3GPP TSG-RAN WG2 Meeting #113e R2-210xxxx

Electronic Meeting, 25th January – 5th February 2021

Agenda: 8.7.2.1

Source: InterDigital

Title: Summary of [AT113-e][605][Relay] Continuation of L2 architecture issues (InterDigital)

Document for: Discussion, Decision

# 1 Introduction

The following email discussion was triggered at RAN2#113:

* [AT113-e][605][Relay] Continuation of L2 architecture issues (InterDigital)

 Scope: Discuss the priority 2 proposals P6, P15-P19 from R2-2102091 and implement the agreements on the priority 1 proposals. Work towards conclusions if possible.

 Intended outcome: Endorsable TP

 Deadline: Tuesday 2021-02-02 1200 UTC (for TP availability)

The summary document summarizes the portion of the scope related to “work towards conclusions if possible”

# 2 Conclusion Section for L2 Relay

Below is the TP for L2 relay for the conclusion section, following email discussion conclusion.

*---------------------------------------------------------- TR 38.836 ----------------------------------------------------------*

## 6.1 Evaluation and Conclusion of UE-to-Network Relay

### 6.1.1 Layer-2 Relay

RAN2 has studied L2 UE-to-Network relay and has reached the following conclusions:

#### 6.1.1.1 Relay discovery and (re)selection

Discovery was studied for L2 UE-to-Network Relay and the baseline solution for L2 relay is the same as for L3 relay. For L2 U2N Relay, the Relay UE should always be connected to a SL capable gNB. Further details of discovery configuration for the remote UE can be discussed in the normative phase.

Relay (Re)selection was studied for L2 UE-to-Network Relay and the baseline solution for L2 relay is the same as for L3 relay. In addition, for RRC\_CONNECTED remote UE in L2 UE-to-Network Relay, gNB decision on relay (re)selection is considered in the normative phase.

#### 6.1.1.2 Relay and remote UE authorization

Both Relay and Remote UE separately follow Rel-16 V2X design (TS 23.287), and no RAN2 impact is expected.

#### 6.1.1.3 QoS management

The general QoS handling for L2 UE-to-Network Relay was studied. The gNB implementation can handle the QoS breakdown over Uu and PC5 for end-to-end QoS enforcement. Details of handling in case PC5 RLC channels with different e2e QoS are mapped to the same Uu RLC channel can be discussed in the normative phase. The end-to-end QoS enforcement can be supported. The gNB is aware of AS conditions of sidelink and Uu link, based on which the QoS breakdown can be flexible and tailored to such conditions (e.g. can be used to adapt the QoS breakdown when there is congestion on sidelink). In case of OOC, remote UE operates using the configuration provided in SIB or dedicated RRC signaling with overall better QoS performance than using pre-configuration. QoS can be enforced for each bearer as the gNB can decide whether an E2E bearer is admitted or not depending on the current congestion.

#### 6.1.1.4 Service continuity

L2 UE-to-Network Relay uses RAN2 aspects of Rel-15 NR handover procedure as a baseline. The AS layer service continuity (i.e. lossless and in-sequence delivery of PDCP PDU with similar performance like legacy HO) can be guaranteed during path switch in L2 U2N relay by involving also relay UEs (e.g. PDCP PDUs packet forwarding between relay UE and gNB and between serving and target relay UEs) in the path switch procedure.

#### 6.1.1.5 Security

In case of L2 UE-to-Network Relay, at AS layer, the security (confidentiality and integrity protection) is enforced end to end by legacy PDCP layer between the endpoints at the Remote UE and the gNB.

#### 6.1.1.6 Protocol stack design

The protocol stack and Uu adaptation layer function were studied for L2 UE-to-Network Relay. Whether the adaptation layer is also supported at the PC5 interface between Remote UE and Relay UE can be discussed in the normative phase. In L2 U2N Relay architecture, the remote UE is visible to the gNB, and the remote UE has its own PDU sessions. It supports the gNB configured/controlled bearer mapping at the relay UE between multiple E2E bearers of a remote UE and/or different remote UEs to one Uu RLC channel, which could also save on the RLC bearers in Uu.

#### 6.1.1.7 CP procedures

Both connection establishment procedure and path switching procedures were captured for L2 UE-to-Network Relay. The establishment of Uu SRB1/SRB2 and DRB of the remote UE is subject to legacy Uu configuration procedures. It supports the remote UE’s RRC connection management, which can provide dedicated RRC configuration to remote UE, reduce the interruption/avoid data loss due to RLF recovery, and speed up RRC connection and data resume, etc. Further details of the steps for path switch procedure (e.g. measurements, message content) and potential differences on the Uu interface for inter-gNB cases may be discussed in the normative phase.

The Option 2 as studied in TR36.746 for FeD2D paging is selected as the baseline paging relaying solution for L2 UE-to-Network Relay. By supporting paging, for remote UE in RRC\_IDLE/RRC\_INACTIVE, the DL data reachability can be supported during remote UE’s mobility.

The system information (i.e SI) request from remote UE and forwarding mechanism from Relay UE to Remote UE was studied L2 UE-to-Network Relay. Specifically, the relay UE can forward system information to the remote UE via broadcast, groupcast or unicast. On-demand SI request is supported for all RRC states. The detailed mechanism for such SI request and forwarding and the exact system information that can be relayed to Remote UEs can be discussed at normative phase. It supports the SI delivery in case remote UE is OCC, which supports remote UE using SIB provided configuration.

For L2 UE-to- Network relay, the Relay UE may provide UAC parameters to Remote UE for performing remote UE access control and RAN overload control. The access control check is performed at Remote UE using the parameters of the cell it intends to access. Remote UE access control can take into account SL congestion as the gNB is aware of the remote UE.

#### 6.1.1.8 Standards impact

Standardization impact from RAN2 perspective to support the operations of L2 UE-to-NW relay can be inferred from discussion in section 4.5, and in this conclusion. From RAN2 perspective, the standard support of L2 UE-to-Network Relay is mainly at RAN.

## 6.2 Evaluation and Conclusion of UE-to-UE Relay

### 6.2.1 Layer-2 Relay

RAN2 has studied L2 UE-to-UE relay and has reached the following conclusions:

#### 6.2.1.1 Relay discovery and (re)selection

Discovery was studied for L2 UE-to-UE Relay and the baseline solution for L2 relay is the same as that of L3 relay.

Relay (Re)selection was studied for L2 UE-to-UE Relay and the baseline solution for L2 relay is the same as that of L3 relay.

#### 6.2.1.2 Relay and remote UE authorization

Both Relay and Remote UE separately follow Rel-16 V2X design (TS 23.287), and no RAN2 impact is expected.

#### 6.2.1.3 QoS management

The design of QoS support for both L2 and L3 UE-to-UE relay are in the scope of SA2. No RAN2 impact of the solution captured in SA2 is identified thus far.

#### 6.2.1.4 Security

In case of L2 UE-to-UE Relay, the security is established at PDCP layer in an end to end manner between source remote UE and destination remote UE. The end-to-end security can be supported.

#### 6.2.1.5 Protocol stack design

The protocol stack and PC5 adaptation layer function (both first hop PC5 and second hop PC5) were studied for L2 UE-to-UE Relay.

#### 6.2.1.6 CP procedures

The connection establishment procedure was studied for L2 UE-to-UE Relay. RAN2 consider the SA2 solution in TR 23.752 as baseline. Further RAN2 impacts can be discussed in WI phase, if any.

#### 6.2.1.7 Standards impact

Standardization impact from RAN2 perspective to support the operations of L2 UE-to-NW relay can be inferred from discussion in section 4.5, and in this conclusion. From RAN2 perspective, the standard support of L2 UE-to-UE Relay is mainly at RAN.

*---------------------------------------------------------- TR 38.836 ----------------------------------------------------------*

# 4 References

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4. R2-2100202 Feasibility for Layer2 Relay CATT discussion Rel-17 FS\_NR\_SL\_relay
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6. R2-2100520 Remaining Control Plane Aspects for L2 Relays InterDigital discussion Rel-17 FS\_NR\_SL\_relay
7. R2-2100521 Discussion on L2 Relay Architecture and QoS InterDigital discussion Rel-17 FS\_NR\_SL\_relay
8. R2-2100535 Further discussions on L2 SL relay Ericsson discussion Rel-17 FS\_NR\_SL\_relay [R2-2009230](file:///C%3A%5CUsers%5Cfredamx%5CDesktop%5CLTE%5CRAN2%5C113%5CDocs%5CR2-2009230.zip)
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19. R2-2101768 RRC status transition reporting procedure LG Electronics Inc discussion Rel-17 FS\_NR\_SL\_relay
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28. R2-2100980 Comparative Analysis of L2 and L3 SL Relay Architecture Ericsson, Samsung, Nokia, Nokia Shanghai Bell
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