3GPP TSG-RAN WG2 Meeting #118 Electronic R2-220xxxx

Online, 09 – 20 May 2022

**Agenda item: 6.7.2.7**

**Source: Huawei, HiSilicon**

**Title: Report of [Pre118-e][602][Relay] 38331 CR and rapporteur resolutions (Huawei)**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report of the following email discussion:

* [Pre118-e][602][Relay] 38331 CR and rapporteur resolutions (Huawei)

In the email discussion, the rapporteur has provided the resolutions and suggested conclusions (i.e. PropAgree, PropReject, ToDisc) to the class 1/2 RIL comments (registered in RIL file v207) for SL Relay. The proposed changes marked as PropAgree have been implemented in the draft CR to be submitted in the meeting. Based on companies further clarification/comments/contributions submitted to RAN2#118, the rapporteur has updated the suggested resolutions, conclusion in the RIL issue list and corresponding draft RRC CR which are to be submitted in R2-220xxxx.

In this document, the left RIL issues (i.e. marked as ToDisc) are listed and the proposals are given for further discussion in the meeting.

# 2 Discussion

**2.1 ToDisc issue list**

In the discussion, the following issues are raised by companies and the rapporteur understand further discussion in the meeting is needed to conclude those issue.

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| --- | --- | --- | --- | --- |
| Number | Issue | Related RILs/Company contributions | Class | Handled by other email |
|  | Clarify exceptional cases for L2 U2N Relay UE’s to trigger RRC connection establishment by AS layer. | V200, v201 | Class 1 |  |
|  | Whether the concept of PCell/current cell is applicable to L2 remote UE. | O002, E089, A806 | Class 1 |  |
|  | Discuss whether L2 relay can be configured with HO without DRB and/or SRB2. | O004 | Class 1 |  |
|  | About PC5 RLC bearer and SRAP configuration for remote UE’s SRB1 transmission at PC5 hop,  1. Clarify if the dedicated configuration can be provide via RRCSetup/RRCReestablishment which has no full security; if allowed, double check if the SetupRelease structure is needed.  2. Revisit the RAN2 agreement that the SRB1 messages other than RRCResume/RRCReestablishment/RRCReconfigurationComplete in case of path switch to IDLE/INACTIVE relay UE mush use dedicated PC5 RLC configuration. | H596, A302, H812(R2-2206075), O94, I012, N005, H811(R2-2206074). | Class 2 |  |
|  | Clarify the meaning and differentiation of the following term: capable of/acting as/is a L2 U2N Relay UE or Remote UE. | A304/A305/A307/A311(R2-2205635), H809(R2-2206076) | Class 1 |  |
|  | Clarify how to determine serving cell change of target relay UE before path switch. | X200, H808(R2-2206073) | Class 1/2 |  |
|  | Relay Re/selection Requirement Conflict;  Clarify UE behaviour on cell (re)selection and relay (re)selection. | M112(R2-2204587), v208 | Class 1 | #610 |
|  | For NR SL discovery transmission, the specific pools for CBR measurements are unknown and should be specified. | Z651, Z652, V353(R2-2204564). | Class 1 | #610 |
|  | Regarding measurement reporting on candidate relay, clarify if the strongest relay is among the ones met upper layer criteria. | A314 | Class 1 |  |
|  | Dedicated pool and shared pool prioritization for discovery monitoring. | V410(R2-2204675), O058(R2-2204636) | Class 1 | #610 |
|  | Clarification on the term of “no suitable cell” for OoC case during AS criteria checking, e.g. no serving cell, out of coverage on the frequency used for SL communication, no acceptable cell, no cell to camp on. | M106, O075, O076, H810(R2-2206072), B207/B208(R2-2205685) | Class 1 |  |
|  | How to configure Remote UE specific timer value, e.g. introduce a remote UE specific offset, define longer values for remote UE. | V213(R2-2204678) and B100(R2-2205695) | Class 2 | #608 |
|  | To enable Remote UE request posSIBs (or Rel-17 SIBs). | M119, H629, Xiaomi(R2- 2205319) | Class 2 | #608, Multi-WI session? |
|  | Whether to differentiate “cell change” in stop condition of the timers. | O090 | Class 1 | #608 (Q9) |
|  | Whether to specify remote UE behaviour of re-establish PC5 RLC channel of SRB1 during RRC reestablishment. | A805 | Class 1 |  |
|  | Clarify whether CHO can be configured to relay UE | B103 | Class 1 |  |
|  | Missing information of PCI and ARFCN-DL for key derivation during RRC resume/reestablishment procedure. | I046(R2-2205826) | Class 2 |  |
|  | To enable allowlist for Event X1 | S776 (R2-2205092) | Class 2 |  |
|  | Clarify whether groupcast/uniast are supported for discovery | Q539(R2-2205962) | Class 2 | #610 |
|  | Confirm the LCIDs of SL\_RLC1, SL\_RLC0, SL SRB4 are 56, 57, 58.  Note this is not marked as ToDisc as companies have aligned proposed change but would like to confirm with others. | Z671, V216, O089, Z672, V218 | Class 1 but with impact on MAC spec |  |

As per Chair guidance, the general principle of the discussion priority is that the class2 issues which have asn.1 impact and the cross-WI issues would be treated with highest priority. **Therefore the class 2 issues would be discussed and addressed first**.

**2.2 Higher priority issues (class 2)**

### Issue 4: PC5 RLC bearer and SRAP configuration for remote UE’s SRB1 transmission at PC5 hop

The background is for SRB1 transmission at PC5 hop, RAN2 has agreed:

1. RRCResume/RRCReestablishment/RRCReconfigurationComplete in case of path switch to IDLE/INACTIVE relay UE use default configuration of PC5 RLC bearer;

2. The SRB1 RRC messages other than above must use dedicated configuration of PC5 RLC bearer;

3. The SRAP header is present for SRB1 transmission at PC5 hop.

The agreements require the dedicated configuration of PC5 RLC bearer and SRAP configuration must be provided via MSG.4. And the potential issues pointed by RIL comments are:

1. There is no full security in RRCSetup/RRCReestablishment message, this is why the two messages do not include dedicated configuration of cell group in legacy Uu interface, thus suggest to remove the dedicated configuration specific to SRB1 transmission at PC5 hop from the two messages. One consequence would be no dedicated configuration used for MSG. 5, this would be fine if default configuration is allowed for other SRB1 messages.

2. For the reception of RRCResume/RRCReestablishment at remote UE, the SRAP header is present, but there is no SRAP configuration/entity yet, leading to a deadlock that the msg4 message is stuck in RLC entity. Thus company suggests to add a default configuration of SRAP for at least RRCSetup/RRCReestablishment message.

The rapporteur understands the above comments are valid and thus propose to agree the above suggestions:

**Proposal 1: Regarding the configuration used for SRB1 transmission/reception at PC5 hop, RAN2 to agree:**

* **All SRB1 messages are allowed to use default SL-RLC1, i.e. remove the dedicated configuration from RRCSetup/RRCReestablishment message;**
* **Define default configuration of SRAP used for reception of RRCResume/RRCReestablishment at PC5 hop, in order to establish SRAP entity and pass the messages to RRC layer.**

### Issue 17: Missing information of PCI and ARFCN-DL for key derivation during RRC resume/reestablishment procedure

In Uu, the KgNB used for integrity protection of RRCReestablishment and for cyphering and integrity protection of RRCResume is derived according to the PCI and ARFCN-DL of the current cell. The information of the PCI and ARFCN-DL of the current cell is obtained during cell search in physical layer. However, when a UE accesses network via a L2 U2N Relay UE, it is not required to perform physical cell search, thus the PCI and ARFCN-DL are not available. In this case, such information should be provided to the remote UE via explicit signalling. The most straightforward way is relay UE provides the information via PC5 message/discovery message to remote UE before remote UE sending/receiving RRCResume/RRCReestablishment. While the other possible way might be network provide the information in RRC messages. For instance, for RRC reestablishment, PCI and ARFCN-DL can be included in RRCReestablishment. After reception of the RRC message, the UE derives KgNB and perform IP checking on the message. But for RRC resume, PCI and ARFCN-DL cannot be provided in RRC resume message which is already cyphered, then RAN2 needs to discuss other message like RRC release message is workable.

The rapporteur understands it would be better to use a pure PC5 message for this purpose and avoid more impact on legacy RRC message, thus propose:

**Proposal 2: PCI and ARFCN-DL should be provided to remote UE to derive KgNB before remote UE receiving RRCResume/RRCReestablishment message. FFS using PC5 RRC or the RRC container in discovery message.**

### Issue 18: To enable allowlist for Event X1

As pointed out by the proponent, this point has been discussed previously by RAN2. And all companies agreed that the allow list can be supported for path switch from indirect to direct link in legacy way without signalling impact, thus the moderator did not provide a proposal for this issue. However, as the new events of X1 and X2 have been introduced for I2D path switch, the allow list is not added in the new event. Thus it is proposed to add allow list to Event X1.

The rapporteur understands this aligns with the majority views in the previous discussion and the signalling change is quite simple, thus propose:

**Proposal 3: RAN2 to agree adding useAllowedCellList in event X1.**

### Issue 20. Confirm the LCIDs of SL\_RLC1, SL\_RLC0, SL SRB4 are 56, 57, 58.

Considering this issue may have impact on other spec, thus the rapporteur would like to treat it as higher priority.

**Proposal 4: RAN2 to confirm the LCIDs of SL\_RLC1, SL\_RLC0, SL SRB4 are 56, 57, 58.**

**2.2 Medium priority issues (may have asn.1 impact)**

### Issue 6: How to determine serving cell change of target relay UE before path switch

RAN2 has discussed the case that target relay in idle/inactive may perform cell reselection after network sending path switch command to the remote UE and before the remote UE successfully connecting to the target relay UE, and agreed that remote UE triggers RRC reestablishment if it identifies such cell change of target relay. However, regarding how the remote UE identifies such case, there is no absolute consensus, thus the compromise is to leave it to UE implementation (e.g. discovery procedure or measurement procedure). Now companies commented it should clarify the UE behaviour, the potential solutions are:

1. Based on measurement report;

2. Based on cell ID which should be indicated in both of path switch command and discovery message, i.e. NCGI is to be added to path switch command.

For solution 1, during previous discussion it was commented by companies that it is not a must that network configure path switch based on measurement results. With the rapporteur hat on, it is suggested:

**Proposal 5: RAN2 to down select among the solutions for remote UE determining target relay UE’s serving cell change:**

* **Based on measurement report;**
* **Based on cell ID indicated in both of path switch command and discovery message, i.e. NCGI is to be added to path switch command.**
* **Keep the current description, i.e. left to UE implementation.**

**2.3 Lower priority issues (class 1)**

Among the left class 1 issues, the rapporteur understands those issues can be treated at best effort. If there is no enough time, they can be handled in CR update, but it would be helpful anyway if company views can be collected before that.

### Issue 2: Whether the concept of PCell/current cell is applicable to L2 remote UE

On this issue, one side is that RAN2 agreed the relay UE’s PCell is remote UE’s PCell as remote UE is controlled by the cell behind relay UE. The other side is the remote UE is not connected directly via the physical cell, thus it is not literally served by the cell. But the rapporteur understand aligning the existing wording in the spec can avoid having more relay specific spec impact, thus suggests RAN2 to keep the concept of PCell/current cell for remote UE if no particular technical issue is found.

**Proposal 6: RAN2 to agree keeping the concept of PCell/current cell for remote UE.**

### Issue 3: Discuss whether L2 relay can be configured with HO without DRB and/or SRB2

In legacy Uu interface, the UE can only be configured with HO when there is at least one DRB and/or SRB2. However, in case of L2 U2N relay operation, it is possible that relay UE has no its own DRB but only configured with Uu Relay RLC channel for relaying service, it is not clear whether the relay UE can be configured with HO. The rapporteur understand as there is no group handover for relay, thus it is not so much useful to allow such handover case, thus for simplicity suggest:

**Proposal 7: RAN2 to confirm L2 relay cannot be configured with HO without DRB and/or SRB2 (Same requirement as legacy UE).**

### Issue 16: Clarify whether CHO can be configured to relay UE

For remote UE’s CHO, RAN2 has discussed and agreed with no support. But for relay UE’s CHO, there is no discussion/consensus. Assuming CHO can be configured to relay UE, relay UE needs to release the unicast link or send notification message to the UE which will have bad influence on the remote UE’s experience, thus the rapporteur does not see much value to support it. For simplicity, the rapporteur suggests:

**Proposal 8: RAN2 to confirm CHO cannot be configured to L2 U2N Relay UE.**

### Issue 11: Clarification on the term of “no suitable cell” for OoC case during AS criteria checking, e.g. no serving cell, out of coverage on the frequency used for SL communication, no acceptable cell, no cell to camp on

During the CR update discussion, the wording of “out of coverage” was first used, but companies commented it is not clear, as there are different understanding in the context of OoC in Uu coverage or OoC in sidelink frequency. Then the wording was changed to “serving cell”, but companies commented that if the UE is in IDLE, serving cell is not right thus suitable cell should be used. In the end, the term of “suitable cell” was adopted in the final Relay RRC CR without considering the case of limited service state. As indicated in M106, using “suitable cell” will be interpreted as if the UE has no suitable cell but an acceptable cell, it can directly consider the AS condition is fulfilled without considering the Uu RSRP condition, which is not the intention.

To address this issue, it was proposed to change “no suitable cell” to:

* Option 1. no acceptable cell;
* Option 2. no serving cell;
* Option 3. no cell to camp on;
* Option 4. out of coverage on the frequency used for NR sidelink communication, and the concerned frequency is not included in sl-FreqInfoToAddModList in sl-ConfigDedicatedNR within RRCReconfiguration message or included in sl-FreqInfoList within SIB12

The rapporteur understand option 1/option 2/option 3 are better as option 3 will hide the case of remote UE is in Uu coverage but the frequency used for sidelink communication is different from that used for Uu communication. Thus suggest to down select among option 1/option 2/option 3.

**Proposal 8: RAN2 to discuss to replace “no suitable cell” with which one from “no acceptable cell” or “no serving cell” or “no cell to camp on”.**

### Issue 5: Clarify the meaning and differentiation of the following term: capable of/acting as/is a L2 U2N Relay UE or Remote UE

In current RRC specification, the definitions of U2N relay UE and U2N remote UE are provided as following:

**U2N Relay UE: A UE that provides functionality to support connectivity to the network for U2N Remote UE(s).**

**U2N Remote UE: A UE that communicates with the network via a U2N Relay UE.**

However, in the exiting procedure text, the usage of U2N remote/relay UE definition is not popular. Instead, there are some other alternative descriptions. Therefore, the descriptions and the definitions should be aligned to avoid possible misunderstanding. Thus the rapporteur suggests:

**Proposal 9: Update the RRC specification as following:**

* **For the procedural text only applicable to UEs acting as U2N remote UE or U2N relay UE, use “UE is acting as U2N remote/relay UE”**
* **For the procedural text common for UEs acting as U2N remote/relay UE and UEs to be acting as U2N remote/relay UE, use “UE capable of U2N remote/relay UE operation”**

### Issue 9: Regarding measurement reporting on candidate relay, clarify if the strongest relay is among the ones met upper layer criteria.

The rapporteur understands the remote UE is not required to check other criteria than AS RSRP threshold, as the network can check if the candidate relay UE is suitable for path switch in terms of other factors, thus see no issues on the current description of the strongest relay.

**Proposal 10: RAN2 to confirm there is no requirement on the remote UE to check upper layer criteria for measurement reporting.**

### Issue 15: Whether to specify remote UE behaviour of re-establish PC5 RLC channel of SRB1 during RRC reestablishment

The rapporteur understands in legacy Uu interface the UE needs to re-establish RLC bearer of SRB1 after sending RRCReestablishmentRequest message. However, there seems no PC5 RLC reestablishment in sidelink, thus not sure if it can be specified for RRC reestablishment procedure.

**Proposal 11: RAN2 to discuss whether to specify remote UE behaviour of re-establish PC5 RLC channel of SRB1 during RRC reestablishment.**

### Issue 1: Clarify exceptional cases for L2 U2N Relay UE’s to trigger RRC connection establishment by AS layer

The rapporteur understands the intention is to clarify that relay may enter connected state triggered by remote's access but not by relay's own NAS layer, which is true. But in SA2 spec, when AS tells upper layer there is remote UE's access, the upper layer will provide service request to AS as legacy, thus the legacy sentence seems still applicable. For simplicity, the rapporteur suggests to keep the current wording in the spec without change.

# 3 Conclusion