**3GPP TSG RAN WG2 Meeting #114-e R2-2106587
Electronic Meeting, 19th - 27th May 2021**

**Agenda item: 8.7.3**

**Source: CATT**

**Title: [AT114-e][618][Relay] Remaining issues on (re)selection**

**Document for: Discussion and Decision**

# Introduction

This is email discussion for below offline discussion:

  [AT114-e][618][Relay] Remaining issues on (re)selection (CATT)

      Scope: Resolve remaining open issues on relay (re)selection:

         Discuss the case of no data for evaluating the relay (re)selection trigger criterion, and determine whether a specified UE behaviour is needed, and if so what to specify

         Discuss P2 and P5 of R2-2106470

      Intended outcome: Report to CB session, in R2-2106587

      Deadline:  Tuesday 2021-05-25 1000 UTC (can extend if needed)

The above email discussion is divided in two phases:

* **Phase I:** Companies are invited to provide feedback on the questionnaire of this email discussion by 2021-05-24 1000 UTC.
* **Phase II :** Rapporteur submits a summary and proposals based on the feedback and companies can comments on the summary and proposals by 2021-05-25 0700 UTC, to allow time for final proposals reshaping and Tdoc submission.

# Discussion

## PC5 measurement in case of no data transmission

During the online discussion, the following agreements regarding to PC5 measurements were reached:

Agreements:

Use only SL-RSRP if available; discuss the no data case by email.

The reaming issue is that how to performs the PC5 measurement in case of no data. There are mainly two options:

* Option 1: still use SL-RSRP;
* Option 2: use SD-RSRP.

For Option 1, it should further discuss how to acquire the SL-RSRP when there is no data available. For Option 2, as mentioned by Apple, if both SL-RSRP and SD-RSRP are used, the reselection threshold may be different, which would be problematic. Hence, in order to make progress, it should first discuss which PC5 measurement should be used in case of no data.

**Question 1: When a Remote UE is connected with a Relay UE and when there is no data transmission, which PC5 measurement should be used for relay reselection evaluation? Please give your comments.**

* **Option 1: SL-RSRP;**
* **Option 2: SD-RSRP.**
* **Option-3: Up to UE implementation to adopt SL-RSRP or SD-RSRP**

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| **Companies** | **Option** | **Comments** |
| OPPO | Option 1 or Option-3 | During Rel-16, it has been discussed on how to perform SL-RSRP under the case that when unicast link has been established but no data transmission. Therefore, there is nothing new if we keep using SL-RSRP.Or, if this issue becomes too controversial, we see one way-out as leave the selection of option-1/2 to UE implementation. |
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If company selected Option 1, it should further discuss how to acquire the SL-RSRP in case of there is no data. According to the contributions on this RAN2 meeting, [1][6][7] suggested to use keep-alive message. [5][7] suggested to send SCI to peer UE to trigger CSI reporting.

**Question 2: When a Remote UE is connected with a Relay UE, if only SL-RSRP is used for relay reselection evaluation, in case of there is no sidelink data, which option should be selected for determining the SL-RSRP?** **Please give your comments.**

* **Option 1: Based on keep-alive message;**
* **Option 2: Based on CSI reporting triggered by SCI;**
* **Option 3: Depends on UE implementation (e.g., based on keep-alive message or CSI reporting).**

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| **Companies** | **Option** | **Comments** |
| OPPO | Option 3 | Both option 1 and option 2 can solve the no data issue, but it is not necessary to pursue spec effort on this issue. Thus, it is more preferable to leave the issue to UE implementation. |
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If company selected Option 2, both SL-RSRP and SD-RSRP can be used for relay reselection evaluation. When there is no SL-RSRP in case of no sidelink data, there must be available SD-RSRP. But considering SD-RSRP should support L3 filtering, hence it should further discuss whether the remote UE should also perform sidelink discovery message transmission or reception when SL-RSRP is above the threshold?

**Question 3: When a Remote UE is connected with a Relay UE, if SD-RSRP is used for relay reselection evaluation in case of there is no sidelink data, when the remote UE should perform sidelink discovery message transmission/reception in order to ensure there is available SD-RSRP in case of there is no sidelink data? Please give your comments.**

* **Option 1: The remote UE should always perform sidelink discovery message transmission and/or reception;**
* **Option 2: The remote UE should perform sidelink discovery message transmission and/or reception only when the SL-RSRP is below a threshold;**
* **Option 3: Others if any (please added here).**

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| **Companies** | **Option** | **Comments** |
| OPPO | Option 1 | According to online conclusion thatProposal 13: De-prioritize additional condition for discovery transmission/reception in Rel-17.there is no need to further discuss enhancement on discovery transmission / reception condition. |
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In addition, if company selected Option 2, it should further discuss whether different relay reselection thresholds should be configured for SL-RSRP and SD-RSRP.

**Question 4:** **Whether different relay reselection thresholds should be configured for SL-RSRP and SD-RSRP? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
| OPPO | up to network implementation | From our understanding, it is up to network implementation on whether to configure different threshold for SL-RSRP and SD-RSRP. In detail, e.g., when remote UE detecting its SL-RSRP is below the configured threshold (if SL-RSRP is adopted), it will start to perform relay reselection, then it can refer to SD-RSRP to reselect other relay UEs which have no unicast link with the remote UE. |
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## Transmit power imbalance issue

For the power control of sidelink discovery message, the following agreement was reached during the online discussion:

Proposal 6: RAN2 agrees to reuse Rel-16 power control mechanism for transmission of discovery messages.

Since it was agreed that sidelink OLPC should be applied to discovery message, SD-RSRP also have the transmission power imbalance issue similar as SL-RSRP. In LTE Prose relay, the power imbalance issue was left to implementation. In NR, whether this can be left to implementation needs further discuss. [1] proposed to reuse LTE Prose relay scheme, rely on Network / UE implementation to resolve the transmit power imbalance issue on PC5 measurement for relay (re)selection trigger and candidate relay evaluation. [4] suggested Relay UE carry TX power information in SL model A discovery message and SD-RSRP measurement result in SL model B discovery message.

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| Tdoc# | Source | Summary of their proposals |
| R2-2104745 | Qualcomm Incorporated | P4: Same as LTE Prose relay, rely on Network / UE implementation to resolve the transmit power imbalance issue on PC5 measurement for relay (re)selection trigger and candidate relay evaluation |
| R2-2105127 | Apple | P1: Relay UE carry TX power information in its SL discovery message in model A relay discovery. P2:Relay UE carry radio signal strength measurement of SL discovery message transmitted by remote UE in model B relay discovery.  |

**Question 5: Whether the power imbalance issue can be left to UE implementation? Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
| OPPO | Yes | We do not think there will be any impact on relay reselection caused by power imbalance issue. |
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If the answer of Question 5 is No, it should further discuss how to solve the power imbalance issue in case of OLPC is used.

**Question 6: Please add your solutions for solving the power imbalance issue in the following table.**

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| **Companies** | **Solutions** |
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## L2/L3 relay support

In RAN2#113bis-e meeting, the agreements on AS criteria for relay (re)selection were made:

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| Agreements:Proposal 3-1 [easy]: Besides serving cell ID, PLMN ID, L2/L3 relay support (if agreed in discovery session) and relay load, other additional AS criteria are not considered in this release. |

We tried to solve the question that whether L2/L3 relay support is used as additional AS criteria for relay (re-)selection. Before we start, we would like to review the proposals from submitted contributions for this topic.

[3] indicated that according to SA2’s progress, the relay service code included in discovery message can indicate if the UE-to-Network Relay is a Layer-3 or Layer-2 UE-to-Network Relay. [1] suggested up to SA2 to decide whether to include L2/L3 relay support in discovery message.

[2] observed SA2 has agreed that UE may indicate the 5G ProSe capability which may indicate whether the UE is capable of one or more of the following 5G ProSe capabilities: ProSe Direct Discovery, ProSe Direct Communication, Layer-2 and/or Layer-3 ProSe UE-to-Network Relay and Layer-2 and/or Layer-3 Remote UE. Hence, it proposed that capability of L2/L3 relay can be used as additional AS criteria for relay (re)selection.

**Question 7: Whether L2/L3 relay support can be used as additional AS criteria for relay (re-)selection？Please give your comments.**

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| **Companies** | **Yes/No** | **Comments** |
| OPPO | Rely on SA2, no need to define AS criteria | Since SA2 is working on this, we can rely on SA2 for this, and thus no RAN2 impact is expected.  |
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# Conclusion

# References

1. R2-2104745 Remaining issues on relay (re)selection Qualcomm Incorporated
2. R2-2104959 Remaining issues on Relay (re)selection vivo
3. R2-2104977 Discussion on Relay selection in Sidelink Relay ZTE, Sanechips
4. R2-2105127 Discussion on remaining issues of relay (re)selection and discovery Apple
5. R2-2105492 Aspects for SL relay selection and reselection Ericsson
6. R2-2106160 Remaining issues on relay selection and reselection Huawei, HiSilicon
7. R2-2106344 Other remaining issues on (re)selection MediaTek Inc.