**3GPP TSG-RAN WG2 #112-e *Draft\_R2-201xxxx***

**E-meeting, November 2020**

Agenda Item: 8.7.1

Source: OPPO

Title: Summary of [AT112-e][601][Relay] Status update to SA2 (OPPO)

Document for: Discussion, Decision

# Introduction

This is for the discussion below

* [AT112-e][601][Relay] Status update to SA2 (OPPO)

Scope: Generate a summary of RAN2 status on relaying for SA2

* Report status of both L2 and L3 relaying designs as well as architecture-independent aspects (including issues in R2-2008760), in order to coordinate with SA2 for reaching conclusions
* Capture any points where we assume SA2 will resolve an issue

Intended outcome: Approvable LS in R2-2010862

Deadline: Friday 2020-11-13 0000 UTC

# Discussion

Firstly, this LS has to solve the questions from SA2 included in R2-2008760

*- SA2 assumes Direct Discovery message will be transmitted in PC5 communication channel, RAN2 is kindly asked to confirm this assumption.*

Given the following text in SID, rapporteur assume it is the assumption in RAN WGs since the very beginning.

1. *Study mechanism(s) to support upper layer operations of discovery model/procedure for sidelink relaying, assuming no new physical layer channel / signal [RAN2];*

**Q1a: Do you agree RAN2 to confirm the SA2 assumption that “Direct Discovery message will be transmitted in PC5 communication channel”?**

* **Yes;**
* **No;**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| MediaTek | Yes | This is in align with the work scope of SL Relay study |
| CATT | Yes | Assuming no new physical layer channel / signal is introduced, the discovery message for relay should be transmitted using the PC5 communication channel. |
| OPPO | Yes |  |
| Sharp | Yes |  |
| Interdigital | Yes |  |
| Intel | Yes | We understand that this just implies that no new channel for discovery shall be introduced |
| Samsung | Yes |  |
| Qualcomm | Yes | We believe this is also RAN2’s common understanding, and thereby RAN2 can confirm it. |
| Nokia | Yes |  |
| vivo | Yes |  |
| Huawei | Yes |  |
| ZTE | Yes |  |

Summary: all companies agree to confirm SA2 consumption.

1. RAN2 confirms the SA2 assumption that “Direct Discovery message will be transmitted in PC5 communication channel”.

And also the following question

*- SA2 has agreed “Destination L2 ID, Source L2 ID; Discovery Group ID” will be included in discovery messages, RAN2 is kindly ask whether they can be included in an AS layer, e.g. in MAC header.*

If following the R16 design, source L2 ID and Desination L2 ID are carried jointly by SCI and MAC header

* 8 bit in SCI and 16 bit in MAC header, for source L2 ID
* 16 bit in SCI and 8 bit for MAC header, for destination L2 ID

And group ID is reflected as the destination L2 ID for group-cast.

So to respond SA2 on the question above, considering RAN1 is not involved in this sidelink relay, rapporteur understand it is not preferred to go for a different MAC PDU format which may impact RAN1 as well.

**Q1b: For SA2 question on whether the “Destination L2 ID, Source L2 ID; Discovery Group ID” can be included in an AS layer, e.g., in MAC header:**

* **Option-1: RAN2 assume reusing the R16 MAC PDU design as above;**
* **Option-2: Other (please explain the option);**

|  |  |  |
| --- | --- | --- |
| Company | Option | Comments |
| MediaTek | Option-1 |  |
| CATT | Option-2 | It’s too rash to discuss the detailed design and we would like to leave it to WI stage.  For the answer to SA2, the below description can be referred:  “RAN2 confirm that the Destination L2 ID, Source L2 ID and Discovery Group ID can all be included in AS layer, e.g. in MAC header.” |
| OPPO | Option-1 | Solution causing RAN1 impact is not aligned with the SID, so it seems not a RAN2-only issue that fully up to RAN2. |
| Sharp | Option-1 | Agree with the rapporteur’s analysis. The Discovery Group ID is used in group member discovery. Based on the existing design, there seems no need in AS layer to know the group information. |
| Interdigital | Option-1 | We prefer to not change the MAC header format. The L2 source/destination IDs are already carried in the AS layer. The discovery group ID can be reflected by SA2 in the L2 destination ID, or carried in PC5 signaling – which would be upto SA2 discussion. |
| Intel | Option-1 | We think Option-1 should be agreeable, i.e. reusing R16 MAC PDU design |
| Samsung | Option-1 | Same view as Interdigital. The MAC header format of Rel-16 NR SL carrying Source L2 ID and Destination L2 ID does not have to be changed. Discovery Group ID can be reflected as a destination L2 ID of the discovery group. |
| Qualcomm | Option-1 | We think Discovery Group ID is not needed to be included as a third address field beyond Rel-16 MAC PDU (with source and destination L2 ID).  In groupcast of NR V2X (TS 23.287), the UE converts the “group identifier” into a destination L2 ID. Because we have agreed that NR discovery message is sent over PC5 communication, the same mechanism of groupcast in NR V2X can be reused, i.e. the “Discovery Group ID” can mapped to a Destination L2 ID to be carried in the Discovery message. |
| Nokia | Option-1 | The reponse from RAN2 to SA2 should just focus on SA2 specific question: “Yes, Dest-ID, Src-ID, Group-ID can be included in an AS layer”.  The detailed solution of the AS layer, i.e. how the three elements are embedded needs to be discussed within RAN2. |
| vivo | Option-1 | We agree to reuse the R16 MAC PDU design, but on the other hand we think the SA2 should be informed that the Discovery Group ID they mentioned in the LS is not explicitly carried in AS layer (i.e. reflected as the destination L2 ID for group-cast), and we can ask if there is any concern. |
| Huawei | Option-1 | We understand the in SA2 LS the design to include the three L2 ID into discovery message is for Prose direct communication, not sure if it is also applicable for SL relay. However, we agree with rapporteur the R16 MAC format could be reused to covey the three information as assumed by SA2. |
| ZTE | Option-1 | Weshould try to reuse NR V2X MAC design as much as possible. So weprefer to keep MAC header design unchanged. |

Summary: 9 out of 10 companies support option-1.

1. RAN2 assume R16 MAC PDU design is reused to carry discovery message.

Then for the following question from SA2

*SA2 kindly requests RAN2 to provide the progress and work plan if any to help SA2 evaluation and conclusion.*

Firstly, to provide the *work plan* in a general level, a drafted version has been provided in R2-2010676

*RAN2 is studying Direct Discovery procedure, UE-to-Network Relay and UE-to-UE Relay solutions in the study on NR Sidelink Relay (FS\_NR\_SL\_Relay). In this study, both Layer-2 based solution and Layer-3 based solutions are discussed in RAN2, for which the latest study progress is summarized in TR 38.836. The study phase is to be completed at RAN2#113-E.*

**Q2a: To provide SA2 with the RAN2 work plan, do you agree with the text above?**

|  |  |
| --- | --- |
| Company | Comments |
| MediaTek | We can say both “Layer-2 based Relay architecture and Layer-3 based Relay architecture are discussed at RAN2”. |
| CATT | Agree |
| Sharp | We are generally fine with the text. For the first sentence, it might be better to indicate RAN2 is studying UE-to-Network Relay and UE-to-UE Relay solutions and for both solutions RAN2 is studying discovery procedure, relay (re)selection and service continuity etc. |
| Interdigital | We are fine with this text above. No additional details need to be added, as those  would anyway be in the TR. |
| Intel | Agree with the yellow highlighted text for now alongside workplan and TR. Our understanding is that we will fill out more details, including the agreements made in this meeting, in Phase 2. |
| Samsung | We are fine with the text from Rapporteur. |
| Qualcomm | Agree with Rapporteur’s text |
| Nokia | Agree with the text, but see suggested additions in comments on Q2b |
| vivo | Agree with Rapporteur. |
| Huawei | Agree with the text. |
| ZTE | Agree with the text. |

Summary: companies are generally fine with the wording above for work plan. Further rewording can be done in Phase-2. No Phase-1 conclusion needed for the text.

Furthermore, for the detailed progress, before reaching for an agreeable text, rapporteur would like to consult companies view on the point that needs to be put into the LS.

**Q2b: To provide SA2 with more detailed information on RAN2 study progress, which aspect(s) do you think should be included in the LS?**

|  |  |
| --- | --- |
| Company | Comments |
| MediaTek | Suggestion 1: For both L2 and L3 relay architecture, we can list the areas that were studied until this meeting. There may be no need to provide a lenghy description for each area, as that is already documented in the TR.    Suggestion 2: Even though for both L2 and L3 relay architecture, there are some open issues and editor notes with FFS within the TR, the current study progresses smoothly. We can indicate that there are some ongoing discussion at RAN2 that aims to close the open issues and FFS. However, there is no need to provide a whole list of the open issues and FFS.    Suggestion 3: In addition, within the LS we can say for both L2 UE-to-Network Relay and L3 UE-to-Network Relay, no showstopper has been identified by RAN2. This will help SA2 to provide the ProSe relay related description within the WID to be submitted to Dec TSG meeting. |
| CATT | The progress table in R2-2008939 is a good option. Useful and comprehensive information is our first consideration. So the table is one good manner to achieve it. |
| Sharp | We are not sure whether the detailed information on RAN2 study progress is needed in the LS, since in the work plan part it is mentioned "the latest study progress is summarized in TR 38.836". The TR38.836 can be the attachment of the LS, and SA2 people can know more detailed information from this TR. If companies believe some detailed information is important for SA2, CATT’s suggestion may be a possible way. |
| Interdigital | If we want to provide progress to SA2, there is no need to add these details to the LS, and we can simply attach the workplan itself (in 8939) to the LS. |
| Intel | It may be helpful to include both the workplan document as well as the updated version of the TR along with the LS reply to SA2  . |
| Samsung | We think that the TR38.836 seems enough to provide to SA2. We are also open to share R2-2008939 with SA2. |
| Qualcomm | Generally, we think referring to RAN2 TR 38.836 (and maybe also attaching 8939) seem to be sufficient because TR is expected to include the latest agreements and assumptions based on SA2 solutions. We agree CATT, sharp and Interdigital that we don’t need to list all details. |
| Nokia | Suggested additions:  1) RAN2 studies both Layer 2 and Layer 3 relay architecture and both have been found  feasible.  2) RAN2 notes that the RAN2 specification impact and complexity of Layer 2 relay architecture is significantly higher than impact and complexity of Layer 3 relay architecture. In Rel-17 only the most relevant solutions and scenarios should be considered in the WI phase and more complex solutions/enhancements should be treated in Rel-18. |
| vivo | No strong view on this but the TR38.836 seems enough to us. |
| Huawei | We think TR38.836 and workplan can provide SA2 with comprehensive information. We also would like to consider the suggestion 3 from MediaTek. |
| ZTE | To us, TR 38.836 is enough for us. |

Summary: seems many companies tend to provide detailed aspects to SA2 by attaching TR 38.836 and work plan in 8939. 2 companies (MTK, Nokia) suggest additons that RAN2 found both L2/L3 solutions are feasible / with no show-stopper. Rapporteur suggest to at least attach TR 38.836 and work plan in R2-2008939, and further additions can be discussed in Phase-2.

1. Include TR 38.836 and Work Plan in R2-2008939 into the LS reply to SA2.

Finally, in order to address the following aspect for this discussion

* *Capture any points where we assume SA2 will resolve an issue*

It is good to sync with SA2 on the aspects that RAN2 assumes to rely on SA2 decision.

By checking the TR 38.836 V0.1.1, rapporteur understands there are in general the following aspects for which RAN2 relies on SA2 decision:

1. Achiecture/Protocol stack decision for L3 relay (i.e., 4.6.1 for U2N relay, and 5.6.1 for U2U relay);
2. QoS mechanism decision for L3 relay (i.e., 4.6.2 for U2N relay, and possibly 5.6.2 for U2U relay, although empty so far)
3. Security mechanism decision for L3 relay (i.e., 4.6.3 for U2N relay, and possibly 5.6.3 for U2U relay, although empty so far)
4. PC5-S layer procedure design (although now only in 4.6.5, rapporteur assume it is a valid assumption for both L2/3 and U2N/U2U Relay)

**Q2c: To provide SA2 with more detailed information on RAN2 assumption on SA2 decision, which aspect(s) do you think should be included in the LS?**

|  |  |  |
| --- | --- | --- |
| Company | Aspect 1/2/3/4 above, or others | Comments |
| MediaTek | 1/2/3/4 | In addition, RAN2 may need to relay on the agreed discovery procedure as discussed by SA2 if any for both UE-to-UE and UE-to-NW relay. |
| CATT | All | We share the view with rapporteur that it is good to sync with SA2 on the aspects that RAN2 assumes to rely on SA2 decision. Based on the principle of smooth communication, all we captured in the TR(the aspects that RAN2 assumes to rely on SA2 decision) should be shared with SA2 as soon as possible. |
| Sharp | All | Fine with all the four aspects. If there are more aspects RAN2 assumes to rely on SA2 decision can be achieved agreement during this meeting, they can also be included. |
| Interdigital | All | We assume 4) to cover details related to discovery procedure for both UE to NW and UE to UE relays. |
| Intel | All | Yes; Agree with other companies that discovery aspect should be covered. We also wonder if evaluation of at least L3 relay (since most of the work is in their domain) can be requested from SA2 to aid input to section 6 (**Comparison**) in TR. |
| Samsung | All |  |
| Qualcomm | All | Agree with MediaTek to include discovery for U2N and U2U relay |
| Nokia | All | We may add that RAN2's assumption is that service continuity for L3 relay is addressed by SA2 |
| vivo | All |  |
| Huawei | All | Can also include discovery procedure, since according to SA2 LS, relay discovery procedure is still FFS. |
| ZTE | All |  |

Summary: all companies are fine with the 4 aspects listed above, and 4 companies raise that discovery should be included as well. Furthermore, outcome from SL Relay session next week should be take into account.

1. Include in the LS the following aspects for which RAN2 relies on SA2 decision: 1) Achiecture/Protocol stack decision for L3 relay; 2) QoS mechanism decision for L3 relay; 3) Security mechanism decision for L3 relay; 4) PC5-S layer procedure design; 5) Discovery procedure for both U2U and U2N Relay .

# Conclusion

We have the following proposals:

[Proposal 1 RAN2 confirms the SA2 assumption that “Direct Discovery message will be transmitted in PC5 communication channel”.](#_Toc55808295)

[Proposal 2 RAN2 assume R16 MAC PDU design is reused to carry discovery message.](#_Toc55808296)

[Proposal 3 Include TR 38.836 and Work Plan in R2-2008939 into the LS reply to SA2.](#_Toc55808297)

[Proposal 4 Include in the LS the following aspects for which RAN2 relies on SA2 decision: 1) Achiecture/Protocol stack decision for L3 relay; 2) QoS mechanism decision for L3 relay; 3) Security mechanism decision for L3 relay; 4) PC5-S layer procedure design; 5) Discovery procedure for both U2U and U2N Relay .](#_Toc55808298)

# Reference

1. R2-2008760 LS on Direct Discovery and Relay in SA2 (S2-2006587; contact: Oppo) SA2 LS in Rel-17 FS\_5G\_ProSe To:RAN2 Cc:RAN1
2. R2-2010693 LS on SA2 progress on UE-to-Network Relay and UE-to-UE Relay (S2-2007945; contact: OPPO) SA2 LS in Rel-17 FS\_5G\_ProSe To:RAN2, SA3
3. R2-2008926 [Draft] Reply LS on Direct Discovery and Relay CATT LS out Rel-17 5G\_V2X\_NRSL-Core To:SA2 Cc:RAN1
4. R2-2010676 [Draft] Reply LS on Direct Discovery and Relay OPPO LS out Rel-17 FS\_NR\_SL\_relay To:SA2 Cc:RAN1