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

**E-meeting, April 2021**

Agenda Item: 8.7.2

Source: Ericsson

Title: Summary of [609]

Document for: Discussion, Decision

# Introduction

This is to discuss the [609] as follows.

* [AT113bis-e][609][Relay] Relay discovery configuration (Ericsson)

 Scope: Discuss P1a/P4a/P9a/P9b-1/P9b-2/P9c/P12 and attempt to reach convergence.

 Intended outcome: Report in R2-2104413

 Deadline: Monday 2021-04-19 1000 UTC

Below proposals have been formulated according to the summary of 8.7.2 relay discovery (i.e., R2-2104297). This email discussion aims to achieve covergence on the below proposals.

**Proposal 1a: [For discussion] Discovery message use the shared resource pool as baseline. RAN2 to decide on the supporting of separated resource pool from below options:**

**Option 1: Not support separate resource pool.**

**Option 2: Also support the separated resource pool, but assume the PHY layer parameters and design will re-use the R16 legacy resource pool design.**

**Proposal 4a: [For discussion] As in LTE, the remote UE and relay UE in the RRC\_CONNECTED can use the threshold based methods as in IDLE/INACTIVE, to determine whether it is allowed to perform discovery message transmission.**

**Proposal 9a: [For discussion]**

**For discovery configuration, relay UE and remote UE use the configuration provided via dedicated signaling, if available, in RRC CONNECTED state; Relay UE and remote UE use configuration provided via SIB, if available, in RRC IDLE/INACTIVE state. FFS if relay UE and remote UE can use the configuration provided via SIB, if dedicated configuration is not available, in RRC CONNECTED state.**

**Proposal 9b-1: [For discussion]**

**L3 relay UE use pre-configuration for discovery, only if the discovery configuration is not provided by gNB (regardless not provided, or not able to provide, or not able to obtain in OOC, etc.), in case its serving carrier is not shared with carrier for sidelink operation. Otherwise, L3 relay UE use the configuration for discovery provided by gNB.**

**Proposal 9b-2: [For discussion]**

**L2 relay UE can only use the configuration for discovery provided by gNB (either via SIB or dedicated signaling).**

**Proposal 9c: [For discussion]**

**Both L2 and L3 Remote UE perform discovery based on pre-configuration, only if the discovery configuration is not provided by gNB (regardless not provided, or not able to provide, or not able to obtain in OOC, etc.), in case its serving carrier is not shared with carrier for sidelink operation. Otherwise, Remote UE use the configuration for discovery provided by gNB.**

**Proposal 12: [For discussion] Transmission power of discovery message is handled same as R16 SL data transmission.**

For rapporteur to have enough time drafting summary report, we would like to have the following two phases:

* Phase 1: collect companies’ view, by 2021-04-15 22:00 UTC
* Phase 2: rapporteur will finalize summary report based on input of phase 1 by 2021-04-19 1000 UTC

# Discussion

## Resource pool (P1a)

During the SI phase, it was highlighted by companies that, with separate resource pool, it would lead to unnecessary resource fragmentation, since the discovery resource pool will not be reused for data transmission. Meanwhile, discovery message has relatively small size, and long transmission periodicity. A separate resource pool would also cause low resource utilization efficiency. It was also highlighted that there will be a risk of unnecessary signaling overhead due to the support of dedicated resource pool for discovery.

Meanwhile, RAN2 has already agreed to transmit discovery message over SL communication channel. It would be very natural to let discovery and SL communication to share a common resource pool.

For P1a, it seems that companies have no concern to support shared resource pool. Anyway, it would be beneficial to double check companies views on whether shared resource pool can be agreed as the baseline.

**Q1-1: do companies agree that shared resource pool shall be the baseline for discovery message transmission/reception?**

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| Company | Yes/No | Comments |
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In addition, R2-2104297 has suggested two options regarding shared resource pool for discovery message transmission/reception for further discussion. It is worth to check companies views on the two options

**Q1-2: regarding shared resource pool, which option do companies prefer?**

* **Option 1: No support of separate resource pool.**
* **Option 2: Also support the separated resource pool, but assume the PHY layer parameters and design will re-use the R16 legacy resource pool design.**
* **Option 3: Other (please specify in the comments section)**

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| Company | Option | Comments |
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## Discovery trigger for UE in Connected (P4a)

P4a is regarding whether remote UE and relay UE can reuse LTE rules to determine whether discovery message transmission is allowed. From Rapporteur understanding perspective, reusing LTE rules would be beneficial to reduce design efforts for RAN2 in order to complete the design work for discovery before June. Anyway, it is worth to clarify companies views on whether LTE rule shall be reused.

**Q2: do companies agree to support the LTE rule for determining whether remote UE and/or relay UE in RRC CONNECTED can trigger discovery message transmission, i.e., the remote UE and relay UE in the RRC\_CONNECTED can use the threshold based methods as in IDLE/INACTIVE, to determine whether it is allowed to perform discovery message transmission?**

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| Company | Yes/No | Comments |
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## Discovery configuration (P9a)

Regarding P9a, as summarized in R2-2104297, companies have different views on the FFS point from SI phase: whether L2 remote UE, in OOC and connected to gNB indirectly, is allowed to transmit discovery message based on configuration provided by the gNB. According to P9a, it is suggested to raise the below questions to collect company views.

**Q3-1: for discovery configuration, can relay UE and remote UE in RRC CONNECTED use the configuration provided via dedicated signalling if available**?

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| Company | Yes/No | Comments |
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**Q3-2: for discovery configuration, can relay UE and remote UE in RRC IDLE or RRC INACTIVE use the configuration provided via SIB if available**?

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**Q3-3: for discovery configuration, can relay UE and remote UE in RRC CONNECTED use the configuration provided via SIB signalling if the configuration configured via dedicated signalling is not available**?

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| Company | Yes/No | Comments |
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## Discovery configuration (P9b-1)

There are diverse scenarios where L3 relay UE may not obtain discovery configuration from gNB, i.e., gNB does not provide, gNB is not able to provide or relay UE is OOC. During the SI phase, RAN2 has made the below agreement regarding the scenario where gNB is not capable of SL relay operation.

*Relay UE supporting L3 UE-to-Network Relay is allowed to transmit discovery message based on at least pre-configuration when it is connected to a gNB which is not capable of sidelink relay operation, in case its serving carrier is not shared with carrier for sidelink operation*.

Nevertheless, it would straightforward to extend the agreement for other scenarios where L3 relay UE is not able to obtain discovery configuration from gNB.

**Q4: do companies agree that L3 relay UE uses pre-configuration for discovery, only if the discovery configuration is not provided by gNB (regardless not provided, or not able to provide, or not able to obtain in OOC, etc.), in case its serving carrier is not shared with carrier for sidelink operation. Otherwise, L3 relay UE uses the configuration for discovery provided by gNB**?

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## Discovery configuration (P9b-2)

During the SI phase, RAN2 has made the below agreement regarding L2 relay UE,

*Relay UE supporting L2 UE-to-Network Relay should be always connected to a gNB which is capable of sidelink relay operation including providing configurations for transmission of discovery messages.*

Since L2 relay UE is always connecting to a gNB which is SL relay operation capable, it would be straightforward to assume that L2 relay UE will always use the discovery configuration provided by gNB.

**Q5: do companies agree that L2 relay UE will always use the discovery configuration provided by gNB (either via SIB or dedicated signalling)**?

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## Discovery configuration (P9c)

During the SI phase, RAN2 has made the below agreement regarding remote UE discovery,

*Remote UE supporting UE-to-Network Relay is allowed to transmit discovery message based on at least pre-configuration when it is directly connected to a gNB which is not capable of sidelink relay operation, in case its serving carrier is not shared with SL carrier.*

*- For Remote UE supporting L2 UE-to-Network Relay which is out of coverage and connected to a gNB indirectly, whether it is allowed to transmit discovery message based on configuration provided by the gNB can be discussed in WI phase.*

Regardless whether remote UE is IC or OOC, whenever remote UE is able to obtain discovery configuration from gNB (i.e., either directly from gNB or indirectly from gNB via a relay UE), it is beneficial for remote UE to use the discovery configuration provided by the gNB to achieve better flexibility and better resource utilization efficiency. In other words, remote UE shall use discovery pre-configuration only when discovery configuration from gNB is not available. Therefore, we raise the below question

**Q6: do companies agree that Remote UE (regardless of L2 relaying or L3 relaying) performs discovery based on pre-configuration, only if the discovery configuration is not provided by gNB (regardless not provided, or not able to provide, or not able to obtain in OOC, etc.), in case its serving carrier is not shared with carrier for sidelink operation**?

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| Company | Yes/No | Comments |
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## Discovery transmission power (P12)

In R2-2104297, for the transmission power of discovery message, the following options are proposed by companies.

**Option 1**: Transmission power of discovery message is handled same as normal SL data transmission, i.e. transmit power subject to OLPC (Open Loop Power Control).

**Option 2**: Transmission power of discovery message is fixed.

From Rapporteur’s understanding perspective, in Rel-16, PSSCH transmission power for unicast is subject to OLPC. A TX UE determines its transmission power for a PSSCH transmission based on report message of CSI measurement provided by RX UE. This requires that the unicast link between TX UE and RX UE needs to be established. Based on the CSI report message provided by RX UE, TX UE can estimate the pathloss of the SL link. For discovery message, the similar framework can not be directly reused, since the discovery message is transmitted in broadcast fashion. So, RX UE is not able to provide CSI report via a unicast link to TX UE. Therefore, TX UE can not consider SL pathloss to perform OLPC. Meanwhile, it may be feasible for TX UE to consider its DL pathloss towards gNB in certain scenarios. Then, TX UE may be able to consider its DL pathloss to perform OLPC, so to avoid interference to Uu transmission due to discovery message. However, when UE triggers discovery transmission, UE is typically OOC, therefore, DL pathloss is not always feasible to be considered. As a conclusion, the above issues need to be addressed in order to apply OLPC for discovery, which is in RAN1 scope, while there is no RAN1 TU allocated.

On the contrary, reuse LTE rule for discovery transmission, i.e., use a fixed transmission power would be simple and avoid unnecessary design efforts for RAN2.

Therefore, rapporteur would like to raise the below question to check companies’ views.

**Q7: do companies agree that discovery transmission uses a fixed transmission power as in LTE**?

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# Conclusion

We have the following proposal:

[Proposal 1 xxx.](#_Toc69160470)

# Reference

1. R2-2104297 Summary of 8.7.2 relay discovery Huawei, HiSilicon