**3GPP TSG-** **RAN2 Meeting #119-bis electronic R2-221xxxx**

**Online, 10th – 19th Oct 2022**

**Agenda item:** 6.7.1

**Title:** Report of [AT119bis-e][414][Relay] Rel-17 relay RRC CR (Huawei)

**Source:** Huawei, HiSilicon

**Document for:** Discussion and decision

1. Introduction

This is the report of the following offline discussion.

* [AT119bis-e][414][Relay] Rel-17 relay RRC CR (Huawei)

Scope: Check the rapporteur CR in R2-2210493, consider related proposals on RRC, and merge in decisions of this meeting. Checkpoint at Rel-17 CB second week; discussion can be extended for merging of the CR.

Intended outcome: Agreeable CR

Deadline: Friday 2022-10-14 1000 UTC (for initial checkpoint)

2. Discussion

In Monday session, the following proposals in R2-2210890 ([Pre119bis-e][401] Summary of AI 6.7.2.2 on relay control plane) are left to [414].

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| RLC handling:  [To be discussed] Proposal 2.2: RAN2 to discuss if the default SL\_RLC1 configuration is used to establish Rx RLC channels for SRB1 messages without Tx UE’s indication, or to adopt PC5-RRC from Tx to Rx for the default SL\_RLC1 configuration. [UEs need to align the understanding]  To be handled in email discussion [414] |

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| [To be discussed] Proposal 13: RAN2 confirms that each PC5 Relay RLC channel configuration provided by network to Relay UE is uniquely associated with one Remote UE. [NW and UEs need to align the understanding]  To be further discussed in email discussion [414]. |

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| Others：  [To be discussed] Proposal 8: RAN2 confirms for sidelink discovery reception the remote UE also needs to check remote UE AS-layer condition. [No inter-operability issue]  [To be discussed] Proposal 10: RAN2 to discuss whether to clarify in AS specifications that emergency services/limited service level is not supported by remote UE in Rel-17. [No inter-operability issue]  [To be discussed] Proposal 12: RAN2 to discuss the change in R2-2210170, i.e. “if T301 and T304 is are not running, initiate the RRC connection re-establishment procedure as specified in 5.3.7”. [No inter-operability issue]  P8/P10/P12 to be discussed in email discussion [414]. |

In addition, the P2 in R2-2210777 (Summary of AI 6.7.2.4 on discovery and reselection) is left to [414] as well.

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| Proposal 2: Merge R2-2209894 into RRC rapporteur’s discussion for further discussion. |

Therefore, in this offline discussion some questions are given on the following aspects to further collect companies’ views.

## 2.1 AS-layer condition for discovery reception

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| **TDoc number** | TDoc title | Source | Proposals | Rapporteur’s comment |
| [**R2-2209377**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209377.zip) | Correction for U2N Relay | OPPO | 3. In 5.8.3.2, remove the relay/remote UE AS-layer condition for relay discovery reception, to align with 5.8.13.2 | The intention is to align the descriptions in RRC as well as TS 38.304, to say there is no need to check remote UE AS-layer condition for sidelink discovery reception. However the issue is if remove remote UE AS condition for discovery reception, it seems there is no way to control a UE being a remote UE in Model A (annouce and monitor). The other way to align 5.8.13.2 is to add the AS condition in 5.8.13.2. Suggest to further discuss. So the rapporteur would like to suggest:  *RAN2 confirms for sidelink discovery reception the remote UE also needs to check remote UE AS-layer condition.* |
| [**R2-2210625**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210625.zip) | U2N relay related clarifications | Nokia, Nokia Shanghai Bell | 4. In clause 8.1 "or receive" is remove from the sentence "The U2N Remote UE, the U2N Relay UE, or both may transmit or receive NR sidelink relay discovery (i.e., as specified in TS 23.304 [22]) if it fulfills the condition(s) defined in TS 38.331 [3].". |

In the above proposed changes, companies suggest to remove the AS threshold condition checking from SUI procedure in RRC spec and from NR sidelink discovery description in 38304. The rapporteur understands the similar issue has been discussed in previous meetings, i.e. companies propose to add the AS threshold condition checking for discovery reception in RRC spec, but majority think AS condition should not control monitoring behavior and LTE sidelink relay has not such limitation, so the change was not agreed.

However, for the proposals to remove threshold condition from SUI and 38.304, the rapporteur also has some concerns, which are mainly on discovery Model A, wherein the Remote UE only needs to monitor the discovery announcement message broadcasted by a Relay UE, then it can choose to select the Relay UE and perform data transmission via the Relay UE, even when the Remote UE is in cell center and the network configures a Uu threshold to restrict only the UEs in cell edge can use U2N relaying functions. This situation would be out of network control and create interference to network and other UEs, which should not be the expectation when the Uu threshold condition was agreed in LTE as a basic relay mechanism.

After further checking LTE spec, although the threshold condition is not used during discovery monitoring, but it is used to trigger RRC connection establishment, which means if the threshold condition is not met, a Remote UE is not allowed to enter RRC\_CONNECTED state to request resource and configuration for relay related communication, which also achieve the purpose that the UE cannot perform relaying function if the threshold condition is not met. In this case, if we want to completely align with LTE spec, the corresponding clauses in NR spec should be updated as well.

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| 5.3.3.1a Conditions for establishing RRC Connection for sidelink communication/ discovery/ V2X sidelink communication/ NR sidelink communication  For sidelink communication an RRC connection is initiated only in the following case:  1> if configured by upper layers to transmit non-relay related sidelink communication and related data is available for transmission:  2> if *SystemInformationBlockType18* is broadcast by the cell on which the UE camps; and if the valid version of *SystemInformationBlockType18* does not include *commTxPoolNormalCommon*;  1> if configured by upper layers to transmit relay related sidelink communication:  2> if the UE is acting as sidelink relay UE; and if *SystemInformationBlockType18* is broadcast by the cell on which the UE camps; or  2> if the UE has a selected sidelink relay UE; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met and if *SystemInformationBlockType18* is broadcast by the cell on which the UE camps; and if the valid version of *SystemInformationBlockType18* does not include *commTxPoolNormalCommon* or *commTxAllowRelayCommon*; |

So the rapporteur suggest to first check whether companies do **intentionally** want to allow the UE not met the threshold conditions to ignore the network control. And then check the views on the potential spec changes.

Q1.1: Do companies want to support that when network broadcasts Uu threshold for remote UE, the remote UE is allowed to ignore the threshold and be acting as Remote UE/perform relaying operation by discovery Model A?

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| **Company** | **Yes/No** | **Comments** |
| OPPO | No with comment | We are somewhat open on this, yet would like to highlight that based on the current spec, the Uu threshold is only used for discovery Tx but not Rx. |
| Ericsson | No | We think Rapp’s concern makes sense. we shall not allow the UE in the cell centre to trigger relay setup. |
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Q1.2: Regrading potential RRC spec change, which way do companies prefer?

* Option1: No further spec change, i.e. no threshold conditions in 5.8.13.2 (discovery monitoring), while keep the threshold conditions in 5.8.3 (SUI);
* Optoin2: Add threshold conditions to 5.8.13.2 (discovery monitoring);
* Option3: Remove threshold conditions from 5.8.3 (SUI), while add the threshold conditions in 5.3.3.1a (establishing RRC connection)/ 5.3.13.1a (resuming RRC connection) to align with LTE spec;
* Other option if any.

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| **Company** | **option** | **Comments** |
| OPPO | See comment | If no change at all (option-1), the pain is in some cases, the SUI message cannot be initiated, if it is OK for network vendor, it is fine for us. So we prefer the change / removal in 5.8.3.2 (option-3 on 5.8.3.2)  While for 5.3.3.1a and 5.3.13.1a, we are open to discuss whether it is needed or not. |
| Ericsson | Option 1 | Option 1 shall be already sufficient. We prefer to limit the spec change as much as possible. |
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Q1.3: Regrading potential 38304 spec change, do companies think

* Q1.3.1: the spec needs to be updated?
* Q1.3.2: the change #4 in R2-2210625 can be agreed?

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| **Company** | **Yes/No to** **Q1.3.1** | **Yes/No to** **Q1.3.2** | **Comments** |
| OPPO | Yes | Yes | If we keep the current status in 331 w.r.t. no AS-layer condition for discovery reception. |
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## 2.2 Emergency service support/limited service state

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| [**R2-2209892**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209892.zip) | Calarification on emergency service support in Rel-17 U2N relay | CATT | Add one note to clarify that the emergency service is not supported in Rel-17 U2N relay. | The rapporteur understands the change is not essential because emergency service is initiated by upper layers, therefore whether it is supported or not in relay case can be agnostic to AS spec. But it would be good to double check others’ view.  *RAN2 to discuss whether to clarify in AS specifications that emergency services/limited service level is not supported by remote UE in Rel-17* |
| [**R2-2210625**](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210625.zip) | U2N relay related clarifications | Nokia, Nokia Shanghai Bell | 2. In Clause 4.3. it is clarified that that limited service level is not supported for an L2 U2N Remote UE. |

In R2-2209892, it is proposed to clarify that emergency services is not supported as SA2 is going to support it in Rel-18, while R2-2210625 propose to clarify if a UE is “camping on” a L2 U2N Relay UE, it cannot support limited service level, and propose to add such description in TS 38.304 spec.

The rapporteur understands that from RAN2 perspective, there seems no issue to support emergency service/limited service state, as we have already discussed the cause value of emergency, and adopted the term of serving cell to cover acceptable cell case. But if SA2/CT1 already agree emergency service/limited service state cannot be supported in Rel-17, there seems no harm to make clarifications in AS specifications. Companies’ views are welcome.

Q2.1: do companies agree:

* Q2.1.1: Emergency services cannot be supported in Rel-17?
* Q2.1.2: Clarification is needed to RRC spec as proposed in R2-2209892?

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| **Company** | **Yes/No to** **Q2.1.1** | **Yes/No to** **Q2.1.2** | **Comments** |
| OPPO | Unspecified in S2 spec in R17, supported in R18. | No | For remote-UE’s emergence service when relay UE is in normal service state, there is a NOTE in S2 spec saying this is not specified in R17. And in R18, it is clarified that it is supported.  So if companies want to do some clarification in R2 spec, we suggest to limit the discussion to limited service state instead of emergency service, since the latter one has finally supported in R18. In the end, for whether clarify something in R2 spec, we are neutral. |
| Ericsson | SA2 uses the wording “unspecified”, which is different from “not support”. In R17, there is some basic support as RAN2 discussion on emergency cause | No | We don’t see the need to update the RRC. But, if the majority companies would like to introduce RRC change, a better way is just refer to SA2 spec  e.g. “for U2N remote UE, how the emergency service is supported is captured in TS 23.304” |
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Q2.2: do companies agree:

* Q2.2.1: Limited service state cannot be supported in Rel-17?
* Q2.2.2: Clarification is needed to 38.304 as proposed in R2-2210625?

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| **Company** | **Yes/No to** **Q2.2.1** | **Yes/No to** **Q2.2.2** | **Comments** |
| OPPO | Unclear in R17, clarified in R18 in S2 spec | Tend to avoid concluding on this in R2 since S2 R17 spec is unclear on this point. | For the limited service of relay-UE, according to our S2 colleagues, there is some uncertainty in R17, yet they clarified it in R18, i.e., Relay UE in limited service state cannot provide service for remote UE.  For the limited service of remote-UE, according to our S2 colleagues, there is some uncertainty in R17, yet they clarified it in R18, i.e., Remote UE in limited service state can use relay archiecture. |
| Ericsson | We agree with OPPO | We agree with OPPO | We shall not make hurry conclusion, we may postpone this issue to future meetings to give companies more time to further check. |
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## 2.3 NotificationMessageSidelink handling during I2D path switching

R2-2210170 raised one scenario that during the I2D path switch, the Remote UE may not release PC5 unicast link immediately, in which case the Relay UE may have chance to send NotificationMessageSidelink to the Remote UE. In order to avoid the Remote UE initiating RRC reestablishment according to 5.3.7, it propose to make change to RRC spec as blow:

*“if T301 and T304 ~~is~~ are not running, initiate the RRC connection re-establishment procedure as specified in 5.3.7”.*

Q3: Do companies agree with the change in R2-2210170,i.e. *“if T301 and T304 ~~is~~ are not running, initiate the RRC connection re-establishment procedure as specified in 5.3.7”?*

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| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes | The change is fine, although the issue is not essential |
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## 2.4 Relay (re)selection

R2-2209894 proposes the following changes. The reason is that in the current description there is a gap between the level-4 bullet of determining AS criterial is met and the level-4 bullet of having more than one suitable relay. Although the NOTE 2 intended to fill the gap, with the proposed changes the structure seems smoother. In addition, the last level-4 bullet of determining no relay to be selected only reflects AS criteria but not upper layer criteria which seems unclear and better to update anyway. Thus the rapporteur understand the changes are reasonable.

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| 5.8.15.3 Selection and reselection of NR sidelink U2N Relay UE  …  …  2>…  2> if the UE has a selected NR sidelink U2N Relay UE, and sidelink radio link failure is detected on the PC5-RRC connection with the current U2N Relay UE as specified in clause 5.8.9.3:  3> perform NR sidelink discovery procedure as specified in clause 5.8.13 in order to search for candidate NR sidelink U2N Relay UEs;  4> when evaluating the one or more detected NR sidelink U2N Relay UEs, apply layer 3 filtering as specified in 5.5.3.2 across measurements that concern the same U2N Relay UE ID and using the *sl-FilterCoefficientRSRP* in *SystemInformationBlockType12* (if in RRC\_IDLE/INACTIVE), the *sl-FilterCoefficientRSRP* in *sl-ConfigDedicatedNR* (if in RRC\_CONNECTED) or the preconfigured *sl-FilterCoefficientRSRP* as defined in 9.3 (out of coverage), before using the SD-RSRP measurement results;  4> consider a candidate NR sidelink U2N Relay UE for which SD-RSRP exceeds *sl-RSRP-Thresh* by *sl-HystMin* has met the AS criteria;  3> if there is any candidate NR sidelink U2N Relay UE can be regarded as suitable NR sidelink U2N Relay UE:  4> consider one of the available suitable NR sidelink U2N relay UE(s) can be selected;  3> else:  4> consider no NR sidelink U2N relay UE(s) to be selected.NOTE 2: A candidate NR sidelink U2N Relay UE which meets all AS layer criteria defined in 5.8.15.3 and higher layer criteria defined in TS 23.304 [65] can be regarded as suitable NR sidelink U2N Relay UE by the NR sidelink U2N Remote UE. If multiple suitable NR sidelink U2N Relay UEs are available, it is up to Remote UE implementation to choose one NR sidelink U2N Relay UE. The details of the interaction with upper layers are up to UE implementation.  NOTE 3: For L2 U2N Remote UEs in RRC\_IDLE/INACTIVE and L3 U2N Remote UEs, the cell (re)selection procedure and relay (re)selection procedure run independently. If both suitable cells and suitable NR sidelink U2N Relay UEs are available, it is up to NR sidelink U2N Remote UE implementation to select either a cell or a NR sidelink U2N Relay UE. Furthermore, L3 U2N Remote UE's selection on both cell and NR sidelink U2N Relay UE is also based on UE implementation. |

Q4: Do companies agree with the above change in R2-2209894 for relay (re)selection?

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| **Company** | **Yes/No** | **Comments** |
| OPPO | No | The intention has always been reflected in the NOTE, there is no need to reclaim it in normative text. |
| Ericsson | Yes | Changes are reasonable. Better to use normative text than a note. |
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## 2.5 RLC handling

For the discussion on Proposal 2.2, the key point is when Tx-UE establish Tx RLC channel whether it is triggered by Rx UE as other DRBs/SRB using dedicated configuration or establish using default configuration autonomously as specified SL\_RLC0. Both options can work but different specification impact is expected.

Q5: Which option do companies prefer for default SL-RLC1 configuration?

* Option1: default SL\_RLC1 configuration is used to establish Rx RLC channels for SRB1 messages without Tx UE’s indication (align with current specification);
* Option2: Tx-UE uses PC5-RRC to inform Rx-UE to establish RLC channel by applying default SL\_RLC1 configuration, in this case one special PC5 RLC channel ID needs to be reserved and network should not use this value for PC5 channel configuration via Uu message. (Clarification on the channel ID reservation is required in spec).

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| **Company** | **option** | **Comments** |
| OPPO | 2 | We do not think option-1 = no change to the spec.  If we abandon PC5-RRC signaling for default configuration of SRB1-RLC (but not for the dedicated RLC configuration of SRB1, which means anyway it is not a clean method for SRB1), we see the issue that in case of ‘change from default to dedicated configuration and later back to **default configuration’**, finally Tx still needs to rely on **PC5-RRC signaling** to update the configuration @ Rx.  Opponent (of option-1) may argue that, in order to avoid PC5-RRC in such case, one solution is to always use separate LCID for dedicated SRB1-RLC and default SRB1-RLC, which means   1. There would more than one LCID (other than 57) occupied by SRB1-RLC 2. When a dedicated configuration for SRB1-RLC is added, Rx UE has to perform SL\_RLC1 release although no explicit signaling to tell the Rx UE to do so; Or When a dedicated configuration for SRB1-RLC is released, Rx UE has to perform SL\_RLC1 adding although no explicit signaling to tell the Rx UE to do so => This part of the operation is obviously new and would lead to spec impact.   On the contrary, for option-2, we just need to decide a RLC channel ID for the SL\_RLC1, (as for dedicated RRC configuration for SRB1-RLC), e.g., we can fix the RLC channel ID for SL\_RLC1, e.g., 1, so that all the other procedural text in spec can be kept without further change, and we can still limit the LCID for SRB1-RLC to 57.  Based on the analysis above, we believe option-2 is the one with less impact actually. |
| Ericsson | Option 1 | We think the current spec is sufficient |
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For the discussion on proposal 13, the rapporteur would like to highlight this proposal is in line with what has been supported in Rel-16 for V2X, if more things are to be supported, new UE logic to handle the configuration of setup/modification/release needs to be discussed and specified. If there is no strong necessity for the new handling, it is suggested to just keep what can be supported in current spec and avoid any over-optimization at this stage.

Q6.1: Do companies agree that each PC5 Relay RLC channel configuration provided by network to Relay UE is uniquely associated with one Remote UE?

(If the answer is no, please indicate why it is necessary to use one configuration for multiple RLC channel establishment?)

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| **Company** | **Yes/No** | **Comments** |
| OPPO |  | Firstly, we understand ‘each PC5 Relay RLC channel configuration provided by network to Relay UE is uniquely associated with one Remote UE’ is anyway a possible NW implementation, and thus has to be supported by UE implementation. And the Q is whether it is the only implementation, and thus if not, UE implementation may take more cases into account.  During the previous discussion, however, we heard some voice from some UE vendor to argue it is not the only implementation, yet some voice from some NW vendor to argue it is the only implementation.. which is confusing to us: I thought unless NW vendor has an intention to support an extra implementation, UE vendor can agree/disagree to support the extra implementation. So we would like to hear more from the NW vendor first to know if it is a real issue to discuss. If so, and if there is objection from some UE vendors on it, we can further debate to conclude. |
| Ericsson | Yes | This is the typical behaviour (e.g., same as Uu), given remote UE is just like a normal UE to the gNB. The question itself is not clear. It needs to be stated that, if companies answer Yes, meaning no spec change. |
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Q6.2: If it is allowed to create multiple RLC channels using one RLC configuration, how to trigger the relay UE to establish the RLC channel using the existing configuration?

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Q6.3: If it is allowed to create multiple RLC channels using one RLC configuration, when one of the RLC channels needs to be modified, how the relay UE differentiate which one to modify?

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Q6.4: If it is allowed to create multiple RLC channels using one RLC configuration, when one of the RLC channels needs to be released, how the relay UE differentiate which one to release?

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3. Conclusion