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

**20 – 30 April 2020**

**Agenda Item:**  **6.4.2.1**

**Source: Huawei (Rapporteur)**

**Title: Summary of offline discussion [AT109bis-e][701][V2X] RRC open issues and ASN.1 class2/3 issues**

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

# Introduction

This document is a summary of the email discussion of [AT109bis-e][701][V2X] RRC open issues and ASN.1 class2/3 issues:

🖂 [AT109bis-e][701][V2X] RRC open issues and ASN.1 class2/3 issues (Huawei)

Scope: Discuss and conclude issues of “to be discussed” in the open issues and 38.331 ASN.1 class2/3 issues in R2-2003519 and R2-2002918

Expected outputs: Proposals and summary in R2-2004071

Deadline: 4/24 10:00 for companies’ feedback and 4/27 10:00 for rapporteur version (UTC)

A list of RRC open issue and ASN.1 class 2/3 issues is updated and maintained in R2-XXXXXX [1], where companies’ feedback are collected. This offline discussion collect companies’ views on the critical RRC/ASN.1 issues that need to be discussed, mainly coming from:

* Summary document of 6.4.2.3 for ASN.1 related issues in V2X session [2]
* Summary document for AI 6.4.2.1 – RRC aspects [3]
* Issues that identified as to be discussed from companies’ feedback in R2-XXXXX [1]

# Discussions

## Issue #N.XYZ: SL configuration in CU-DU architecture

The issue comes from [2]. Since which information is generated by CU and by DU would have impacts on RRC signaling structure, the potential impacts on NR SL related configurations need to be concluded and implemented in TS 38.331 before ASN.1 freeze. So this is a critical issue to be handled for the time being.

In the R15 NR Uu interface, for the UE’s AS configuration, the DU will generate the “lower layer” parameters and transmit those parameters to CU, e.g., by the INITIAL UL RRC MESSAGE TRANSFER, as defined in TS 38.473. Then the CU generates and add other “higher layer” parameters to construct the complete RRCReconfiguration message, which is to be delivered to UE as the AS configuration. In R15, the CellGroupConfig, including rlc-BearerToAddModList, is generated by DU and delivered to CU, while the radioBearerConfig is generated by CU.

When it comes to NR SL, as per R3 design [4], the DU should generate the configuration on RLC/MAC/PHY while the CU should generate the configuration on SDAP/PDCP/Measurement. Considering the legacy design of F1AP message, the potential impacts to RRC ASN.1 is that the configuration generated by DU should be defined in one IE, so that those parameters can be directly added in the RRCReconfiguration, together with those IEs generated by CU. In the current RRC SL configuration in RRCReconfiguration, those PHY, MAC, RLC, PDCP and SDAP configuration are mixed in SL-ConfigDedicatedNR, without such categorization.

Therefore, the following questions are asked.

* **Question 1:** Based on RAN3’s design, do companies agree to gather all the NR SL related configurations for RLC/MAC/PHY into one IE in *SL-ConfigDedicatedNR*?
1. Yes;
2. No.

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| **Companies** | **Preferred options** | **Comments if any** |
| Huawei | Yes | Otherwise, the gNB with CU-DC architecture cannot support NR SL configurations. |
| CATT | Yes | Agree with Rapporteur. |
| OPPO | Yes |  |
| Samsung | a) |  |
| MediaTek | Yes |  |
| Intel | a) |  |
| Ericsson | Maybe | This is more an optimization rather that something to fix something that is broken. On top of this, it seems that changes is not purely related to the ASN.1 but it impact also the procedural text and from which any solution has been provided. Therefore, before to fully agree on this we would like to see also how this changes is reflected in the procedural text.  |
| LG | a) |  |
| ZTE | a) |  |
| Qualcomm | a) |  |
| vivo | a) |  |

* **Question 2:** If “Yes” is selected for Question 1, do companies agree the changes to TS 38.331 in Appendix?
1. Yes;
2. No. If this option is selected, please specify which specific configurations do you think should be gathered in the same IE in SL-ConfigDedicatedNR?

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| **Companies** | **Preferred options** | **Comments if any** |
| Huawei | Yes | Just to gather related configurations with no other things changed. |
| CATT | Yes | Agree with Rapporteur. |
| OPPO |  | The appendix is generally correct, but the definition of sl-PHY-MAC-RLC-Config-r16 should be an octet string. |
| Samsung | a) |  |
| MediaTek | Yes, but see comment | We think OPPO are correct about the need for an OCTET STRING. We understand the IE will be transferred as an OCTET STRING from the DU to the CU and repacked over the air in that form. |
| Intel | a) |  |
| Ericsson | NO | Agree with OPPO that an OCTET STRING is needed. However, this should be added in the inter-node RRC messages and not in the IE send by the UE. This is the same logic we apply to the radioBererConfig in NR Uu and our preference is to re-use the same for sidelink. This is what I refer to (from 38.331):In **RRCReconfiguration**:RRCReconfiguration-IEs ::= SEQUENCE { radioBearerConfig RadioBearerConfig OPTIONAL, -- Need M secondaryCellGroup OCTET STRING (CONTAINING CellGroupConfig) OPTIONAL, -- Need M measConfig MeasConfig OPTIONAL, -- Need M lateNonCriticalExtension OCTET STRING OPTIONAL, nonCriticalExtension RRCReconfiguration-v1530-IEs OPTIONAL}And then in **CG-Config**:CG-Config-IEs ::= SEQUENCE { scg-CellGroupConfig OCTET STRING (CONTAINING RRCReconfiguration) OPTIONAL, scg-RB-Config OCTET STRING (CONTAINING RadioBearerConfig) OPTIONAL, configRestrictModReq ConfigRestrictModReqSCG OPTIONAL, drx-InfoSCG DRX-Info OPTIONAL, candidateCellInfoListSN OCTET STRING (CONTAINING MeasResultList2NR) OPTIONAL, measConfigSN MeasConfigSN OPTIONAL, selectedBandCombination BandCombinationInfoSN OPTIONAL, fr-InfoListSCG FR-InfoList OPTIONAL, candidateServingFreqListNR CandidateServingFreqListNR OPTIONAL, nonCriticalExtension CG-Config-v1540-IEs OPTIONAL} |
| LG | a) |  |
| ZTE | a) |  |
| Qualcomm | a) |  |
| vivo | a) |  |

## Issue #N.XYZ: Delta trigger for SL-RSRP reporting

This issue comes from [3] and also [5] discussed last meeting. Considering that a number of companies (at least 10 companies) explicitly supported the need of it (as observed in [5, Q1]), and the reason why it was not concluded last time was the lack of time for detailed discussion, it is hard to easily determine whether it is critical, so that the need of it and potential solutions should be continuously discussed in this meeting.

However, considering that this has ASN.1 impacts, it should be noted that at this stage, it is unrealistic to send an LS to RAN1 for any check, because the round-trip correspondence time will lead to this feature impossibly captured into TS 38.331 in time before ASN.1 freeze (i.e. LS sent this meeting to RAN1 🡪 RAN1 replies in May meeting 🡪 RAN2 has no time to discuss the specific change before June). Also, it is noted that as always, the measurement and reporting mechanism is mainly designed in RAN2, which is certainly able to directly conclude what procedures and configurations are needed. Therefore, it is proposed that RAN2 to further discuss the need and potential solutions to introduce the “delta-RSRP” based event for SL-RSRP reporting, without sending any LS to RAN1.

* **Question 3:** Assuming no LS to RAN1, is an event based on “delta” SL-RSRP measurement results needed 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.

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| **Companies** | **Preferred options** | **Comments if any** |
| Huawei | Yes | We are fine to follow the majority. But just to note again that no LS to RAN1, as we don’t have enough time to do so now. |
| CATT | No | SL-RSRP measurement is related with power control. Since there isn’t RAN1 requirement on “delta” SL-RSRP measurement, at the late stage, we prefer not to do such enhancement. |
| OPPO | Yes | We see this as an necessary tool to avoid recurring configuration based on the existing event S1/S2 (which requires frequent reconfiguration of the report triggering) |
| Samsung | b) | We think this is not an essential feature. So it is better not to handle this issue in this release. |
| MediaTek | Yes | Same view as OPPO, and we agree with the rapporteur’s analysis that this is in RAN2 scope to decide. |
| Intel | a) with comment | While we do think RAN1 should be involved in this decision (since this is really for open-loop power control and RAN1 requested this feature in the first place), we are ok if the majority wants to agree on this. |
| Ericsson | Yes | Agree to take the decision in RAN1 without consulting RAN1. |
| LG | b) | We think it seems not essential to be supported. We prefer to discuss this feature in a future release. |
| ZTE | b) | In our opinion, the UE can send the updated SL-RSRP measurement results when period report is triggered. If the measurement results changes frequently, the UE can configure short reporting period, otherwise, it can configure long reporting period. Therefore, even if the measurement results is always higher than a threshold or lower than a threshold, the UE can also send measurement results to the receiver UE. There is no need to introduce an event based on “delta” SL-RSRP measurement results. |
| Qualcomm | b) |  |
| vivo | b) | Agree with CATT. We are not sure about the benefit to introduce the Delta trigger for SL-RSRP reporting without RAN1 evaluation. |

## Issue #N.051: SR configuration for SL-SRBs

This is a left-over issue from email discussion [Post109e#54][V2X], as not enough companies’ inputs were collected, so that only the need can be discovered, without the concrete solution able to be reached. The specific issue is: now the SL-SRB configuration is specified but not NW configured, so no SR configuration can be configured for SL-SRBs in the current RRC spec; therefore, for a mode-1 UE, if an SL-BSR and SR is triggered by the logical channel of an SL-SRB, the UE can only depend on random access to request SL resources.

The reason why this issue is critical is that it may enforce the UE to have to rely on random access to request the SL grant for SL-SRB transmission, when an SL BSR is triggered by SCCH. Relying always on random access is obviously unacceptable. So below question is to resume the discussion of this issue.

* **Question 4:** Which of the following options do you agree, in order to make SL BSR triggered by the logical channel of SL-SRBs able to trigger SR transmission?
1. A list of *sl-SchedulingRequestId* is introduced to indicate the SR configurations used for SL SRBs. The SL-SRBs of different DSTs can be configured with different SR configuration IDs.
2. A list of *sl-SchedulingRequestId* is introduced to indicate the SR configurations used for SL SRBs. The SL-SRB of a specific SCCH is configured with a specific SR configuration ID without distinguishing to which DST the SL-SRB actually belongs.
3. An SR configuration ID is specified in the SL-SRB configuration of each SCCH respectively. When the NW configures an SR configuration with the SR configuration ID associated with an SL-SRB, the SR configuration is used for that SL-SRB.
4. When SL-BSR is triggered by SL-SRB, it can trigger SR transmission by using any SR configuration.
5. The SL-BSR triggered by SL-SRB cannot trigger SR transmission, but only rely on random access.
6. The list of sl-SchedulingRequestId used to indicate the SR configurations of SL DRBs can be reused for SL SRBs. Then the SL-SRB of a specific SCCH is configured with a specific SR configuration ID without distinguishing to which DST the SL-SRB actually belongs.

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| **Companies** | **Preferred options** | **Comments if any** |
| Huawei | a), b), c), d) | We are open to any solution to address this issue. But anyway, it is not acceptable for the UE to always use random access to as long as LCH of SL-SRB triggered SR, as this would lead to too frequent random access initiated but random access is not something used to request resource scheduling in normal cases. |
| CATT | c) or d) | We think It is straightforward to rely on specified SR configuration for each SL-SRB, i.e., Option c). But Option b) is also fine for us. |
| OPPO | c | It is straightforward to rely on specified configuration for SR as well (one thing to note that for the first SL-grant used for PC5-S DCR message, network can by its implementation to provide SL-grant directly without a need to further wait for SR/BSR, yet for the subsequent SRB messages, SR would be needed). |
| Samsung | d) |  |
| MediaTek | a), b), c) | We don’t have a strong view on the particular solution, but we agree a solution is needed. Option d) seems not informative enough for the network, since it doesn’t distinguish which SRs are for SL-SRB, while the network may want to handle them with different priority. |
| Intel | c) | We agree with OPPO that it seems like the most straightforward way to handle this issue |
| LG | a) | We prefer to follow the same rule as STCH. |
| ZTE | f) | As we know, in NR Uu, each SRB may be associated to a logical channel and each logical channel may be mapped with a SchedulingRequestId. Similarly, for sidelink, considering that SL SRB is not configured to associate to any logical channel, it can be mapped with a SchedulingRequestId directly. |
| vivo | d) | Option d) is simple and can avoid unnecessary RACH. |

## Issue #N.039: Security related configuration in the AS for NR SL unicast

The issue comes from [3] and is also associated with N.039. RAN2 has not started the discussion on the security related configurations for NR SL unicast, but this has potential RRC impacts (procedure and/or signalling).

The discussion of this issue needs to be based on the current SA3 progress. According to the latest TS33.536 [6], the security related configurations are mainly exchanged via PC5-S signaling, whereas the main impact to AS seems to be the security policy for integrity protection and/or for ciphering, for PC5 RRC signalling and/or for UP data.

According to SA3 design, it seems that they would like to imitate Uu, and make the integrity protection and/or ciphering for PC5 RRC signaling and/or UP bearers able to be enabled/disabled in the AS for NR SL unicast. Furthermore, it is still under SA3 discussion on the granularity of such security policy (i.e. whether per service or per connection). This brings about the question on whether RAN2 needs to have a ciphering and integrity protection enabling/disabling mechanism as in Uu for NR SL unicast in the AS.

However, considering the limited time left for RAN2 before ASN.1 freeze, and the fact that SA3 still not reached crystal clear conclusion, RAN2 may also need to consider whether AS really supports the flexible security policy designed by SA3 in this release. For example, if time is not enough, maybe the ciphering and integrity protection are mandatorily used for each PC5 RRC connection in this release, as long as they are configured and exchanged between the peer UEs via PC5-S signaling.

Bearing above progress and situation in RAN2 and SA3, the following questions are asked towards the AS security related configurations for SL-SRBs and SL-DRBs in SL unicast.

* **Question 5:** From AS perspective, do companies agree that ciphering and/or integrity protection is mandatory for the SL-SRB carrying PC5 RRC message on a PC5 RRC connection between the two UEs for unicast?
1. Yes for ciphering (no support of flexible ciphering enabling/disabling);
2. Yes for integrity protection (no support of flexible integrity protection enabling/disabling);
3. No for ciphering;
4. No for integrity protection;
5. Wait for further SA3 progress.

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| **Companies** | **Preferred options** | **Comments if any** |
| Huawei | a), b); ORe) | Due to the very limited time as well as no final conclusion from SA3 even till now, we propose to not support flexible cipher and integrity protection enabling/disabling mechanism in this release. Otherwise, we might have to wait for SA3 to make final decision in May, which may make RAN2 have to conclude all security related configurations in the very last meeting (May): this results in the risk whether RAN2 is able to complete all RRC impacts before ASN.1 freeze. |
| CATT | a), b) | In SA3 LS R2-1914357, SA3 have made the assumption that the PC5-RRC signalling for AS-layer configuration shall only be sent after security has been established. In RAN2#108 meeting, RAN2 confirm this assumption. Thus, we think the PC5 RRC message is always needed ciphering and integrity protection. |
| OPPO | See comment | Our understanding of the question here is whether MAC-I is to be always present for SRB of PC5-RRC or not. We see no difference compared to Uu interface on this, i.e., it can be always present, and can be set as 0 if integrity protection is not enabled.Or if the question here is about whether the enabling of ciphering / integrity-protection is always mandatory, we understand it is fully up to SA3 on the PC5-S signaling design, so out of RAN2 scope. |
| Samsung | e) | “whether ciphering and/or integrity protection is mandatory for the SL unicast” is up to SA3 decision. |
| MediaTek | e), but see comment | On the presence of MAC-I we agree with OPPO.The sidelink SRB for PC5-RRC signalling is a specified configuration (in section 9.1.1.4), so we understand that the question is whether we would change to have multiple configurations with/without ciphering/integrity. We think this decision has to come from SA3, hence option e). However, the spec impact in RRC seems not so great; section 9.1.1.4 would have to fork into multiple configurations, and section 5.8.9.1.6 would need corresponding branches according to what was indicated by upper layers.  |
| Intel | e) | While we understand the lack of time as a valid issue from rapporteur’s comments, we still think we should wait for SA3 to make this decision.  |
| Ericsson | a), b), e) | We think that integrity protection and chipering should be mandatory for SL-SRB. However, this need to be confirmed by SA3. |
| LG | e) |  |
| ZTE | a), b) | Base on SA3’s LS and RAN2 agreement “Except for Direct Communication Request, the MAC-I field is always present in the PDCP format for other PC5 Signallings and SL RRC signallings.”, it is surely that ciphering and integrity protection are needed for PC5-RRC messages. |
| Qualcomm | e) | We share the views expressed by OPPO and MediaTek.  |
| vivo | a), b); ORe) | Our understanding is that flexible enabling/disabling of security (i.e., ciphering/ integrity protection) are only appliable to DRBs but not SRBs as NR Uu. However, we are also open to send LS to SA3 to confirm such understanding.  |

* **Question 6:** From AS perspective,do companies agree that ciphering and/or integrity protection is mandatory for SL-DRBs on a PC5 RRC connection between the two UEs for unicast?
1. Yes for ciphering (no support of flexible ciphering enabling/disabling);
2. Yes for integrity protection (no support of flexible integrity protection enabling/disabling);
3. No for ciphering;
4. No for integrity protection;
5. Wait for further SA3 progress.

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| **Companies** | **Preferred options** | **Comments if any** |
| Huawei | a), b); ORe) | Due to the very limited time as well as no final conclusion from SA3 even till now, we support to not support flexible cipher and integrity protection enabling/disabling mechanism in this release. Otherwise, we might have to wait for SA3 to make final decision in May, which may make RAN2 have to conclude all security related configurations in the very last meeting (May): this results in the risk whether RAN2 is able to complete all RRC impacts before ASN.1 freeze |
| CATT | c), d) | In SA3 LS R2-1916275, for user plane data, SA3 mentioned “For unicast, depending on the requirements of each V2X application, AS-layer ciphering can be configured.” and “For unicast, depending on the requirements of each V2X application, AS-layer integrity protection can be configured.”Thus, we think both ciphering and integrity protection can be separately configured for SL-DRBs for unicast, which is more flexible. |
| OPPO | See comment | Our understanding of the question here is whether MAC-I is to be always present for DRB or not. We see no difference compared to Uu interface on this, it can be optional, and up to PC5-S signaling configuration.Or if the question here is about whether the enabling of ciphering / integrity-protection is always mandatory, we understand it is fully up to SA3 on the PC5-S signaling design, so out of RAN2 scope. |
| Samsung | e) | “whether ciphering and/or integrity protection is mandatory for the SL unicast” is up to SA3 decision. |
| MediaTek | c), d), but see comment | The SA3 LS quoted by CATT indicates that security can be set per service, which suggests per DRB, and we think RAN2 should proceed on this assumption until and unless SA3 give us different guidance. |
| Intel | e) | Same comment as in the last question |
| Ericsson | c), d), e) | We think that integrity protection and chipering should be optional for SL-DRB. However, this need to be confirmed by SA3. |
| LG | e) |  |
| ZTE | c), d) | In TS 33.536, it is specified “When establishing the user plane bearer the initiating UE shall indicate the configuration of confidentiality and integrity protection in the PC5-RRC message.”. It is clearly that SA3 assumes the ciphering and integrity protection for SL data for unicast are flexible configurable at AS layer.We shall keep the flexibility for configuring the ciphering and integrity protection for SL DRBs for unicast. |
| Qualcomm | c), d) | We share the view that security can be configured, as well as the observations from OPPO and MediaTek regarding SA3 guidance.  |
| vivo | c), d); ORe) | Same comments in Question 5. |

* **Question 7:** If Option c) or d) is selected to Question 6, how should the ciphering and/or integrity protection be enabled/disabled for the SL-DRBs on the PC5 RRC connection between the two UEs for unicast?
1. Yes, enable/disable ciphering in a per connection manner (applying to all SL-DRBs on this connection);
2. Yes, enable/disable ciphering in a per bearer manner;
3. Yes, enable/disable integrity protection in a per connection manner (applying to all SL-DRBs on this connection);
4. Yes, enable/disable integrity protection in a per bearer manner;
5. No, not support any flexible security enabling/disabling mechanism for SL-DRB in this release;
6. Wait for further SA3 progress;
7. Others. If this option is selected, please indicate the specific solution.

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| **Companies** | **Preferred options** | **Comments if any** |
| Huawei | e) preferable; a) and c), if RAN2 concludes the support of flexible security enabling/disabling  | As indicated in above Q5-6, we prefer supporting non-flexible security enabling/disabling mechanism for this release. So option e) is our first choice. If anyway RAN2 concludes to support flexible security enabling/disabling mechanism, we think it is enough to support it in a per connection manner, i.e. the enabling/disabling of ciphering and integrity protection applied to all SL-DRBs on a PC5 RRC connection. Otherwise, there would be other complicated issues that might need addressing by RAN2 (e.g. as in below Q7, what if different PC5 QoS flows having different security enabling/disabling mechanism are mapped to same SLRB configuration by NW)  |
| CATT | a) and c) with comments | We prefer to follow Uu principle. In Uu, the ciphering and integrity protection are configured per DRB, but NW needs to guarantee the same configuration for all DRBs with the same PDU-session ID Thus, for sidelink, we prefer to configure per bearer, but the UE needs to guarantee the same configuration for all SL DRBs in the same PC5 connection.Moreover, if we have some progress on this issue from RAN2 perspective, we think we need send LS to SA3 for further check. |
| OPPO | F | We understand it is fully up to SA3 decision, and up to PC5-S signaling configuration, so not of RAN2 scope (In general, we understand per-connection is preferred, i.e., to follow legacy, but that is anyway of SA3 scope). |
| Samsung | f) | We also prefer to per-connection manner if the flexible security policy is applied. But still this is up to SA3.  |
| MediaTek | a), c), but see comment | We generally agree with CATT. It’s natural for security to be signalled per bearer as part of the PDCP configuration, but it seems reasonable to have a Uu-like constraint that all SL DRBs in the same PC5 unicast link have the same setting. This should, however, be checked with SA3. |
| Intel | f) |  |
| Ericsson | f) | We prefer to wait for SA3 before to decide on the mechanism on how to enable/disable, integrity protection and chipering. |
| LG | f) |  |
| ZTE | b), d) | Similar as Uu, the ciphering and integrity protection shall be configured per bearer, but the UE can guarantee the same configuration for all SL-DRBs for the same PC5 connection. As our comments in Q6, it is very clear in SA3 spec that the ciphering and integrity protection can be configured. RAN2 shall consider how to support this feature and make the decision instead of SA3. |
| Qualcomm | f) |  |
| vivo | f) | The detailed mechanism is totally SA3 scope. |

In SL unicast, the security configuration and policy are actually configured and exchanged between the two peer UEs, so that they are invisible to the gNB. Therefore, if the flexible security policy of ciphering and integrity protection enabling/disabling is supported in the AS, there might be the case that on a PC5 RRC connection, the UEs may apply different ciphering/integrity protection policy (i.e. enabling/disabling) for the PC5 QoS flows which are however mapped to the same SL-DRB configuration provided by the gNB/preconfiguration (especially for RRC\_IDLE/INACTIVE/OoC UEs). To this end, it seems that the UE may need to configure different SL-DRBs for these QoS flows, based on the same SL-DRB configuration, and only map the QoS flows with the same ciphering and integrity onto the same SL-DRB configured.

* **Question 8:** Is it a possible case that a UE applies different ciphering and/or integrity protection policies (i.e. enabling/disabling) for the PC5 QoS flows which are mapped to the same SL-DRB (pre-)configurations by the NW? If yes, how to deal with them?
1. Yes, the UE configures different SL-DRBs for these PC5 QoS flow, and mapped the flows with the same ciphering/integrity protection policy (i.e. enabling/disabling) into the same SL-DRB;
2. Wait for further SA3 progress;
3. Others. If this option is selected, please indicate the specific solution.
4. No, it can be avoided if this release does not support flexible ciphering/integrity protection enabling/disabling mechanism or supports only ciphering/integrity enabling/disabling mechanism at a per connection level.

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| **Companies** | **Preferred options** | **Comments if any** |
| Huawei | d) | Option d) is our preference, since this can avoid further complicated RAN2 impacts (also see our comments to above Q5, 6, 7). However, if one anyway supports the ciphering/integrity protection at a per bearer level for SL-DRBs (b/d in Q7) , then Option a) may happen, leading to further RAN2 impacts on how to deal with it and potential extra RAN2 impacts.  |
| CATT | d) | As we comments in Q7, the UE should apply the same ciphering/integrity protection policy (i.e. enabling/disabling) for all SL DRBs in the same PC5 connection, even though the ciphering and integrity protection are configured per SL DRB. Thus, we think the issue raised in Q8 can be avoided. |
| OPPO | B | We need to rely on SA3 conclusion on this part anyway (we prefer d, but again that is SA3 scope anyway). |
| Samsung | b) | Same as Q7 |
| MediaTek | d), but check with SA3 | The problem can be avoided if the policy is at the connection level, but we should get confirmation from SA3. |
| Intel | b) |  |
| Ericsson | b) | We need to wait for SA3 progress. |
| LG | b) |  |
| ZTE | e) | Generally, it is not possible that different ciphering/integrity protection is required for the PC5 QoS flows in a PC5 unicast link/connection. Though the ciphering/integrity protection policy is per unicast link, the ciphering and integrity protection enable/disable shall be configured per SL DRB.As our comments in Q6 and Q7, even though the ciphering and integrity protection are configured per SL DRB, the UE can guarantee the same configuration for all SL-DRBs for the same PC5 connection. |
| Qualcomm | b) |  |
| vivo | b) | Same as Q7 |

## Issue #N.046: Header compression configuration in PC5-RRC for NR unicast

The issue comes from [1] where some companies are concerned about whether the below header compression configuration, *sl-HeaderCompression*, in RRCRecnfigurationSidelink should be kept or removed.

SL-PDCP-ConfigPC5-r16 ::= SEQUENCE {

 sl-PDCP-SN-Size-r16 ENUMERATED {len12bits, len18bits} OPTIONAL, -- Need N

 sl-HeaderCompression-r16 CHOICE {

 notUsed-r16 NULL,

 rohc-r16 SEQUENCE {

 maxCID-r16 INTEGER (1..16383) DEFAULT 15

 }

 },

 ...

}

The current situation is: some companies think that as per SA2 spec, only one of IP and non-IP traffic can be transmitted on a PC5 RRC connection, so there is no case where the IP and non-IP traffic are mapped to the same SLRB, and thus this configuration *sl-HeaderCompression* works for the SLRB for IP traffic; by contrast, some other companies think there may still be the case that IP and non-IP traffic are mixed in the same SLRB on a PC5 RRC connection (like for a DST in groupcast/ broadcast), so one SLRB can have different header compression attributes, and thus it is impossible to have this *sl-HeaderCompression.*

Below question is to discuss this issue, with focus on the AS impacts, i.e. whether to have this configuration in PC5 RRC message or not.Note that there seems to be no problem in NR SL, even if an SLRB is enabled with header compression but a non-IP packet is mapped to it, because with the help of SDU type in PDCP, the UE will not perform header compression to non-IP packet [7, 5.2.3/4]. Also, the bottom line would be to step back to LTE SL/V2X SL way of handling, i.e. leaving only the header compression configuration in preconfiguration (like in SL-PreconfigGeneral-r12), which can apply to all unicast/broadcast/groupcast without problem.

* **Question 9:** Should this field sl-HeaderCompression be included in RRCReconfgiurationSidelink?
1. Yes.
2. No.

|  |  |  |
| --- | --- | --- |
| **Companies** | **Preferred options** | **Comments if any** |
| Huawei | b) preferable, ORa) acceptable | First, no matter there is the case that IP and non-IP traffic can be mixed in one SLRB in unicast, this field anyway works without technical problem. Reason is that, according to PDCP spec, 5.2.3/4, it says the UE shall “perform the header compression/decompression using ROHC as specified in clause 5.7.4, if SDU Type is IP.”; then even for an SLRB having mixed IP and non-IP traffic, this field is interpreted as “ applying to **only packets with SDU type = IP packet** ”. This also means that, RAN2 does not need to specifically conclude whether such mixed IP/nonIP into an SLRB exists or not, because in either way this field of sl-HeaderCompression in RRCReconfigurationSidelink works. However, it is seen that even if there is no such field, it seems the header compression still works, i.e.: if we step back to LTE SL/V2X SL, and put the ROHC related parameters in the pre-configuration, the TX/RX UE will use the preconfigured ROHC profile to do header compression/decompression for any IP packet. Of course, the TX UE can rely on this field in RRCReconfigurationSidelink to open/close the header compression function, but then this looks like some forms of enhancements from this perspective, since even without it, it can still work. So our top preference is to remove it and step back to LTE way (which is the baseline to work w/o any further problems), lest any further potential ambiguity among companies is further caused for this IP vs. non-IP issue. . |
| CATT | b) | We prefer a common solution for all unicast/broadcast/groupcast, i.e., the LTE rule can be used as leaving only the header compression configuration in preconfiguration and UE can perform header compression to IP packet with the help of SDU type in PDCP. |
| OPPO | B | We are fine to rely on LTE solution to this at the current stage. |
| Samsung | b) | We are fine to configure the parameter in pre-configuration. |
| MediaTek | b) | Given the outcome of the issue on PC5-RRC connection to PC5 unicast link mapping, we understand that a PC5-RRC connection can now carry only one of IP and non-IP traffic, so it would be possible to have this field. However, we agree that the LTE solution works. |
| Intel | b) | We are also ok with pursuing the LTE solution |
| Ericsson | a) | Given that the parameter is already in the specification and that can be set to “notUsed”, we don’t see any harm in keeping it. |
| LG | b) | We are fine to follow the LTE rule. |
| ZTE | b) |  |
| Qualcomm | b) |  |
| vivo | a) | We agree with Huawei that there is no problem for the case that IP and non-IP traffic are mixed in one SLRB for unicast (if supported). We can simply keep the parameter, but also fine to follow the majority. |

## Issue #N.071 Numbering SL-SRBs or not

This is related to N.071 in [1]. The comments are as follows:

|  |  |  |
| --- | --- | --- |
| N.071(M107) | MediaTek | [Issue Description]Sidelink SRBs could be numbered.[Proposed Change] 5.8.1 GeneralReplace “One sidelink SRB” with “SL-SRB0/1/2/3” respectively. This would also need to propagate to the message definitions in section 6.6.2. |

The reason why this issue needs to be discuss is that, after numbering the SL-SRBs in TS 38.331, there might be potential changes led to other Specs, e.g. PDCP, with everywhere then needing to use this numbered SL-SRB. So it is better to check with companies whether this change, along with other potential changes it would result in, is worth.

* **Question 10:** Do companies agree to number the SL-SRB configurations in 9.1.1.4? If yes, what is the specific number for each SL-SRB configuration?
1. Yes. If this option is selected, please give specific the number for each SL-SRB configuration in 9.1.1.4.
2. No.

|  |  |  |
| --- | --- | --- |
| **Companies** | **Preferred options** | **Comments if any** |
| Huawei | b) | No need is identified. |
| CATT | a) | We think it’s clearer in the spec to number the SL-SRB configurations. The specific number for each SL-SRB can be as follows:* SL-SRB0 for unprotected PC5-S message (e.g. Direct Communication Request);
* SL-SRB1 for PC5-S message establishing PC5-S security (e.g. Direct Security Mode Command and Direct Security Mode Complete);
* SL-SRB2 for protected PC5-S message;
* SL-SRB3 for PC5-RRC message.
 |
| OPPO | A | It seems a cleaner method by relying the numbering to index the SL-SRBs in different spec.We have no strong view on the numbering. |
| Samsung | a) | The numbering seems clearer. We are fine with the suggestion by CATT. |
| MediaTek | a) | We think it’s unnecessarily wordy to rely on phrases like “SL-SRB for unprotected PC5-S messages”, and it creates some risks in spec maintenance that a phrase is incorrectly read or written, so we would prefer to number the SRBs in order of appearance, as suggested by CATT.We checked PDCP and found four places where an SRB number would be needed (sections 5.9, 6.2.2.4, 6.3.2, and 6.3.4). Stage 2 seems to be OK as it is. |
| Intel | a) | We are ok with the proposed numbering |
| Ericsson | a) | No strong view on the numbering. |
| LG | a) | It is clear to set the number of the SL-SRB configuration. The number of SL-SRB can be equal to the index of the LCID as specified in Table 6.2.4-1 in 38.321.Table 6.2.4-1 Values of LCID for SL-SCH

|  |  |
| --- | --- |
| Index | LCID values |
| 0 | SCCH carrying PC5-S messages that are not protected |
| 1 | SCCH carrying PC5-S messages "Direct Security Mode Command" and "Direct Security Mode Complete" |
| 2 | SCCH carrying other PC5-S messages that are protected |
| 3 | SCCH carrying PC5-RRC messages |

 |
| ZTE |  | No strong opinion |
| Qualcomm | a) | This seems a cleaner approach, but we do not have a strong view this issue.  |
| vivo | a) | Agree with CATT. |

## Issue #N.009 SLRB configuration procedure

This is a subsequent discussion of #N.009 in email discussion [Post109e#54][V2X], where two FFS were left over therein:

|  |
| --- |
| **Proposal 8: RAN2 further discuss the following two issues for SLRB configuration procedures in 5.8.9.1.4 and 5.8.9.1.5 and decide whether any changes are needed. Other changes are to be discussed in WI specific TS 38.331 CR reviewing.*** **Whether there is a need to separate the SLRB addition/modification/release procedures for Gcast/Bcast and Ucast**
* **Whether the SL DRB release conditions need to be changed, and if yes, what specific case is missing and/or needs to be corrected.**
 |

The first bullet mainly comes from the two Tdoc: 1) R2-2002625 (OPPO) changes on 5.x.9.1.4.2, 2) R2-2003679 (Samsung) P1.

The second bullet mainly comes from P2-4 in R2-2002624(OPPO).

**For the 1st bullet**

As to the concerns from R2-2002625 (OPPO) changes on 5.x.9.1.4.2, rapporteur has sympathy with the intention and will include the proposed changes in the next version of running CR.

As to the P1 from R2-2003679 (Samsung), company proposes that SL DRB addition/modification/release procedures for TX UE in SL groupcast/broadcast should be specified in a new subclause of section 5.8.9, in order to differentiate with the unicast.

Therefore, rapporteur would like to ask companies the following question?

* **Question 11:** Which option below do you prefer?
1. The current spec style: the SL DRB addition/modification/release procedures for all cast types are captured in the subclauses 5.8.9.1.4 and 5.8.9.1.5. (no distinction between procedures of Ucast and Gcast/Bcast)
2. A proposed CR: Move the description for broadcast/groupcast DRB into new sections in 5.8.9.1.x, 5.8.9.1.y, and change subclauses 5.8.9.1.4 and 5.8.9.1.5 as dedicated for unicast SL DRB. (distinguishing procedures of Ucast and Gcast/Bcast)

|  |  |  |
| --- | --- | --- |
| **Companies** | **Preferred options** | **Comments if any** |
| Huawei  | a) |  |
| CATT | a) |  |
| OPPO | See comment | We support the differentiation of different cast-types in RRC spec. then seems we have different options:1. Either we do this within the existing of 5.8.9.1.4/5;
2. Or to add a new section in 5.8.9.1.x/y, i.e., to separate from the existing 5.8.9.1.4/5 on unicast only

We have no strong view, as long as the spec can differentiate the behavior clearly. |
| Samsung | b) with comment | The section 5.8.9.1 defines SL RRC reconfiguration procedures which is only applicable for unicast. Then its subclauses 5.8.9.1.N should be targeted for unicast. If common procedures i.e., RB configuration for all cast types should be defined in its subclauses, the section 5.8.9.1 should be clarified accordingly. |
| MediaTek | b) | We think it’s cleaner to have separate sections for the different cast types. |
| Intel | a) |  |
| Ericsson | No strong view | We have no strong view on this issue, but maybe different section for the cast type is a more future proof solution. |
| LG | b) with comment | There is no strong view, but the procedure for each cast type needs to be clearly identified. |
| ZTE | b) | We think it is better to distinguish procedures of unicast and Gcast/Bcast |
| Qualcomm |  | No strong view on this issue |
| vivo | a) is preferred.b) is also acceptable. |  |

**For the 2nd bullet**

Before we go to the next question, rapporteur would like to clarify the current spec on the “5.8.9.1.4.1 Sidelink DRB release conditions”, because the concern from P1 in R2-2003679 (Samsung) for bullet 1 may come from a misunderstanding to the spec. And also, the concern from P2-4 in R2-2002624 (OPPO) for bullet 2 may come from a different preference again the current spec.

For the SL DRB release condition, based on the following spec:

|  |
| --- |
| 5.8.9.1.4.1 Sidelink DRB release conditionsFor NR sidelink communication, a sidelink DRB release is initiated only in the following cases: 1> for the *slrb-Uu-ConfigIndex* (if any) of the sidelink DRB, if *slrb-Uu-ConfigIndex* isincluded in *sl-RadioBearerToReleaseList* in *sl-ConfigDedicatedNR*,or if no sidelink QoS flow with data indicated by upper layers is mapped to the sidelink DRB for transmission, which is (re)configured by receiving *SIB12* or *SidelinkPreconfigNR*; and1> for the *slrb-PC5-ConfigIndex* (if any) of the sidelink DRB, if *slrb-PC5-ConfigIndex* isincluded in *slrb-ConfigToReleaseList* in *RRCReconfigurationSidelink*, or if the sidelink QoS flow mapped to the sidelink DRB, which is (re)configured by receiving *RRCReconfigurationSidelink*, has no data; |

For each SL DRB, the current SL-DRB release procedures work as follows; whether the DRB can be released needs to check:

* Case 1: This DRB was configured with *slrb-Uu-ConfigIndex* before and this DRB was also configured with *slrb-PC5-ConfigIndex* before: With the two “(if any)” satisfied, UE needs to check both (i.e. “and”) buttet 1>
* In this case, this DRB is configured by its NW via *slrb-Uu-ConfigIndex* and also by its peer UE via *slrb-PC5-ConfigIndex.* The DRB is used for bi-direction transmittion. **It should be relased only after both its NW and its peer UE inform that the DRB is not needed anymore**.
* Case 2: This DRB was only configured with *slrb-Uu-ConfigIndex* before: With the 1st “(if any)” satisfied, UE only needs to check 1st buttet 1>, since the (if any) in the 2nd bullet 1>is not satisfied.
* In this case, this DRB is only configured by its NW for transmission to the peer UE. As long as the NW informs the release of the DRB, UE can directly release that.
* Case 3: This DRB was only configured with *slrb-PC5-ConfigIndex* before: With the 2nd “(if any)” satisfied, UE only needs to check 2nd buttet 1>, since the (if any) in the 1st bullet 1> is not satisfied.
* In this case, this DRB is only configured by its peer UE for reception. As long as the peer UE informs the release of the DRB, UE can directly release that.

A different mechanism is proposed as P2/3 in R2-2002624 as below:

|  |
| --- |
| Proposal 2 RAN2 confirm CONNECTED UE **perform the network command on SLRB release immediately** for all cast types, and rely on network implementation to ensure there is no need to carry the L2 feedback for the counterpart SLRB for unicast.Proposal 3 RAN2 confirm unicast UE **perform the AS-layer configuration command from the counterpart UE immediately,** and rely on UE implementation to ensure there is no need to carry the L2 feedback for the counterpart SLRB. |

With the proposal 2/3, even in **case 1** above, the UE should release the DRB as long as either NW or peer UE informs the release.

Therefore, rapporteur would like to ask companies following questions?

* **Question 12:** Which option do you prefer on the SL DRB release condition in 5.8.9.1.4.1: for the SL DRB, which was configured both by its NW and by its peer UE for bi-direction transmission (e.g. data or feedback)?
1. The current spec style: UE releases the DRB only after *both* its NW *and* its peer UE inform the SL DRB release, which means transmissions in both directions finish.
2. A proposed CR: UE releases the DRB once *either* its NW *or* its peer UE inform the SL DRB release, which means the coordination between its NW and its peer UE to determine whether both direction transmission finish is required by implementation.

|  |  |  |
| --- | --- | --- |
| **Companies** | **Preferred options** | **Comments if any** |
| Huawei  | a) |  |
| CATT | a) |  |
| OPPO | B | The current spec leads to a different operation compared to legacy:* In legacy, when UE receives the RRC command from network, it would take effect immediately, (maybe conditional handover is an exceptional case, but that is a different story since network meant to send the handover command which is not to take effect immediately);
* Here, even if the network send the RRC command to UE, the UE may delay the effect of that, until the counterpart SLRB satisfy the condition.

If we go for the latter case, it would cause ambiguity to network, i.e., network would not know whether the RRC command sent to the UE has been “accepted” by UE or not, and thus later it is hard for network to perform any subsequent SL reconfiguration, since the previous one on SLRB release may not take effect yet. |
| Samsung | b) | Assuming that this question is only about SL unicast, the SLRB release can be directed by the peer UE based on the peer UE’s configuration (i.e., dedicated RRC or SIB12) where the configuration may not be same as UE’s configuration. Then, UE should follow peer UE’s direction with no its NW direction. |
| MediaTek | a) | For the UE in RRC\_CONNECTED, the network will be informed if the reconfiguration fails, so we’re not sure the problem described by OPPO really exists. |
| Intel | a) |  |
| Ericsson | b) | For case1 described by the Rapporteur, the UE should release immediately the DRB if the network indicates to do so. Further, regardless if option a) or option b) is pursued, the current procedural text needs anyway to be revised and split in more sub-bullets (i.e., 1>, 2>, >3..) as having conditions in parenthesis (e.g., if any) is definitively not the right way to go. |
| LG | b) |  |
| ZTE | b) |  |
| Qualcomm | a) |  |
| vivo | a) | Agree with MediaTek that the NW can be informed by the UE no matter the reconfiguration fails or completes, so it seems no big issues here. |

# Conclusion

# References

1. R2-20xxxxx Updated RRC Open Issue List for 5G V2X with NR SL Huawei, HiSilicon
2. R2-2003560 Summary document of 6.4.2.3 for ASN.1 related issues in V2X session Huawei, HiSilicon
3. R2-2003520 Summary document for AI 6.4.2.1 - RRC aspects Huawei, HiSilicon
4. RAN3 #106 meeting minutes
5. R2-2001965 Report for the offline discussion on Category-2 proposals in RRC summary Huawei (Rapporteur)
6. TS 33.536, V1.1.0
7. TS 38.323, V16.0.0

# Appendix: Prototype change for Question 2

– *SL-ConfigDedicatedNR*

The IE *SL-ConfigDedicatedNR* specifies the dedicated configuration information for NR sidelink communication.

***SL-ConfigDedicatedNR* information element**

-- ASN1START

-- TAG-SL-CONFIGDEDICATEDNR-START

SL-ConfigDedicatedNR-r16 ::= SEQUENCE {

 ~~sl-ScheduledConfig-r16 SetupRelease { SL-ScheduledConfig-r16 } OPTIONAL, -- Need M~~

 ~~sl-UE-SelectedConfig-r16 SetupRelease { SL-UE-SelectedConfig-r16 } OPTIONAL, -- Need M~~

 ~~sl-FreqInfoToReleaseList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF ARFCN-ValueNR OPTIONAL, -- Need N~~

 ~~sl-FreqInfoToAddModList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfig-r16 OPTIONAL, -- Need N~~

 sl-RadioBearerToReleaseList-r16 SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SLRB-Uu-ConfigIndex-r16 OPTIONAL, -- Need N

 sl-RadioBearerToAddModList-r16 SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SL-RadioBearerConfig-r16 OPTIONAL, -- Need N

 ~~sl-RLC-BearerToReleaseList-r16 SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfigIndex-r16 OPTIONAL, -- Need N~~

 ~~sl-RLC-BearerToAddModList-r16 SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfig-r16 OPTIONAL, -- Need N~~

 sl-MeasConfigInfoToReleaseList-r16 SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-DestinationIndex-r16 OPTIONAL, -- Need N

 sl-MeasConfigInfoToAddModList-r16 SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-MeasConfigInfo-r16 OPTIONAL, -- Need M

 t400-r16 ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000} OPTIONAL, -- Need M

 ~~sl-CSI-Acquisition-r16 ENUMERATED {enabled} OPTIONAL, -- Need N~~

 ~~sl-CSI-SchedulingRequestId-r16 SchedulingRequestId OPTIONAL, -- Need N~~

 ~~sl-SSB-PriorityNR-r16 INTEGER (1..8) OPTIONAL, -- Need N~~

 ~~sl-PUCCH-Config-r16 PUCCH-Config OPTIONAL, -- Need N~~

 ~~sl-PDCCH-Config-r16 PDCCH-Config OPTIONAL, -- Need N~~

 ~~networkControlledSyncTx-r16 ENUMERATED {on, off} OPTIONAL, -- Need N~~

sl-PHY-MAC-RLC-Config-r16 SL-PHY-MAC-RLC-Config-r16 OPTIONAL, -- Need M

 ...

}

SL-PHY-MAC-RLC-Config-r16::= SEQUENCE {

 sl-ScheduledConfig-r16 SetupRelease { SL-ScheduledConfig-r16 } OPTIONAL, -- Need M

 sl-UE-SelectedConfig-r16 SetupRelease { SL-UE-SelectedConfig-r16 } OPTIONAL, -- Need M

 sl-FreqInfoToReleaseList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF ARFCN-ValueNR OPTIONAL, -- Need N

 sl-FreqInfoToAddModList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfig-r16 OPTIONAL, -- Need N

 sl-RLC-BearerToReleaseList-r16 SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfigIndex-r16 OPTIONAL, -- Need N

 sl-RLC-BearerToAddModList-r16 SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfig-r16 OPTIONAL, -- Need N

 sl-CSI-Acquisition-r16 ENUMERATED {enabled} OPTIONAL, -- Need N

 sl-CSI-SchedulingRequestId-r16 SchedulingRequestId OPTIONAL, -- Need N

 sl-SSB-PriorityNR-r16 INTEGER (1..8) OPTIONAL, -- Need N

 sl-PUCCH-Config-r16 PUCCH-Config OPTIONAL, -- Need N

 sl-PDCCH-Config-r16 PDCCH-Config OPTIONAL, -- Need N

 networkControlledSyncTx-r16 ENUMERATED {on, off} OPTIONAL, -- Need N

}

SL-DestinationIndex-r16 ::= INTEGER (0..maxNrofSL-Dest-1-r16)

-- TAG-SL-CONFIGDEDICATEDNR-STOP

-- ASN1STOP