**3GPP TSG-RAN WG2 Meeting #123R2-23xxxxx**

**Toulouse, France, August 21 – August 25, 2023**

Source: Qualcomm Incorporated (Moderator)

Title: Summary of UE-to-UE relay

Agenda Item: 7.9 Enhanced NR Sidelink Relay

Document for: Discussion and Decision

# Introduction & Background

This contribution is the summary of UE-to-UE relay.

# Discussion

## 2.1 Proposals on discovery and Relay (re)selection

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| Contribution | Proposals | Rapp’s comments |
| R2-2307233 | Proposal 1 As in R17 U2N, RAN2 not pursue separate AS-layer criterion for discovery message transmission/reception and for relay (re)selection.Proposal 2 For model-B discovery, R2 not pursue AS-layer criterion for relay-UE to decide on whether to relay the solicitation/response message.Proposal 3 Relay UE does not forward AS link quality degradation of one hop to the peer remote UE of the other hop.Proposal 4 R2 not pursue an AS-layer criterion for direct link reachability judgement for indirect to direct switching. |  |
| R2-2307446 | Proposal 1. Remote UE should choose the U2U relay UE considering the quality of both hops.Proposal 2. Relay UE should send RSRP related parameter of another hop to a remote UE. Proposal 3. Threshold of SD-RSRP/SL-RSRP should consists of the upper limit and lower limit.  |  |
| R2-2307547 | Proposal 1: RAN2 to discuss whether we should support DCR message with integrated discovery to use the dedicated discovery pool.Proposal 2: RAN2 to discuss which interpretation is the correct understanding and send a LS to SA2 to confirm:- Interpretation 1: UE can compare or select from direct link and indirect link based on two PC5-RSRPs even the two links are using different L2 ID pair;- Interpretation 2: UE cannot compare or select from direct link and indirect link based on two PC5-RSRPs because the two links are using different L2 ID pair.Proposal 3: If it is confirmed that reselection towards direct link is supported during relay reselection, the following AS criterion for that can be discussed:*- When the PC5 RSRP on indirect link is below a configured threshold and when the PC5 RSRP on the direct link is above a configured threshold, the UE may switch from the indirect to direct link.*Proposal 4: Leave the decision to SA2 of whether/how to handle the case that relay reselection is triggered simultaneously at both remote UE1 and remote UE2. Send a LS to SA2 to inform this if agreed. | P4: it is already captured in SA2 and CT1 specification, no LS is needed. |
| R2-2307641 | U2U Relay SelectionProposal 1. U2U Relay UE selection triggers include Remote UE detection of direct link PC5-RLF.U2U Relay ReselectionProposal 2. RAN2 confirms the understanding that the “current hop quality” refers to the PC5 signal strength for the PC5 link between that Remote UE and the existing Relay UE, which provides the U2U relaying connection to the destination/peer Remote UE.Proposal 3. RAN2 (re)confirms: Each Remote UE can trigger Relay UE reselection independently, based at least on the respective PC5 signal strength falling below a threshold for the respective PC5 supporting the U2U relaying connection between that Remote UE and the Relay UE current hop quality.Proposal 4. RAN2 confirms that a Remote UE triggers Relay UE reselection at the Access Stratum, on detecting a PC5-RLF for the PC5 connected between itself and the Relay UE providing to the Remote UE a U2U relaying connection.Proposal 5. following the Remote UE reception of a reselection trigger condition 3), a PC5-RLF indication from the U2U relay UE, and informing the upper layer, the decision to maintain or release the local PC5 link between the Remote UE and the Relay UE is left to UE implementation. | P2: it should be clear current hop quality is detected by the said “each UE”. P3: already agreed in RAN2 and SA2, no need to discuss again. |
| R2-2307716 | Proposal 1: In Model A and Model B, source remote UE is responsible for selecting a relay UE based on source remote UE implementation. | SA2 already specified it, no need RAN2 discussion |
| R2-2307742 | Proposal 1: No indication is to be introduced when the link quality between the relay UE and peer remote UE is below a threshold.Proposal 2: AS criterion is not needed for switching from indirect path to direct path. UE can switch to direct path once discovering the target remote UE.Proposal 3: RAN2 follows SA2 and CT1 specification on how to coordinate the final Relay UE between the source and target Remote UE in ProSe layer. |  |
| R2-2307750 | Proposal 1 RAN2 should consider if the remote UE is expected to send a DCR to a U2U relay when the remote UE is already PC5-RRC connected to the same relay UE for U2N relay connection.Proposal 5 RAN2 should consider which metric should be used by the relay UE to inform the source remote UE/target remote due to drop in quality on the second hop. | P1: It should be in SA2 scope, U2U and U2N use different L2 IDs, then DCR is expected. |
| R2-2307855 | Proposal 1 A U2U Relay UE discards the received model-B U2U relay discovery solicitation message if the SD-RSRP measurement is below the configured AS-layer RSRP threshold.Proposal 2 Relay (re-)selection in remote UE need consider the PC5 signal strengths of both hops. Proposal 3 “whether the PC5 link of the 2nd PC5 hop is already established or not” is considered as one of the criteria for relay (re-)selection. | P3: RAN2 agreed that “Besides the PC5 link quality, RAN2 does not pursue other AS criteria for relay (re)selection.” |
| R2-2307932 | Proposal 1: For model B discovery, Relay UE transmits discovery a response message when the following both conditions are satisfied. - When the SD-RSRP toward the source remote UE is above a configured threshold.- When the SD-RSRP between relay UE and the target remote UE is above a configured threshold.Proposal 2: As the same principle, for the integrated-discovery model, the relay UE forwards the discovery message for DCA message with integrated Discovery case only if the PC5-RCRP between the relay UE and the target remote UE is above a threshold. | P1: the link quality of the target Remote UE should be considered, Relay UE does not know whether target Relay UE is neighboring UE.P2: same comment as P1 |
| R2-2307944 | Proposal 1 For the U2U relay, RRC\_CONNECTED UEs may obtain discovery configuration from dedicated signaling.Proposal 2-a The direct link between the two remote UEs is prioritized over any indirect link.Proposal 2-b Relay UE with the established unicast link is prioritized over other Relay UEs in the candidate list.Proposal 3 Two remote UE may select two different relay UEs simultaneously for communicating with each other, so RAN2 should send LS to inform SA2.  | P1: already agreed in RAN2P2a: covered in SA2P2b: RAN2 agreed that “Besides the PC5 link quality, RAN2 does not pursue other AS criteria for relay (re)selection.”P3: SA2 and CT1 already cover it. |
| R2-2307989 | Proposal 1: In U2U relay, the remote/relay UE in RRC\_CONNECTED can acquire discovery configuration via dedicated signaling.Proposal 2: RLF on the direct PC5 link between two remote UEs can be used to trigger relay selection.Proposal 3: Once the second (receiving) remote UE detects the PC5 link between the relay UE and the second(receiving) remote UE is less than the threshold associated with relay reselection, the second(receiving) remote UE indicates to the relay UE. Then, the relay UE transmits the indication to the first (transmitting) remote UE. Proposal 4: A threshold of triggering relay reselection can be configured to the relay UE besides the remote UE.Proposal 5: If the threshold for triggering relay reselection can be (pre)configured to the relay UE, the relay UE can transmit the indication of relay reselection to the first (transmitting) remote UE once the relay UE detects the PC5 link between the relay UE and the second (receiving) remote UE is less than the threshold. Proposal 6: Remote UE can switch back from the U2U relay operation to direct PC5 link if PC5 signal strength condition of direct PC5 link between two remote UEs is better than a threshold. | P1: already agreedP2: discussed in RLF handlingP3: as agreed in RAN2 and SA2, the second remote UE can trigger Relay reselectionP4-5: Relay UE does not trigger relay reselection |
| R2-2308100 | Relay discovery:Proposal 1a: For U2U relay, the conditions for discovery message transmission are specified separately from the trigger conditions for relay (re)selection.Proposal 1b: The same thresholds are used for discovery message transmission and relay (re)selection trigger for U2U remote UE.Proposal 2a: For Model B discovery, the relay UE transmits discovery solicitation message to target remote UE only if the PC5 link quality between the relay UE and the source remote UE is above a threshold.Proposal 2b: For Model B discovery, the relay UE transmits discovery response message to source remote UE only if the PC5 link quality between the relay UE and the target remote UE is above a threshold.Proposal 3a: When relay (re)selection is triggered, integrated-discovery can be also triggered to discovery and select a relay UE.Proposal 3b: For integrated-discovery, the relay UE forwards the DCA message with integrated discovery only if the PC5 RSRP between the relay UE and the target remote UE is above a threshold.Proposal 4: In U2U relay, RRC\_CONNECTED remote/relay UEs acquire discovery resource configuration from dedicated signalling as legacy. Relay (re)selection:Proposal 5: When PC5 RLF of the direct link is detected, remote UE can trigger relay selection. Proposal 6: Relay UE sends indication to the remote UE upon detecting the PC5 link quality of the second hop is below a configured threshold. When receiving the indication, the remote UE may trigger relay re-selection even the PC5 link quality of the first hop is good.Proposal 7a: Switching from indirect link to direct link is not considered when the current indirect link is good.Proposal 7b: When relay re-selection is triggered, if direct link is available and the link quality of the direct link is above a threshold, remote UE prioritizes to switch to direct link.Proposal 8: It is suggested relay (re)selection for RRC\_CONNECTED U2U remote UE is controlled by gNB. | P1a: too high levelP1b: unclear for which discovery message and which Remote UEP3a, which discovery procedure is used is up to SA2.P7a: should be upper layer determinesP7b: in ProSe layer scope which path should be prioritized.P8: too general, difficult to discuss. |
| R2-2308119 | Proposal 1: RRC\_CONNECTED UE in UE-to-UE relay should acquire discovery configuration via dedicated signalling.Proposal 2: In Model B, the discoverer End UE is allowed to transmit Solicitation message with relay indication enabled if the link quality between itself and the discoveree End UE is below one configured threshold (including the case where the discoverer End UE cannot discover the discoveree End UE) when the link quality results are available.Proposal 3: In Model B, candidate Relay UE decides whether it is allowed to send Solicitation message to by comparing the link quality between itself and the discoverer End UE with one configured lower threshold and/or one configured upper threshold.Proposal 4: End UE triggers relay selection when: RLF of PC5 link with peer End UE is detected.Proposal 5: End UE triggers relay reselection when an indication is received from relay which indicates that the PC5 link quality between relay UE and the peer End UE is below a configured threshold. | P2: agreed in RAN2, which discovery should be used is up to SA2. |
| R2-2308160 | Proposal 1: The source UE will send an ordered candidate relay list, according to the preference from source UE’s point of view, to destination UE. Proposal 2: A U2U relay UE is considered suitable if the PC5 link quality between source UE and U2U relay UE as well as PC5 link quality between U2U relay UE and destination UE exceeds a (pre)configured threshold. | P2: final UE selection coordination is captured in SA2 and CT1 spec |
| R2-2308321 | Discovery:Proposal 1: In Model B, there is no need to consider transmission conditions of relay UE to transmit discovery solicitation/response message. Proposal 2: Same threshold is used for relay (re)selection and discovery procedures.Proposal 3: The relay/remote UE in RRC connected mode can get discovery configuration from gNB through both SIB message and dedicated signalling. Relay (re)selectionProposal 4: For R18 U2U relay, when one hop PC5 link is released, the connection between source remote UE and target remote UE can change back to direct Sidelink connection (not via Relay UE), if the direct link SD-RSRP quality is above a configured threshold.Proposal 5: The selected relay UE can broadcast source remote UE and target remote UE L2 IDs. And if candidate relay UEs receive L2 IDs, they will not serve as the relay UE for the pair remote UE. A new timer for candidate relay UE is needed if necessary.Proposal 6: If source remote UE both sends and receives discovery solicitation request message, source remote UE is responsible for relay UE (re)selection and PC5 link setup.Proposal 7: In case two E2E PC5 links already established, source remote UE can negotiate with target remote UE to release one of two E2E PC5 links (also two hops PC5 link) by comparing channel qualities of two links. | P4: trigger discovery, and perform path selection in ProSe layerP5-7: SA2 scope |
| R2-2308368 | Proposal 1: RAN2 to agree the second hop quality is not used to trigger relay reselection.Proposal 5: The source End UE may indicate to the U2U Relay UE candidates the discovery model (Model A or Model B) used by the target End UE along with its U2U relay discovery solicitation.Proposal 6: As when triggering the relay selection, any of the End UEs may provide a list of U2U Relay UE candidates for the other End UE to perform the U2U relay selection for a direct-to-indirect path switch.Proposal 7: The trigger from the current U2U Relay UE for U2U relay reselection may include a condition on when the current U2U Relay UE stops serving as a U2U relay between the source End UE and the target End UE.Proposal 8: RAN2 considers specifying triggers at least for indirect-to-direct path switch related to U2U relay. | P5: ProSe layer, out of RAN2P6: covered in SA2 |
| R2-2308380 | Proposal 1: For model B discovery, the relay UE transmits discovery solicitation message to the target remote UE only if the PC5 link quality between the relay UE and the source remote UE is above a configured threshold. RAN2 informs SA2.Proposal 2: For RRC\_CONNECTED U2U relay/remote UE, dedicated signaling is used for discovery configuration.Proposal 3: If multiple suitable U2U relay candidates which meet both the AS-layer and higher layer criteria are available, it is upto remote UE implementation to choose a U2U relay UE. Proposal 4: Discovery message transmitted by the relay UE should carry the RSRP measurement(s) of the link to each remote UE. Proposal 5: When including measurements in the discovery message, the relay UE includes SD-RSRP of a remote UE when SL-RSRP is unavailable and includes both SD-RSRP and SL-RSRP when SL-RSRP is available. | P3: should be SA2 spec.P4-5: not critical, but optimization |
| R2-2308469 | Proposal 1 During relay selection, it is left to source/destination remote UE’s implementation to choose a U2U relay UE to perform PC5 connection establishment when more than one suitable candidate U2U relay UEs meet the AS-layer and higher layer criterion.Proposal 2 During relay reselection, it is left to source remote UE’s implementation to choose either the direct link or an indirect link. No AS criteria needs to be defined.Proposal 3 For in-coverage scenarios, the U2U relay relay (re-)selection procedure are purely UE-based procedures with no gNB assistance/involvement required.Proposal 4 For in-coverage UEs in RRC\_CONNECTED state, the gNB does not provide a dedicated configuration for relay (re-)selection. Such configurations can be acquired from the cell-specific configuration or preconfiguration.Proposal 5 RAN2 does not pursue the co-existence between U2N relays and U2U relays in this release as it is not scope of the work item.Proposal 6 In UE-to-UE relaying, the gNB does not provide a dedicated discovery configuration for an in-coverage UE in RRC\_CONNECTED and can rely on cell-specific configuration/preconfiguration. |  |
| R2-2308205 | Proposal 9: In Model B, only when PC5 signal strength between the source remote UE and the relay UE is better than a threshold, the relay UE can send discovery message to the target remote UE.Proposal 10: Remote UE can inform the RSRP between itself and the candidate relay UEs to peer remote UE in the negotiated procedure. | P10: should be in SA2 scope |
| R2-2308220 | Proposal 1. AS layer of a UE receiving DCR message for U2U relay should recognize what the message is.Proposal 2. To distinguish integrated discovery message from other PC5 messages, RAN2 to select one option from the following options.- UE measures RSRP of all PC5 message. AS layer can understand type of the PC5 message when upper layer notifies it. (i.e. UE implementation)- RAN2 to use dedicated SRB and/or LCID for transmission of DCR/A messages for U2U relay. (if dedicated SRB is used, RAN2 reverts back the related agreement) | P1: different L2 ID should be used, and ProSe layer can recognize the message based on UE internal implementation. |

Issue 1: Trigger Relay selection when direct link PC5-RLF is detected.

Several contributions propose Relay selection can be triggered when direct link PC5-RLF is detected. Rapp thinks it useful as RAN2 agreed PC5-RLF can trigger Relay reselection.

**Proposal 1: The UE can trigger Relay selection when detecting direct link PC5-RLF.**

Issue 2: Dedicated discovery configuration for UE in RRC\_CONNECTED

Several contributions propose to UE in RRC\_CONNECTED state UE can obtain dedicated discovery configuration as existing Rel-17. One company think no dedicated discovery configuration is needed for CONNECTED state UE. Rapp thinks it makes sense that the existing dedicated discovery configuration can be reused for U2U relay discovery without further enhancements to gNB

**Proposal 2: UE in RRC\_CONNECTED state UE can obtain dedicated discovery configuration via existing Rel-17 mechanism. FFS whether gNB enhancement is expected for U2U discovery configuration.**

Issue 3: Whether AS criterion is needed for relay-UE to decide forwarding discovery message, including Model B and DCA message.

Some companies propose AS criterion is needed for relay UE to decide forwarding discovery message, including Model B. Rapp thinks since RAN2 agreed that for Model A and DCR message, the AS criterion is needed for relay UE to forwarding discovery message, then following the same principle and majority view, it makes sense to define AS criterion for relay UE decide forwarding solicitation message. For Model B response message, since RAN2 agreed that a target remote UE transmits the discovery response message only if the PC5 RSRP between the target remote UE and the relay UE is above a configured threshold, that means target Remote UE already filter out the candidate relay UEs, then it is not critical for the Relay UE to figure out again which response message should be forwarded.

**Proposal 3: For Model B, the relay UE forwards the solicitation message only if the PC5 RSRP between the relay UE and the source remote UE is above a threshold.**

**Proposal 4: For Model B, no AS criterion is needed for the relay UE to forward the response message to the source Remote UE.**

For integrated discovery DCA message, according to SA2, the target Remote UE will select the Relay UE, and send DCA message to the selected Relay UE.

**Proposal 5: For integrated discovery DCA message, no AS criterion is needed for the relay UE to forward the response message to the source Remote UE.**

Issue 4: Whether AS criterion is needed for switching from indirect link to direct link

There are diverse views on this issue. Rapp thinks that in existing direct communication procedure, AS criterion is not defined for UE to initiate PC5 link setup procedure, that means once the UE discovers the peer UE, the UE can setup a PC5 link with the peer UE. Following existing procedure, when switching from indirect path to direct path, the Remote UE can switch the communication to direct path once discovering the peer Remote UE.

**Proposal 6: AS criterion is not needed for switching from indirect link to direct link, and the Remote UE can switch the communication to direct path once discovering the peer Remote UE.**

## 2.2 Layer-2 specific

##### 2.2.1 E2E SL-SRB configuration

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| **Contribution** | **Proposals** |
| R2-2307386 | Proposal 2 RAN2 use specified SRAP and RLC configuration for SL-SRB. |
| R2-2307548 | 1. For E2E SL-SRBs, RAN2 to confirm that the BEARER ID in SRAP header is set to a fixed configuration index value for each SL-SRB, e.g., 0/1/2/3 are specified for SL-SRB 0/1/2/3 respectively.
2. Due to overlapping values of the BEARER ID in SRAP header between SL-SRB and SL-DRB, configure separate PC5 RLC channels to differentiate SL-SRB and SL-DRB of remote UE.
3. All E2E SL-SRB 0/1/2/3 have SRAP header.
4. One specified or default PC5 RLC channel configuration is introduced for E2E SL-SRB0/1/2/3 aggregation.
5. Due to overlapping values of the BEARER ID in SRAP header between SL-SRB and SL-DRB, configure separate PC5 RLC channels to differentiate SL-SRB and SL-DRB of remote UE.
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| R2-2307551 | Proposal 3: For the E2E SL-SRB configuration of U2U relay, specified SRAP configuration is used.Proposal 4: In order to support the specified configuration for E2E SL-SRBs, the mapping between the two PC5 RLC channels used for the E2E SL-SRBs should be specified.Proposal 5: In order to support the specified configuration for E2E SL-SRBs, new per-hop SL-RLCs (e.g. SL-RLC4/5/6/7) should be introduced.  |
| R2-2307641 | 1. Specified SRAP configuration and specified PC5 relay RLC channel are defined and used for E2E SL-SRBs.
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| R2-2307732 | Proposal 2-1. Specified SRAP and RLC channel configuration is used for E2E SL-SRB.Proposal 2-2. If Proposal 2-1 is agreed, RAN2 is kindly asked to discuss parameters to be specified with consideration of SL-SRB multiplexing. |
| R2-2307742 | Proposal 7: For the E2E SL-SRB configuration of U2U relay, specified per-hop RLC Channel configuration is used.Proposal 8: Reuse the existing specified SL-SRB1/2/3 RLC Channel configuration to RLC Channel configuration of U2U relay E2E SL-SRB1/2/3.Proposal 9: No SRAP configuration is needed for E2E SL-SRB bear and RLC Channel mapping. |
| R2-2307855 | Proposal 6 Sidelink SRB/DRB differentiation is explicitly included in the SRAP header for U2U Relay.Proposal 7 RAN2 consider one of the following options for BEARER ID field for U2U SRAP: 1) one extra bit in BEARR ID field to distinguish SRB and DRB; 2) Reserved numerical space from 0 to N-1 to represent N SL-SRBs, while SL-DRB numbering starts from N. |
| R2-2307944 | Proposal 4-b: We should consider using the default PC5 relay RLC channel(s) and the default SRAP configuration for SL-SRBs.Proposal 4-c: One PC5 RLC channel applied to transmit SL-SRBs is more efficient for a single relay transmission scenario. |
| R2-2308101 | Proposal 2c: E2E bearer IDs for SL-DRBs and SL-SRBs are not overlapped, i.e. 0~3 are reserved for SL-SRBs, the E2E bearer ID for SL-DRBs can be enumerated from 4.Proposal 3a: Default SRAP configuration and default PC5 relay RLC channel are defined and used for E2E SL-SRBs (SL-SRB0/1/2/3).Proposal 3b: A single PC5 Relay RLC channel in each hop is used to transmit at least all E2E SL-SRBs of one UE pair. |
| R2-2308119 | Proposal 8: For E2E SL-SRB, specified configuration is used for the configuration of per-hop SRAP/RLC/MAC configuration. |
| R2-2308205 | Proposal 3: For E2E SL-SRB transmission, the configuration of bearer mapping and RLC channel can be specified, but the local ID needs to be configured by relay UE, e.g. in SRAP configuration. |
| R2-2308220 | Proposal 7. remote UE should transmit E2E SL-SRB0/1/2 messages with SRAP header including the assigned UE ID. |
| R2-2308321 | Proposal 10: For the E2E SL-SRB configuration of U2U SL relay, specified SRAP and PC5 RLC channel configurations are used.  |
| R2-2308470 | [Proposal 8 For SL-SRBs apart from SL-SRB0, the SRAP layer is present over both hops.](#_Toc142588887)[Proposal 9 Fixed or default RLC configuration is used for all E2E SL-SRBs.](#_Toc142588889)[Proposal 10 Specified SRAP configuration can be used for all E2E SL-SRBs.](#_Toc142588891)[Proposal 13 RAN2 does not pursue the differentiation of SL-SRB/DRBs at the SRAP layer.](#_Toc142588897) |

For E2E SL-SRB and E2E SL-DRB differentiation,

Option 1: Different PC5 RLC Channels for SL-SRB and SL-DRB

Option 2: Introduce an indication in SRAP header to differentiate SRB and DRB 1

Option 3: Reserved numerical space from 0 to N-1 to represent N SL-SRBs, while SL-DRB numbering starts from N.

Rapp think all the three options could work for SL-SRB and SL-DRB differentiation, but according to SA3 reply LS, E2E bearer ID can be used as input for E2E security, then anyway, SL-SRB and SL-DRB should use different index.

**Proposal 7: E2E SL-SRB and E2E SL-DRB use different index space.**

For E2E SL-SRB ID, almost all contributions propose to use a fixed index, e.g. 0/1/2/3 are specified for SL-SRB 0/1/2/3 respectively. Then it should be straight-forward to propose fixed index are defined for E2E SL-SRB 0,1,2,3 respectively.

**Proposal 8: Fixed index (i.e., 0/1/2/3) are defined for E2E SL-SRB 0/1/2/3 respectively.**

All companies propose to use specified PC5 RLC Channel configuration on each hop for E2E SL-SRB.

**Proposal 9: Use specified PC5 RLC Channel configuration on each hop for E2E SL-SRB 0/1/2/3.**

About which specified PC5 RLC Channel configuration should be used for E2E SL-SRB 0/1/2/3, there are different proposals, e.g. reuse existing specified RLC Channel configuration for SL-SRB 0/1/2/3 (SCCH), new per-hop SL-RLCs (e.g. SL-RLC4/5/6/7), one RLC Channel configuration for all E2E SL-SRB 0/1/2/3. Raps think it is more simple to reuse existing specified RLC Channel configuration, and no clear motivation to introduce any enhancements.

**Proposal 10: Discussing which option is used as per-hop configuration for E2E SL-SRB**

Option 1: Reuse existing specified per-hop (e.g. RLC Channel configuration) of SL-SRB 0/1/2/3 (SCCH) as per-hop (e.g. RLC Channel configuration) of E2E SL-SRB 0/1/2/3.

Option 2: New specified per-hop configurations for E2E SL-SRB 0/1/2/3 respectively.

Option 3: One or more new common per-hop configuration(s) for all E2E SL-SRB 0/1/2/3.

##### 2.2.2 E2E SL-DRB configuration

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| Contribution | Proposals |
| R2-2307233 | [Proposal 18 For L2 U2U relay UE as Tx-UE of the second hop, R2 discusses whether rely on relay UE itself (or the serving gNB) or the Tx end-UE (or the serving gNB) to decide on the Tx side related PC5 RLC channel parameters.](#_Toc142557595) |
| R2-2307548 | Proposal 10 Legacy SL RB configuration rules are reused in R18 U2U, i.e. source remote UE (or its serving gNB if RRC CONNECTED) decides E2E configurations and HbH configurations for the hop between source and relay, and L2 U2U Relay UE (or its serving gNB if RRC CONNECTED) decides HbH configurations for the hop between relay and target. |
| R2-2307641 | Proposal 11. Source remote UE determines the E2E SDAP/PDCP configuration of SL-DRB based on E2E QoS parameters.Proposal 12. Source remote UE informs the target remote UE of the E2E SDAP/PDCP parameters applied to both TX and RX.Proposal 13. Relay UE determines the per-hop SRAP/RLC/MAC configurations for each hop based on per hop QoS.Proposal 14. Relay UE informs the source remote UE of the SRAP/RLC/MAC parameters applied to TX only or applied to both TX and RX for the first hop.Proposal 15. Relay UE informs the target remote UE of the SRAP/RLC/MAC parameters applied to both TX and RX for the second hop. |
| R2-2307742 | Proposal 11: RAN2 discusses how to associate the RLC Channel configuration on the second hop with the E2E SL-DRB ID. Proposal 12: For RLC Channel configuration on the second hop, the Remote UE sends the mapping of E2E-SL-DRB and QoS flow ID(s) to the Relay UE; the Relay UE derives SL-DRB ID for the QoS flow ID(s); and the Relay UE derives the RLC Channel configuration on the second hop for the SL-DRB ID. Proposal 13: For RLC Channel configuration on the first hop, Relay UE sends back the split QoS profiles and QoS flow ID(s) to source Remote UE; and the source Remote UE derives first hop RLC Channel configuration for the E2E-DRB.Proposal 14: The source Remote UE derives SDAP and PDCP configuration for a E2E SL-DRB. |
| R2-2307932 | Proposal 4: The RRCReconfigurationSidelink message from source remote UE to relay UE includes at least the following configurations: - SL RLC channel configuration for the 1st-hop (e.g., between source remote UE and relay UE). - End-to-end bearer configuration from source remote UE and target remote UE. - The mapping configuration between SL RLC channel in the 1st-hop and end-to-end bearer.Proposal 5: The RRCReconfigurationSidelink message from relay UE to target remote UE includes at least the following configurations: - SL RLC channel configuration for the 2nd-hop (e.g., between relay UE and target remote UE).- End-to-end bearer configuration from source remote UE and target remote UE. This configuration is forwarded from the source remote UE. - The mapping configuration between SL RLC channel in the 2nd-hop and end-to-end bearer. |
| R2-2308101 | Proposal 5: Considering the per hop PC5 unicast link may be shared by multiple E2E PC5 links, when transmitting information related to an E2E link using per hop PC5-RRC signalling, RAN2 needs to discuss how to indicate which E2E link the information applies.Proposal 6a: For SDAP/PDCP configuration of E2E SL-DRB, source remote UE determines the Tx side parameters and sends the parameters related to both Tx and Rx side to target remote UE via E2E PC5-RRC signalling. Proposal 6b: For the 1st hop PC5 RLC channel, source remote UE determines the Tx side parameters and sends the parameters related to both Tx and Rx side to relay UE via per hop PC5-RRC signalling. Proposal 6c: For the 2nd hop PC5 RLC channel, relay UE determines the Tx side parameters and sends the parameters related to both Tx and Rx side to target remote UE via per hop PC5-RRC signalling. Proposal 7: RAN2 discuss what assistant information is needed for relay UE to decides the Tx parameters of the 2nd hop PC5 RLC channel. |
| R2-2308104 | Proposal 6. RAN2 to discuss handling of potential mismatch of per-hop SLRB configurations for the case of QoS handling when bearer multiplexing is used. |
| R2-2308119 | Proposal 10: For E2E SDAP/PDCP configuration and SRAP/RLC/MAC configuration on the first hop for E2E SL-DRB, the Tx End UE or its serving gNB decide the Tx and Rx related parameters.Proposal 11: For SRAP/RLC/MAC configuration on the second hop for E2E SL-DRB, the Relay UE or its serving gNB decide the Tx and Rx related parameters. |
| R2-2308205 | Proposal 6: Following Rel-16 sidelink communication principle of Tx UE configuring Rx UE, in L2 U2U relay operation, the E2E SDAP/PDCP and per hop RLC bearer configuration are generated in the following way: * Tx remote UE provides E2E SDAP/PDCP configuration to the Rx remote UE and also in the meanwhile provides first hop RLC bearer configuration to the relay UE.
* The relay UE provides the second hop RLC bearer configuration to the Rx remote UE.

Proposal 7: The Tx remote UE informs the QoS flow-to-DRB mapping to the relay UE via PC5-RRC, so that relay UE can derive DRB level QoS of the second hop and obtain the second hop RLC bearer configuration based on it. |
| R2-2308220 | Proposal 8. For transmission satisfying E2E QoS, relay UE need to know the mapping between E2E QoS flow and E2E SL-DRB.Proposal 9. relay UE configures SRAP configuration based on the mapping between E2E QoS flow and E2E SL-DRB. |
| R2-2308381 | Proposal 1: For SL DRBs, the TX source UE determines end-to-end SDAP and PDCP configuration parameters associated with the QoS profile from (pre)configuration.Proposal 2: For SL DRBs, the TX source UE sends the RX-related configuration parameters to the RX destination UE via end-to-end PC5-RRC signalling.Proposal 3: The TX source UE determines the first hop RLC, MAC, and PHY configuration parameters associated to the QoS profile from (pre)configuration. FFS how to distinguish parameters associated with relaying compared to parameters associated with a direct link.Proposal 4: RAN2 decides which of the following options are used to configure lower layers of the second hop: 1) TX source UE determines the allowable RLC channel configurations for the second hop, associated to the QoS profile from (pre)configuration, and sends them to the relay, or 2) Relay UE determines the allowable RLC channel configurations, associated to the QoS information provided by the TX source UE, from (pre)configuration. |
| R2-2308722 | Proposal 2 Source remote UE transmits an E2E RRCReconfigurationSidelink message to Target remote UE to provide the SDAP configuration and the PDCP configuration for establishing the new E2E SL DRB for a new PC5 QoS flow. |

E2E DRB configuration for PDCP and SDAP

For PDCP and SDAP configuration, all contributions proposes the source Remote UE derives the PDCP and SDAP configuration and provides to the target Remote UE using E2E PC5-RRC message.

**Proposal 11: The TX Remote UE derives the PDCP and SDAP configuration and provides configuration related to both TX and RX to the RX Remote UE using E2E PC5-RRC message.**

The first hop RLC Channel configuration

There are different proposals for the first hop RLC Channel configuration as following.

Option 1: The TX Remote UE derives the RLC Channel configuration for the first hop and provides to the relay UE.

Option 2: The relay UE derives the RLC Channel configuration for the first hop and provides TX config. to the TX Remote UE.

Most of companies propose option 1 following existing TX configuration principle, i.e. TX UE derives the configuration and provides to the RX UE.

**Proposal 12: The TX Remote UE derives the first hop configuration (e.g. RLC Channel configuration) and provides configuration related to both TX and RX to the relay UE using per-hop PC5-RRC message.**

The second hop RLC Channel configuration

For the second hop configuration, there is one issue that how to associate the hop configuration with the E2E SL-DRB since currently Relay UE does not know the E2E SL-DRB info. There are different proposals for the second hop RLC Channel configuration.

Option 1: Relay UE derives the per-hop configuration for the second hop according to e.g. split QoS profiles for the second hop. With this option, the Relay UE needs to know the E2E SL-DRB info and then derives the second hop configuration for the E2E SL-DRB.

Option 2: TX Remote UE derives the second hop configuration(s) and provides to the Relay UE.

Most of companies propose option 1 following existing per-hop configuration procedure.

**Proposal 13: The Relay UE derives the second hop configuration (e.g. RLC Channel configuration) for each E2E SL-DRB according to e.g. the split QoS profiles for the second hop and preconfiguration or configuration from gNB.**

Besides, in order for the Relay UE to derive the association between the E2E SL-DRB with the second hop configuration, the source Remote UE needs to inform the QoS flow-to- E2E SL-DRB mapping to the relay UE via PC5-RRC, so that relay UE can derive E2E SL-DRB level QoS of the second hop and obtain the second hop configuration based on it. Since RAN2 agreed Relay UE split the QoS profiles the QoS profile split should be per PFI, then it is assumed Relay UE need to know the QoS flow ID(s).

**Proposal 14: If P13 is agreed, the source Remote UE informs the QoS flow-to-E2E SL-DRB mapping to the relay UE via PC5-RRC, relay UE can derive the second hop configuration for the E2E SL-DRB based on the QoS flow-bearer mapping.**

##### 2.2.3 QoS handling

|  |  |
| --- | --- |
| Contribution | Proposals |
| R2-2307233 | [Proposal 9 For QoS split in L2 U2U Relay, the QoS split is performed per-QoS flow as in L3 U2U Relay.](#_Toc142557586)[Proposal 10 For QoS split in L2 U2U relay, it is up to relay UE implementation to decide the split-QoS for the 2 hops as for L3 U2U Relay.](#_Toc142557587)[Proposal 11 For QoS split in L2 U2U relay, RAN2 to define the PC5-RRC signalling between Source remote UE and Relay UE to support Source UE provides the E2E QoS (negotiated with Target UE) to Relay UE and Relay UE to reject, or accept by sending the hop-1 split-QoS result to Source remote UE.](#_Toc142557588)[Proposal 15 Define a new PC5-RRC signal for the QoS split procedure in L2 U2U Relay.](#_Toc142557592)[Proposal 16 Include PDB into the PC5-RRC message for QoS split in L2 U2U Relay.](#_Toc142557593)[Proposal 17 Not include PER into the PC5-RRC message for QoS split in L2 U2U Relay, by assuming that PER is split equally between the two hops.](#_Toc142557594) |
| R2-2307386 | Proposal 3 RAN2 should discuss whether it is allowed to have specified QoS split behaviour of U2U Relay UE. |
| R2-2307548 | 1. Using Hop-by-Hop PC5 RRC procedure in L2 U2U relay scenario to perform the E2E QoS (i.e., for PC5 PDB parameter) splitting over the two hops.
2. In order to maximum reuse of existing signalling mechanism, RAN2 to accept a specified split method for PacketErrorRate (PER), e.g. directly set to the next PER level (10^-3 -> 10^-4).
 |
| R2-2307551 | Proposal 7: The end-to-end PDB parameter needs to be split between two PC5 links for U2U relay.  |
| R2-2307641 | Proposal 10. Source remote UE provides E2E QoS parameters of SL-DRB to relay UE for QoS split. |
| R2-2307716 | Proposal 6: AS layer is responsible for QoS split in L2 U2U relay.Proposal 7: Relay UE is responsible for QoS split in L2 U2U relay, how the relay UE handles the QoS of two hops of U2U relay is up to the implementation of relay UE.  |
| R2-2307732 | Proposal 1. Source Remote UE can provide E2E QoS information (e.g., PQI) to its connected Relay UE via PC5 RRC message. |
| R2-2307742 | Proposal 10: The source Remote UE reuses the existing PC5-S message to send E2E QoS profiles and QoS flow ID(s) to Relay UE.Proposal 15: Send LS reply to SA2 that PC5-S message is reused to transmit QoS parameters between the source Remote UE and the Relay UE.  |
| R2-2307932 | Proposal 15: QoS split is performed only for PDB such as L2 U2N.Proposal 18: For the U2U relay operation, the R*RCReconfigurationSidelink* message from the UE source remote UE to relay UE or from relay UE to the target remote UE includes at least the followings:- SL RLC channel configuration- The required (/remaining) PDB information per RLC channel IDProposal 19: For the U2U relay operation, the R*RCReconfigurationCompleteSidelink* message from the target remote UE to relay UE or from the relay UE to the source remote UE includes at least the followings: - The split PDB per RLC channel ID |
| R2-2307944 | Proposal 6 The source remote UE can provide assistance information to the relay UE for proper configure the QoS parameters of two hops.  |
| R2-2307989 | Proposal 10: Remote UE transmits the QoS information to relay UE for QoS splitting purpose. |
| R2-2308101 | Proposal 4a: For L2 U2U relay, source remote UE sends E2E QoS to relay UE reusing PC5-S message while relay UE sends split QoS to source remote UE via PC5-RRC message, e.g. RRCReconfigurationSidelink.Proposal 4b: For L2 U2U relay, relay UE sends only the split PDB of the first hop of each QoS flow to the source remote UE.Proposal 4c: For L2 U2U relay, it is not necessary for relay UE to send the split QoS of the second hop to target remote UE. |
| R2-2308205 | Proposal 4: Relay UE obtains the split QoS info in the following way:* Remote UE informs the E2E QoS parameters to relay UE via PC5 RRC message.
 |
| R2-2308368 | Proposal 9: RAN2 considers joint adaptation of QoS split between the Tx End UE and the U2U relay UE for E2E PDB.Proposal 10: QoS split configuration for a respective E2E RB from the U2U relay UE to the Tx End UE may include ranges for per-hop PDBs for the first hop and second hop.Proposal 11: SL MAC CE is used for indicating the expected range of per-hop PDB on respective egress hop from one to another between the Tx End UE and the U2U relay UE. |
| R2-2308380 | Proposal 9: The relay UE determines the PDB split for a new E2E bearer mapped to an existing RLC channel configuration by reusing the PDB of the RLC channel on that hop and assigning the remaining PDB to the other hop. |

Some contributions propose QoS split should be per-QoS flow, one company propose QoS split should be SL-DRB level. Rapp thinks it should be straight-forward to split per QoS flow level. Then the Remote UE informs the Relay UE QoS flow info and corresponding QoS profiles for each QoS flow, which is the same as L3 based U2U relay.

**Proposal 15: Same as L3 based U2U relay, the QoS split should be per QoS flow, and the source UE should inform the Relay UE QoS flow(s) and corresponding QoS profiles.**

About which QoS profiles should be sent to the Relay UE, most of companies think PDB should be sent and be split. Some other companies think other parameters also need to be sent to the Relay UE, e.g. PQI, and other QoS profiles. Rapp thinks at least PDB is needed to be sent to the Relay UE, whether other parameters to be sent to the Relay UE depends on whether the Relay UE derives the second hop configuration, i.e. proposal 13. If yes, then Relay UE needs all the QoS profiles and derives the proper second hop configuration for the E2E bearer/flow.

**Proposal 16: At least PDB is sent from the source UE to the relay UE for splitting.**

**Proposal 17: If it is Relay UE to derive the second hop configuration for the E2E SL-DRB, then Relay UE needs all the QoS profiles.**

Most of companies propose that after QoS slit, only PDB is needed to be sent to the source Remote UE if it is the source Remote UE to derive the first hop configuration.

**Proposal 18: If it is the source (TX) Remote UE to derive the first hop configuration, split PDB is sent to the source (TX) Remote UE.**

Some contributions propose it should be left to UE implementation on how to split the QoS profiles, one company propose to standardize how to split QoS profiles. It should be simple way to leave to Relay UE implementation, same as L3 U2U relay.

**Proposal 19: It is left to Relay UE implementation on how to split the QoS profiles.**

Some contributions propose using PC5-RRC or PC5-S message to inform the QoS profiles. It should depend on what QoS parameters to be sent to the Relay UE and which granularity the QoS profiles should be, e.g. per bearer or per QoS flow. If QoS profiles are split per bearer, then RRC message is needed, but if If QoS profiles are split per QoS flow, then reuse existing PC5-S message is more simple way for RAN2.

**Proposal 20: RAN2 discusses to use PC5-RRC message or reuse existing PC5-S message to send QoS profiles to Relay UE, considering e.g. QoS profiles split per bearer or per QoS flow and what QoS parameters to be sent to the Relay UE.**

##### 2.2.4 UE ID in SRAP

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| Contribution | Proposals |
| R2-2307233 | Proposal 5 R2 discusses using 24-bit L2 ID as the UE ID to be included in SRAP header.Proposal 6 For U2U Relay, the IDs on the 2 hops are same, i.e., there is no ID replacement operation by relay UE.Proposal 7 If short ID is agreed, include both source UE ID and destination UE ID in SRAP subheader. |
| R2-2307386 | Proposal 4 It is suggested to apply global assignment of short ID. |
| R2-2307750 | For U2U relay, unless there is further clarification of which entity should perform ID assignment in the case of multihop relays, the baseline assumption should be to use L2ID for Rel-18. |
| R2-2307402 | Proposal 3: Short ID(s) is included in SRAP header in L2 U2U relay. Proposal 4: Both Source short ID and Destination short ID are included in the header the SRAP layer.  |
| R2-2307548 | 1. RAN2 to support Option b (Source ID and Destination ID).
2. Short ID should be used in SRAP header.
 |
| R2-2307551 | Proposal 1: The short ID should be assigned unique within one U2U relay.Proposal 2: For U2U relay, suggest to use one single ID to identify the source and destination remote UEs. |
| R2-2307641 | Proposal 16. Include both source and destination UE IDs in the SRAP header.Proposal 17. Source and destination UE IDs in the SRAP header are local IDs.Proposal 18. Relay UE performs the local ID assignment for source remote UE and target remote UE. The assigned local ID is a global ID. |
| R2-2307655 | Proposal 1: It is preferable to include L2 ID as the remote UE ID in SRAP header.Proposal 2: Exclude Option 2, as it is not applicable to multi-hop scenario.Proposal 3: If RAN2 agrees on short ID, include one common local pair ID in SRAP layer for each hop (Option 6).Proposal 4: RAN2 to consider a local pair ID for a pair of source/target remote UEto be included in each hop(Option 6) to avoid collision. |
| R2-2307716 | Proposal 3: RAN2 is suggested to take local ID used in the SRAP header. Proposal 4: For the U2U relay, the UE ID in the SRAP header should be extended to both source remote UE ID and target remote UE ID.Proposal 5: For the U2U relay, the local IDs should be assigned by the relay UE, details are FFS. |
| R2-2307742 | Proposal 4: If only single-hop relay is considered, Option 1 (i.e. single global local ID) is adopted.Proposal 5: If multi-hop relay is considered, Option 3 (i.e. single per-hop local ID) is adopted.Proposal 6: RAN2 does not pursue the Layer-2 ID as ID format in SRAP layer. |
| R2-2307855 | Proposal 4 SRAP header including both Source L2 address and Destination L2 address is used in U2U Relay adaptation layer.Proposal 5 If local ID is to be used in SRAP, adopt the option of using short “Source ID and Destination ID”. |
| R2-2307932 | Proposal 9: Using a single short ID is an efficient way in terms of SRAP header overhead.Proposal 10: After SL unicast is established from the source remote UE to the target remote UE, the direction of delivering the packet is decided based on ingress and egress RLC channel configuration. Proposal 11: Local ID is just for identifying at the target remote UE side that the packet originated from which source remote UE.Proposal 12: Even if the single short ID is duplicated at a relay UE, the relay UE can identify the receiving packet based on L2 ID of the MAC layer. Proposal 13: In terms of local ID assignment, using the global ID looks simpler than using the hop-by-hop local ID.Proposal 14: Using a global short ID, identifying the pair of the source remote UE and the target remote UE, is preferable. |
| R2-2307944 | Proposal 5-a For the U2U relay, the adaptation header includes the Source ID and Destination ID.Proposal 5-b To reduce the size of the SRAP header, we can use the Destination ID in the first hop and Source ID in the second hop during the message transmissions. |
| R2-2308101 | Proposal 1: It is suggested that both source UE L2 ID and destination UE L2 ID are included in the adaptation header of each hop. |
| R2-2308104 | Proposal 1. SRAP functions for U2N case also apply to the U2U case, while bearing in mind that determination of UE ID field function in the U2N case may translate to determination of a pair identifier in the U2U case, or a destination UE identifier.Proposal 2. The SRAP function of ‘Determination of SRAP ID field and BEARER ID field for data packets’ needs to be modified according to agreements made, once RAN2 decides between options a) and b), and assuming short ID is used to begin with.Proposal 3. For the case where the Source UE inserts the pair ID into the SRAP header, RAN2 to discuss using the PC5 Link Identifier for this purpose.Proposal 4. RAN2 to discuss handling of collision in the {SRC UE ID, DST UE ID} pair ID space.Proposal 5. The short ID – if used – should be assigned globally. |
| R2-2308119 | Proposal 6: For UE-to-UE relay, adaptation layer header should include local UE ID of the source End UE and local UE ID of the target End UE.Proposal 7: Local UE IDs are assigned hop-by-hop. |
| R2-2308205 | Proposal 1: Between L2 ID based solutions and short ID based solutions, RAN2 to adopt a short ID based solution.Proposal 2: For L2 U2U relay, the adaptation layer header includes single local ID, which is to identify target remote UE in first hop and to identify source remote UE in second hop. |
| R2-2308220 | Proposal 6. Upon establishment of per hop connection, relay UE should assign the UE ID to each remote UE. |
| R2-2308321 | Proposal 8: To reuse R17 U2N SRAP layer design, short ID should be used in SRAP header to reduce signalling overhead.Proposal 9: For SRAP header design, slightly prefer Option 5: A local pair ID for a pair between source remote UE and target remote UE included in each hop, the local ID is unique within one PC5 hop and relay UE needs to replace the local ID on each hop. |
| R2-2308368 | Proposal 2: RAN2 to agree on a single ID to identify each PC5 link.Proposal 3: The single ID should be local and thus assigned per hop-by-hop.Proposal 4: RAN2 to agree a short local ID should be sufficient. |
| R2-2308380 | Proposal 6: *Include both source L2 ID and destination L2 ID in the adaptation layer header on both hops.*  |
| R2-2308470 | [Proposal 1 Short ID is to be included in the SRAP header for SRC/DST remote UE identification.](#_Toc142588865)[Proposal 2 Both source and destination short-IDs are included in the SRAP header for identifying the corresponding source and destination remote UEs.](#_Toc142588867)[Proposal 3 Deprioritize the discussion on hop-by-hop vs global assignment in this release.](#_Toc142588871) |
| R2-2308611 | Proposal 1) RAN2 discusses using optimized short ID to identify a path between peer UEs and does not pursue 24-bit L2 ID in SRAP header. Proposal 2) RAN2 decides to select short ID of either single ID or a pair of source and destination IDs in SRAP header.Proposal 4) The U2U relay UE forwards a SRAP header to next hop without updating short ID in the SRAP header.  |
| R2-2308220 | proposal 4. Both local UE ID (source and destination) should be included in SRAP header. |

L2 ID vs. Local ID

6 companies prefer to use L2 ID as UE ID in SRAP header where 3 companies can accept local ID;

18 companies prefer to use local ID, as today’s U2N relay.

Rapp thinks the benefit of local ID is very clear on SRAP header overhead, and besides the overhead aspects, there are also other issues for L2 ID, e.g. privacy issue. Following majority view, it is proposed to use local ID as UE ID in SRAP header.

**Proposal 21: Use local ID as UE ID in SRAP header.**

Two local IDs vs. one single local ID

There are diverse views on whether two local IDs or single local ID should be used, two IDs has slightly majority view. Technically, the issue that whether two local IDs or single local IDs is mainly for multi-hop relays since relay UEs needs to know the target Remote UE and the target Remote UE needs to know the source Remote UE. For single-hop U2U relay, single local ID is enough on each hop, i.e, target Remote UE ID is on the first hop, source Remote UE ID on the second hop. For multi-hop relay, it can be further discussed. Then it is proposed to discuss this issue.

**Proposal 22: At least for single-hop U2U relay, discuss one or two local IDs are included in SRAP header to identify source and target Remote UE respectively.**

Global local ID vs. per-hop local ID

There are diverse views on whether global local ID or per-hop local ID should be used. The Global local ID has benefits of simple Relay UE handling and less SRAP specification impact. The issue for the global local ID is there could be collision in multi-hop relays, but in single-hop relay, the collision is very corner case.

Then from simplicity point of view, global local ID is proposed for at least single-hop U2U relay. For multi-hop U2U relays, even though there is note in the WID that future-compatibility should be considered, but actually it is not in Rel-18 scope, and it is not clear so far whether it will be in Rel-19 package. So it is proposed to prioritize single-hop relay in Rel-18.

For single-hop U2U relay, regardless of single local ID or two local IDs added on each hop, it makes sense the global ID is used to simplify the Relay UE handling.

**Proposal 23: At least for single-hop U2U relay, global local ID is used as UE ID in SRAP header.**

Multi-hop relay forward-compatibility

There is NOTE in the WID that multi-hop relay forward-compatibility needs to be considered. Rapp understands it is unclear on how to support the forward-compatibility considering several reasons: 1) multi-hop relay is not in Rel-18 and it is not clear so far whether it will be in Rel-19 package; 2) for all other aspects, e.g. connection establishment, discovery, relay (re)selection, multi-hop relay has not been considered in SA2 and RAN2, that means forward-compatibility is not considered for those aspects; 3) support forward-compatibility does not means the same solution to be used. So Rapp would like to check companies views on multi-hop relays consideration in Rel-18.

Option 1: Do not consider multi-hop relays in Rel-18.

Option 2: Design a solution for SRAP which can be used for multi-hop relays.

Option 3: Support forward-compatibility via other method, e.g. leave a reserved bit in SRAP header to allow future extension.

**Proposal 24: Discuss which option is the way-forward to handle mulit-hop relays in Rel-18**

## 2.3 Others

Other proposals are not summarized into this document, considering some reasons. E.g.

- U2U relay service continuity handling during e.g. RLF, or path switching. It is early to talk about service continuity before basic functions are determined.

- gNB involvement for discovery, reselection and SL-DRB configuration. The related proposals are pending on the proposals being discussed, propose to discuss later.

- DRX in U2U relay. It is unclear whether it should be discussed in this agenda.

- Proposals related to SA2 or already covered in SA2 spec, e.g. U2U control plane message sequence.

# Conclusion

This contribution summarizes the proposals for U2U relay and provides Rapp’s proposals.

Discovery and Relay (re)selection

**Proposal 1: The UE can trigger Relay selection when detecting direct link PC5-RLF.**

**Proposal 2: UE in RRC\_CONNECTED state UE can obtain dedicated discovery configuration via existing Rel-17 mechanism. FFS whether gNB enhancement is expected for U2U discovery configuration.**

**Proposal 3: For Model B, the relay UE forwards the solicitation message only if the PC5 RSRP between the relay UE and the source remote UE is above a threshold.**

**Proposal 4: For Model B, no AS criterion is needed for the relay UE to forward the response message to the source Remote UE.**

**Proposal 5: For integrated discovery DCA message, no AS criterion is needed for the relay UE to forward the response message to the source Remote UE.**

**Proposal 6: AS criterion is not needed for switching from indirect link to direct link, and the Remote UE can switch the communication to direct path once discovering the peer Remote UE as legacy.**

E2E SL-SRB configuration

**Proposal 7: E2E SL-SRB and E2E SL-DRB use different index space.**

**Proposal 8: Fixed index (i.e., 0/1/2/3) are defined for E2E SL-SRB 0/1/2/3 respectively.**

**Proposal 9: Use specified PC5 RLC Channel configuration on each hop for E2E SL-SRB 0/1/2/3.**

**Proposal 10: Discussing which option is used as per-hop configuration for E2E SL-SRB**

Option 1: Reuse existing specified per-hop (e.g. RLC Channel configuration) of SL-SRB 0/1/2/3 (SCCH) as per-hop (e.g. RLC Channel configuration) of E2E SL-SRB 0/1/2/3.

Option 2: New specified per-hop configurations for E2E SL-SRB 0/1/2/3 respectively.

Option 3: One or more new common per-hop configuration(s) for all E2E SL-SRB 0/1/2/3.

E2E SL-DRB configuration

**Proposal 11: The TX Remote UE derives the PDCP and SDAP configuration and provides configuration related to both TX and RX to the RX Remote UE using E2E PC5-RRC message.**

**Proposal 12: The TX Remote UE derives the first hop configuration (e.g. RLC Channel configuration) and provides configuration related to both TX and RX to the relay UE using per-hop PC5-RRC message.**

**Proposal 13: The Relay UE derives the second hop configuration (e.g. RLC Channel configuration) for each E2E SL-DRB according to e.g. the split QoS profiles for the second hop and preconfiguration or configuration from gNB.**

**Proposal 14: If P13 is agreed, the source Remote UE informs the QoS flow-to-E2E SL-DRB mapping to the relay UE via PC5-RRC, relay UE can derive the second hop configuration for the E2E SL-DRB based on the QoS flow-bearer mapping.**

QoS handling

**Proposal 15: Same as L3 based U2U relay, the QoS split should be per QoS flow, and the source UE should inform the Relay UE QoS flow(s) and corresponding QoS profiles.**

**Proposal 16: At least PDB is sent from the source UE to the relay UE for splitting.**

**Proposal 17: If it is Relay UE to derive the second hop configuration for the E2E SL-DRB, then Relay UE needs all the QoS profiles.**

**Proposal 18: If it is the source (TX) Remote UE to derive the first hop configuration, split PDB is sent to the source (TX) Remote UE.**

**Proposal 19: It is left to Relay UE implementation on how to split the QoS profiles.**

**Proposal 20: RAN2 discusses to use PC5-RRC message or reuse existing PC5-S message to send QoS profiles to Relay UE, considering e.g. QoS profiles split per bearer or per QoS flow and what QoS parameters to be sent to the Relay UE.**

UE ID in SRAP

**Proposal 21: Use local ID as UE ID in SRAP header.**

**Proposal 22: At least for single-hop U2U relay, discuss one or two local IDs are included in SRAP header to identify source and target Remote UE respectively.**

**Proposal 23: At least for single-hop U2U relay, global local ID is used as UE ID in SRAP header.**

**Proposal 24: Discuss which option is the way-forward to handle mulit-hop relays in Rel-18.**

**Option 1: Do not consider multi-hop relays in Rel-18.**

**Option 2: Design a solution for SRAP which can be used for multi-hop relays.**

**Option 3: Support forward-compatibility via other method, e.g. leave a reserved bit in SRAP header to allow future extension.**

# Reference

R2-2307233 Discussion on U2U relay OPPO discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2307386 Discussion on remaining issue of U2U relay NEC discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2307402 Discussion on the adaptation layer Fujitsu discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2307446 Discussion on U2U relay Sharp discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2307547 Remaining issues on U2U discovery and relay (re)selection vivo discussion

R2-2307548 Discussion on the remaining issues of L2 U2U relaying vivo discussion

R2-2307551 Discussion on U2U Relay CATT discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2307641 U2U Relay selection reselection, SRAP design Beijing Xiaomi Mobile Software discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2307655 Discussion on using short ID in U2U relaying Fraunhofer IIS, Fraunhofer HHI discussion Rel-18 NR\_SL\_relay\_enh

R2-2307716 Discussion on U2U relay TCL discussion

R2-2307732 QoS and bearer configuration for L2 U2U relaying Samsung discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2307742 Common part and Layer-2 specific part on U2U Relay Qualcomm Incorporated discussion NR\_SL\_relay\_enh-Core

R2-2307743 gNB involvement and capability on U2U relay Qualcomm Incorporated discussion NR\_SL\_relay\_enh-Core

R2-2307750 Considerations for U2U L2 relay operations Kyocera discussion Rel-18

R2-2307855 Discussion on remaining issues on UE-to-UE Relay Apple discussion Rel-18

R2-2307932 Control plane procedure for U2U relay LG Electronics Inc. discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2307944 Further discussion on L2 U2U relay China Telecom discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2307989 Discussion on L2 U2U relay Lenovo discussion Rel-18

R2-2308100 Discussion on U2U Relay discovery and (re)selection ZTE, Sanechips discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2308101 Discussion on U2U relay L2-specific functionality ZTE, Sanechips discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2308104 SRAP design for U2U Sidelink Relay Samsung discussion

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R2-2308160 UE-to-UE relay (re)selection Sony discussion Rel-18 NR\_SL\_relay\_enh

R2-2308161 Discussion on DRX for Sidelink UE to UE Relay Sony discussion Rel-18 NR\_SL\_relay\_enh

R2-2308205 Discussion on UE-to-UE relay Huawei, HiSilicon discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2308220 Remaining issues for UE-to-UE relay Sharp discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2308321 Discussion on U2U relay CMCC discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2308368 Considerations on U2U relay (re)selection and Local ID assignment Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_SL\_relay\_enh-Core R2-2305590

R2-2308380 Open Issues on Discovery, Relay Selection, and SRAP for UE to UE Relays InterDigital discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2308381 QoS and Configuration for L2 UE-to-UE Relays InterDigital discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2308469 Discussion on Relay (re)selection and Discovery Ericsson España S.A. discussion Rel-18

R2-2308470 Control Plane Procedures for Layer 2 UE-to-UE Relays Ericsson España S.A. discussion Rel-18

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R2-2308721 Discussion on E2E PC5-RRC procedures ASUSTeK discussion Rel-18 NR\_SL\_relay\_enh-Core

R2-2308722 Discussion on AS layer configuration for L2 U2U Relay ASUSTeK discussion Rel-18 NR\_SL\_relay\_enh-Core