**[R2 AT115-e][604][Relay] Discussion on Adaptation Layer - Version 0.0.1**

**RAN2**

3GPP TSG-RAN WG2 Meeting #115-e

Electronic Meeting, August 16-27, 2021

[Draft] R2-2108934

Agenda item: 8.7.2.3

Source: OPPO

Document for: Discussion

# Introduction

This is for the following email discussion Scope:

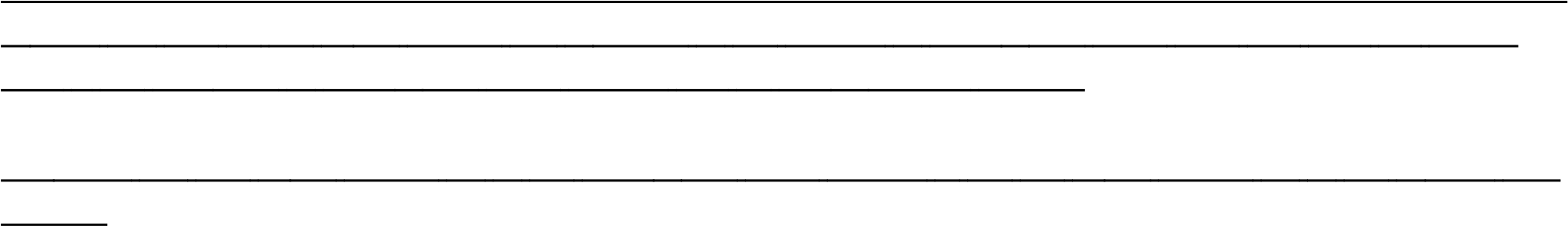
* Discuss the proposals for a relaying adaptation layer on PC5 interface, and conclude on whether theadaptation layer should be supported in Rel-17.
* Discuss the need for the adaptation layer on SRB0, and conclude on whether the adaptation layer should beused on SRB0.

Intended outcome: Report in R2-2108934 Deadline:

* Phase 1 (gauge initial support for the proposals, and see if downselection of options is possible): Wednesday2021-08-18 2000 UTC
* Phase 2 (final conclusion): Tuesday 2021-08-24 2000 UTC

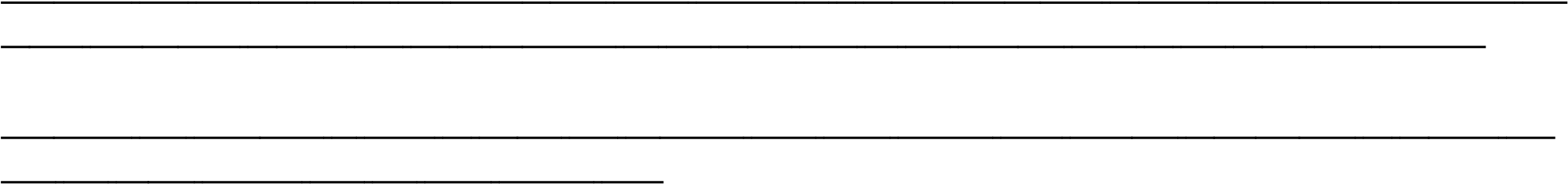
# Presence of Adaptation layer

RAN2 has agreed on the following aspects for adaptation layer

*Proposal 3: For both DL and UL transmission of Uu radio bearers other than SRB0, identity information of a remote UE and its Uu radio bearer are included in the header of adaptation layer over Uu. FFS for SRB0. FFS if the presence of adaptation layer header can be configurable. (24/24)*

*Proposal 3a: The radio bearer ID in the adaptation layer header is the Uu radio bearer ID of the remote UE. (23/24)*

*Proposal 3b: The UE ID in the adaptation layer header is a local, temporary remote UE ID. FFS whether the local, temporary remote UE ID is assigned by the relay UE, or the serving gNB of the relay UE. (23/24)*

*Proposal 3c: Mapping is done at Relay UE between PC5 RLC bearer IDs, identity information of remote UE and Uu radio bearer, and Uu RLC bearer IDs.*

## Uu hop

Then the FFS point on SRB0 deserve some further discussion. Please note this is independent of the issue on configurability, i.e., if it is configurable, the following issues can be for the case where it is configured.

**Q2.1-1a: For SRB0, do you think adaptation layer can be present over Uu hop for UL?**

**Feedback Form 1: Please answer ”Yes”/”No” before providing detailed comment (if any).**

|  |
| --- |
| **1 – Guangdong OPPO Mobile Telecom.**  Yes  By reporting L2 ID of remote UE to gNB, relay can get mapping of remote UE L2 ID and temp ID (used in adaptation layer), so that it can be used in UL for gNB to know the related remote UE who sent the SRB0 UL message. |
| **2 – MediaTek Inc.**  No  We think that SRB0 message from Remote UE can be forwarded in an RRC message (i.e. in a RRC container) from the Relay UE to the gNB. This will simplify the handling for SRB0 message. |
| **3 – Ericsson LM**  No  the adaptation layer for SRB0 in the Uu interface is not needed. first, there is no dedicated configuration for the adaptation layer yet. second, without the adaptation layer, the gNB is able to identify which UE is the source UE of the SRB0 signaling, since the signaling message can contain remote UE ID. Third, including the unnecessary adaptation layer header in the SRB0 signaling, may also increase the signaling overhead, although it is not high. |
| **4 – Qualcomm communications-France**  Yes  We think this question actually depends on whether local remote UE is assigned by relay or serving gNB:  - If assigned by relay, Uu adaptation layer header can be present, i.e. relay UE include its assigned local remote UE ID and RB ID (i.e. SRB 0) in adaptation layer header. It will be always preferred to have unified behavior for SRB0 and other SIB/DRB. |

- If assigned by gNB, we think adaptation layer header should be absent because local remote UE ID is not available to relay for the timing being. Of course, relay UE can send adaptation layer header after getting local UE ID from gNB. However, it incurs unnecessary latency.

1. **– InterDigital France R&D**

No

There is no need to identify the UE or bearer to the network, since the UE ID is already contained in the SRB0 message itself. We think the SRB0 message can be encapsulated in an RRC message of the relay UE. This will reduce specification effort since a container can be used and there is no need to define a separate LCID at the relay UE for forwarding this message.

1. **– Apple Europe Limited** Yes.
   * For UL SRB0 message, the remote UE ID (e.g., C-RNTI) can be read by gNB, but the local UE ID needs also be known by gNB to arrange a DL RRC response via relay. From this point of perspective, we think the SRB0 message needs be tagged with the adaptation layer header which indicates the locally assigned ”Remote UE ID”.
   * This is also easier for relay UE implementation that relay UE always applies the adaptation header to all traffic from the same remote UE.
2. **– MediaTek Inc.**

No.

As the discussion goes to the handling of SRB0 message transmission. We just provide our second for this question.

As said, the Relay UE can forward the SRB0 message to gNB e.g. via a RRC message container. Then logically speaking, the Remote UE ID information is transparent to gNB. We think the Relay UE need to indicate the Remote UE ID associated with the SRB0 message outside of the RRC message container. For simplicity, the Relay UE can assign a local ID for the Remote UE during SRB0 message forwarding, and it is only used to identify whether the later on received SRB0 response from the gNB is for that particular Remote UE who initiates the SRB0 message transmission before. This is also an acknowledgement of the reply from Apple.

1. **– vivo Mobile Communication Co.**

Yes.

Our view is that the relaying specific dedicated configuration can be obtained by the relay UE from the gNB before the remote’s UL SRB0 message is forwarded. In this case, the relay UE can get a NW configured dedicated Uu RLC channel (instread of a new specified Uu RLC channel) to which the remote’s SRB0 is mapped, as the Uu adaptation layer configuration. So the adaptation layer header is attached with both remote UE ID and RB ID of SRB0 in the adaptation layer PDU carrying this remote UE’s UL SRB0 message.

|  |
| --- |
| **9 – ASUSTEK COMPUTER (SHANGHAI)**  Yes  We think gNB should assign the local remote UE ID to the relay UE before the relay UE starts forwarding any traffic/signalling between the remote UE and gNB. Thus, the relay UE should already have the local remote UE ID when forwarding the SRB0 message from the remote UE to gNB. |
| **10 – LG Electronics France**  Yes.  Considering a unified format, all data from remote UE can have an adaptation header. Especially, as the QC’s comment, if relay UE assigns Remote UE’s local ID, the adaptation header for SRB0 can inform remote UE ID and local ID mapping to gNB. We think it is an efficient connection establishment procedure for remote UE. |
| **11 – Beijing Xiaomi Mobile Software**  Yes  We note that to do so the Relay UE should indicate the temporary Remote UE ID in the header. This is preferred as it reduces any latency concerns which may be incurred from waiting for an ID from the gNB before it can be included in the adaptation header.  Also we support the view that the adaptation layer, when applied, is applied to all traffic from the same Remote UE. |
| **12 – Futurewei Technologies**  No  Applying adaptation layer to SRB0 would incur latency for serving gNB to configure the mapping at the relay UE. |
| **13 – Intel Korea**  Yes  As per the CP protocol stack, we understand that we can send any message from the Remote UE to be relayed via Uu RLC channel with adaptation layer; we think it is better to be consistent for all the messages and send SRB0 as well with the adaptation layer.  This is also tied to which node assigns the local Remote UE ID to be carried in the adaptation layer header and we prefer Relay UE’s serving gNB. And we agree with OPPO that this can be achieved when the relay UE is configured after it informs the gNB about the first message from the Remote UE. |
| **14 – Spreadtrum Communications**  Yes  The relay can allocate a temporary Remote UE ID and inlcude the temporary Remote UE ID into the adaptation layer header. |
| **15 – Lenovo (Beijing) Ltd**  No.  UE ID is already included in the SRB0 message. It seems unnecessary to carry UE ID in adaptation layer again. The SRB0 message can be encapsulated in Uu RRC message. |
| **16 – HUAWEI TECHNOLOGIES Co. Ltd.**  Yes  Remote UE ID carried in Uu AL for remote UE’s UL SRB0 message can help gNB to differentiate different Remote UEs in case there are more one remote UEs accessing via the same Relay UE at that moment. |
| **17 – Nokia Corporation**  No  As other mentioned, there is no need to send this twice. Furthermore, the local, temporary remote ID is configured between relay and gNB when SRB0 is used to transmit remote UE’s initial RRC message.  Hence, the adaptation layer cannot be used |
| **18 – Samsung R&D Institute UK**  Yes  Yes it can be present (the pros and cons are a separate matter). And this can work for both the case where gNB configures the local (Adapt) ID for Remote UEs, and for the case where Relay UE performs this configuration. In the former case, SRC L2 ID of Remote UE can be sent in the Adapt header for UL SRB0 message transmission. gNB then configures a local ID mapped to the SRC L2 ID and sends the mapping to the Relay UE. In the latter case, the local ID assigned by the gNB is temporary and may need to be reassigned by the Relay UE. |
| **19 – ZTE Corporation**  Yes.  It is suggested to include the Uu adaptation layer header for both UL and DL SRB0 message. In this case, the Adaptation layer entity may handle the SRB0 message in unified way, e.g. Tx entity add the adaptation layer header and peer Rx entity remove the adaptation layer header. On the other hand, relay UE may encapsulate the local ID in the adaptation layer header of first SRB0 message. Upon receiving such message, gNB may associate the remote UE with the local ID, encapsulate the local ID in the adaptation layer header for remote UE’s DL packet. |
| **20 – CATT**  No.  UE ID is already included in the SRB0 message. It seems unnecessary to carry UE ID in the adaptation layer for UL. |
| **21 – Convida Wireless**  No  We understand that it may be useful to have a common approach for all RBs to/from the remote UE. However, we agree with Ericsson that when transmitting SRB0, the remote UE will likely not have the adaptation layer configured yet. In addition, the identity of the UE is already included in the RRC message carried over SRB0, and this RRC message can be encapsulated in a relay UE RRC message. |

**Rapp summary:**

**Yes: 12**

**No: 8 (MediaTek provides two answers)**

**Rapp understand the proponent of “No” is either to rely on existing UE ID in SRB0, or include a UE ID in the RRC container, i.e., in a way different from adaptation layer.**

**Seems both methods work – in that case, rapp suggest to go for majority view.**

1. RAN2 discuss for SRB0, adaptation layer is present over Uu hop for UL [12/20].

**Q2.1-1b: For SRB0, do you think adaptation layer can be present over Uu hop for DL?**

**Feedback Form 2: Please answer ”Yes”/”No” before providing detailed comment (if any).**

|  |
| --- |
| **1 – Guangdong OPPO Mobile Telecom.**  Yes  By reporting L2 ID of remote UE to gNB, relay can get mapping of remote UE L2 ID and temp ID (used in adaptation layer), so that it can be used in DL for relay UE to know the related remote UE to whom the SRB0 DL message is to send. |
| **2 – MediaTek Inc.**  No  See our answer for Q2.1-1a. We prefer symmetric for both DL and UL SRB0 message |
| **3 – Ericsson LM**  No  since the adaptation layer in UL is not needed for SRB0, it is not needed either for the DL. The relay UE knows which UL signaling the DL signaling is associated with. therefore, there is no issue for the relay UE to identify which remote UE the DL signaling is aiming for. |
| **4 – Qualcomm communications-France**  Yes  See our answer for Q2.1-1a. We prefer symmetric configuration for both DL and UL SRB0 message. It will be always preferred to have unified behavior |
| **5 – InterDigital France R&D**  No.  See our answer for Q2.1-1a. We should have symmetric configuration for UL and DL. |
| **6 – Apple Europe Limited**  Yes.  This is essentially needed in DL so that relay UE knows which remote UE (L2 address) to forward this message. The need for this header in DL justifies the need of the same header in UL. |
| **7 – vivo Mobile Communication Co.**  Yes.  Same comments as to Q2.1-1a. |
| **8 – ASUSTEK COMPUTER (SHANGHAI)**  Yes  In case there are multiple remote UEs sending SRB0 messages to gNB via a relay UE, the relay UE needs to know the DL SRB0 message is to be sent to which one remote UE by knowing the local remote UE ID in the DL AL PDU header. |

|  |
| --- |
| **9 – LG Electronics France**  Yes.  Relay UE should know the SRB0 is for which remote UE. Using the adaptation layer header, relay UE can know remote UE ID for forwarding the SRB0. The header of the adaptation layer for SRB0 can include a remote UE ID. |
| **10 – Beijing Xiaomi Mobile Software**  Yes  Support the Uu DL adaptation layer being configured |
| **11 – Futurewei Technologies**  No  Applying adaptation layer to SRB0 would incur latency for serving gNB to configure the mapping at the relay UE. |
| **12 – Intel Korea**  Yes  We prefer unified solution for both UL and DL. |
| **13 – Spreadtrum Communications**  Yes  Relay UE can identify the target Remote UE via the ID in the adaptation layer header. |
| **14 – Lenovo (Beijing) Ltd**  No.  The pair of request and response can have the symmetric configuration. |
| **15 – HUAWEI TECHNOLOGIES Co. Ltd.**  Yes  By carrying the same Remote UE ID in AL for DL SRB0 message can help Relay UE to know which Remote UE to be forward with that msg4. |
| **16 – Nokia Corporation**  No  Please see comments to Q2.1-1a |
| **17 – Samsung R&D Institute UK**  Yes  Please see our answer to previous question for details on the mapping. If we decide to use Adapt for SRB0 transmission on the UL, we would then prefer to use a symmetrical design. |
| **18 – ZTE Corporation**  Yes.  It is suggested that gNB encapsulate the local ID in the adaptation layer header for remote UE’s SRB0 DL packet. Upon receiving the remote UE’s DL SRB0 packet, relay UE may differentiate the remote UE’s UL packets based on the local ID in adaptation layer header and then deliver this packet to the corresponding remote UE. |
| **19 – CATT**  Yes.  For remote UE’s DL SRB0 messages transmission, since these RRC messages are to the relay UE, hence the relay UE needs to use the remote UE’s ID in the header of adaptation layer to decide the target remote UE. |
| **20 – Convida Wireless**  No.  Similar reasoning to Q2.1-1a. |

**Rapp summary:**

**Yes: 13**

**No: 7**

**Rapp understand the proponent of “No” is of the same reason as clarified in Q2.1-1a.**

**Seems both methods work – in that case, rapp suggest to go for majority view.**

1. ~~F~~or SRB0, adaptation layer is present over Uu hop for DL [13/20].

One related question on how for network to differentiate between relay (i.e., traffic terminates at network and remote UE) and non-relay traffic (i.e., traffic terminates at relay and gNB), i.e., whether adaptation layer can be used for that.

**Q2.1-2: Which option(s) can be used to differentiate relay and non-relay traffic over Uu hop?**

**Option-1: Via different LCID (i.e., relay and non-relay traffic carried via different LCH);**

**Option-2: Via indication in adaptation layer (i.e., relay and non-relay traffic carried via a same LCH)**

**Feedback Form 3: Please indicate the preferred option(s) before providing detailed comments (if any).**

|  |
| --- |
| **1 – MediaTek Inc.**  Option 1 and Option 2  We think both options can work for such differentiation. However Option-1 puts the restrictions for LCH carrying the traffics |
| **2 – Ericsson LM**  Option-1 |
| **3 – Qualcomm communications-France**  Option-1  Since Option-1 can work without spec change, Option-2 is an optimization. Furthermore, we should respect WID objective, where only bearer mapping and remote UE identification are in scoping of this release:  *5. Specify mechanisms for U2N* ***Adaptation layer design*** *[RAN2]* |

***a.***

***For***

***bearer***

***map***

***ping***

***and***

***Re***

***mote***

***UE***

***iden***

***ti***

***fi***

***ca***

***tion,***

***incl.***

***RAN***

***re***

***lated***

***se***

***cu***

***rity***

***as***

***pects***

***if***

***any***

**4**

**– InterDigital France R&D**

Option 2

Both options can work. However, we have a slight preference for option 2, as it can be more flexible given

there is no need to split the LCH space at the relay UE between relayed and non-relayed traffic.

**5**

**– Apple Europe Limited**

Option 2.

The LCID space is limited. The segregation of local and relay traffic in different LCID space will limit the

number of RLC bearers can be used for relay purpose.

**6**

**– vivo Mobile Communication Co.**

Option 1.

It looks a bit weird to have a Uu RLC bearer linked with the entities of two different protocols at the same

time, one adaptation layer entity (for relaying traffic), one PDCP entity (for non-relaying traffic).

**7**

**– ASUSTEK COMPUTER (SHANGHAI**

**)**

Option 2

We think the LCID space would be insufficient if relay and non-relay traffic are sent between the relay UE

and gNB. Thus, we think Option 2 is better.

**8**

**– LG Electronics France**

Option-2.

Relay UE uses a limited number of LCH. So, separating LCHID between the relay and non-relay traffic

in a relay UE will make further limitations for the number of LCHID. The adaptation layer can handle to

differentiate relay and non-relay traffic even though remote UE and relay UE uses the same LCHID.

**9**

**– Beijing Xiaomi Mobile Software**

Option-1

**10**

**– Futurewei Technologies**

Option-1

direct (legacy) Uu connection should not be impacted.

**11**

**– Intel Korea**

Option 2

Although option 1 may also work up to gNB. We think the presence of adaptation layer header offers the

benefit of multiplexing both relayed and non-relayed traffic and although it is up to gNB on how to provide

configuration, it should be possible to utilize Uu RLC channels efficiently.

|  |
| --- |
| **12 – Spreadtrum Communications**  Option 1 |
| **13 – Lenovo (Beijing) Ltd**  Option 1.  The different bearer can be configured for relay traffic and non-relay traffic. |
| **14 – HUAWEI TECHNOLOGIES Co. Ltd.**  Option-1  We doubt the feasibility of option-2. For Relay UE’s own DRB, there is no Uu AL in the UP protocol stack. If the Remote UE’s data is mapped into the same DRB, how the Relay UE’s Uu RLC receiver know whether to pass a DL packet to AL layer or Relay UE’s PDCP layer. We do not like to add AL header to Relay UE’s own data, as it would increase unnecessary overhead and also change the Relay UE’s legacy UP protocol stack. |
| **15 – Nokia Corporation**  Option-1  We prefer non-relay traffic to be transmitted in the legacy way, which will also result in a significantly |
| **16 – Samsung R&D Institute UK**  Option-1  Both options are feasible, and using Adapt for non-relaying traffic (Option-2) would allow us to make full use of Adapt and keep the LCID space as is; however we share some concerns raised by Huawei among others about using Uu Adapt for Relay UE’s own traffic. |
| **17 – ZTE Corporation**  Option 1  As we know, the QoS flows corresponding to different PDU session are mapped to different DRBs. For relay UE’s own traffic and the relayed traffic from remote UE, they definitely belong to different PDU sessions. It is suggested to differentiate them and map them into different logical channels. |
| **18 – CATT**  Option 1  We doubt option 2 can further cause some unexpected issue. This issue is related with UAC part issue(LS to CT1 handled by Xiaomi from last meeting). |
| **19 – Convida Wireless**  Option 2  The indication may be included in the adaptation layer header. |

**Rapp summary:**

**Option-1: 13**

**Option-2: 7**

**Rapp understand the proponent of option-1 highlight it is supported already in legacy, so option-2 is more of optimization, while proponent of option-2 highlight the limitation of LCID space.**

**Seems both methods seem not colliding with each other – in that case, rapp suggest to go for option-1 as baseline.**

1. ~~I~~n order to differentiate relay and non-relay traffic over Uu hop, different LCID (i.e., relay and non-relay traffic carried via different LCH) is used as baseline [13/19].

## PC5 hop

A key aspect of the design is the presence of adaptation layer over PC5 hop. Maybe it is helpful to split the question for SRB0 and others, as for Uu hop.

**Q2.2-1a: What is your preference for the presence of adaptation layer over PC5 hop, for both DL and UL transmission of Uu radio bearers other than SRB0?**

**Option-1: Mandatory presence**

**Option-2: Configurable presence**

**Option-3: Not support at all**

**Feedback Form 4: Please indicate the preferred option(s) before providing detailed comment (if any).**

|  |
| --- |
| **1 – Guangdong OPPO Mobile Telecom.**  Option-2  By observing proponent of both option-1 and option-3, it can be understood there are different view on the use case, therefore configurability (not only for network, but also for UE based on optional capability) seems the only way out to solve this issue. |
| **2 – MediaTek Inc.**  Option 1 and Option 2  We think mandatory presence may reduce the spec efforts during Rel-17. Furthermore, bearer mapping should be the main functionality supported over PC5. |
| **3 – Ericsson LM**  Option 1 we don’t see the benefits to introduce the configuration. |
| **4 – Qualcomm communications-France**  Option 3   * No need for N:1 bearer mapping from Uu bearer to PC5 RLC  1. The LCID space is maintained per PC5 RRC, instead of per UE; 2. Some companies argued that there is mismatch because up to 32 Uu bearers but only up to 16 LCID for PC5. However, TS 38.306 has specified only up to 16 Uu DRB can be configured per UE in Section 8. Spare LCID space (16) is for security purpose (i.e. changing DRB ID to change the security input). Thus, there is no mismatch. 3. The N:1 mapping for remote UE Uu bearers to PC5 RLC can be achieved through QoS flow levelmapping to DRB at SDAP, which doesn’t require any spec change.  * No need for multi-hop |

We think the main benefit of PC5 adaptation layer is to support multi-hop. However, multihop is not in WID scoping. And there were strong industry interest in supporting multihop relay in Rel-18 Workshop. Then, why RAN2 not purse PC5 adaptation layer with careful consideration of multihop in Rel-18?

1. **– InterDigital France R&D**

Option 1 or option 2

We have a slight preference for option 1, but think option 2 can be a compromise solution.

1. **– Apple Europe Limited**

Option 1 (We do not accept Option 2)

* + We think considering the forward-compatibility to multi-hop U2N relay case is important. We prefer to have a unified design for both R17 and R18, so that R18 relay UE does not need to support many different options when handling user plane traffic.
  + We do not accept option 2 as this option will force a UE to support two different protocol stacks for no good reasons. Also, when the PC5 header is switched from the ”not present” to ”present” during reconfiguration due to the need of support more E2E bearers, the same RLC bearer will contain both traffic with header and w/o header, which will be messy.

1. **– vivo Mobile Communication Co.**

Option 3.

As we explained in detail in our contribution, having multiple remote UE Uu DRBs mapped to one PC5 RLC bearer has no benefits over directly mapping the related QoS flows onto the same remote UE Uu DRBs, because finally these QoS flows will be aggregated onto the same Uu channel of the relay UE.

To us, therefore, the only value of having PC5 adaptation layer in Rel-17 is for future extension. In this case, we can accept Option-2, if there is really a clear majority that wants it, but since it is for future use, we ask RAN2 to add a restriction like “In this release, the PC5 adaptation layer is not configured” (just like what we did for multiple carrier/BWP configurations in R16 NR SL), to avoid any further enhancement to be proposed in R17 around PC5 adaptation layer.

1. **– ASUSTEK COMPUTER (SHANGHAI)**

Option 2

1. **– LG Electronics France**

**Option 3**

**We think the adaptation layer over PC5 is not necessary. The Multi-hop support can be for the next release for SL relay. In addition, we think N:1 bearer mapping for remote UE’s Uu bearer and PC5 RLC can be performed at the QoS flow level.**

1. **– Beijing Xiaomi Mobile Software**

Option 3

It seems to us that the optimisations identified as benefiting from the introduction of the adaptation layer on the PC5 are not necessary or do not relate to REL17 functionality.

|  |
| --- |
| **11 – Futurewei Technologies**  Option 1  We have similar comments as Apple. |
| **12 – Intel Korea**  Option-3; not support option 2    Most companies prefer it for forward compatibility and multi-hop support which is not in scope for this release; we think that we can consider support of PC5 adaptation layer in next release. We understand that the number of PC5 RLC channels supported is per PC5-RRC link and the UEs may establish a new PC5 link as necessary to support additional PC5 RLC channels.  Even if supported, we do not prefer option 2 as it will add complexity to the implementation. |
| **13 – Spreadtrum Communications**  Option 3 |
| **14 – Lenovo (Beijing) Ltd**  Option3.  we dont see the necessity to suppport adaptation layer in PC5 link. The current DRB number is sufficient.  The ‘configurable’ in option2 makes network/UE implementation complex |
| **15 – HUAWEI TECHNOLOGIES Co. Ltd.**  Option 3  We do not see the necessity of AL between Remote UE and Relay UE, and even not see forward-compatible issue for multi-hop where the PC5 AL could only be used between the Prior-hop Relay UE and a Next-hop Relay UE but not between Remote UE and the near serving Relay UE.  However if majority really want to support PC5 AL, we can accept option 1 as compromise, on condition that only bearer mapping is considered in this release and no more other PC5 AL functions to be discussed.    We do not like option 2, as it will make UE implementation more complex. |
| **16 – Nokia Corporation**  Option-3  PC5 adaptation layer is not needed for the current release |
| **17 – Samsung R&D Institute UK**  Option-3  We do not see a need for N:1 mapping on the PC5 link in this Release, and the SL LCID space , while limited, can be made to work. Additionally, Option-2 is unacceptable to us. |
| **18 – ZTE Corporation**  Option 1  Firstly, adaptation layer over PC5 can be used to support the N:1 mapping between remote UE’s DRB and PC5 RLC channel.  Secondly, we think the QoS flow mapping policy for Uu and PC5 may be independent from each other. It is not appropriate to use coarse Uu QoS flow mapping for remote UE’s Uu DRB just to tailor for the limitation of PC5 RLC channels. Suppose the remote UE initially connect with gNB directly and gNB enable finer QoS flow mapping with more than 16 DRBs established. Later remote UE performs path switch from direct to indirect path. It seems that the QoS flow re-mapping should be performed and some DRB need to be released to support these remote UE’s DRB with 1:1 bearer mapping, which is both troublesome and inefficient. |
| **19 – Qualcomm communications-France**  Option-3  Just point that there is a typo in our previous comments on LCID space (LCID->Uu bearer ID:  *”2. Some companies argued that there is mismatch because up to 32 Uu bearers but only up to 16 LCID for PC5. However, TS 38.306 has specified only up to 16 Uu DRB can be configured per UE in Section 8. Spare ~~LCID~~ Uu bearer ID space (16) is for security purpose (i.e. changing DRB ID to change the security*  *input). Thus, there is no mismatch. ”* Sorry for the confusion. |
| **20 – CATT**  Option1  The adaptation layer header should always present, not configurable. |
| **21 – Convida Wireless**  Option 1 or Option 2  We have a preference for supporting the adaptation layer over the PC5 hop, not only for support of future multi-hop scenarios, but also for the mapping of a UEs multiple Uu DRBs to a single PC5 RLC channel.  However, as others have mentioned, making it configurable could be a viable compromise solution. |

**Rapp summary:**

**Option-1: 8**

**Option-2: 5 (two companies indicate this option as not acceptable)**

**Option-3: 10**

**Rapp observes that the view is quite divergent, and to move forward, one further step can be to remove the option with lowest support ratio, i.e., option-2.**

**Considering there are some companies who vote for option-2 only, with option-2 removal, the supporting ratio needs to be double checked.**

1. RAN2 discuss the presence of adaptation layer over PC5 hop, for both DL and UL transmission of Uu radio bearers other than SRB0, to select between 1) mandatory support and 2) not support.

**Q2.2-1b: What is your preference for the presence of adaptation layer over PC5 hop, for SRB0?**

**Option-1: Mandatory presence**

**Option-2: Configurable presence**

**Option-3: Not support at all**

**Feedback Form 5: Please indicate the preferred option(s) before providing detailed comment (if any).**

|  |
| --- |
| **1 – Guangdong OPPO Mobile Telecom.**  Option-3  As replied to Q2.2-1a, since the support of adapation layer over PC5 hop is an optional UE capability, network cannot be aware of the UE capability during SRB0 message exchange, i.e., it can only be enabled after SRB0. |
| **2 – MediaTek Inc.**  Option-3  we do not think SRB0 message need to go through PC5 adaptation layer, since this type of message can be put into a PC5 RRC message container. |
| **3 – Ericsson LM**  option-3  we would like to have an unified solution, i.e., when the adaptation layer is applied at the Uu interface, it is also applied at the PC5 interface. vice versa, when the adaptation layer is not applied at the Uu interface, the adaptation layer is not applied at the PC5 interface either. |
| **4 – Qualcomm communications-France**  Option-3  Same view as above. it is impossible. |
| **5 – InterDigital France R&D**  Option 3  SRB0 over PC5 uses specified configuration, so there is no need for adaptation layer. |
| **6 – Apple Europe Limited**  Option 1.  We prefer the PC5 adaptation header is also present for SRB0 message, so that a unified approach can be used for all traffic to be forwarded and also be forward-compatible with multi-hop U2N solution. |
| **7 – vivo Mobile Communication Co.**  Option 3.  We already agreed to rely on specified PC5 RLC channel to carry remote’s SRB0 message, so we don’t see any use of applying PC5 adaptation layer for SRB0 transmission on PC5 in this release. |
| **8 – LG Electronics France**  **Option-3.**  **SRB0 over PC5 will be used specified configuration. There is no need for an adaptation layer over PC5 for SRB0.** |

|  |
| --- |
| **9 – Beijing Xiaomi Mobile Software**  Option-3 |
| **10 – Futurewei Technologies**  Option-3 |
| **11 – Spreadtrum Communications**  Option 3 |
| **12 – Intel Korea**  Option-3; not support option 2    We already agreed that the PC5 RLC channel configuration for SRB0 is fixed/specified; If PC5 adaptation layer is indeed supported, we prefer option 1 and 1:1 mapping in this release (without adaptation layer header). |
| **13 – Lenovo (Beijing) Ltd**  Option 3. see above |
| **14 – HUAWEI TECHNOLOGIES Co. Ltd.**  Option-3 |
| **15 – Nokia Corporation**  Option-3  Please see reply to Q2.2-1a |
| **16 – Samsung R&D Institute UK**  Option-3 |
| **17 – ZTE Corporation**  Option 1  Agree with Apple that unified design is recommended. |
| **18 – CATT**  Option 1  We share the same view as Apple and ZTE. |
| **19 – Convida Wireless**  Option 3  Same view as for Uu hop |

**Rapp summary:**

**Option-1: 3**

**Option-3: 16**

**Rapp understand the proponents of option-3 mainly consider that the specified configuration with 1:1 mapping is sufficient for relay UE to forward SRB0.**

**Rapp suggest to go for clear majority, i.e., option-3**

1. Adaptation layer is not present over PC5 hop for SRB0 [16/19].

Similar to Uu hop above, in order to be crystal clear, it would be helpful to clarify whether BCCH and PCCH can be excluded.

**Q2.2-1c: If one selected option-1/2 for Q2.2-1a/b, do you agree PCCH and BCCH does not need adaptation layer over PC5 hop?**

**Feedback Form 6: Please answer ”Agree”/”Disagree” before providing detailed comment (if any).**

|  |
| --- |
| **1 – Guangdong OPPO Mobile Telecom.**  Agree  PCCH and BCCH are of broadcast/groupcast type at Uu hop, so is out of the scope of the adapation layer discussion, which is limited to unicast case. |
| **2 – MediaTek Inc.**  Agree |
| **3 – Ericsson LM**  agree agree with OPPO. |
| **4 – Qualcomm communications-France**  Agree  Same view as OPPO |
| **5 – InterDigital France R&D**  Agree |
| **6 – Apple Europe Limited**  Agree.  BCCH and PCCH traffic are not to be relayed, at least from a user plane perspective. So, it is not part of this discussion. |
| **7 – ASUSTEK COMPUTER (SHANGHAI)**  Agree |
| **8 – LG Electronics France**  **Agree** |
| **9 – Beijing Xiaomi Mobile Software**  Agree  if our preference for Q2.2-1a/b was not successful (option-3) then we agree with others here that the adaptation layer is not needed for the BCCH and PCCH over the PC5 hop |
| **10 – Futurewei Technologies**  Agree |
| **11 – Intel Korea**  Agree |
| **12 – Lenovo (Beijing) Ltd** Agree. |
| **13 – HUAWEI TECHNOLOGIES Co. Ltd.**  Agree |
| **14 – ZTE Corporation**  Agree, but.  Agree with OPPO that adaptation layer is used for unicast traffic. It does not directly apply to BCCH and PCCH. However, if the relay UE forward the content of BCCH and PCCH (e.g. SI or paging message) to remote UE via unicast PC5 message, the PC5 adaptation layer should be presented. |
| **15 – Convida Wireless**  Agree |

**Rapp summary:**

**Agree: all**

1. Adaptation layer is not present over PC5 hop for BCCH and PCCH [15/15].

One left FFS point is the functionality of adaptation layer over PC5 hop, if supported.

**Q2.2-2: If one selected option-1/2 for Q2.2-1a/b, do you agree to support the N:1 mapping between Remote UE Uu Radio Bearers and PC5 RLC channels for relaying?**

**Feedback Form 7: Please answer ”Agree”/”Disagree” before providing detailed comment (if any).**

|  |
| --- |
| **1 – MediaTek Inc.**  Agree  We think the support of N:1 mapping is one of the main motivations |
| **2 – Ericsson LM**  Agree. |

|  |
| --- |
| **3 – Qualcomm communications-France**  Disagree   * The LCID space is maintained per PC5 RRC, instead of per UE * Some companies argued that there is mismatch because up to 32 Uu bearers but only up to 16 LCID for PC5. However, TS 38.306 has specified only up to 16 Uu DRB can be configured per UE in Section 8. Spare LCID space (16) is for security purpose (i.e. changing DRB ID to change the security input). Thus, there is no mismatch. * The N:1 mapping for remote UE Uu bearers to PC5 RLC can be achieved through QoS flow level mapping to DRB at SDAP, which doesn’t require any spec change. |
| **4 – InterDigital France R&D**  Agree  We think this is the main motivation for supporting adaptation layer on PC5. |
| **5 – Apple Europe Limited** Agree. |
| **6 – ASUSTEK COMPUTER (SHANGHAI)**  Agree |
| **7 – LG Electronics France**  **Disagree** |
| **8 – Beijing Xiaomi Mobile Software**  Disagree  ifourpreferenceforQ2.2-1a/bwasnotsuccessful(option-3)thenwedonotbelieveN:1mappingisrequired in this release. |
| **9 – Futurewei Technologies**  Agree |
| **10 – Intel Korea**  Disagree  We think there can be sufficient LCID space available over PC5 to do 1:1 mapping. The question could be whether this mapping is handled in PDCP layer or another logical layer. i.e. an adaptation layer. |
| **11 – Lenovo (Beijing) Ltd**  No.  LCH is sufficient. |
| **12 – HUAWEI TECHNOLOGIES Co. Ltd.**  Agree  If RAN2 agrees to support PC5 AL in this release, then we suppose the only thing needs to be supported via AL is bearer mapping. There seems not much difference between support only 1:1 mapping or also N:1 mapping. |
| **13 – Samsung R&D Institute UK**  Disagree |
| **14 – ZTE Corporation**  Agree.  We think the N:1 mapping is necessary. The QoS flow mapping policy for Uu and PC5 may be independent from each other. It is not appropriate to use coarse Uu QoS flow mapping for remote UE’s Uu DRB just to tailor for the limitation of PC5 RLC channels. Suppose the remote UE initially connect with gNB directly and gNB enable finer QoS flow mapping with more than 16 DRBs established. Later remote UE performs path switch from direct to indirect path. It seems that the QoS flow re-mapping should be performed and some DRBs need to be released in order to support the 1:1 bearer mapping between remote UE’s DRB and PC5 RLC channel, which is both troublesome and inefficient. |
| **15 – CATT**  Agree.  According to the current spec, the maximum number of sidelink radio bearer for one UE is 16 (LCID range from 4 to 19), which is defined in [4]. And the maximum number of DRBs in Uu is 32 (LCID range from 1 to 32). That is to say, there is need to achieve the N:1 bearer mapping for the same remote UE in PC5 interface. |
| **16 – Convida Wireless**  Agree |

**Rapp summary:**

**Agree: 10**

**Disagree: 6**

**Rapp understand the opponents holds the view and so do not support PC5 adaptation layer in general.**

**Rapp suggest to discuss the presence over PC5 hop first.**

Regardless of whether one supports adaptation layer over PC5 hop, there is one question on how for relay/remote UE to differentiate between relay (i.e., traffic terminates at network and remote UE) and non-relay traffic (i.e., traffic terminates at relay and remote UE).

**Q2.2-3: Which option(s) can be used to differentiate relay and non-relay traffic over PC5 hop?**

**Option-1: Via different L2 ID (i.e., relay and non-relay traffic carried via different L2 links);**

**Option-2: Via different LCID (i.e., relay and non-relay traffic carried via a same L2 links but different LCH);**

**Option-3: Via indication in adaptation layer (i.e., relay and non-relay traffic carried via a same L2 links and a same LCH – this option is only possible in case one selected option-1/2 for Q2.2-1a/b)**

**Feedback Form 8: Please indicate the preferred option(s) before providing detailed comments (if any)**

|  |
| --- |
| **1 – MediaTek Inc.**  Option 2 and Option 3  Both options work. But Option 2 puts the restrictions over LCH assignment |
| **2 – Ericsson LM**  Option 2  with option-1, the number of total L2 links maintained by remote/relay UEs will be increased, which may cause higher signaling overhead, which is unnecessary. |
| **3 – Qualcomm communications-France**  Option-2  Since Option-2 can work without spec change, Option-3 is an optimization. Furthermore, we should respect WID objective, where only bearer mapping and remote UE identification are in scoping of this release:  *5. Specify mechanisms for U2N* ***Adaptation layer design*** *[RAN2]*  ***a. For bearer mapping and Remote UE identification, incl. RAN related security aspects if any*** |
| **4 – InterDigital France R&D**  Option 3  To be consistent with Uu, we can use adaptation layer here as well. |
| **5 – Apple Europe Limited** Option 2 and Option 3.   * If PC5 adaptation layer is not used, then Option 2. * If PC5 adaptation layer is used, then Option 3 |
| **6 – vivo Mobile Communication Co.**  Option 2 or Option 1.  We think the answer of this question may somewhat depend on the L2 ID assignment in SA2. If the relaying traffic and non-relaying traffic are distinguished by L2 IDs, then Option 1 holds. Otherwise, we may depend on Option 2, which is similar to how we introduced duplicated LCHs in Rel-15 eV2X. On PC5; since LCID is in a self-assigned manner, the hard-coded way is always regarded as simple and effective.  We are fine to go with the majority’s preference. But in case RAN2 decided to go with Option-1 or Option2, we may need to inform SA2 of our decision, as the decision would be made with an assumption on whether the L2 ID space for relaying and non-relaying traffic is shared or separated. |
| **7 – ASUSTEK COMPUTER (SHANGHAI)**  Option 3  We think the LCID space would be insufficient if relay and non-relay traffic are sent between the relay UE and the remote UE. Thus, we think Option 3 is better. |

|  |
| --- |
| **8 – LG Electronics France**  **Option 1**  **We assume the service for UE-to-NW relay and the service for only SL will be different. So, the L2 ID for relay and the L2 ID for non-relay should be different. We think it is nonsense the same service is used for UE-to-NW relay and for only SL communication. we need to confirm to the SA2 whether the same L2 ID can be used for UE-to-NW relay operation and non-relay operation.** |
| **9 – Beijing Xiaomi Mobile Software**  Option-2  Option-3 is outside the scope of adaptation layer functionality as captured in the WID for this Release. |
| **10 – Futurewei Technologies**  Option-2 |
| **11 – Spreadtrum Communications**  Option-2 |
| **12 – Intel Korea**  Option 2  It should work as per discussion above regarding LCID space wherein additional PC5 links may be established as needed. Option 1 could also work. |
| **13 – Lenovo (Beijing) Ltd**  Option2 |
| **14 – HUAWEI TECHNOLOGIES Co. Ltd.**  Option-1  Since the unicast links for relay service and non-relay service are triggered by different upper layers and established in different circumstances, it seems not possible that relay traffic and non-relay traffic would be carried in the same one unicast link.  However if companies really want to look into the case that relay service and non-relay service are in ONE unicast link, option 2 is enough. |
| **15 – Nokia Corporation**  Option-1  We believe that the services supported by relay and non-relay traffic may be differen, and therefore have different L2 ID |
| **16 – Samsung R&D Institute UK**  Option-2 or Option-1, depending on SA2 input |
| **17 – ZTE Corporation**  Option 1  All the option works. Option 1 is simple to implement. However, Option 1 requires the confirmation from SA2. |
| **18 – CATT**  Option 1 |

**Rapp summary:**

**Option-1: 7**

**Option-2: 11**

**Option-3: 4**

**Rapp understand the option-1 is feasible anyway, but whether option-1 ONLY is sufficient is up to L2 ID configuration which is under SA2 scope. Rapp also observe related discussion on-going in SA2, so suggest to leave this option to SA2. While option-3 depends on the support of adaptation layer over PC5 hop,**

**From that perspective, it is to suggest to go for the following proposal for now, i.e., conclude the feasibility of option-2, and leave option-1 to SA2**

1. RAN2 discuss in order to differentiate relay and non-relay traffic over PC5 hop, from R2 perspective, different L2 ID [7/18] and/or different LCID [11/18] can be used. For the usage of different LCID, and it can be revisited based on SA2 decision on whether shared L2 ID for relay and non-relay traffic needs to be considered.

# CP related discussion

## For relay UE

The following FFS issue is for the remote UE ID field

*Proposal 3b: The UE ID in the adaptation layer header is a local, temporary remote UE ID. FFS whether the local, temporary remote UE ID is assigned by the relay UE, or the serving gNB of the relay UE. (23/24)* **Q3.1-1a: Who assigns the local/temporary remote UE ID?**

**Option-1: relay UE**

**Option-2: serving gNB of the relay UE**

**Feedback Form 9: Please indicate the preferred option(s) before providing detailed comment (if any).**

|  |
| --- |
| **1 – Guangdong OPPO Mobile Telecom.**  Option-2  As adopted in IAB, gNB based allocation is more future proof, considering later the topology may be extendedtomulti-hopandmulti-path. Furthermore, ifconsideringpathswitchprocedureforRRC\_CONNECTED remote UE, leaving the control to gNB simplify the procedure, i.e., (target) gNB can fully decide on the context for the remote UE, other than inviting further decision from relay UE. |
| **2 – MediaTek Inc.**  Option 1 and Option 2  We have no strong view on who can assign the local ID. If we consider the UE-to-UE case, Relay UE may be the right node to do so. |
| **3 – Ericsson LM**  Option-2  1) gNB has full knowledge on how local UE IDs are allocated to remote UEs, therefore, ID conflict between remote UEs can be avoided. |

2) If relay UE is allowed to assign local IDs to remote UEs, the relay UE needs to report all allocated IDs to gNB, which causes unnecessary signaling overhead between the relay UE and the gNB. On the contrary, for the gNB based option, gNB can include the allocated UE ID in the existing RRC message which is used to configure the SL for the remote UE.

1. **– Qualcomm communications-France**

Option-1

We have comparison in our contribution (**R2-2107105**). The main benefit of Option-1 is shorter latency because it can save two RRC messages between gNB and relay UE. If it is only for single hop relay, then we actually agree there is no much difference b/w option 1 and option 2. However, if we consider multi-hop case (quite likely in Rel-18), the latency difference will be quite large to be ignored (bi-directional delay propagation with multi-hop in Option-2).

Some companies argued that there may be local remote UE ID collision issue in Option-1. However, gNB can always know the combination (1st hop relay UE ID, local remote UE ID), which is unique for a gNB.

1. **– InterDigital France R&D**

Option 2

This option is more future-proof when considering, for example, multi-hop relays.

1. **– Apple Europe Limited** Option 1.
   * We agree with Qualcomm that the assigning of local ID by gNB will just add latency to the whole procedure with out introducing any tangible benefit.
   * The local temporary ID space is defined per ”relay UE” so it is natural to be allocated by relay UE itself. Even when this scheme is extended to multi-hop U2N, this temp ID is still a local ID and does not need to be a globally unique ID from the gNB perspective to cover an endless chain of all Remote UEs. On the other hand, making this a unique ID among gNB context may have some security concern to allow the remote UE traffic being tracked.
   * RAN2 has decided to pursue user plane SRB0-forwarding approach instead of treating the delivery of SRB0 message as RRC control plane message. This means we prefer a quick and simple method for UP plumbing without the explicit gNB consent of identifiers.
2. **– MediaTek Inc.**

Option 1 and Option 2

We prefers **Option 2 over Option 1.**

With the discussion going on, we just provide our second reply for this question.

As a follow-up discussion of Q2.1-1a, we think the Relay UE can assign a local ID for the Remote UE during SRB0 message forwarding to gNB. But this local ID is only used to identify whether the later on received SRB0 response from the gNB is for that particular Remote UE who initiates the SRB0 message. With this saying, after SRB0 transmission, the Remote UE may already be configured with a new ID by the gNB (i.e. we assume, any UE accessing the gNB should be allocated by a AS layer ID by the gNB). In this way, after SRB0 transmission, the Relay UE can then discard its local ID for the Remote UE and update the mapping between the Remote UE ID and the new UE ID assigned by gNB.

|  |
| --- |
| **8 – vivo Mobile Communication Co.**  Option 2.  We don’t want a UE to **decide** an ID/parameter that is **actually used** by the gNB. This is not following the logic of legacy system design. |
| **9 – ASUSTEK COMPUTER (SHANGHAI)**  Option 2 |
| **10 – LG Electronics France**  **Option 2**  **We are ok either option 1 or option 2. We think there is no problem with the identification of the remote UEs. And we understand being decided by relay UE is a little simple procedure than being decided by gNB. However, deciding by gNB looks more natural. Especially, if the local/temporary remote UE ID has to be changed from the reason of security passing the time, we think it’s better gNB configures the local/temporary remote UE ID than relay UE configures that.** |
| **11 – Beijing Xiaomi Mobile Software**  Option-1  latency in the setup of relay traffic needs to be kept in mind, there is no reason to impose delay waiting for gNB to provide this to the Relay UE. Also any concerns over the uniqueness of the temporary Remote UE ID at the gNB is manageable through association of the temporary Remote UE ID with the Relay UE ID. |
| **12 – Futurewei Technologies**  Option-2 |
| **13 – Spreadtrum Communications**  Option-1  The Remote UE ID uniquely identifies one Remote UE locally within the Relay UE and thus can be decided by the Relay UE itself. |
| **14 – Intel Korea**  Option-2  Since we agreed to support selection of RRC\_*INACTIVE and RRC\_*IDLE Relay UE, we wonder if latency consideration is a valid argument. We prefer gNB to assign the ID to ensure uniqueness, ID refresh if necessary and relieving burden on the Relay UE. It could aid in obtaining relevant configuration for SRB0. We also think that Relay UE may anyways be involved in signalling gNB for moving to RRC connected or obtaining mode 1 resources if any. |
| **15 – Lenovo (Beijing) Ltd**  Option2.  both options can work. We prefer gNB to control the remote UE ID allocation. |
| **16 – HUAWEI TECHNOLOGIES Co. Ltd.**  Option-1  Similar views as Qualcomm and Apple. |
| **17 – Nokia Corporation**  Option-2 |
| **18 – Samsung R&D Institute UK**  Option-2 |
| **19 – ZTE Corporation**  Option 1  Compared with local remote UE ID allocation by relay UE, allocating the local remote UE ID by gNB may cause large latency for the first RRC message of remote UE if the relay UE request the local ID from gNB after receiving the first RRC message from remote UE.  In addition, the local UE ID allocated by relay UE is beneficial for the potential group mobility support in future release. If the local UE ID is allocated by gNB, the relay UE needs to request new local UE IDs for all connected remote UEs for the group mobility scenario, which may cause signaling overhead. However, if the local UE ID is allocated by relay UE, local UE ID does not need to be changed after HO of relay UE. |
| **20 – CATT**  Option 1.  Considering the usage of this local temporary remote UE ID is within the relay UE, and it is not needed to use a global unique remote UE ID allocated by gNB. We prefer that the relay UE is in charge of assigning the local temporary remote UE ID and the detailed assigning method can be left to UE implementation. |
| **21 – Convida Wireless**  Option 2  As others have mentioned, this will allow the design to be applicable in multi-hop scenarios. In our view the gNB has global view of all assigned UE IDs and can guarantee these are unique across remote UEs. |

**Rapp summary: (MTK is calculated as option-2)**

**Option-1: 7**

**Option-2: 13**

**Rapp understand both options work, And proponents of option-1 highlight the benefit of latency, while proponents of option-2 highlight the gNB control is more future proof and of better control of ID allocation.**

**Since both options work, rapp suggest to go for majority.**

1. Serving gNB of relay UE assigns the local/temp remote UE ID [13/20].

Although there are some voice saying there is no security concern on the remote ID field since it is allocated in a temporary manner, there seems some thought that SA3 confirmation is beneficial.

**Q3.1-1b: Do you agree to send LS to SA3 to notify the RAN2 agreement on remote UE ID field in adaptation layer, and asks if any security concern?**

**Feedback Form 10: Please answer ”Agree”/”Disagree” before providing detailed comment (if any).**

**1 – Guangdong OPPO Mobile Telecom.**

No strong view.

Firstly, we understand local/temp UE ID has already solved the security concern, since there is no another

way-out. Although being OK to send the LS, not sure how for R2 to react if S3 indicate security concern,

which has to be clarified before R2 agreeing on the LS-out.

**2**

**– MediaTek Inc.**

Agree but

We agree we can send our decision on local ID to SA3 but RAN2 may need not assume there is any security

concern. RAN2 can inform the agreement to SA3 (no need to explicitly ask if there is any security concern)

and then SA3 work is up to SA3.

**3**

**– Ericsson LM**

agree

to pvovide the answer on the security, is in SA3 scope, it would be anyway good to check their views.

in addition, if a local ID is used by a remote UE for a very long time, there will be no actual difference

between the local ID and the real UE ID. so, if SA3 indicates that there is a security concern even with the

local ID, RAN2 may react to introduce a maximum time period that a local ID can be applied. after that, a

new local ID needs to be applied.

**4**

**– Qualcomm communications-France**

Agree

But we actually don’t see security issue if we use a local and temp UE ID. Our intention is to close this

issue.

**– InterDigital France R&D**

**5**

Agree

**6**

**– Apple Europe Limited**

Agree to ask SA3 about any security concern.

**7**

**– vivo Mobile Communication Co.**

No strong view.

But if we do not follow this way, what other ways should we go with?

**8**

**– LG Electronics France**

**Agree**

**9**

**– Beijing Xiaomi Mobile Software**

Agree

As others have indicated it may be that a maximum duration for assignment of a temporary ID that needs

to be considered.

**10**

**– Futurewei Technologies**

Agree

No strong view that it is needed.

|  |
| --- |
| **11 – Spreadtrum Communications**  Agree |
| **12 – Intel Korea**  Agree (if majority of companies prefer) No strong view. |
| **13 – Lenovo (Beijing) Ltd** Agree. |
| **14 – HUAWEI TECHNOLOGIES Co. Ltd.**  Agree but  Similar with MediaTek and Qualcomm, there is no security issue identified from RAN2 point of view. Besides SA3 relay WI will do the evaluation from SA3 perspective, we do not see the need of this LS. But if companies believe sending LS to SA3 is the only way to close the RAN2 discussion, we are also fine.  Then the LS content could be RAN2 agreements and the RAN2 view that no security issue is identified. |
| **15 – Nokia Corporation**  Agree  e.g. to ask how often and/or in which condition the local ID should be updated |
| **16 – Samsung R&D Institute UK**  Agree  It is ok in our view to ask SA3 explicitly if they see any security concern. |
| **17 – ZTE Corporation**  No strong view.  ready to follow majority view. |
| **18 – CATT**  Agree.  It is recommended to send LS to SA3 for evaluating. Considering the extra time is needed for cross-group interaction, it is recommended to send LS to SA3 to check whether there is security issue for disclosing UE IDs on the adaptation layer at RAN2#115-e meeting. |
| **19 – Convida Wireless**  Agree |

**Rapp summary:**

**All companies agree on the LS, or have no strong view**

**Rapp understand there are different view on whether there is a need for question to SA3 on any security concern – proponents are thinking about the need of updating temp ID frequently,**

**From that perspective, rapp believe the need of the LS can be confirmed, and detailed issue can be handled during LS drafting phase.**

1. Send LS to SA3 to notify the RAN2 agreement on remote UE ID field in adaptation layer [19/19].

## For remote UE

And in case adaptation layer is configured over PC5 hop, there seems a need for remote UE to know the temp UE ID.

**Q3.2-1: If adaptation layer over PC5 hop is configured for a remote UE, do you agree that remote UE has to acquire temporary remote UE ID from relay UE or serving gNB, as concluded based on Q3.1-1a?**

**Feedback Form 11: Please answer ”Agree”/”Disagree” before providing detailed comment (if any).**

|  |
| --- |
| **1 – Guangdong OPPO Mobile Telecom.**  Yes remote UE can get the configuration from gNB via RRC signaling forwarded by relay UE. |
| **2 – MediaTek Inc.**  Agree  We think this is the precondition for Remote UE to assemble a Adaptation layer header. |
| **3 – Ericsson LM**  yes same as OPPO. |
| **4 – Qualcomm communications-France**  Agree  Same view as OPPO |
| **5 – InterDigital France R&D**  Yes |
| **6 – Apple Europe Limited**  Not Agree.  The remote UE ID in PC5 adaptation headers can just be L2 Address. we do not think this has to be allocated by gNB. |
| **7 – vivo Mobile Communication Co.**  Disagree.  Even if PC5 adaptation layer is finally supported in this release, for R17 U2N relaying, there still seems to be no use for the remote UE to know the local remote UE ID. If it is for multi-hop case, it is better for this issue to be discussed when it is really supported in future, lest in this release the remote UE is signaled with a local ID which is however of no use. |

|  |
| --- |
| **8 – LG Electronics France**  **Yes** |
| **9 – Beijing Xiaomi Mobile Software**  Disagree  Use of the temp Remote UE ID on the PC5 seems mostly relevant if we consider the multi-hop case in which case we should fully consider the scenario. In addition for U2U there would be no gNB so alternative consideration regarding the allocation of the temp Rem UE ID may need to be established if gNB is preferred to set the temp Rem ID.  As these features are not included in this release, this reinforces the view for no adaptation layer on PC5 at this time and a holistic solution can be proposed when we support these functions in later releases. |
| **10 – Futurewei Technologies**  Agree |
| **11 – Spreadtrum Communications**  Disagree  Temporary Remote UE ID is not needed even we agree to support N:1 mapping bewteen Remote UE Uu RB and PC5 RLF channel. |
| **12 – Intel Korea**  Disagree  Even if PC5 adaptation layer is agreed for this release, we believe that the adaptation header is not necessary for single-hop case wherein 1:1 mapping can be performed. |
| **13 – HUAWEI TECHNOLOGIES Co. Ltd.**  Disagree  Not sure what’s the use for Remote UE to know the (Remote UE) ID carried in Uu AL. For UL Remote UE only has one destination which is Relay UE, and for DL the Relay UE can know which Remote UE to forward according to the mapping from Remote UE local ID in Uu AL to uncast link L2 ID. |
| **14 – Nokia Corporation**  Disagree |
| **15 – Samsung R&D Institute UK**  Disagree  Multi-hop work is not within the scope of this Release and therefore related items including Adapt over PC5 should be deprioritized. Many questions in this discussion focus on details of a system design with Adapt on PC5 present, which is not a working assumption we have made.  ’If’ Adapt over PC5 is agreed (which does not seem to have majority support based on responses received this far), the Remote UE would only need to know Remote UE Adapt ID in a multi-hop scenario, which is not part of Rel-17 work. For single hop, Remote UE can just use its SL L2 address. |
| **16 – ZTE Corporation**  Agree.  If remote UE can get the local ID, it may add the adaptation layer header to the Uu RB packet and relay UE does not need to change it. The relay UE only need to detect local remote UE ID and RB ID for bearer mapping purpose, which can simplify the relay UE operation. |
| **17 – Convida Wireless**  Agree |

**Rapp summary**

**Since this one follows the decision of presence of adaptation layer over PC5 hop, there is no need for conclusion at least during this phase.**

# Conclusion

We have the following proposals

Firstly, it is suggested to go through the easy ones.

[Proposal 5 Adaptation layer is not present over PC5 hop for SRB0 [16/19].](#_Toc80255662)

[Proposal 6 Adaptation layer is not present over PC5 hop for BCCH and PCCH [15/15].](#_Toc80255663)

[Proposal 9 Send LS to SA3 to notify the RAN2 agreement on remote UE ID field in adaptation layer [19/19].](#_Toc80255666)

Secondly, it is suggested to check the following ones that need to be further checked.

[Proposal 1 RAN2 discuss for SRB0, adaptation layer is present over Uu hop for UL [12/20].](#_Toc80255658)

[Proposal 2 For SRB0, adaptation layer is present over Uu hop for DL [13/20].](#_Toc80255659)

[Proposal 3 In order to differentiate relay and non-relay traffic over Uu hop, different LCID (i.e., relay and non-relay traffic carried via different LCH) is used as baseline [13/19].](#_Toc80255660)

[Proposal 4 RAN2 discuss the presence of adaptation layer over PC5 hop, for both DL and UL transmission of Uu radio bearers other than SRB0, to select between 1) mandatory support and 2) not support.](#_Toc80255661)

[Proposal 7 RAN2 discuss in order to differentiate relay and non-relay traffic over PC5 hop, from R2 perspective, different L2 ID [7/18] and/or different LCID [11/18] can be used. For the usage of different LCID, and it can be revisited based on SA2 decision on whether shared L2 ID for relay and non-relay traffic needs to be considered.](#_Toc80255664)

[Proposal 8 Serving gNB of relay UE assigns the local/temp remote UE ID [13/20].](#_Toc80255665)

# Reference

1. R2-2106992 - Adaption Layer Design for L2 U2N Relay CATT
2. R2-2107047 - Adaptation layer for PC5 at L2 UE-to-Network Relay MediaTek Inc., InterDigital
3. R2-2107105 - Further discussion on adaptation layer of L2 U2N relay Qualcomm Incorporated
4. R2-2107175 – Open issues with Adaptation layer design Samsung Electronics GmbH
5. R2-2107194 – Left issues on CP aspects for adaptation layer OPPO
6. R2-2107195 - Left issues on UP aspects for adaptation layer OPPO
7. R2-2107277 - Discussion on L2 Relay Architecture InterDigital
8. R2-2107303 - L2 U2N relaying Adaptation layer design aspects Intel Corporation
9. R2-2107356 - Remaining issues on adaptation layer for L2 relay Spreadtrum Communications
10. R2-2107451 - Adaptation Layer for L2 SL Relay vivo
11. R2-2107470 - UP aspects on Layer 2 SL relay Ericsson
12. R2-2107620 - Discussion on adaptation header in PC5 link Apple
13. R2-2107734 - Remaining Issues in Adaptation Layer Design Futurewei
14. R2-2108148 - Discussion on adaptation layer design ZTE, Sanechips
15. R2-2108250 - Sidelink Relay Uu RLC for Remote UE and Adaptation Layer Design Beijing Xiaomi Mobile Software
16. R2-2108511 - Adaption layer for L2 U2N relay CMCC discussion
17. R2-2108623 - Adaptation layer functionalities for L2 U2N relay Huawei, HiSilicon