts TX pool selection (how to specify a rule or left to UE implementation can be discussed in MAC spec later).
5. Do not consider configuration of multiple TX resource pool per BWP (e.g., Change to RRC CR is needed).

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 3** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| OPPO | c | For zone-based resource pool, RAN2 previously has sent a LS to RAN1, yet no reply from RAN1 yet. Considering that no progress in RAN1 on this part yet, RAN2 should not further proceed on this aspect.  For FB based resource pool solution, we agree with the rapporteur analysis that there would factors more than HARQ FB that affects pool selection. In order to avoid over-specifying various factors for pool selection in R16 (and later in R17+), option c) can solve all these issues ultimately. |
| Huawei | c | Similar view as OPPO.  Also, as illustrated in the discussion texts above Q3, considering only an individual factor is not enough in NR SL. Take the zone-based pool selection as an example: as the usable MCS table is now per-pool configuration, there is the likeliness that a UE selects a pool only based on the zone it is located in, but the MCS included in the MCS table of the selected pool cannot support the transmission of the TBs to be sent at all. As a result, the pool selected based only on zone is an error, as it cannot support the transmission actually. |
| Ericsson | b) | For a), we understand that it is still under RAN1 discussion wither to support it or not.  For b), when the LCH which as data available and triggers the resource selection requests a HARQ feedback, it does not work if UE later selects a pool without PSFCH resources. It seems straightforward to us to support the pool selection based on PSFCH resource.  For c), as said, if it’s up to UE implementation, a UE may select a pool without PSFCH resource for LCHs requesting HARQ feedback. It simply cannot work.  Other factors pointed out by rapporteur, e.g. CBR-priority lookup table, speed-priority look-up table, are related to PHY transmission parameter selection while has nothing to do with the pool selection procedure. |
| Qualcomm | c | Note that RAN1 has not agreed to zone-based resource pool selection |
| Interdigital | a is specified, UE implementation for other | HARQ FB based resource pool selection can be left to UE implementation as a reasonable UE will chose the correct pool based on whether PSFCH resources are available or not. However, for zone-based pool selection, this was specified in LTE, and so it would make sense to keep the LTE baseline. |
| Apple | d | Given that multiple TX pools are to be used by a single TX UE, it is no longer suitable to have semi-static RRC configuration to instruct UE to use which pool. The simplest way-forward is to move this issue out of RRC spec, so it will not impact ASN.1. Companies can have time to discuss TX pool selection in April meeting. Even if RAN1 decides to support zone-based resource configuration, this pool selection procedure can still be done in MAC layer. |
| vivo | b) | If the UE is configured with HARQ-enable and it does have the need for HARQ feedback, it would be strange and unreasonable that the UE performs the pool selection in a entirely ‘blind’ way. And if UE do not consider the HARQ related factors in pool selection, at least it should be able to request to NW or perform pool reselection for PSFCH resources.  For a), the zone-based pool selection seems to have no gain due to RAN1 evaluation and maybe there is no need to support this. |
| Samsung | b like, but see comments. | According to RAN1 decision there can be a pool with or without PSFCH. So we should consider HARQ in TX resource pool selection. However we think it should be selected by MAC since MAC PDU may or may not contain packet from LCH/SLRB configured HARQ (i.e. not by RRC based on whether there is SLRB configured with HARQ or not).  About a), according to RAN1 study, there seems no benefit with zone based pool selection. |
| Spreadtrum | c) | Zone based resource pool selection has not been agreed by RAN1 yet. Further, there are other factors such as CBR besides feedback. So we prefer to be up to UE implementation. |
| ZTE | b or c | So far there is no agreement on zone-based resource pool selection in RAN1. In our opinion, HARQ feedback based resource pool selection is reasonable since the logical channel configured with AHRQ feedback enabled shall select a resource pool with PSFCH resources. Otherwise, it cannot work well. Hwever, we also agree that it can be up to UE implementation. |
| LG | e | Regarding the configuration of the SL TX resource, RAN1 has not agreed to consider the configuration of multiple resource pool. However, RRC running CR describes that multiple resource pool are configured per BWP. Thus, the configuration of the multiple resource pool should be fixed to the configuration of single resource pool in the running CR. |
| Nokia | c) | While option c might sound intuitive and easy for the moment, please keep in mind that in *Rel.17 WI SL\_enh* we need to specify “combined-mode-1 and mode-2” (as it was already on the agenda for Rel. 16). |
| CATT | c) | Same view as OPPO and Huawei. |
| Xiaomi | d) | At least, the resource pool selection should be specified clearly. Even to the same destination, sidelink transmission at different time may select different resource pool, due to HARQ enable or disable in SCI. It’s not appropriate to specify such dynamic selection in RRC. |
| Intel | c) with comments | While we understand the rapporteur’s comments on the difficulty of capturing all the factors involved in selection of a resource pool in mode 2, it seems a bit strange if we mention all such factors scattered across the specification and then not mention anything about how the UE selects the resource pool based on these factors.  In any cases, since option a) is still under discussion, if majority of the companies want to reduce the specification effort, we can leave it to UE implementation, but at least the relationship between requiring HARQ feedback and selecting pool with PSFCH resources configured should be captured as non-normative text |
| Convida | c) | Can revisit this in release 17. |
| Lenovo, MM | a) | Zone based will be easier for us to accept at this late stage, especially since it comes from LTE and has been in deployment. Leaving to UE implementation is clearly not an option since this will affect directly system performance. HARQ FB based RP selection is not acceptable since it only allows a Boolean decision i.e. RP has HFB resources or not. We need better control than that to make optimum use of resources. |
| MediaTek | b), could accept c) | It seems clear that when HARQ feedback is configured, the UE needs to select a pool with PSFCH resources. We tend to think this should be specified, but if it is left to UE implementation we hope everyone will do it anyway.  We also understand that a) is still open in RAN1 and we shouldn’t reopen the discussion in RAN2. |
| ASUSTeK | b | We prefer option b. If there is the SLRB with FB enabled and there are multiple TX pools configured with PSFCH, TX pool selection can be up to UE implementation. |

**Result and Conclusion of Q3:**

Option a): 2

Option b): 5

Option c): 11

Option d): 2

Option e): 1

A clear majority selected Option c) and thus thought that at this late stage, it is OK to leave mode-2 TX resource pool selection to UE implementation. Note that the UE implementation will take all relevant and necessary factors into account, including the HARQ FB related issues, so that it should be assumed that the UE will not select a pool that cannot support its transmission mistakenly. Also, there was a clear RAN1 agreement saying that multiple resource pools can be configured to a single UE, and this is how this question comes. The proposal of this question will be given together with that of Question 4 later.

* **Question 3a**: In case Option a) is selected in Q3, are two sets of zone configurations needed (with one used for mode-2 resource pool selection and the other used for distance calculation by RAN1)?

1. Yes. If this option is selected, please clarify the reason.
2. No.

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 3a** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| Interdigital | Yes | Ideally, different configurations would be preferable because the zones are being used for different purposes. |
| Apple | Pending RAN1 | If RAN1 wants to support zone-based resource selection, in addition to zone-baed TX UE location indication, then two different sets of configurations are needed. |
| Lenovo, MM | a) | Yes, since as Fujitsu showed in their simulation (e.g. in R1-1906441), bigger Zones ensure better performance. This is also intuitively true since a moving vehicle will need to change Zones faster if the Zones (rectangular boxes) were smaller, thereby the transmission resources need to reselected very often and lot of time will be wasted in Sensing.  For the Rx-Tx distance calculation, the Zones should be as small as possible to minimize quantization errors.  Therefore, two sets of zone configurations are indeed needed. |
| MediaTek | Yes, pending RAN1 | ***If*** RAN1 indicate to support zone-based pool selection, then there seems no particular reason why the zone granularity for computing distance would also make sense for resource allocation. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Result and Conclusion of Q3a:**

No support of zone-based resource pool selection is needed based on majority’s view to Question 3.

As there is anyway the issue on whether the UE’s RRC layer instructs all (pre-)configured mode-2 TX resource pools to the lower layers, or only instructs the selected one, regardless of which option is selected above in Q3; therefore, below question is to discuss this issue.

* **Question 4**: Should the RRC layer of the UE instruct all the mode-2 TX resource pools (pre-)configured or instruct only the mode-2 TX resource pool selected to the lower layers?

1. Instruct all the mode-2 TX resource pools (pre-)configured to the lower layers, with lower layers performing pool selection (similar to LTE D2D or LTE V2X SL release 15);
2. Instruct the selected mode-2 TX resource pool to the lower layers, with RRC layer carrying out the resource pool selection (similar to LTE V2X SL release 14).

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 4** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| OPPO | a) | As replied in Q3, the factors that affects pool selection are mostly up to MAC layer decision, so it is straightforward to rely on MAC layer to perform pool selection. |
| Huawei | a) | Similar view as OPPO. |
| Ericsson | a) |  |
| Qualcomm | a) |  |
| Interdigital | a) | MAC layer can select the (pre)configured pools based on (e.g. need for PSFCH configured). Any selection by RRC (e.g. zone-based) would be part of the (pre)configured pools provided by the RRC, |
| Apple | a) | As explained in Q3, the TX pool selection issus is a MAC issue. So RRC indicates all the pools to lower layer. |
| vivo | a) |  |
| Samsung | a | In Q3, HARQ feedback based resource pool selection is needed. See our inputs in Question 3. |
| Spreadtrum | a) | Similar view as Interdigital. |
| ZTE | a) | As said in Q3, the resource poo selection shall be handled by MAC. So it shall instruct all the mode-2 Tx resource pools (pre-)configured to the lower layers. |
| LG | a) | In LTE V2X release 15, multiple resource pools on multiple carriers can be configured for a UE. This concept could be used for multiple resource pools on a single carrier in NR. If multiple resource pools are supported in NR, ‘TX carrier reselection procedure’ in LTE could be changed to ‘TX resource pool reselection procedure’ in NR. |
| Nokia | a) | So far, the UE can select only a single TX resource pool per carrier in Rel.16 V2X (see RAN1 response in Q3 R1-2000301). However, in Rel.17 RAN1 will discuss the option of multiple TX resource pools within a carrier. |
| CATT | a) |  |
| Xiaomi | a) |  |
| Intel | a) |  |
| Convida | a) |  |
| Lenovo, MM | b) | Since Zone Id calculation happens in RRC, it should select the corresponding RP and signal to lower layers. |
| MediaTek | a) | Prefer that resource pool selection is done by MAC layer to avoid inter-layer problems, e.g. RRC selecting a resource pool which does not satisfy MAC layer’s requirements. |
| ASUSTeK | a) |  |

**Result and Conclusion of Q4:**

Option a): 18

Option b): 1

There is an absolute majority who would like the RRC layer of the UE instruct all the (pre-)configured mode-2 TX resource pool(s) to the lower layers which then select the specific resource pool used for resource (re-)selection and data transmission. Together with companies’ views given for Question 3, the mode-2 Tx resource pool selection is concluded as follows:

**Proposal 3: The RRC layer of the UE instructs all the (pre-)configured mode-2 transmission resource pool(s) to the lower layers. The MAC layer then performs resource pool selection for transmission based on UE implementation.**

### Discussion on Proposal C-5 – AS configuration failure related

This section discuss the *RRCReconfigurationFailureSidelink* content in Proposal C-5 in [1], *together with* the AS configuration failure procedure not having been concluded from the email discussion [2] (specifically related to Proposal 4 and 5 therein). The discussion on the content of *RRCReconfigurationFailureSidelink* message comes first.

* **Question 5:** What information should be included in *RRCReconfigurationFailureSidelink* from the RX UE to the TX UE?

1. A failure type of “AS configuration failure” is included;
2. The SLRB configurations (signaled in the RRCReconfigurationSidelink from the peer UE) that caused the AS configuration failure are included;
3. Nothing is included, keeping RRCReconfigurationFailureSidelink as an empty message.

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 5** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| OPPO | c | b) is not correct since AS configuration failure includes ASN.1 decoding error, in which case it is infeasible to judge the IE mapping. Furthermore, AS-layer configuration may further involve in later releases to configure not only SLRB, but also MAC/PHY parameters, so limit the error cause to SLRB is not future proof.  For a), it is not clear how to further split AS configuration failure into different category, i.e., no clear motivation to define different failure cause at least in R16. |
| Huawei | c | Similar view as OPPO. |
| Ericsson | a)-b) | Keeping an RRC message empty is very inefficient and usually unnecessary. For this reason, we believe that either option a) or option b) should be supported.  Between the two, option a) could be a good compromise to help the TX UE to decide what to do. On top of this, adding the *RRCReconfigurationSidelink* from the peer UE that caused the AS configuration failure, may help sometime to figure out if the failure is given to a wrong filling of the fields or some wrong configuration.  According to this, the TX UE may eventually re-send a new *RRCReconfigurationSidelink* to solve this issue. |
| Qualcomm | c |  |
| Interdigital | b (and possibly a) | Declaring failure for the entire unicast link due to failure of a single SLRB configuration seems unnecessary. Including SLRB configuration in the failure allows the TX UE to provide an updated configuration without having to tear down the PC5-S link already established. Other parameters to the message (if needed in later releases) can easily be added. ASN.1 decoding error can be handled by not providing any SLRB configuration, or having a separate failure cause. |
| Apple | a, b | We think for the clarity of the PC5-RRC procedure, both a failure cause and additional information (e.g, SLRB configuration deemed approrioate/inappropriate) should be allowed by RX UE to send back to TX UE, so that TX UE can adjust its behavior accordingly. |
| vivo | A or c with comments | We think this issue may be coupled to the issue that how we treat the AS configuration failure procedure. If we would like it to follow the RLF procedure then c) is enough. Otherwise, we can put a failure type of “AS configuration failure” inside the message. |
| Samsung | a or c | We slightly prefer to a) for future proof i.e. there may be more than one cause/case to be distinguished in a later release. But we are OK with c) as well. |
| Spreadtrum | a) | We think a failure type of “AS configuration failure” is reasonable and suitable to let TX UE know how to deal with the AS configuration failure. |
| ZTE | a), b)\_ | It would be beneficial for the Rx UE to indicate the failure type and optionally the slrb-PC5-ConfigIndex indicating the failed SLRB configuration(not the detailed configuration info) to Tx UE. |
| LG | a) | A failure type can be included in the *RRCReconfigurationFailureSidelink* for forward compatibility. For b) additional information (e.g., SLRB configurations that caused the AS configuration failure) is not needed. |
| Nokia | c) |  |
| CATT | b) | In our understanding, at least for connected UE, if the failed AS configuration is indicated, option b can help the network to perform reconfiguration.  For example, if the failure is happened due to LCID collision, the TX UE may re-send a new RRCReconfigurationSidelink to solve this issue based on option b. |
| Xiaomi | C | Only one cause is possible in R16, so no need to include the cause value. Even if UE includes SLRB configurations that caused the AS configuration failure, there may be many failure types regarding to the SLRB configuration, e.g. exceed UE capability or collision with network configuration or reject by network and peer UE is not able to identify the real cause. |
| Intel | c) | Option a) by itself is not helpful unless other failure types are introduced to provide further insight into what caused the failure. b) could be helpful, but we think that the peer UEs can determine which configuration message caused the failure. For minimal specification impact we can go with c). |
| Convida | a and even b | a), additionally b can be added to further pinpoint the root cause of the failure |
| Lenovo, MM | b) |  |
| MediaTek | c), can accept a) if a reason is shown | We generally agree with OPPO and do not see a motivation for having any content in this message. However, if the Tx UE would do something different based on the failure cause indication, it would be low-impact to include a cause value. |
| ASUSTeK | b | In case RX UE cannot comply with (partial of) the AS configuration (due to e.g. not supported capability), it should indicate the SLRB configuration(s) with problem in the RRCReconfigurationFailureSidelink.  In case ASN.1 decoding error, we think it should be UE implementation issue so that it would not happen. However, if it is the case, we think this situation can be handled by a specific failure cause. |

**Result and Conclusion of Q5:**

Option a): 9

Option b): 8

Option c):7

There is no majority view on this question. Therefore, no proposal is given to this question, and the situation would be that the *RRCReconfigurationFailureSidelink* message will currently be kept as empty with nothing included inside, and in further meetings if really critical issues detected, the specific content will be filled in later (before June).

Based on Monday on-line discussion, regarding what TX UE should do upon receiving *RRCReconfigurationFailureSidelink*, Option C, i.e. up to UE implementation, has already been out; also, based on the atmosphere of the on-line discussion, it seems that Option B, i.e. report a new failure cause to the NW, received the support of a majority of companies. For the sake of progress, therefore, below question tentatively asks whether tOption 2 in [2] can be accepted as a way forward at this stage.

* **Question 5a**: As per on-line discussion on Monday, do companies now agree that the TX UE reports a new failure cause to the NW upon the reception of *RRCReconfigurationFailureSidelink* from the RX UE?

1. Yes.
2. No. If this option is selected, please clarify the reason and specify other solutions (in detail).

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 5a** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| OPPO | b) | As commented online, one cannot perform reporting for IDLE/INACTIVE/OOC UE anyway.  For CONNECTED UE, our first preference is to align with IDLE/INACTIVE/OOC UE as well, since there is anyway scenarios where the failure cannot be solved by reporting, e.g., in case the network does not respond with an updated configuration (similar to the IDLE/INACTIVE/OOC where UE relies on fixed SIB/pre-configuration). |
| Huawei | a) | Due to Monday on-line discussion, the option asked in the question (original option b in the email discussion) seems most promising to be converged to; so, for the sake of progress, we’d like to propose to support it. |
| Ericsson | a) | Reporting a failure case to the network it may help the network to understand what the cause of the failure was. At the end, this is something that is already done for the RLC failure case. |
| Qualcomm | b) | Agree with OPPO’s comments. Option 2 is not meaningful for Mode 2 (OOC) |
| Interdigital | a) | For CONNECTED UE, it seems consistent with other behaviors (e.g. RLF) to report configuration failure to the network. |
| Apple | b | WE prefer a solution working for both IDLE and CONNECTED mode |
| vivo | b) | We share the same view with OPPO to align with IDLE/INACTIVE/OOC UE. |
| Samsung | b | We think that the report to NW in case of SL RLF can be reused. |
| Spreadtrum | a) | If the UE in connected does not report the failure to the network, there will be information mismatch between the network and the UE, which can cause problems later, |
| ZTE | a) | The PC5 AS configuration failure is different from the failure of SL RLF, a new indication for PC5 AS configuration failure is needed. |
| LG | a) | The new failure type needs to be included to distinguish it from the sl-Failure included in the SL-TxResourceReq of *SidelinkUEInformation*. The sl-Failure is a failure cause for the purpose of releasing SL transmission resources by informing the NW of the SL RLF occurrence, and a new failure cause for reconfiguring the SLRB from the NW due to the AS configuration failure needs to be included in *SidelinkUEInformation*. |
| Nokia | a) | Option a) for RRC\_CONNECTED UEs  For IDLE/INACTIVE/OOC the TX-UE should report the received *RRCReconfigurationFailureSidelink* to upper layers |
| CATT | a) | For connected UE, reporting a failure case to the network can help the network to perform reconfiguration. |
| Xiaomi | b | I don’t see how NW could utilize this information, without identifying the error configuration. |
| Intel | a) | Agree with Ericsson’s comment that it is already done for RLC retransmission based RLF; in that case, connected UE anyway behaves differently than idle/inactive mode UE. |
| Convida | a) | Same view as CATT above |
| Lenovo, MM | a) |  |
| MediaTek | a) | Agree with Interdigital that this seems consistent with what we do in other cases. |
| ASUSTeK | a) | If the SLRB configuration with problem indicated in the RRCReconfigurationFailureSidelink message comes from dedicated signaling by the gNB, then TX UE in RRC\_CONNECTED should report this failure to the gNB. |

**Result and Conclusion of Q5a:**

Option a): 13

Option b): 6

A definite majority of companies support option a) for this issue, so the proposal below is given regarding the AS configuration failure handling.

**Proposal 4: The TX UE reports a new failure cause to the NW upon the reception of *RRCReconfigurationFailureSidelink* from the RX UE.**

* **Question 5b**: If Option a) is selected in Q5a, how does the TX UE deal with the failing SLRB(s) included in the AS configuration failure message (if any)?

1. Release them.
2. Continue using them.
3. Suspend UP data transmission until updated configurations acquired are applied to both TX and RX

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 5b** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| OPPO | Discuss the UP behavior for AS-layer configuration failure, but not limited to SLRB configuration failure. | Although we respond b) to Q5a, this is our comment to Q5b:  The premise of Q5b is that AS configuration failure is only caused by SLRB configuration, yet as responded in Q5, it is not future-proof to assume that the failure is only for SLRB configuration, i.e., it may be caused by MAC/PHY configuration that could be included in AS-layer configuration later.  So it would be more future-proof to discuss the UP behavior for AS-layer configuration failure, but not limited to SLRB configuration failure. |
| Huawei | c) | We think it is good to have a simple and generic operation for the UP data transmission, so we propose option c). |
| Ericsson | a) | If there is a failure, it means that the configuration has been never applied and there is, in reality no SLRB. According to this, the UE should just discard the failed AS configuration (i.e., maybe “release” is not the right term here). |
| Interdigital | a) | Any SLRBs that fail due to configuration should not be established in the first place. Therefore b and c are not possible. |
| Apple | See comment | I do not understand why faiulure case handling or reconfiguration are only applicable to CONNECTED UE. Even For IDLE /INACTIVE UE, we think at least the UE pair can fallback to prior working configuration with successfully configured SLRBs. |
| vivo | See comments | Agree with Apple. Option a) in Q5a may not be the precondition for the question and we may discuss a unified solution for the UEs in different RRC state. Fallback to prior working configuration as Apple mentioned can be a solution. |
| Samsung | a |  |
| Spreadtrum | See comments | We think that it is reasonable to fallback to previous SLRB configuration. |
| ZTE | a) |  |
| LG | a) | TX UE should release failed SLRB when the UE receives *RRCReconfigureFailureSidelink* from the RX UE. |
| Nokia | a) or c) | If the root-cause of the *RRCReconfigurationFailureSidelink* can be determined (at the TX UE side) option c) can be applied for RRC\_CONNECTED UEs with an updated RRCConfiguration, otherwise option a). |
| CATT | a) with comments | We agree the principle of option a. But if there is a failure, the configuration doesn’t have been applied and the Tx UE may send a new configuration. Thus, the “release” is not correct for this case. |
| Xiaomi | a | The failure could happen before DRB is established. Furthermore, we can’t guarantee updated configuration would not fail again. |
| Intel | a) with comment | If the TX and RX UE can reliably determine the SLRBs that caused failure, we prefer to release or cancel those SLRBs (release where applicable i.e. if the SLRBs were being modified) rather than declare PC5 link RLF |
| Convida | a) |  |
| Lenovo, MM | a) |  |
| MediaTek | a) with comment | Same view as Ericsson and Interdigital. The new configuration has not been applied and the Tx UE should fall back to the previous configuration, i.e. “release” (or “discard” or some other suitable verb) the affected SLRBs. |
| ASUSTeK | a | UE should release the SLRB if the AS configuration failed. If there is still a QoS flow, UE can try to establish another SLRB using new AS configuration with peer UE. |

**Result and Conclusion of Q5b:**

Option a): 13

Option b): 0

Option c): 2

Fallback to previous configuration (inspected from comments): 3

Others (generic UP handling): 1

First, rapporteur would like to clarify that this issue is directly inherited from the related email discussion (P5) where the “if” in the question was already there. But rapporteur agrees that the “if” is not necessarily impacting the discussion of this issue itself. From companies’ input, it can be seen that the clear majority would like to go for the intention of option a). However, it is also pointed out by some companies that perhaps the new SLRB configurations for which RX UE actually respond with the AS configuration failure message might not have been applied by the TX UE. That means, the TX UE simply does not apply those SLRB configurations, which were included in the AS configurations message that however corresponds to a failure message received from the RX UE. Therefore, rapporteur would like to reword the option a) a bit, and try the following proposal.

**Proposal 5: In case an AS configuration *failure* message is received from the RX UE, the TX UE shall not apply the SLRB configuration(s), which were included in the original AS configuration message corresponding to this AS configuration *failure* message received.**

### Discussion on Proposal C-6 – RLC AM SLRB release

The below question is to collect companies’ views on Proposal C-6 in [1]. It is about how to release the SLRB configuration provided by the gNB only for RLC AM status reporting. The specific issue is that, the configuration of the peer UE’s SLRB used for RLC AM feedback transmission is triggered by the initiating UE, and the release of this SLRB is also triggered by the reception of the SLRB release signalling in *RRCReconfigurationSidelink* from the initiating UE. However, when the SLRB is released, the peer UE will not report to its own gNB, as the SLRB release is not due to the termination of any PC5 QoS flows in the upper layers, so that the peer UE’s gNB will not know such release without SUI reported by the peer UE and thus cannot release the SLRB configuration properly.

* **Question 6**: When a peer UE receives the release of an RLC AM/UM SLRB via PC5-RRC from the initiating UE, should it report the release of this SLRB to its own gNB?

1. Yes, by excluding the entry in the *sl-RLC-ModeIndicationList* corresponding to the released SLRB in SUI.
2. No, no need to deal with this issue.

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 6** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| OPPO | a) | It is straightforward to act as the counterpart procedure we agreed in R2#108, i.e., we agreed for the reporting for SLRB establishment in R2#108, and the corresponding procedure is needed for SLRB release. |
| Huawei | a), or following majority’s view | Option a) looks like having been supported by the current specification, as the *sl-RLC-ModeIndicationList* is a full list and will remove the corresponding entry when it no more needs to exist. |
| Ericsson | a) | It seems natural that the peer UE informs its gNB about the SLRB release, so the gNB can remove the relevant context. |
| Qualcomm | a) |  |
| Interdigital | a) | Agree with Ericsson that the network should be informed. |
| Apple | a |  |
| vivo | a) |  |
| Samsung | a |  |
| Spreadtrum | a) |  |
| ZTE | a) |  |
| LG | a) |  |
| Nokia | a) |  |
| CATT | a) |  |
| Xiaomi | a) |  |
| Intel | a) | Same comment as OPPO |
| Convida | a) |  |
| Lenovo, MM | a) |  |
| MediaTek | a) | Agree with Huawei that this seems aligned with the current running CR. |
| ASUSTeK | a) with comment | We agree the intention of option a. However, based on the current RRC running CR, it is not clear if the IE sl-RLC-ModeIndicationList should be always present when SUI is reported. If this IE can be absent when no content of the IE is changed, how the gNB know if absence of the IE means all SLRB used for RLC AM feedback transmission is to be released. |

**Result and Conclusion of Q6:**

Option a): 19

Option b): 0

The convergence is clear, and it is proposed as follows for this question.

**Proposal 6: When a peer UE receives the release of an RLC AM/UM SLRB via PC5-RRC from the initiating UE, it reports the release of this SLRB to its own gNB. Further details are up to running CR discussion.**

### Discussion on Proposal C-7 – Handling of SL configuration during state transition

The below question is to collection companies’ vies on proposal C-7 in [1]. It is related to how to handle the SL configuration during the state transition, and the specific issue is “whether such handling during state transition should be supported as full configuration operation”. Specifically, the question below asks whether this is needed, and take one step forward to ask such full configuration is applied to which specific cases and involve what specific SL related configurations (if regarded as needed).

* **Question 7**: Does the SLRB handling during the state transition need to be supported as the full configuration operation?

1. Yes. If this option is selected, please clarify such full configuration applies to which specific cases and involves which specific SL related configurations.
2. No, it is up to UE implementation how to address this issue.

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 7** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| OPPO | a) | The scenario is that   * When Tx-UE switch between dedicated RRC / SIB / pre-configuration; * When Tx-UE switch between SIB:s;   In the above scenario(s), Tx-UE cannot get delta-configuration when changing from old-configuration to new-configuration, which means that Tx-UE experience a full-configuration on Uu interface, and the issue is how to reflect the full-configuration on PC5 interface. It is straightforward to reflect such behaviour on PC5 via full-configuration as well, considering the following reasons (which is also the main reason that full-configuration is used in legacy Uu system):  - Firstly, some parameters cannot be changed after DRB re-established. For example: 1) for SDAP, SDAP header presence/absence are not reconfigurable after DRB setup, and 2) for PDCP, SN length, integrity protection and ciphering are not reconfigurable after DRB setup. For these type of parameter, the reconfiguration can only be implemented by SLRB release and add, i.e., full configuration.  - Secondly, full configuration is necessary to handle the configuration between different releases of NR-V2X. In other words, in case old-configuration is based on Rel-x NR-V2X, while new-configuration is based on Rel-y NR-V2X, full configuration is needed. |
| Huawei | a) with comments | We think option a) is needed only for the handover case, as in Uu. The reason to have a full configuration operation is that the target gNB, for an RRC\_CONNECTED UE during handover, has the choice of providing either delta configuration or full configuration via dedicated signaling, so that it needs to indicate which one is applied explicitly to the UE which shall follow that indication accordingly. This issue might also apply to the UE performing NR SL communication in RRC\_CONNECTED, so for the handover case option a) seems needed.  For other cases, where the UE uses the SIB configuration or pre-configuration after entering the new state (i.e. RRC\_IDLE/OoC), the target SL (pre-)configurations has no other choice but to be provided in a full configuration manner. This is different from the handover case where either style of the configuration is possibly provided by the target gNB. To this end, we think for such cases, the *common understanding* should be that UE has no other choice but to do full configuration without potential ambiguity, and thus there seems to be no need to intentionally specify this. |
| Ericsson | a) | Agree with OPPO analysis |
| Qualcomm | a) |  |
| Interdigital | a) | Agree with the scenarios from Huawei. |
| Apple | b) with comments | Not sure what is the specification impact of proposal a, we think the current PC5-RRC procedure already support full configuration. It is up UE to use it or not. |
| vivo | a) | We agree that some parameters cannot be changed after DRB re-established so we can rely on full configuration for this. |
| Samsung | a | We think UE applies full configuration in the following cases:   * OOC <-> IC * IDLE/INACTIVE <-> CONNECTED * Cell reselection   Delta configuration can be applied when UE in connected mode receives re-configuration i.e.  Dedicated v2x config in CONNECTED -> Dedicated v2x config in CONNECTED |
| Spreadtrum | a) | Full configuration is necessary to handle the configuration between gNBs with different releases of NR-V2X. |
| ZTE | b) | In our view, if some non-reconfigurable SLRB parameters (such as PDCP/RLC SN size, RLC mode etc.) are reconfigured during state transition, UE can regard this SLRB configuration as a new SLRB configuration (just as full configuration) and assign new LCID for it. Thus, new SLRB is established and the old SLRB can be released. We see it is just a UE implementation operation. |
| LG | a) |  |
| Nokia | a) | While UE is in state transition and has ongoing sidelink communication over PC5, the state transition can infer SLRB split/merge compared to old state. It seems option a) is needed and how to guarantee PC5-QoS flow service continuity during state transition is FFS. |
| CATT | a) | Agree with OPPO analysis. |
| Xiaomi | b) | I think both full and delta configuration should be supported. I agree in the scenarios provided by OPPO full configuration is the only choice. But delta configuration is also feasible in other scenarios. The proposal seems to exclude the delta configuration option. |
| Intel | a) | We agree with the analyses above and in any case, it seems “safer” to handle all such applicable cases (including state changes and handover) with full configuration. |
| Convida | a) |  |
| Lenovo, MM | a) |  |
| MediaTek | a) | We understood the proposal was directed to the state transition case, where as observed by OPPO it seems needed to have the full configuration option for those parameters that can’t be reconfigured as part of a delta configuration. |
| ASUSTeK | a) with comment | If UE acquires a new configuration but some existed TX-RX aligned parameters (e.g. PDCP/RLC SN length) are not reconfigurable, full configuration is needed; otherwise, for those existed TX-RX aligned parameters (e.g. QoS flow-to-SLRB mapping) are reconfigurable, delta configuration can be used. |

**Result and Conclusion of Q7:**

Option a): 16

Option b): 3

A clear majority of companies confirm that the full configuration operation for NR SL configurations are needed in some specific cases. Such cases, as inspected from companies’ views input to the form, could include state transition, change of SIB used for NR SL and the *fullConfig* present in dedicated signaling. However, some companies expressed uncertainty on how whether some Spec change is really needed to some specific cases, e.g. when using SIB config in the new state, which is quite nature. Rapporteur would like to leave the specific Spec change details to the running CR discussion.

**Proposal 7: The UE handles new NR SL configurations using full configuration operations as in Uu, in case the new configuration for SL cannot be performed by delta configuration (i.e. state transition, change of SIB used for NR SL and *fullconfig* present in dedicated signaling). Further details are up to running CR discussion.**

### Discussion on Proposal C-8 – PC5-S connection vs. PC5-RRC connection

The below question is to discuss proposal C-8 in [1]. It is related to the clarification on a previous RAN2 agreement “For a pair of UEs performing unicast communication, PC5-S connections and PC5 RRC connections are 1 to 1 mapping”, as some companies think the wording of this agreement is literally not aligned with SA2’s latest progress in TS 23.287 on PC5-S connection in the upper layers. It has been clarified in [1] that the true intention of this agreement on the relationship between PC5-S connection and PC5-RRC connections was to decide how to the model *PC5-RRC connection* in the AS (so as to avoid further introducing a so called *“UE ID” in the AS* @RAN2 #107bis), but *NOT* to decide how the PC5-S connection in the upper layers is configured/maintained (which should be an SA2-decided issue). Therefore, with the PC5-RRC connection agreed by RAN2 as an AS connection between a pair of SRC L2 ID and DST L2 ID, as already indicated in the earlier LS to SA2/RAN1 and now specified in TS 38.331 running CR [5], it is fully up to SA2 on whether to have more than one PC5-S connections in the upper layers on a PC5-RRC connection, and this seem to be pure upper layer issues without obvious AS impacts. As a result, it seems that only a clarification is needed on the relationship of PC5-S connection vs. PC5-RRC connection in the upper layers.

* **Question 8**: Do companies agree that it is up to SA2 whether more than one PC5-S connections can be associated with a PC5-RRC connection (which was agreed and specified as an AS connection between a pair of SRC L2 ID and DST L2 ID by RAN2)?

1. Yes.
2. No. If this option is selected, please clarify the reason.
3. other

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 8** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| OPPO | No need to revisit this issue, i.e., neither LS is needed and nor RAN2 spec impact. | Our understanding is that RAN2 has previously discussed the one-to-many mapping between PC5-RRC link and PC5-S link, for which we concluded that there would be only one-to-one mapping.  For SA2, our understanding is that SA2 has not intention to go this one-to-many mapping either – specifically, by reading the related paper, seems the issue is caused by the interperation that there is a one-to-two mapping between PC5-RRC and PC5-S for IP and non-IP traffic, but by checking SA2 spec:   1. According to the following description, L2-ID and APP-layer ID is one-to-one mapping      1. According to the following text and figure, a “unicast link” in SA2 is defined for a APP-layer ID pair, i.e., unicast link and APP-layer-ID-pair is one-to-one mapping      1. Then according to the following sentence, each unicast link is for a single NW layer protocol, i.e., IP/non-IP     So there is one-to-one mapping between L2-ID – APP-layer ID – unicast-link – NW-layer-protocol, so there is no chance for a single pair of L2-ID to carry more than one NW-layer protocol. |
| Huawei | a), and no further RAN2 action or discussion on this issue is needed. | We have the similar view as OPPO that we needn’t revisit this issue anymore, with the reason that how many PC5-S connections are associated with a PC5-RRC connection is a pure upper-layer issue and has no AS impact needed. For the IP vs. non-IP issue for unicast raised by some companies (as also analyzed by OPPO above), we’d like to clarify that we already had the PDCP SDU type field in the AS, and it is just used to distinguish IP and non-IP packets and is commonly applied to all unicast/groupcast/broadcast as in LTE. Beyond that, we don’t need anything else in the AS to distinguish IP or non-IP services/links specifically for unicast.  At present, no other AS impact is further identified by companies, so we don’t foresee any AS impacts related to how many PC5-S connection can be associated with a PC5-RRC connection in the upper layers. Therefore, no further action or discussion by RAN2 is needed for this issue, and one can always turn to his/her own SA2 delegate for clarification. |
| Ericsson | a) | Agree with Oppo and Huawei |
| Qualcomm |  | Agree with prior comments that there is no need to revisit this issue (LS to SA2 not required) |
| Interdigital | a) | Agree with the Rapporteur description that this is upto SA2 and there is no further action needed by RAN2. |
| Apple | a | Up to SA2 |
| vivo | a) | For the issue itself, in our understanding(with discussion to SA2 colleague):  The UE is supposed to use an existing link is the peer Application Layer IDs are the same and the network layer protocol is the same (IP or non IP). So you probably end up with 2 unicast links, one for IP and the other non IP.      But we agree with the rapporteur that the intention of former agreement on the relationship between PC5-S connection and PC5-RRC connections was NOT to decide how the PC5-S connection in the upper layers is configured/maintained. So we can leave it to SA2. |
| Samsung | a | The association of PC5-S and PC5-RRC is up to SA2. |
| Spreadtrum | a) | It should be decided by SA2 and wait for the processing result of SA2. |
| ZTE |  | Agree with rapporteur |
| LG | Keeping the previous RAN2 agreement: one-to-one mapping between PC5 unicast link and PC5-RRC connection | According to SA2, the following situation may happen:   * Peer UEs in unicast can have two PC5 unicast links addressed by the same pair of Source/Destination L2 IDs; and * Two PC5 unicast links correspond to IP and non-IP respectively; and * Two PC5 unicast links are addressed by different PC5 link identifiers.   According to RAN2 agreement, two different PC5 unicast links should be associated with different PC5-RRC connections. We prefer to keep this RAN2 agreement.  Accordingly, collision of the same Layer 2 IDs for different PC5-RRC connection may occur in some AS procedures. The pair of Layer 2 IDs could not be used for identification of a PC5-RRC connection in AS specifications in many cases. Thus, the pair of Layer 2 IDs may need to be replaced by a PC5 link identifier. |
| Nokia | a) | It is ok for AS layer as long as it is specified that an AS connection is between a pair of SRC L2 ID and DST L2 ID by RAN2. No additional clarification is needed in AS layer specification. |
| CATT | a) | Agree with OPPO and Huawei |
| Xiaomi | a) | In R16, we can stick to the previous agreement. |
| Intel | a) | We agree with the comments from OPPO and HW here in terms of not opening up this question in RAN2. Even if multiple PC5-S connections are mapped to a single PC5-RRC from the upper layer perspective, we don’t think we need to do anything in RAN2 at this time and from the AS layer perspective, we are fine as things stand |
| Convida | a) | Agree with the rapporteur that this should be up to SA2 |
| Lenovo, MM | c) | We understand that V2X layer would not see RRC connections. V2X layer passed down to the AS layer a PC5 Link Identifier (identifying the unicast link) and Source and Destination Layer 2 ID. AS layer may use the PC5 Link ID and source and destination l2 Ids to determine if there is an existing RRC connection active between the two UEs and “combine” PC5-S under the same RRC Connection.  It is completely up to RAN2 and we should have agreed on this already from the start – maintaining too many “L2 IDs” and as many RRC Connection can prove out to be a pain for a number of procedures including measurements, CSI reporting, RLM/ F… |
| MediaTek | See comment | We think this issue has been somewhat misunderstood. Note that we have different understandings between companies in this discussion already, e.g. LG above understand the connection to be per PC5 unicast link, while Nokia understand it to be per L2ID.  First, we don’t think SA2 has visibility into the concept of a PC5-RRC connection (the term “PC5-RRC” never appears in TS 23.287), so it seems not possible for them to decide this relationship.  Second, we agree with Huawei that the IP vs. non-IP issue for unicast is not a problem for the user plane on a per-packet basis, because the packets can be differentiated by the SDU type.  Third, we find from the SA2 spec that there can be two PC5 unicast links (IP and non-IP) between the same pair of ALIDs, i.e. OPPO’s point (b) above is not correct. From 23.287 section 5.2.1.4:   |  | | --- | | When the Application layer in the UE initiates data transfer for a V2X service type which requires unicast mode of communication over PC5 reference point:  - the UE shall reuse an existing PC5 unicast link if the pair of peer Application Layer IDs and the network layer protocol of this PC5 unicast link are identical to those required by the application layer in the UE for this V2X service, and modify the existing PC5 unicast link to add this V2X service type as specified in clause 6.3.3.4; otherwise  - the UE shall trigger the establishment of a new PC5 unicast link as specified in clause 6.3.3.1. |   Fourth, we agree with OPPO that the ALIDs and L2IDs seem to be one-to-one, although SA2 are not absolutely clear about it.  But the current running CR is clear that there is a PC5-RRC connection for every PC5 unicast link (first paragraph of section 5.X.1). So we think we didn’t correctly capture the decision to have the PC5-RRC connection be a logical link between a pair of L2IDs; rather, we created a requirement that we didn’t intend, to have the UE construct a new PC5-RRC connection for each PC5 unicast link, and tear down the PC5-RRC connection when the PC5 unicast link is torn down. We think this was due to the same understanding as OPPO’s point (b), the impression that there would only be one PC5 unicast link between a pair of L2IDs, but that’s not what 23.287 says.  So there needs to be some cleanup of the PC5-RRC connection concept in the running CR, to clarify what we in fact agreed, that it is scoped to the pair of L2IDs. |
| ASUSTeK | See comment | In our understanding, PC5-RRC link and PC5-S link is one-to-one mapping. Thus, we think RAN2 does not need to revisit this issue. |

**Result and Conclusion of Q8:**

Option a) (incl. no RAN2 action/revisiting needed): 16

Option b): 0

Others: 3

A clear majority of companies commented that RAN2 does not need to further revisit/discus/clarify this issue which should be up to SA2 without AS impact, and thus are willing to keep the previous RAN2 agreement for PC5 RRC connection that it is a connection between a pair of SRC L2 ID and DST L2 ID. Considering also the Mediatek’s concern which is about an unclear description in the running CR related to this issue, rapporteur would like to simply remove the corresponding description to avoid any ambiguity, as anyway the issue itself has nothing to do with RAN2, but up to SA2, as per the majority’s view.

**Proposal 8: No further action and discussion is needed in RAN2 on how many PC5-S connection are associated to a PC5-RRC connection (no RAN2 impact, but up to SA2), and a related sentence "One PC5-RRC connection is corresponding to one PC5 unicast link [xx]" will be removed from 5.X.1 in TS 38.331 running CR.**

### Discussion on Proposal C-9 – SRC L2 ID in SUI or not

The below question is to collect companies’ views on proposal C-9 in [1]. It is related to whether to report the SRC L2 ID in the SUI, along with the DST L2 ID. Note that even if the reporting SRC L2 ID itself can be agreed, at this stage of Relase-16 it is not desirable to perform further enhancements (e.g. some enhancement based on the gNB awareness of the paring relation between two UEs) based on that. So this point is still to be confirmed in the below questions.

* **Question 9**: Does the SRC L2 ID also need to be reported in the SUI?

1. Yes. If this option is selected
2. No.
3. Wait for SA2.

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 9** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| OPPO | B | Since the flow-ID (which is used for SDAP configuration) is defined in SUI is a per-UE manner, i.e., it would not reused for different destination UE, even if there is a case of different source address for a same destination address (which we do not agree as a valid scenario), there should be no ambiguity for SDAP configuration.  For other reasons like gNB awareness of UE pairing, the motivation has to be clarified first – from our perspective, which seems not a critical issue at current stage anyway. |
| Huawei | a) |  |
| Ericsson | a) | In our understanding, there are some potential benefits to let gNB be aware of UE paring:   * If two UEs are configured by the same gNB, gNB can consider the peer UE’s capability when provide SLRB configuration to the initiating UE. * Or gNB can forward the peer UE’s capability to the initiating UE in advance.   SRC L2 ID seems a very simple future proof design, besides this we tend to agree that further enhancement is not desirable at this stage, |
| Qualcomm | b |  |
| Interdigital | a) | SLRB configuration at the gNB would benefit if the gNB is aware that two unicast links associated with two different destination IDs are associated with the same physical UE. One simple way to do this is to simply report the source ID in SUI. |
| Apple | b | Agree with OPPO |
| vivo | c) | This issue was discussed in SA2 and there are some solutions proposed then but without progress, e.g. During the PC5 unicast link establishment procedure, if UE A receives 2 PC5 unicast link accept messages with same target L2 ID, UE A will reject one of them to avoid the L2 ID confliction.  Also we think it has the possibility that UE A can receive message from UE-B and UE-C with the same L2-ID, but at a very low probability.  So, one option is that we can wait SA2 progress on this. Maybe this issue is not a big problem if SA2 finally decides to do nothing. |
| Samsung | b | We do not see a critical reason to use SRC L2 ID at NG-RAN. In LTE V2X TX resource can be granted without reporting SRC L2 ID. This can be same in NR sidelink. Rather there will be more signaling in Uu due to periodical reporting updated SRC L2 ID for privacy reason. |
| Spreadtrum | b) | We think that destination L2 ID is enough because different services will use different destination L2 IDs |
| ZTE | b) | In our view, cast type together with the destination L2 ID can solve the ID collision issue across cast types. It is not necessary to report SRC L2 ID to network. |
| LG | b | In case a UE have a multiple PC5 unicast link with same destination UE, the UE have different SRC L2 ID per same DST L2 ID among the multiple PC5 unicast link. Thus, reporting SRC L2 ID would be beneficial for gNB, so that the gNB can see each SRC L2 ID and DST L2 ID pair within the UE performing SL unicast communication. As other option, PC5 link identifier can be reported in the SUI. Because UE frequently update SRC L2 ID, PC5 link identifier is more beneficial in terms of SUI transmission overhead. |
| Nokia | b) |  |
| CATT | b) | Agree with ZTE. There is no need to report SRC L2 ID to network. |
| Xiaomi | B | The issue of multiple source IDs within one connection was discussed in RAN2 and concluded not to resolve. |
| Intel | a) | In addition to echoing the comments made by Ericsson, we additionally do not see any big harm in reporting this information |
| Convida | a) | Share same view as Ericsson |
| Lenovo, MM | b) | See some limited benefits when both the end UEs in Unicast intend to transmit and gNB recognizes this and schedules them one by one (and thus avoids HD problem). But this maybe a corner case when both UEs are “RRC connected” to the same gNB. Indeed this will introduce further signaling when either source or destination L2 id changes.  We can however accept a) to minimize HD issue. |
| MediaTek | a) | We think the case of different source addresses for the same destination address is not excluded by SA2, and we should avoid breaking this case. The QoS flow identity uniquely identifies flows between the UE and different destinations, but we understand that it does not distinguish multiple SRC/DST pairs, so the inclusion of source L2ID in the SUI seems helpful. |
| ASUSTeK | b) | For unicast, we think UE should assign different SRC L2IDs for different PC5-RRC connections (or PC5-S connections). Thus, it is not needed to report SRC L2ID in SUI in order to distinguish different SRC/DST pairs.  In case the same L2ID is used by a groupcast and used by a peer UE for unicast, since SUI includes cast type IE, the gNB can still distinguish these two destinations without SRC L2ID. |

**Result and Conclusion of Q9:**

Option a): 6

Option b): 12

A majority of companies see no need to also report SRC L2 ID in sidelink UE information, so we go for that way.

**Proposal 9: No support of reporting SRC L2 ID in Sidelink UE Information.**

* **Question 9a**: If “yes” is selected in Q9, do companies agree that no other enhancements based on the reporting of SRC L2 ID should be further pursued in this release (e.g. enhancements with gNB awareness of the pairing of two UEs), besides the reporting of SRC L2 ID itself?

1. Yes.
2. No.

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 9a** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| Huawei | a) | But we would like to highlight again that even if reporting SRC L2 ID is agreed, no other enhancements (e.g. pairing based operations in RAN, etc.) should be pursued based on this SRC L2 reporting in this release. |
| Ericsson |  | I think we should not agree this at this stage as the functional freeze is postponed until June. Even if our target would be to minimize the standardization impact at this stage, we believe whether further enhancements or not it depends by the circumstances. |
| Interdigital | a) |  |
| LG |  | Same view with Ericsson |
| Intel |  | We think it really depends on the enhancement in question, how useful/critical it is and how easy it is to implement. So, it ideally should be on a case by case basis. |
| Convida |  | Same view as Ericsson |
| MediaTek | a) | If a really important issue is shown, of course it should be considered, but we shouldn’t do “nice to have” items. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Result and Conclusion of Q9a:**

See above Question 9**.**

### Discussion on Proposal C-10/10a – SIB size reduction or not

The below question is to collect companies’ views on proposal C-10/10a in [1]. It is related to whether SIB size reduction should be done for the NR SL specific SIB in various cases. For this issue, since only one company provided calculation of the current SIB size, perhaps the most RAN2 can do in this meeting is to attempt to discuss the need of it. Therefore, the below question only covers the need itself. IT should be noted that, at least until now, even the need of SIB reduction has not been sufficiently analysed by companies’ documents, not mentioning the solutions on how to do it. Therefore, even if the SIB size reduction were to really be determined as needed, it could only be done in April/May meeting as ASN.1 correction, not possibly in this meeting or before March

**Question 10**: In SIB size reduction needed for the NR SL specific SIB?

1. Yes, but should only be done in the ASN.1 correction phase (i.e. in April/May, not before March);
2. No at least for the time being, with the need FFS in April/May;
3. No, not needed at all;
4. Others.

|  |  |  |
| --- | --- | --- |
| **Companies are invited to provide views below for Question 10** | | |
| **Companies** | **Preferred options** | **Comments if any** |
| OPPO | It is a critical issue for inter-RAT scenario, but OK with a) | As calculated in our paper, the SIB size is obviously out of the limit for LTE SIB, i.e., in case of LTE Uu controlling NR SL scenario, there is no way to use the current ASN.1 definition, which means inter-RAT support would not be feasible for R16 – that is not a preferred result for sure. Our proposal is to employ the DL segmentation, which has been used for CMAS/ETWS and DL DCCH as well.  For intra-RAT scenario, it is also worth to remove the redundant part, to ensure the SIB size can be fit into 24PRB case (the minimum one in 24/48/96 cases).  So we would like to encourage companies to look into this issue as soon as possible, and at least solve this issue before ASN.1 frozen. |
| Huawei | A or B | We would like to first thank OPPO for the thorough analyses. We think that maybe this issue can be further discussed in detail in April or May meeting (before ASN.1 freeze), since for the time being it seems that companies are still not pretty sure on the need with in-depth analyses and since this is inherently an ASN.1 correction issue (though critical, if needed). |
| Ericsson | b) | I think we need to understand better if there is a problem and how to tackle it if needed. Therefore, we prefer to postpone this for the time being.  We can further investigate this in May or April meeting. |
| Qualcomm | a |  |
| Interdigital | b | This seems not a critical issue. |
| Apple | a |  |
| vivo | b) | Agree with Ericsson. |
| Samsung | b |  |
| Spreadtrum | b) | Agree with Ericsson. |
| ZTE | 1. or b) |  |
| LG | a |  |
| Nokia | b) | We do not see an urgent need to introduce methods for SIB size reduction in Rel.16. |
| CATT | b) | Agree with Ericsson. |
| Xiaomi | b) |  |
| Intel | b) |  |
| Convida | b) |  |
| Lenovo, MM | a) | Its important to reduce SIB size but RAN2 have not studied the means to do this in this context – can be pursued in the ASN1 phase if reasonable proposals appear. |
| MediaTek | a) or b) | We agree that this is a real concern, but some more discussion would be useful and it seems like a suitable topic for the ASN.1 correction phase. |
| ASUSTeK | b |  |

**Result and Conclusion of Q10:**

Option a): 8

Option b): 14

From companies’ input, it is seen that at least for the time being companies are not ready to address this SIB size reduction issue right now. However, it is also observed that all companies are fine to further discuss this issue in April and May meeting, as nobody selected option c to prohibit it immediately. So rapporteur recommend that we postpone this discussion to April/May as ASN.1 correction issue (but not a finality issue impacting Stage-3 functional completion).

**Recommendation: RAN2 may further discuss the SIB size reduction issue (including need of it) in April/May as an ASN.1 correction issue (but has nothing to do with stage-3 functional completion).**

# Conclusion

Thanks to all companies participating in this offline discussion and providing comments. Below are the proposals and recommendations achieved from this offline discussion:

**Proposal 1: RAN2 try to agree that an event based on delta SL-RSRP measurement is supported for event-triggered SL-RSRP reporting, i.e. if the delta value between the current measured SL-RSRP and the last reported SL-RSRP exceeds a threshold, the SL-RSRP reporting is triggered. If agreeable, further details are up to running CR discussion.**

**Proposal 2: No support of TX-triggered SL-RSRP reporting mechanism at the RX UE.**

**Proposal 3: The RRC layer of the UE instructs all the (pre-)configured mode-2 transmission resource pool(s) to the lower layers. The MAC layer then performs resource pool selection for transmission based on UE implementation.**

**Proposal 4: The TX UE reports a new failure cause to the NW upon the reception of *RRCReconfigurationFailureSidelink* from the RX UE.**

**Proposal 5: In case an AS configuration *failure* message is received from the RX UE, the TX UE shall not apply the SLRB configuration(s), which were included in the original AS configuration message corresponding to this AS configuration *failure* message received.**

**Proposal 6: When a peer UE receives the release of an RLC AM/UM SLRB via PC5-RRC from the initiating UE, it reports the release of this SLRB to its own gNB. Further details are up to running CR discussion.**

**Proposal 7: The UE handles new NR SL configurations using full configuration operations as in Uu, in case the new configuration for SL cannot be performed by delta configuration (i.e. state transition, change of SIB used for NR SL and *fullconfig* present in dedicated signaling). Further details are up to running CR discussion.**

**Proposal 8: No further action and discussion is needed in RAN2 on how many PC5-S connection are associated to a PC5-RRC connection (no RAN2 impact, but up to SA2), and a related sentence "One PC5-RRC connection is corresponding to one PC5 unicast link [xx]" will be removed from 5.X.1 in TS 38.331 running CR.**

**Proposal 9: No support of reporting SRC L2 ID in Sidelink UE Information.**

**Recommendation: RAN2 may further discuss the SIB size reduction issue (including need of it) in April/May as an ASN.1 correction issue (but has nothing to do with stage-3 functional completion).**

# Reference

1. R2-2002093 Summary document of AI 6.4.2.1 – RRC aspects Huawei, HiSilicon
2. R2-2000757 Summary of email discussion [108#44][V2X] - Miscellaneous RRC issues for 5G V2X with NR Sidelink Huawei, HiSilicon