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

Electronic meeting, 25th January – 5th February 2021

Agenda Item: 8.7.2.2

Source: Ericsson

Title: [AT113-e][606][Relay] TP on conclusions for L3 relay architecture

Document for: Discussion, Decision

# 1 Introduction

This document is to handle the following email discussion:

* [AT113-e][606][Relay] Continuation of L3 architecture issues (Ericsson)

Scope: Discuss the “to be discussed” proposals P2/P3/P8/P9 from the L3 summary, and implement the agreements. Work towards conclusions if possible.

Intended outcome: Endorsable TP

Deadline: Tuesday 2020-02-02 1200 UTC—extended to 2021-02-04 0200 UTC to finalise TP in R2-2102115

# 2 Contact information

|  |  |
| --- | --- |
| Company (Name) | Email |
| OPPO (Qianxi) | qianxi.lu@oppo.com |
| Nokia (Gyuri) | gyorgy.wolfner@nokia.com |
| InterDigital (Martino) | martino.freda@interdigital.com |
| Fraunhofer (Nithin) | nithin.srinivasan@hhi.fraunhofer.de |
| Ericsson (Tony) | antonino.orsino@ericsson.com |
| Futurewei (Hao) | hao.bi@futurewei.com |
| Vivo(Boubacar) | kimba@vivo.com |
| Qualcomm(Peng) | [chengp@qti.qualcomm](mailto:chengp@qti.qualcomm) |
| Intel (Ansab) | ansab.ali@intel.com |
| Sharp (Lei LIU) | lei.liu@cn.sharp-world.com |
| Huawei, HiSilicon | wangrui46@huawei.com |
| CATT (Hao) | xuhao@catt.cn |
| LG(SeoYoung) | Seoyoung.back@lge.com |
| Philips (Jesus) | [jesus.gonzalez.tejeria@philips.com](mailto:jesus.gonzalez.tejeria@philips.com) |
| Spreadtrum(Xing) | [xing.liu1@unisoc.com](mailto:xing.liu1@unisoc.com) |
| ASUSTeK(Lider) | lider\_pan@asus.com |
| Lenovo, MotM (Prateek) | [pmallick@lenovo.com](mailto:pmallick@lenovo.com) |
| Samsung (Milos) | m.tesanovic@samsung.com |
| Sony (Vivek) | Vivek.sharma@sony.com |
| Convida (Zhuo) | Chen.zhuo@convidawireless.com |

# 3 What is included in this TP

The following TP is provided for including the following agreements:

Agreements:

Change to normative text the following note:

“Editor note: whether other QoS solution (e.g. whether gNB can perform PDB split) is introduced depends on SA2.”

Change to normative text the following editor’s note:

“Editor note: whether new PC5-S signaling is also introduced depends on SA2.”

Move the following editor’s note for L3 UE-to-UE relay in 3GPP TR 38.836 into normative text:

“Editor Note: Whether the SA2 captured solutions can satisfy the security requirement depends on SA3.”

Move the following editor’s note for L3 UE-to-Network relay in 3GPP TR 38.836 into normative text:

“Editor Note: Whether the SA2 captured solutions can satisfy the security requirement depends on SA3.”

RAN2 to confirm that there is no HO mechanism for L3 UE-To-Network relay since the UE is invisible to the gNB.

Agreements:

For L3 U2N, the Relay UE does not transfer PDCP SN status considering the second hop PDCP PDU/SDU delivery status during path switching in order to support lossless service continuity.

For L3 U2N, the study of optional AS layer-based solutions to enable PDCP SN status during path switch though service continuity is not pursued.

Further, the TP includes also the outcome of the summary submitted in [R2-2102101](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113-e/Docs/R2-2102101.zip). Please note that not all the agreements are to be captured in the following TR.

Further, the 38.826 TR taken as reference is the one endorsed during this meeting in:

TR

[R2-2100113](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113-e/Docs/R2-2100113.zip) TR 38.836 V1.0.1 OPPO draft TR Rel-17 38.836 1.0.1 FS\_NR\_SL\_relay

* Endorsed (baseline for decisions of this meeting)

# 4 TP to be included in the TR 38.386

*START OF CHANGE*

### 4.6.2 QoS

The basic QoS support mechanism for L3 UE-to-Network Relay is illustrated in Figure 4.6-3 from TR 23.752 [6].



Figure 4.6-3: basic QoS support mechanism of L3 UE-to-Network Relay captured in [6]

SA2 captured two solutions for QoS support of L3 UE-to-Network Relay:

1) Separate Uu QoS parameters and PC5 QoS parameters as in option 2 of solution#25 of TR 23.752 [6].

2) End-to-End QoS support in solution#24 of TR 23.752 [6], where Relay UE can obtain a mapping between PQI and 5QI from SMF/PCF.

No AS impact is identified for SA2 QoS solution#24 and #25 captured in TR 23.752 [6], for which legacy PC5-RRC procedure can be reused. RAN2 can consider in WI phase SA2 conclusions on QoS solutions, including whether it is sufficient to enforce E2E QoS via legacy PC5-RRC reconfiguration of SLRB and resource allocation.

Remote UE doesn’t need to provide information on which QoS flows need to be relayed to UE-to-Network Relay UE in AS layer. RAN2 don’t intend to study QoS enhancement for L3 UE-to-Network Relay. And RAN2 don’t intend to study the forward compatibility solution for multi-hop support.

Whether other QoS solutions (e.g., whether gNB can perform PDB split) are introduced depends on SA2.

*END OF CHANGE*

*START OF CHANGE*

4.6.5 Control Plane Procedure

*Editor note: Service continuity related CP procedure is captured in 4.6.4.*



**Figure 4.6-4: basic connection setup procedure of L3 UE-to-Network Relay based on Figure 6.6.2-1 of [6]**

The basic connection setup procedure is illustrated in Figure 4.6-4 which is based on Figure 6.6.2-1 in TS 23.752 [6]. Among them, the following procedures are identified with RAN2 impacts:

- Step 2: the discovery procedure, which is described in Section 4.2.

- Step 3: the relay (re)selection procedure, which is described in Section 4.3.

- Step 4: Rel-16 NR V2X PC5-RRC establishment procedure is reused to setup a secure unicast link between Remote UE and Relay UE before unicast traffic relaying.

Further AS impacts (if any) can be discussed in WI phase.

Whether new PC5-S signaling is also introduced depends on SA2.

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5.6.3 Security

Security protection of L3 UE-to-UE relay is in the scope of SA2 and SA3. No RAN2 impact is identified.

Whether the SA2 captured solutions can satisfy the security requirement depends on SA3.

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4.6.3 Security

SA2 captured two solutions for security support of L3 UE-to-Network Relay:

1) Via legacy Uu security and PC5 security;

2) Via N3IWF in solution #23 of TR 23.752 [6];

Solution#23 of TR 23.752 [6] with N3IWF is feasible to meet end-to-end security requirements.

Whether the SA2 captured solutions can satisfy the security requirement depends on SA3.

*END OF CHANGE*

*START OF CHANGE*

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

### 6.1.2 Layer-3 Relay

RAN2 has studied L3 UE-to-Network relay and has concluded that L3 UE-to-Network relay meets all the objective of the NR Sidelink Relay SID [Ref]. Specifically, RAN has reached the following conclusions:

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

RAN2 concluded that both the model A and model B are to be supported, and similar AS criteria of LTE relay will be reused as baseline. The details are left to WI.

#### 6.1.2.2 Relay and remote UE authorization

RAN2 confirmed the solution is up to SA2 and SA3 with no RAN2 impact foreseen.

#### 6.1.2.3 QoS management

This is subject to upper layer solutions defined by SA2 in TR 23.752 [6], clause 8.3. RAN2 can consider in WI phase the SA2 conclusions on QoS solutions, including whether it is sufficient to enforce E2E QoS via legacy PC5-RRC reconfiguration of SLRB and resource allocation.

#### 6.1.2.4 Service continuity

No AS layer solution is studied in RAN2 to guarantee service continuity, and this is left to the upper layer solutions defined by SA2 in TR 23.752 [6].

#### 6.1.2.5 Security

Solution#23 of TR 23.752 [6] with N3IWF is assumed to be feasible to meet end-to-end security requirements from RAN2 perspective.

#### 6.1.2.6 Protocol stack design

RAN2 concluded the CP and UP protocol stacks of L3 U2N relay are up to SA2 and these are illustrated in TR 23.752 [6].

#### 6.1.2.7 CP procedures

For CP procedures, PC5-RRC aspects of Rel-16 NR V2X PC5 unicast link establishment procedures can be reused to setup a secure PC5 unicast link. Further AS impacts (if any) can be discussed in WI phase. Whether new PC5-S signalling is also introduced depends on SA2. For path switch procedure, there is no AS solution discussed and concluded in RAN2 to perform path switch procedure from indirect link to direct link in case there is data transmission between remote UE and gNB via a relay UE.

#### 6.1.2.8 Standards impact

There is minimum standard impact from RAN2 perspective to support the operations of L3 UE-to-Network Relay. RAN2 concluded the standards support of L3 UE-to-Network Relay is mainly at SA.

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

[…]

### 6.2.2 Layer-3 Relay

RAN2 has studied L3 UE-to-UE relay and has concluded that L3 UE-to-UE relay meets all the objective of the NR Sidelink Relay SID [Ref]. Specifically, RAN has reached the following conclusions:

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

RAN2 concluded that both the model A and model B are to be supported, and similar AS criteria of LTE relay will be reused as baseline. The details are left to WI.

#### 6.2.2.2 Relay and remote UE authorization

RAN2 confirmed the solution is up to SA2 and SA3 with no RAN2 impact foreseen.

#### 6.2.2.3 QoS management

This is subject to upper layer solutions defined by SA2 in TR 23.752 [6], clause 8.4.

#### 6.2.2.4 Service continuity

No AS layer solution is studied in RAN2.

#### 6.2.2.5 Security

RAN2 concluded the solution is up to SA2 and SA3.

#### 6.2.2.6 Protocol stack design

RAN2 concluded the CP and UP protocol stacks of L3 U2U relay are up to SA2 and these are illustrated in TR 23.752 [6].

#### 6.2.2.7 CP procedures

RAN2 concluded the design is left to SA2.

#### 6.2.2.8 Standards impact

There is minimum standard impact from RAN2 perspective to support the operations of L3 UE-to-UE Relay. RAN2 concluded the standards support of L3 UE-to-UE Relay is mainly at SA.

*END OF CHANGE*

# 5 Comments to the proposed TP

Companies are encouraged to provide their comments on the proposed TP in the following table or as bubble word comment directly in the text.

|  |  |
| --- | --- |
| Company | Comments |
| OPPO | In section 4.6.2,  Currently the wording for solution#25 simply causes gap with SA2 conclusion, we are open to other wording suggestion to remove the gap, but the current misleading wording can be misunderstood that RAN2 would like to go to another direction different from SA2 conclusion..  1) Separate Uu QoS parameters and PC5 QoS parameters as in option-2 of solution#25 of TR 23.752 [6].  *[Rapporteur] Thanks for the suggestion. It is now adopted in the TR.*  In 6.1.2 and 6.2.2: L2=>L3  RAN2 has studied L3 UE-to-Network relay and has concluded that L2 UE-to-Network relay meets all the objective of the NR Sidelink Relay SID [Ref].  RAN2 has studied L3 UE-to-UE relay and has concluded that L2 UE-to-UE relay meets all the objective of the NR Sidelink Relay SID [Ref]. Specifically, RAN has reached the following conclusions:  In 6.1.2.3, full stop is missing  including whether it is sufficient to enforce E2E QoS via legacy PC5-RRC reconfiguration of SLRB and resource allocation.  For 6.1.2.7, just wonder what the source of the following part? Fail to find it in 4.6.5 in TR 38.836, suggest to remove  For path switch procedure, there is no AS solution discussed and concluded in RAN2 to perform path switch procedure from indirect link to direct link in case there is data transmission between remote UE and gNB via a relay UE.  In 6.2.2.1, considering there is no U2U in LTE, it is suggested to remove  RAN2 concluded that both the model A and model B are to be supported, and similar AS criteria of LTE relay will be reused as baseline. The details are left to WI.  For the spec impact part, we suggest to follow the following agreement to have a common section only, i.e., to remove the separate section spec impact in L2/L3 part.  *Capture in the TR: “Mechanisms for layer-2 relay have been studied and identified by RAN2, striving for minimum specification impact”, and a matching sentence for L3.* |
| Apple | For both U2N and U2U evaluations:  Because the sections begin with the sentence like “Specifically, RAN has reached the following conclusions”, I think there is no need to repeat “RAN2 concludes” in each section below, for example, we suggest  ~~RAN2 concluded that~~ B~~b~~oth the model A and model B are to be supported, and similar AS criteria of LTE relay will be reused as baseline. The details are left to WI.  ~~RAN2 concluded~~ ~~t~~The CP and UP protocol stacks of L3 U2U relay are up to SA2 and these are illustrated in TR 23.752 [6].  And there are a couple of similar subclauses begin with “RAN2 conclude”…we can remove them too.  For 6.1.2.4 and 6.2.2.4, the section does not need to be included. Because the solutions are not even studied, so we do not have any evaluation and conclusions.  For the section 6.1.2.8 and 6.2.2.8 about standards impact, I agree with OPPO suggestion to remove both of them and only capture the following:  *Mechanisms for layer-2 relay and layer-3 relay have been studied and identified by RAN2, striving for minimum specification impacts.* |
| Huawei, HiSilicon | For the section 6.1.2.8 and 6.2.2.8 about standards impact, we agree with OPPO and APPLE’s suggestion to remove both of them and only capture the following:  *Mechanisms for layer-2 relay and layer-3 relay have been studied and identified by RAN2, striving for minimum specification impacts.*  Regarding OPPO’s comment on 6.1.2.7 path switch part, we are fine to keep the sentence as it is. Our understanding is that during SI discussion we assume for L3 relay the remote UE’s mobility is supported via relay (re)selection procedure, however there is no discussion in RAN2 on how remote UE swithes path from relay UE back to Uu. |
| Samsung | As we already mentioned previously, with regards to 6.1.2.5 Security, our preference is to either capture something which is closer to the actual SA2 agreement:  Solution #6 of TR23.752 [6] is taken as baseline in case the UE-to-Network Relay is a trusted entity by the Remote UE. Solution#23 of TR 23.752 [6] with N3IWF is assumed to be feasible to meet end-to-end security requirements from RAN2 perspective in case the UE-to-Network Relay is not a trusted entity by the Remote UE.  Or to have the text identical to that of 6.2.2.5.  We do not and cannot agree with the removal of Sections 6.1.2.8 and 6.2.2.8 – as explained previously. |
| Ericsson | For the Apple comment on deleting “RAN2 concluded”, we think is still okay to keep the “RAN2 concluded” and similar. It does not hurt at the end to emphasize what RAN2 has achieved or concluded. But if other companies believe to do as Apple suggested, we are also fine to modify the TP.  For the Apple comment on the service continuity section, it is true that those have not been studied but is also good to notify the reader of this. Also, is good to keep the same structure (section wise) of what we have for L2.  For the removal of the section of the standard impact, we think that those can be kept because they simply describe on which WG is expected the work to be done in case of L3 relay architecture. Also, the way how the sentences are formulates do not provide any comparison between L2 and L3. However, if majority is really eager to take those sections out, a possible compromise is to add only the last sentence in the common section for L2 and L3. Something like:  *Mechanisms for layer-2 relay and layer-3 relay have been studied and identified by RAN2, striving for minimum specification impacts. RAN2 concluded the standards support of layer-3 relay is mainly at SA whereas the standard support of layer-2 relay is mainly at RAN.* |
| Qualcomm | We also prefer to keep Sections 6.1.2.8 and 6.2.2.8, and we don’t think it is relevent to comparison between L2 and L3. |
| InterDigital | Regarding 6.2.2.4, section is not needed, as the TR already states that service continuity requirement does not apply for U2U relay.  Agree with OPPO, Apple, Huawei on how to capture specification impact section. |
| ZTE | We share the same view with OPPO. Huawei and Apple that capture the following sentence like L2 relay:  *Mechanisms for layer-2 relay and layer-3 relay have been studied and identified by RAN2, striving for minimum specification impacts.* |
| Nokia | We support the provided TP. We think that RAN2 shall clarify that L2 and L3 have different RAN specifications impacts without any comparison.  We would like to propose the following revision for 6.1.2.8 (Standards impacts):  Beyond the relay discovery and relay (re)selection aspects, there is minimum standard impact from RAN2 perspective to support the operations of L3 UE-to-Network Relay. RAN2 concluded the standards support of L3 UE-to-Network Relay is mainly at SA.  Similar type of changes should also be applied in 6.2.2.8 |
| Futurewei | We share the same view with OPPO. Huawei, Apple, InterDigital, and ZTE to have the same section and sentence to capture the standards impact.  We don’t agree with the current wording in 6.1/2.2.8 and don’t think RAN2 is tasked to assess workload of standards impact of RAN or SA. |
| Convida | We share the same view with OPPO. Huawei, Apple, InterDigital, ZTE and Futurewei to have the same section and sentence to capture the standards impact.  We don’t agree with the current wording in 6.1.2.8/6.2.2.8 and don’t think RAN2 is tasked to assess workload of standards impact of RAN or SA. |
| Philips | For sections 6.1.2.8 we prefer to use a similar wording as suggested by InterDigital for L2 and that would be:  Standardization impact from RAN2 perspective to support the operations of L3 UE-to-NW relay can be inferred from discussion in section 4.6, and in this conclusion. From RAN2 perspective, the standard support of L3 UE-to-NW is mainly at SA.  For section 6.2.2.8 we prefer to use a similar wording as suggested by InterDigital for L2 and that is:  Standardization impact from RAN2 perspective to support the operations of L3 UE-to-UE relay can be inferred from discussion in section 4.6, and in this conclusion. From RAN2 perspective, the standard support of L3 UE-to-UE is mainly at SA. |
| Intel | Regarding section 6.1.2.1, it seems like the L2 conclusion refers to this section when discussing relay discovery and (re-)selection when mentioning the baseline solutions. It is ok in our view but we need to split the two aspects into separate sentences as follows to keep in line with corresponding L2 conclusions:  RAN2 has concluded that both the model A and model B are to be supported as baseline.  RAN2 has concluded that for relay (re-)selection, similar AS criteria of LTE relay (re-)selection procedure will be reused as baseline.  Similar comments for section 6.2.2.1 for the U2U case    In addition, regarding specification impact section, we are fine with the current version. Anyway, section 6.3 captures the feasibility and recommendation (which is the culmination of the work done during the SI) while 6.2.1.8 and 6.2.2.8 refer to the standards impact of the two solutions, so to us they seem different enough to keep. |
| LG | We support the provided TP. Agree with OPPO, Apple, Huawei on how to capture specification impact section. |