3GPP TSG-RAN WG2 Meeting #116-e R2-211xxxx

Electronic Meeting, November 1 – 12, 2021

Agenda: 8.7.2.1

Source: InterDigital

Title: Summary of [AT116-e][622][Relay] Remaining proposals from relay control plane (InterDigital)

Document for: Discussion, Decision

# 1 Introduction

The following email discussion was triggered at RAN2#116-e, and the results are summarized in this discussion

* [AT116-e][622][Relay] Remaining proposals from relay control plane (InterDigital)

Scope: Attempt to converge the proposals for discussion from R2-2109928 and the proposals from R2-2111368.

Intended outcome: Report to CB session

Deadline: Tuesday 2021-11-09 0800 UTC (can be extended to Thursday if needed)

# 2 Discussion

## 2.1 Proposals from R2-2109928

For the remaining proposals from R2-2109928 [1], rapporteur suggests to focus on the “easy proposals on UAC and timers” and the “more difficult agreements and aspects to be discussed with high priority” and to skip the “agreements/aspects that can be down-prioritized” for the purposes of this email discussion.

### 2.1.1 Proposals on UAC and Timers

Proposals 16, 17, and 18 had significant support in the email discussion [1], and were marked as easy agreements. Rapporteur therefore suggest that for the sake of progress we agree to these unless there are significant concerns on them.

Proposal 16 from [1] is as follows:

* *Proposal 16: Relay UE does not perform UAC check for the remote UE’s data. [20/23]*

The proposal had majority support and aligns with the preference from CT1. Rapporteur suggests we can agree with the proposal in its current form, and comments are invited only if companies have significant concerns with the proposal.

**Q1.1) Can we agree with proposal 16 from R2-2109928: The relay UE does not perform UAC check for the remote UE’s data.**

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Proposal 17 from [1] is as follows:

* *Proposal 17: Remote UE uses different timers (FFS: value and/or name) for access (T300-like), resume (T319-like) and re-establishment (T301-like) compared to those for legacy Uu procedures [23/23]*

While all companies agreed that different times for access, resume, and re-establishment compared to legacy are needed for relay, a few companies indicated that this could be done by configuring a different value of the existing timer to the UE, rather than having a new timer. For this reason, the FFS in the proposal was included. Since then, it was noted by several companies by email, as well as in company contributions, that these timers are configured in SIB, and a separate IE would be needed to configure a different value of each timer for relay and non-relay connection. In addition, the conclusion of the service continuity discussion (where T304 is discussed) proposes a new timer. To align with that discussion, rapporteur suggests agreing to proposal 17 without the FFS.

**Q1.2) Can we agree that remote UE uses different timers for access (T300-like), resume (T319-like) and re-establishment (T301-like) compared to those for legacy Uu procedures?**

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Proposal 18 from [1] is as follows:

* *Proposal 18: Basing RRC timers (T300-like, etc) on the RRC state of the relay UE is not supported in this release. [19/23]*

There was clear majority to not support this enhancement in this release. Rapporteur suggests that we agree with proposal 18 and invites companies to express comments only if there are significant concerns on such agreement.

**Q1.3) Can we agree with proposal 18 from R2-2109928: Basing RRC timers (T300-like, etc) on the RRC state of the relay UE is not supported in this release.**

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### 2.1.2 Proposals on Short Message and SI Forwarding

The discussion on short message and SI forwarding in [1] resulted in a set of proposals requiring further discussion. Firstly, for a remote UE in RRC\_CONNECTED, the following is proposed.

* *Proposal 8: RAN2 further discusses whether, for an RRC\_CONNECTED remote UE, a) the relay UE forwards short message to the remote UE for the remote UE to perform dedicatedSIBRequest [12/23] b) the network forwards SIB to each remote UE when the SIB changes; [5/23] or c) the relay UE, following reception of the short message, forwards only the SI that the remote UE requires (based on prior knowledge) [6/23]*

From the three options in the proposal, the one with the smallest support (5/23 companies) is that the network forwards SIB to each remote UE when SIB changes. It was commented by a few companies in the email discussion and in contributions to this meeting that the network may not be able to know all of the SIBs required by a remote UE (e.g., when a remote UE first enters RRC\_CONNECTED). Furthermore, in Uu, despite the remote UE being able to receive SIB from dedicated signalling from the network, the UE can still know about SI changes and request SIB. Rapporteur therefore suggests that option b) is removed, keeping in mind that this option is always possible by network implementation, but that it should not be relied on exclusively if we want to be consistent with Uu.

**Q2.1) When the remote UE is in RRC\_CONNECTED, and the relay UE receives a short message, which of the following is preferred relay UE behaviour. Companies are asked to comment on the reason(s) why one or more approach is preferred and/or if any approach is not feasible/acceptable.**

1. **Relay UE forwards short message to the remote UE with the understanding that the remote UE then performs dedicatedSIBRequest to the gNB**
2. **Relay UE forwards SI to the remote UE without forwarding the short message**

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For a remote UE in RRC\_IDLE/RRC\_INACTIVE, there seems to be a majority support for the relay UE forwarding the SI itself upon reception of the short message.

* Proposal 9: For the remote UE in RRC\_IDLE/RRC\_INACTIVE, short message is not forwarded by the relay UE to the remote UE [15/23]

Rapporteur suggests we try to go with the majority in this case, unless there is significant technical issues.

**Q2.2) When the remote UE is in RRC\_IDLE/RRC\_INACTIVE, and the relay UE receives a short message, do you agree that the Relay forwards SI to the remote UE without forwarding the short message?**

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Assuming there are cases (at least IDLE/INACTIVE) where the relay UE forwards the SI and not the short message, the email discussion tried to discuss which SI is forwarded. For PWS, there was majority view that the relay UE forwards the PWS SIB after reception of the short message:

* Proposal 10: When short message forwarding is not performed by the relay UE, the relay UE forwards the PWS SIBs being broadcast after receiving the PWS notification [19/23].

Companies which did not agree with the proposal indicated that a remote UE may not support PWS (e.g. IOT UE).

**Q2.3) Can we agree that assuming short message forwarding is not performed by the relay UE, the relay UE forwards the PWS SIBs to remote UEs which support PWS after reception of the PWS notification?**

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Finally, for non PWS SIBs, it was not decided which SI is to be forwarded by the relay UE when the short message is received.

**Q2.4) Assuming short message forwarding is not performed by the relay UE, which non-PWS SI does the relay UE forward to the remote UE?**

1. **All changed SI**
2. **A subset of the changed SI that is applicable to the remote UE**

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### 2.1.3 Proposals on Sending Remote UE Paging on PC5-RRC

Proposal 7 from [1] indicated the need to further discuss how to deliver paging to the remote UE:

* *Proposal 7: RAN2 further discusses whether the PC5-RRC message delivering paging to the remote UE contains a) the entire paging record; b) the UE ID of the UE being paged only; c) the paging type only.*

The outcome, in terms of preference of companies for each approach, was as follows:

* a) the entire paging record – 10 companies
* b) UE ID of the remote UE being paged only – 7 companies
* c) paging type only – 8 companies

The main difference in opinion is based on whether we should prioritize resource efficiency versus whether we should prioritize simplicity of the relay:

* The companies preferring resource efficiency (7+8 = 15 companies) indicate that forwarding the entire paging record is not needed and would create unnecessary overhead on SL.
* The companies preferring simplicity (10 companies) indicate that it would be simpler to forward the entire paging record to the remote UE rather than regenerating a new message

Rapporteur observes that for the efficiency argument, the paging record can in fact contain the paging of multiple UEs (which are not necessarily connected to the same relay) and so may be a large message. The main reason for paging multiple UEs with a single

Rapporteur observes that for the simplicity argument, the relay UE is sending the paging message in PC5-RRC and so is anyways creating a new message on PC5-RRC (different than the Uu paging message/record). Furthermore, the transmission of the paging message to the remote UE is not transparent, as the relay still needs to determine which remote UE to send paging to by decoding the Uu paging message.

Rapporteur therefore sees more technical merit to the efficiency argument, and to make progress in this discussion, suggests we agree that the relay only sends paging information relevant to that specific remote UE, when paging is sent to a remote UE over PC5 (which is also aligned with the majority view).

**Q3.1) Can we agree that the PC5-RRC message delivering paging to the remote UE contains either the UE ID of the remote UE being paged, or the paging type, and that we will further select from one of these two options?**

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Assuming the statement in 3.1 is agreeable, companies are asked to give their preference between the approaches.

**Q3.2) Between the two options assumed in 3.1, which do companies prefer?**

1. **UE ID of the remote UE being paged only**
2. **Paging type**

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## 2.2 Proposals from R2-2111368

### 2.2.1 Proposals for Potential Agreement

In the summary of the control plane [2], a number of potential easy agreements were identified. Apart from proposal 24, which simply confirms an existing agreement and may not be necessary to repeat, rapporteur would like to check that we can firstly agree to the following proposals, or whether there are any significant concerns:

* *Proposal 12. As a baseline, in-coverage Remote UE is allowed to acquire some necessary SIB over Uu irrespective of its PC5 connection to Relay UE.*
* *Proposal 22. Agree that Remote UE needs to know the PCI of Relay UE’s serving cell. FFS how Remote UE obtains the PCI of relay UE’s serving cell.*
* *Proposal 25. Agree that Relay UE can notify Remote UE ID (i.e. 5G-S-TMSI/I-RNTI) information to the gNB via dedicated RRC message for paging delivery purpose.*

**Q4.1) Can we agree to proposals 12, 22, and 25 above from the control plane summary (please respond no if there are significant concerns with any of these proposals)?**

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### 2.2.2 Proposals with Majority View

Regarding which SIB can be requested, majority view from the contributions is that the remote UE can request any SIB. Some companies indicated that some SIBs (e.g. SIB1) should not be possible to request.

* Proposal 1. [Majority view, 6(any), 1(except SIB1), specific SIBs(2), updated SIB only (1)] The Remote UE could request any SIB to be forwarded from Relay UE in an on-demand manner. FFS whether request of any specific SIBs is not allowed.

**Q5.1) Which SIB can the remote UE request from the relay UE?**

1. **Any SIB**
2. **Any SIB except some specific SIBs (please indicate which ones)**

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Regarding establishment cause value, the majority view from company contributions was to not introduce a new establishment cause value:

* Proposal 15. [Majority view, 8-1] Agree that the Relay UE reuses existing establishment/resume cause value when Relay UE enters RRC\_CONNECTED only for relaying purpose.

**Q5.2) Should a new establishment cause for relay UE entering RRC\_CONNECTED only for relaying purposes be introduced?**

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### 2.2.3 Proposals for further discussion

Regarding proposals requiring further discussion, rapporteur would like to collect company opinion on the proposals where options were suggested by the rapporteur of [2].

a) PC5-RRC signaling for SI

* *Proposal 9. Discuss which option is preferable for the PC5-RRC message when Relay UE forwards SIB to Remote UE after PC5 connection establishment for SI request and response:* 
  + *Option a) New PC5-RRC messages; FFS message content/details (3)*
  + *Option b) Existing RRCReconfigurationSidelink message (1)*

**Q6.1) Which PC5-RRC message is used by the remote UE to request SI from the relay UE after PC5 connection establishment?**

1. **New PC5-RRC message**
2. **RRCReconfigurationSidelink**

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**Q6.2) Which PC5-RRC message is used by the relay UE to send SI to the remote UE after PC5 connection establishment?**

1. **New PC5-RRC message**
2. **RRCReconfigurationSidelink**

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b) Voluntary forwarding of SI

Regarding proposal 5, it seems related to the discussion on short message, in the sense that if short message forwarding is not supported, then voluntary forwarding of SIBs is supported for the case of updated SIBs.

* Proposal 5. Discuss which option is preferable for the Relay UE to voluntarily forward SIBs to the Remote UE:

Option a) Relay UE can voluntarily forward without a request any SIB (4)

Option b) Relay UE should voluntarily forward without a request only specific SIBs, such as SIB1, SIB6, SIB7, SIB8 (4) and updated SIB(s) considering Remote UE’s prior request (9)

The remaining question is whether voluntary forwarding is supported for other cases.

**Q6.3) Are there any cases, other than the case SIB update determined by the relay UE, where the relay UE can voluntarily forward SIBs to the remote UE without request? If yes, please specify the case, and which SIB(s).**

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c) SI forwarding before PC5-RRC Connection

* Proposal 6. Discuss based on SA2 recent LS [R2-2111236], how to enable Remote UE to receive the list of non-serving PLMN IDs before PC5 connection establishment.
* Proposal 7a. Discuss whether Relay UE could support forwarding of some essential bits of system information besides agreed PLMN ID and cell ID to Remote UE before PC5 connection establishment.
* Proposal 7b. Discuss which options are preferable for the essential bits of system information besides list of non-serving PLMN IDs to be forwarded toward Remote UE before PC5 connection establishment:
  1. cellBarred from MIB
  2. intraFreqReselection from MIB
  3. cellAccessRelatedInfo from SIB1 (includes PLMN ID list)
  4. t300 (3bit), t319 (3bit), useFullResumeID (1bit) from SIB1
  5. UAC configuration (~217bit), optionally.
* Proposal 8. If proposal 7a is agreed, discuss which option is preferable to enable forwarding of system information before PC5 connection establishment:
  + Option a) PC5 broadcast (2 + 2(either option) or 4)
  + Option b) Relay discovery message (3+2 (either option) or 5)

**Q6.4) Can RAN2 confirm, based on SA2 LS R2-2111236, that the list of non-serving PLMN IDs need to be provided by the relay UE to the remote UE before PC5 connection establishment?**

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**Q6.5) What other system information (in addition to list of non-serving PLMN IDs) should be provided by the relay UE to the remote UE before PC5 connection establishment?**

1. **cellBarred from MIB**
2. **intraFreqReselection from MIB**
3. **cellAccessRelatedInfo from SIB1 (includes PLMN ID list)**
4. **t300, t319**
5. **useFullResumeID**
6. **UAC configuration**
7. **Other**

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**Q6.6) Which option is preferrable for forwarding of system information before PC5 connection establishment?**

1. **Broadcast PC5-RRC message**
2. **Relay Discovery Message**

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d) SI forwarding after PC5-RRC Connection

* Proposal 10. Further discuss if SIB forwarding using broadcast [and groupcast] from Relay UE is allowed after PC5 connection establishment.

**Q6.7) Should SIB forwarding using groupcast/broadcast from the relay UE to remote UE(s) be allowed after PC5 connection establishment?**

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e) Informing gNB of connected remote UE information

* Proposal 13. If P25 is agreed, discuss which one of the following options is preferable to be used by Relay UE to notify Remote UE ID (i.e. 5G-S-TMSI/I-RNTI) information to the gNB via dedicated RRC message for paging delivery purpose:
  + Option a) UE Assistance information (1)
  + Option b) SidelinkUEInformation (2)
  + Option c) New RRC message (1)

**Q6.8) If the relay UE notifies the gNB of remote UE information (i.e. 5G-S-TMSI/I-RNTI), which RRC message should be used?**

1. **UE Assistance Information**
2. **SidelinkUEInformation**
3. **New RRC Message**
4. **Other**

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f) Establishment Cause Determination

* *Proposal 16. If proposal 15 is agreed, discuss which one of the following options is preferable for Relay UE to use for establishment/resume cause value when Relay UE enters RRC\_CONNECTED only for relaying purpose:*
  + *Option a) Provided by its upper layer*
  + *Option b) Received from Remote UE*

**Q6.9) How does the relay UE determine the establishment/resume cause value when the relay UE enters RRC\_CONNECTED for relaying purposes only?**

1. **Provided by upper layers**
2. **Received from the remote UE**

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g) Inter-gNB re-establishment and resume

* *Proposal 17. Discuss whether Inter-gNB RRC Re-establishment for the Remote UE is allowed.*
* *Proposal 23. RAN2 discuss whether INACTIVE remote UE can Resume via Relay UE served by a different gNB or via a different gNB directly, i.e., inter-gNB resume is allowed.*

**Q6.10) Should inter-gNB RRC Re-establishment for remote UE be supported?**

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**Q6.11) Should resume by an INACTIVE remote UE to a relay served by a different gNB or a different gNB directly be supported (i.e. inter-gNB resume allowed)?**

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h) Default configuration for Uu SRB0

* *Proposal 18. RAN2 discuss whether gNB should configure Relay UE’s Uu RLC carrying Remote UE’s SRB0 while sending Remote UE’s local/temporary ID towards the Relay UE i.e. default configuration is not needed for Uu RLC for SRB0.*

**Q6.12) Should default configuration for Uu RLC carrying SRB0 be specified?**

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i) Uu RLF

* *Proposal 20. Upon Uu RLF, RAN2 discuss whether Relay UE sends new PC5-RRC message based indication to Remote UE.*

**Q6.13) Should a new PC5 RRC message be used for sending indication to the remote UE upon Uu RLF at the relay UE?**

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# 3 Conclusion

# 4 References

1. R2-2109928 Summary of [POST115-e][610][Relay] Control Plane Procedures (InterDigital) - InterDigital
2. R2-2111368 – Summary of agenda item 8.7.2.1: Control Plane Procedures – Intel Corporation