**SA WG2 Meeting #143E (e-meeting) S2-21xxxxx**

**Elbonia, Feb 24 – Mar 9, 2021**

**Source: Qualcomm Incorporated**

**Title: Closing outstanding issues for UE-to-UE Relay conclusions**

**Document for: Discussion/Approval**

**Agenda Item: 8.8**

**Work Item / Release: FS\_5G\_ProSe/Rel-17**

*Abstract of the contribution: This contribution proposes changes to close the outstanding issues to conclude, KI#4: UE-to-UE relay, considering RAN2 WG input.*

1. Discussion

Below are the outstanding issues to approve the interim conclusions (in clause 8.4 of TR 23.752) for KI #4: Support of UE-to-UE Relay in SA2 study phase:

1) UE-to-UE Relay conclusions are subject to confirmation from RAN WG2 and SA WG3 for normative work.

2) The final decision on whether or not to proceed with Layer-2 and/or Layer-3 into normative work will be made in cooperation with other WGs.

Issue 1) above is dependent on the technical feasibility analysis of UE-to-UE relay solutions in RAN WG2 and SA WG3 SIs. Issue 2) is going to be dependent on the decision of the RAN WG2 on which architecture option (L3 or L2 or both) and which feature under each architecture option is suitable for Rel-17 normative work.

RAN2 provided an LS response [1] to SA2, including the RAN workplan and the technical progress on UE-to-UE relay study after the RAN2#112-E meeting. The RAN2 LS response [1] indicated that both L3 and L2 UE-to-UE relay are considered feasible from RAN2 study. The same has been confirmed by RAN2 as per the below agreements at RAN2#113-E.

Agreements:

Update the TR with the following changes:

- Remove “Editor’s note: Service continuity related CP procedure is captured in 4.5.4” from section 4.5.5

- Remove “Editor’s note: RAN2 needs to consider SA3 input” from section 5.5.3 and add the sentence “Security aspects require confirmation from SA3” to the text.

- Revise the following sentence as: “For the inter-gNB cases, compared to the intra-gNB cases, potential different parts on RAN2 Uu interface in details can be discussed in WI phase.” in section 4.5.4.

RAN2 confirm the decision of last meeting that L2 and L3 are both feasible for U2N and U2U, aligned with the LS sent to SA2 from RAN2#112-e (this is not a conclusion on the recommendation for normative work).

**Observation 1: RAN2 WG study on NR Sidelink Relay (FS\_NR\_SL\_Relay) concluded that both L3 and L2 UE-to-UE relay architecture options are feasible and provided feedback to SA2 in [1].**

In the LS response [1], RAN2 identified the topics that are beyond RAN2 scope and should be concluded by SA2 independently. As per the workplan provided by RAN2 in [1] and agreements above, the conclusion on which of the UE-to-UE relay options will be considered for Rel-17 normative work is not going to be made in the study phase of RAN2. RAN WG plenary discussion is necessary for normative work decision. SA2 can wait for conclusion on what to be covered in the normative work until after the RAN plenary and SA3 confirmation.

Considering RAN2 feasibility input and progress so far, we think that it is suitable for SA2 to agree on the interim conclusions as final conclusions for the UE-to-UE technical evaluation in study phase.

**Proposal 1: Considering the RAN2 study conclusions, SA2 agree to resolve the open issues in clause 8.4 of TR 23.752 to conclude the technical study in SA2.**

**Proposal 2: SA2 coordinate with RAN WG and SA WG3 to further decide which UE-to-UE relay options is to proceed to the normative work in Rel-17.**

RAN2 TR 38.836[2], clause 5.5.4 for L2 U2U relay control plane procedures, has specified “RAN2 consider the SA2 solution in TR 23.752[6] as baseline. Further RAN2 impacts can be discussed in WI phase, if any.” However, the conclusion for L2 U2U relay in SA2 TR are not clear on which solution (sol#8 or Sol#9) is considered as baseline for connection establishment.

Based on our understanding of the PC5 Adaptation layer functions specified in clause 5.5.1 of RAN2 TR 38.836[2], the adaptation layer headers include the source UE and/or target UE identifiers to route the data via the relay UE over the individual hop-by-hop links. This aligns with Sol#8 approach, where a hop-by-hop unicast link is setup and end-to-end relay link setup control plane signaling is relayed over the established unicast link. Sol#9 discusses about the connection setup end-to-end as well. However, it assumes that relay UE assigns itself two Relay-L2 IDs for supporting the end-to-end relaying. Sol#9 does not specify why the L2 identifiers for each hop-by-hop link that is setup cannot be used for the routing purpose and what is the benefit of using relay local L2 identifiers in the PC5 adaptation layer instead of the source/ target remote UE IDs. Considering that Sol#8 can support the end-to-end connection setup without the additional complexity in sol#9 and there is limited time to resolve the issues in sol#9, we suggest SA2 to consider sol#8 as the baseline solution for connection setup to conclude the L2 U2U relaying study.

**Proposal 3: SA2 consider sol#8 as the baseline solution for end-to-end connection establishment via L2 UE-to-UE relay and update the conclusions.**

1. Text Proposal

It is proposed to consider the changes below for conclusions clause 8.4 for Key Issue #4 in TR 23.752.

**>>>>Start Changes<<<<**

8.4 Key Issue #4: Support of UE-to-UE Relay

The followings are concluded for Layer-3 UE-to-UE relay:

- No showstopper has been identified by SA2 for L3 UE-to-UE solution. SA2 recommends L3 UE-to-UE Relay proceed into normative work, subject to RAN2 and SA3 conclusion.

- L3 UE-to-UE relay solution can support relaying of IP and non-IP traffic. For IP traffic, the IP addresses of the UEs can be either assigned by the relay (as described in sol#10) or self-assigned (as described in sol#32). For Non-IP traffic, it can be either handled via IP encapsulation or without IP encapsulation (as described in sol#49).

- UE-to-UE Relay discovery and selection are supported by:

- Model A discovery (as described in sol#11);

- Model B discovery (as described in sol#8); and

- Integrated PC5 unicast link establishment procedure (as described in sol#8).

- UE-to-UE relay reselection

The relay reselection can be viewed just like redoing the relay selection as described in Sol#8 or be performed as described in Sol#50. The reselection criteria are to be coordinated with RAN2 WG.

- QoS support

End-to-end QoS support for Remote UE is provided by splitting the QoS between the two PC5 links between the source UE and target UE. QoS splitting configuration can be provided from PCF as part of policy to both Remote UE and Relay UE or the QoS splitting can be managed by the Relay UE based on the end-to-end QoS needs. For QoS handling, Sol#31 can be considered as the starting point for the normative work.

The following are taken as concluded for the L2 UE-to-UE Relay:

- No showstopper has been identified by SA WG2 for L2 UE-to-UE solution. SA WG2 recommends L2 UE-to-UE Relay proceed into normative work.

NOTE 1: The operation procedures for supporting the L2 UE-to-UE Relay need coordination with RAN2 to decide how the UE-to-UE Relay performs the data/signalling routing.

* For communication via UE-to-UE relay, an end-to-end connection establishment procedure is supported between the source UE and target UE. Hop-by-hop unicast link is setup between the source UE/target UE and relay UE to relay the control signaling for end-to-end connection setup. Procedures in sol#8 can be taken as baseline for connection establishment.

- For UE-to-UE Relay discovery, both Model A and Model B are supported (as described in sol#11, sol#8). It is recommended that Relay discovery is integrated into the PC5 unicast link establishment procedure.

- For QoS handling, Sol#31 can be taken as baseline.

NOTE 2: It is left to RAN2 to support the QoS enforcement in AS layer.

- For Relay reselection, the negotiated UE-to-UE Relay reselection in Sol#50 and the Relay selection in Sol#8 can be used under different conditions. Both Sol#50 and Sol#8 can be taken as baseline.

NOTE 3: It is left to RAN2 to decide the radio criteria on Relay reselection.

NOTE 4: It is left to RAN2 and SA3 to decide the details of how to support end-to-end security between the Source UE and Target UE.

**>>>>End Changes<<<<**

1. References

[1] R2-2010862 Reply LS on Direct Discovery and Relay

[2] 38.836 Study on NR sidelink relay;(Release 17)