**3GPP TSG-RAN WG2 Meeting #118 e R2-22xxxxx**

**Online, 9th – 20th May 2022**

**Source: vivo (Rapporteur)**

**Title:****Initial comments on discovery and (re)selection of AI 6.7.2.5 summary**

**Agenda Item:** **6.7.2.5**

**Document for:** **Discussion and Decision**

# Introduction

A Pre-meeting offline discussion was triggered as follows:

* [Pre118-e][610][Relay] Summary of AI 6.7.2.5 on discovery and (re)selection (vivo)

The offline discussion was summarized in [1] with the following proposals

|  |
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| **[to be agreed]**  **Proposal 1-1: RAN2 to agree UL/SL prioritization rules in MAC specification should also consider SL discovery transmissions.**  **Proposal 1-4: RAN2 to agree that resource pool selection procedure for discovery should be specified in MAC specification and this procedure is applicable to both single MAC PDU case and multiple MAC PDU case.**  **[to be discussed]**  **Proposal 1-2: If Proposal 1-1 is agreed, further discuss whether the TP in R2-2205610 is agreeable.**  **Proposal 1-3: The TP in R2-2204769 (TS 38.321) to add definition of LCID for discovery is to be discussed.**  **Proposal 2-1: RAN2 to discuss whether the relay (re)selection procedure should be updated with adding cell (re)selection in the procedure text, and if yes, adopt the TP in R2-2204587 as baseline.**  **Proposal 2-2: RAN2 to discuss whether UE shall only monitor dedicated discovery RX pool(s) when performing discovery reception operation if the UE is (pre-)configured with dedicated discovery RX pool(s), and if yes, adopt the TP on [O058] in R2-2204636 as baseline.**  **Proposal 2-3: If Proposal 1-4 is agreed, RAN2 to further discuss whether the TP in R2-2204768 is agreeable, or we introduce a dedicated sub-clause for TX pool selection.**  **Proposal 2-4: RAN2 to discuss whether the Uu threshold conditions are also used to control whether a UE shall MONITOR discovery messages for relay operation, and if yes, to further discuss whether the TP in R2-2205345 is agreeable.**  **Proposal 2-5: RAN2 to discuss whether groupcast can be used for discovery transmission, and if no, adopt the TP in R2-2205963 as baseline.**  **Proposal 2-6: RAN2 to discuss whether SL CG is supported for 1) non-relay discovery message transmission and 2) relay discovery message transmission by relay/remote UE before remote UE connection with relay UE, and if both no, adopt the TP in R2-2205356 as baseline.**  **Proposal 2-7: RAN2 to discuss whether CBR should be measured for discovery in dedicated and/or shared pool, and if yes, adopt the TP in R2-2204564 as baseline.**  **[others]**  **Proposal 3: R2-2204992 (TS 38.304), R2-2205114(TS 38.321), and TP of P3 in R2-2205345(TS 38.331), can be handled by related CR rapporteur.**  **Proposal 4: R2-2205357 (TS 38.331) is an optimization and is de-prioritized.**  **Proposal 5: R2-2204636 (except [O058]), R2-2205063 are to be discussed in [Pre118-e][602].** |

The following offline discussion is further triggered to mainly discuss these proposals as follows:

* [AT118-e][621][Relay] Initial comments on discovery and (re)selection (vivo)

Scope: Collect company views on the issues raised in R2-2206056.

Intended outcome: Report to Wednesday session

Deadline: Tuesday 2022-05-10 1800 UTC

The Rapporteur proposes to conduct this email discussion as follows:

* It is suggested that companies provide feedback on the questionnaire of this email discussion by **2022-05-10 1500 UTC.** Feedback after 15:00 UTC and before 18:00 UTC is still allowed but any related question may not be answered by the rapporteur because of time difference, but those comments would still be considered in the final summary.
* As the time for collecting companies’ views is already tight, no phase-2 discussion would be separately launched for company to comment on the draft proposal of this offline discussion. Instead, the draft proposals of this offline discussion MAY be provided when e.g. 10~15 companies have provided feedback, and rapporteur would claim it when the draft output is ready on the email thread.

# Contact Information

To make it easier to find the correct contact delegate in each company for potential follow-up questions, the rapporteur encourages the delegates who provide input to provide their contact information in this table:

|  |  |
| --- | --- |
| Company | Contact: Name (E-mail) |
| vivo | Jing Liang (liangjing@vivo.com) |
| OPPO | Boyuan Zhang(zhangboyuan@oppo.com) |
| Samsung | Hyunjeong Kang (hyunjeong.kang@samsung.com) |
| CATT | Hao Xu([xuhao@catt.cn](mailto:xuhao@catt.cn)) |
| Apple | Zhibin\_wu@apple.com |
| LG | Seoyoung Back(seoyoung.back@lge.com) |
| Lenovo | Wulh5/Prateek(wulh5@lenovo.com) |
| Nokia | berthold.panzner@nokia.com |
| Xiaomi | gordonpetery@xiaomi.com |
| Ericsson | min.w.wang@ericsson.com |
|  |  |

# Discussion

## MAC ISSUES















### “”3.1.3 Support of configured grant for discovery

In [1] there is a proposal:

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| **Proposal 2-6: RAN2 to discuss whether SL CG is supported for 1) non-relay discovery message transmission and 2) relay discovery message transmission by relay/remote UE before remote UE connection with relay UE, and if both no, adopt the TP in R2-2205356 as baseline.** |

Till now, the SL CG has just been discussed for L2 U2N remote UE, as the following agreement:

***RAN2 #116e Agreements:***

***Proposal 1: In this release, for L2 U2N relay, remote UE can’t be configured to use CG type 1 of RA Mode 1 if relay connection has been setup.***

So, for the case that remote UE transmitting relay discovery message after connection with relay, CG type 1 cannot be used. For relay UE, rapporteur understands that there seems no need for any restriction on using mode-1. For other cases, e.g., remote UE transmitting relay discovery message BEFORE connection with relay, or UE transmitting non-relay discovery message, whether CG type-1 can be used needs to be confirmed.

**Q1-3a: Whether Non-relay Discovery message transmission can be allowed to use SL CG type-1?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Yes | We think no restriction seems needed for Ues to transmit non-relay discovery message by using SL CG type-1, if configured by gNB. |
| OPPO | see comment | We do not see the need to differentiate between relay/non-relay case, so a same criterion can be used. So for relay UE, yes it can be used, for remote UE, remote UE can’t be configured to use CG type 1 of RA Mode 1 if relay connection has been setup |
| Qualcomm | Yes, with comment | we don’t need to differentiate relay and non-relay for remote UE that is not yet connected to relay |
| Samsung | Yes | gNB can configure SL CG type-1 for non-relay discovery message. |
| CATT | Yes | There is no need to restrict Discovery message from using SL CG grant. |
| Apple | Yes with comment | For non-relay discovery message, there is no restriction. But there is no remote UE concept in this case. So, if a UE is configured with SL CG, then it cannot be a U2N remote UE connected to relay.. |
| LG | Yes | We think discovery message can be transmitted by using SL CG type 1. And also, there is no reason to differentiate between relay and non-relay discovery. |
| Lenovo | Yes | The question should be clear that the relay or remote UE is allowed. |
| Nokia | Yes | share vivo’s view |
| MediaTek | See comments | Same view as OPPO and Qualcomm |
| Xiaomi | Yes | And agree with vivo and Apple’s observations |
| Ericsson | See comments | Share the same view as OPPO. |

**Q1-3b: Whether Relay Discovery message transmission can be allowed to use SL CG type-1 by remote UE before connection with relay UE?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Yes | The RAN2 #116e Agreement already implies that we are not having the restriction on that **before** the PC5-connection between remote/relay UE. |
| OPPO | Yes | See the reply to Q1-3a. In addition, before remote UE connecting with a relay, it could be in mode 1 as a normal sidelink UE. In that case, the legacy principle can be reused, i.e., SL CG type-1 is allowed. |
| Qualcomm | Yes | Agree with OPPO |
| Samsung | Yes | gNB can configure SL CG type-1 to Remote UE which is not connected with Relay UE. |
| CATT | Yes | Same view as vivo. |
| Apple | Yes |  |
| LG | Yes | We think remote UE don’t have any restriction for SL operation before being connected with relay UE. |
| Lenovo | Yes | Agree with Oppo. |
| Nokia | Yes | share vivo’s view |
| MediaTek | Yes |  |
| Xiaomi | Yes |  |
| Ericsson | Yes |  |

**Q1-3c: Whether Relay Discovery message transmission can be allowed to use SL CG type-1 by relay UE before and/or after connection with relay UE?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Yes | The restriction for not allowing remote UE to use CG type-1 is that it is controlled by relay UE’s serving cell in an indirect way.  For relay UE, it should anyway be controlled by its own gNB, and if the relay UE is RRC CONNECTED it seems no need to restrict gNB to configure SL CG type-1 to the relay UE to use, and this has no relationship with whether this relay UE has PC5 connection with remote UE or not. |
| OPPO | Yes | See the reply to Q1-3a, in addition, for relay UE, it should always work as normal sidelink UE, for which the legacy principle can be reused, i.e., SL-CG type 1 is allowed. |
| Qualcomm | Yes | RAN2 already agreed that Relay UE can support Mode 1, so it should be allowed like a normal sidelink UE in coverage. |
| Samsung | Yes | gNB can configure SL CG type-1 to Relay UE in RRC\_CONNECTED. |
| CATT | Yes | There is no need to restrict relay UE from using SL CG grant |
| Apple | Yes | No restriction for relay UE |
| LG | Yes | Before having a connection with remote UE, any operation for normal SL is allowed. |
| Lenovo | Yes | Remote UE can monitor the related resource pools. |
| Nokia | Yes | share vivo’s view |
| MediaTek | Yes |  |
| Xiaomi | Yes |  |
| Ericsson | Yes |  |

**Summary:**

### 3.1.4 others

|  |
| --- |
| **Proposal 1-3: The TP in R2-2204769 (TS 38.321) to add definition of LCID for discovery is to be discussed.**  **Proposal 3: R2-2204992 (TS 38.304), R2-2205114(TS 38.321), and TP of P3 in R2-2205345(TS 38.331), can be handled by related CR rapporteur.** |

After coordination with MAC CR rapporteur, Proposal 1-3 and R2-2205114 would be discussed in MAC CR offline discussion.

## RRC ISSUES

### Relay Re/selection Requirement Conflict [M112][v208]

R2-2204587 thinks that ‘The normative text within section 5.8.15.3 of TS38.331 says the L2 U2N Remote UE in in RRC\_IDLE or RRC\_INACTIVE shall select a new candidate relay UE always…, but the right behaviour is for the UE to evaluate whether suitable cells and/or relays are available, and apply the cell or relay selection procedure accordingly, with implementation freedom in case both are available’. TP is extracted as follows:

|  |
| --- |
| 5.8.15.3 Selection and reselection of NR sidelink U2N Relay UE  A UE capable of NR sidelink U2N Remote UE operation that is configured by upper layers to search for a NR sidelink U2N Relay UE shall:  1> if the UE has no suitable cell; or  1> if the RSRP measurement of the cell on which the UE camps (for L2 and L3 U2N Remote UE in RRC\_IDLE or RRC\_INACTIVE)/ the PCell (for L3 U2N Remote UE in RRC\_CONNECTED) is below *threshHighRemote* within *sl-remoteUE-Config*:  2> if the UE does not have a selected NR sidelink U2N Relay UE; or  **<omitted…>**  3> perform NR sidelink discovery procedure as specified in clause 5.8.13 in order to search for candidate NR sidelink U2N Relay UEs;  3> when evaluating the one or more detected NR sidelink U2N Relay UEs, apply layer 3 filtering as specified in 5.5.3.2 across measurements that concern the same U2N Relay UE ID and using the *sl-FilterCoefficient-RSRP* in *SystemInformationBlockType12* (in coverage) or the preconfigured *sl-FilterCoefficient-RSRP* as defined in 9.3 (out of coverage), before using the SD-RSRP measurement results;  3> if the UE detects a candidate NR sidelink U2N Relay UE whose SD-RSRP exceeds *sl-RSRP-Thresh* by *sl-HystMin*:  4> perform cell selection in accordance with the cell selection process as specified in TS 38.304 [20], select a candidate NR sidelink U2N Relay UE for which SD-RSRP exceeds *sl-RSRP-Thresh* by *sl-HystMin*, or both;  NOTE 2: If multiple suitable candidate Relay UEs which meet all AS-layer & higher layer criteria are available, it is up to Remote UE implementation to choose one Relay UE. The details of the interaction with upper layers are up to UE implementation.  3> else:  4> consider no NR sidelink U2N Relay UE to be selected;  NOTE 3: For L2 U2N Remote UEs in RRC\_IDLE/INACTIVE and L3 U2N Remote UEs, the cell (re)selection procedure and relay (re)selection procedure run independently. If both suitable cells and suitable U2N Relay UEs are available, it is up to U2N Remote UE implementation to select either a cell or a U2N Relay UE. Furthermore, L3 U2N Remote UE’s selection on both cell and U2N Relay UE is also based on UE implementation. |

In summary [1], one proposal is given:

Proposal 2-1: RAN2 to discuss whether the relay (re)selection procedure should be updated with adding cell (re)selection in the procedure text, and if yes, adopt the TP in R2-2204587 as baseline.

**Q2-1a: Do you think the current relay (re)selection procedure text will always make a remote UE to select a relay UE rather than a cell when conditions are met?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Yes |  |
| OPPO | Yes |  |
| Qualcomm | No | This change is adding a new condition on when cell selection should be performed. We did not agree on changing cell selection criteria and NOTE 3 captures the previous agreement already about cell selection done independently. So, existing spec is clear. |
| Samsung | Yes |  |
| CATT | Yes |  |
| Apple | See comment | The current NOTE correctly captures the agreement. But the cell selection is not described in this section. So, we have no perfect ways to explain this “independently perform relay selection and cell selection” in RRC spec, . |
| LG | No | We agree with QC’s opinion. The change seems to make a new triggering cell selection condition. We want not to change the current spec. |
| Lenovo | See comments | We don’t need to mix relay selection and cell selection. Note is sufficient. |
| Nokia | No | Agree with QC – The changed procedural text changes the UE behaviour wrt cell selection. |
| MediaTek | Yes |  |
| Xiaomi | No, see comment | Have similar view to Qualcomm, the proposal adds new functionality. Generally the note 3 makes the existing functionality clear, both procedures run independently. |
| Ericsson | No | Same view as QC |

**Q2-1b: If yes for Q2-1, Do you agree to update current relay (re)selection procedure with adding cell (re)selection in the procedure text and adopt the TP in R2-2204587 as baseline?**

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| **Company** | **Yes/No** | **Comment** |
| vivo | Yes, with comments | OK with Mediatek’s change.  Another alternative (as suggest by Huawei) could be that we change ‘*select a candidate NR sidelink U2N Relay UE for which SD-RSRP exceeds sl-RSRP-Thresh by sl-HystMin’* to e.g. ‘*consider a candidate NR sidelink U2N Relay UE is available for which SD-RSRP exceeds sl-RSRP-Thresh by sl-HystMin*’, and then with clarification in NOTE 3, the procedure should be clear. |
| OPPO | See comment | MTK change is a bit heavy to us, we can simply change “shall” to “can / may” or the change by Huawei to solve this issue.  If we go with MTK change (not our first preference), we need to clarify the “or both” is limited to L3 relay case only. |
| Samsung | Yes with comment | We prefer alternative proposal by Huawei. |
| CATT | Yes | The current wording is OK to us. |
| Apple | See comment | Same view as OPPO. Prefer to simple changes. |
| MediaTek | Yes |  |
|  |  |  |

### Dedicated pool and shared pool prioritization for discovery MONITORING [O058]

For now, in the specification, the dedicated resource pool is prioritized for discovery monitoring over the shared resource pools. In R2-2204675, it was questioned that whether this dedicated discovery pool should be prioritized when configured by gNB or pre-configuration, because it is not sure that the dedicated pool would be a superset to cover all possible discovery transmission in different dedicated/shared pools (which however may be the assumption for normal data reception) and therefore needs to be confirmed. There are two kinds of understanding:

Option-1: The UE should always prioritize to monitor dedicated resource pool for discovery once configured by network or pre-configuration. The dedicated pool should be a superset to cover all possible discovery transmission in different dedicated/shared pools, which can be left to gNB implementation.

Option-2: The UE should always monitor dedicated and/or shared pool for discovery, considering there may be UEs under gNB that does not configure any dedicated resource pool for discovery transmission.

In summary [1] it is proposed:

Proposal 2-2: RAN2 to discuss whether UE shall only monitor dedicated discovery RX pool(s) when performing discovery reception operation if the UE is (pre-)configured with dedicated discovery RX pool(s), and if yes, adopt the TP on [O058] in R2-2204636 as baseline.

**Q2-2a: Which option do you think is the right understanding?**

**Option-1: The UE should always prioritize to monitor dedicated resource pool for discovery once configured by network or pre-configuration. The dedicated pool should be a superset to cover all possible discovery transmission in different dedicated/shared pools, which can be left to gNB implementation.**

**Option-2: The UE should always monitor both dedicated and shared pool for discovery, considering there may be UEs under gNB that does not configure any dedicated resource pool for discovery transmission.**

**Option 3: Dedicated Discovery pools shall be identically configured for all UEs in the same geographical area (up to NW operators to coordinate). No spec impact. We do not think mixed configuration of dedicated/share pool is a good idea.**

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| --- | --- | --- |
| **Company** | **Option** | **Comment** |
| vivo | Option-1 | Proponent.  The prioritization rule of dedicated vs.shared discovery pool can work based on the fact that the dedicated pool and shared pool are both configured by the network and therefore, for the UEs under a same gNB, there will not be any problem as both TX and RX would have the same understanding to use dedicated resource pool for discovery transmission/reception.  However, the case is not the same when it comes to different gNBs or pre-configuration. E.g. if one gNB configure the dedicated resource pool and TX UE-A is using it for discovery transmission, when another gNB does not configured the dedicated resource pool thus RX UE-B only monitors discovery messages in shared pool, then these two UEs may not be able to discover each other.  But anyway, we think the simplest way is that we go for option-1 and leave it to gNB implementation. The only question is that whether it is feasible that the dedicated pool is a superset to cover all possible discovery transmission under different gNB/pre-configuration, considering the limitation on number of pools to be configured. |
| OPPO | Option 1 | It is the simple way to minimize spec impact for Rx UE behavior. |
| Qualcomm | Option 1 |  |
| Samsung | Option-1 |  |
| CATT | Option-1 | We think the Rx pool of a UE should include all Tx pools of other possible Tx UE. It can be left to implementation of gNB. |
| Apple | Option 3 | To ensure power saving benefits of dedicated discovery pool, those pools have to be homogenously configured as “small” pools in an area. If a UE in proximity choose to use the common shared pool instead for discovery, then there is no much benefit for other UEs to use dedicated dedicated small pool for TX discovery, because all UE has to monitor a big “shared” pool anyway to avoid missing any discovery messages. So, we think the best way is to just configure identical discovery pools in all cells (include pre-configuration). |
| LG | Option-1 |  |
| Lenovo | Option-1 |  |
| Nokia | Option-2 | The UE cannot predict whether it will receive a transmission in a dedicated pool or shared pool – and hence the UE should monitor both. In other words the UE can not exclude the possibility that a transmission will happen in a shred pool – if the UE is not monitoring the shared pool it will miss this transmission. |
| MediaTek | Option-1 |  |
| Xiaomi | Option-2 | We are fine with the idea of prioritizing dedicated pools as this aligns to the agreements on dedicated pools.  However, whether the dedicated pool can be a super set of all discovery resources and maintain the premise of being an efficient and power saving mechanism for discovery then this seems unlikely.  Prioritization seemingly does not exclude partial monitoring for shared pools, only that in these cases that use of these resources for discovery will be sub-optimal in terms of discovery time |
| Ericsson | Option 2 | Share the same view as Nokia. UE may miss discovery transmission if only monitor dedicated resource pool |
|  |  |  |

**Q2-2b: If option-1 for Q2-2a, do you think we can adopt the TP on [O058] in R2-2204636 as baseline (extracted as follows)?**

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| 5.8.13.2 Sidelink discovery monitoring  A UE capable of sidelink discovery that is configured by upper layers to monitor NR sidelink discovery messages shall:   1. if the frequency used for NR sidelink discovery is included in *sl-FreqInfoToAddModList* in *RRCReconfiguration* message and *sl-DiscConfig* is included in *RRCReconfiguration*; or if the frequency used for NR sidelink discovery is includedin *sl-FreqInfoList* included in *SIB12* and *sl-DiscConfigCommon* is included in *SIB12*:   **<omitted…>**   1. else:   2> if out of coverage on the concerned frequency for NR sidelink discovery:  3> if *sl-DiscRxPool* is included in *SL-PreconfigurationNR*:  4> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool that were preconfigured by *sl-DiscRxPool* o for NR sidelink discovery reception in *SL-PreconfigurationNR*, asdefined in clause 9.3;  3> else:  4> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool that were preconfigured by *sl-RxPool* for NR sidelink discovery reception in *SL-PreconfigurationNR*, asdefined in sub-clause 9.3; |

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Yes |  |
| OPPO | Yes |  |
| Qualcomm | Yes |  |
| Samsung | Yes |  |
| CATT | Yes |  |
| Apple | Yes | Even with Option 3,. The change above is OK. |
| LG | Yes |  |
| Lenovo | Yes |  |
| MediaTek | Yes |  |
|  |  |  |

### Uu Threshold for discovery MONITORING

The key issue here is that it is not clear whether the threshold to make a UE qualified for being a remote or relay UE, by controlling its discovery transmission, can also be used to determine whether a UE can MONITOR the discovery message. Rapporteur understands that this issue needs to be discussed because we don’t have explicit agreement to restrict the discovery reception by the Uu threshold configuration. In summary [1]:

Proposal 2-4: RAN2 to discuss whether the Uu threshold conditions are also used to control whether a UE shall MONITOR discovery messages for relay operation, and if yes, to further discuss whether the TP in R2-2205345 is agreeable.

**Q2-3a: Do you think the Uu threshold conditions are also used to control whether a UE shall MONITOR discovery messages for relay operation?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Yes | We have sort of sympathy on the observation in R2-2205345 (Xiaomi) that:  *Observation: Following discovery model A, a Remote UE may not transmit a discovery message and simply initiates PC5 link establishment.*  Therefore, it may be ok to also control discovery messages monitoring for relay operation by the Uu threshold conditions. Also, we don’t expect much spec impact on this. |
| OPPO | No | Firstly, we prefer to keep the behavior since LTE, i.e., no restriction on Rx UE behavior. Secondly, logically it is hard to control Rx UE behavior, since for a remote UE, it may need to do Rx for other reasons, e.g., it could be also a normal sidelink UE, which should always keep monitoring due to the necessity of reception of broadcast service. In that case, it is questionable on how to prevent a UE from monitoring discovery message. |
| Qualcomm | No | Do not see a need to introduce this change as discovery is transmitted on SL communication. Agree with OPPO on keep the behavior same as LTE. |
| Samsung | No | We share the view from OPPO and Qualcomm that the same behavior as LTE can be kept. |
| CATT | No | We are agree with the intention but considering it is one optimization, suggest postpone. |
| Apple | No | We think the change is not necessary. |
| LG | No | We have the same view with OPPO. |
| Lenovo | No | RAN2 has discussed this, which is not agreed. |
| Nokia | No |  |
| MediaTek | No | The change is too big comparing with the legacy |
| Xiaomi | Yes | Proponent  The proposal is simply monitoring for discovery should not occur. The observations above expect that the UE should not monitor at all. But the principal is that in case of monitoring and detecting a discovery message that no further discovery activity should take place.  Keeping the behaviour as is will lead to an unresolved condition of a discovery model B UE receiving a discovery message, processing it (with the higher layers) and then on trying to respond failing due to the transmission limitation. If we don’t attempt to manage the reception case then we will need to address this transmission error triggering. |
| Ericsson | No | This seems to be an optimization, tend to agree with OPPO |

**Q2-3: If yes for Q2 -3a, do you think the TP in R2-2205345 is agreeable (extracted as follows)?**

|  |
| --- |
| 5.8.13 NR sidelink discovery  5.8.13.1 General  The purpose of this procedure is to perform sidelink discovery as specified in TS 23.304 [65].  5.8.13.2 Sidelink discovery monitoring  A UE capable of acting as an NR sidelink U2N Relay UE or an NR U2N sidelink Remote UE that meets the threshold conditions specified in 5.8.14.2 and 5.8.15.2 respectively for sidelink discovery and is configured by upper layers to monitor NR sidelink discovery messages shall:   1. if the frequency used for NR sidelink discovery is included in *sl-FreqInfoToAddModList* in *RRCReconfiguration* message and *sl-DiscConfig* is included in *RRCReconfiguration*; or if the frequency used for NR sidelink discovery is includedin *sl-FreqInfoList* included in *SIB12* and *sl-DiscConfigCommon* is included in *SIB12*:   2> if the UE is configured with *sl-DiscRxPool* for NR sidelink discovery reception included in *RRCReconfiguration* message with *reconfigurationWithSync* (i.e. handover):  3> configure lower layers to monitor sidelink control information and the corresponding data using the resource pool indicated by *sl-DiscRxPool* for NR sidelink discovery reception in *RRCReconfiguration*;  **<omitted…>**  5.8.13.3 Sidelink discovery transmission  A UE capable of acting as an NR sidelink U2N Relay UE or an NR U2N sidelink Remote UE that meets the threshold conditions specified in 5.8.14.2 and 5.8.15.2 respectively for sidelink discovery and is configured by upper layer to transmit NR sidelink discovery message shall:   1. if the frequency used for NR sidelink discovery is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message and *sl-DiscConfig* is included in *RRCReconfiguration*; or if the frequency used for NR sidelink discovery is includedin *sl-FreqInfoList* within *SIB12* and *sl-DiscConfigCommon* is included in *SIB12*:   **<omitted…>** |

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | No | 5.8.13.2/3 seems both cover relay and non-relay discovery, the condition to be specified just below this clause seems not appropriate. |
| OPPO | No |  |
| LG | No |  |
| MediaTek | No |  |
| Xiaomi | See comment | To support the change for the non-relay case then maybe something more akin to the transmission section would be appropriate |

### Support of groupcast for discovery [Q539]

R2-2205963 and RIL-Q539 thinks that Discovery can only be sent using cast-type broadcast.

For Groupcast, they think ‘Sidelink groupcast transmission mode requires HARQ, and since it was agreed that discovery transmission does not have HARQ feedback support, groupcast cannot be used for sidelink discovery’. For Unicast, they think that discovery cannot be transmitted in unicast because:

* We agree RLC UM mode is used for SL-SRB4.
* SL-SRB4 is not associated with a unicast link.

Rapporteur understands that it seems unnecessary to have this restriction for discovery messages to use groupcast/unicast. Also, this issue could be further checked with SA2, if preferred by companies.

For the related spec update, rapporteur thinks it is quite straightforward and can be handled by 38331 CR rapporteur (for RIL-Q539) And 38322 CR rapporteur (for R2-2205963), if needed.

**Q2-4b: Do you think that Discovery message can be sent using Groupcast?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Check with SA2 | We don’t think the reason by above contribution is valid because if discovery message is multiplexed with other message and HARQ feedback is used, there is no harm. Also the HARQ can be disabled in groupcast.  However, we tend to think that this is in SA2 scope and we’d better to check with them whether there is any need to transmit Discovery message in groupcast manner. |
| OPPO | Yes | RAN2 has already made agreement on group-based discovery message transmission in R2-116e, which was the key aspect that we discussed for non-relay discovery considering UC/BC-based discovery is necessary for relay-discovery as well. We do not see the need / point to re-open the discussion. |
| Qualcomm | No | In our view group-based discovery is different from using groupcast transmission mode for discovery. Group-based discovery is for supporting group discovery procedures supported by upper layers which is discussed before.  In SL communication, the type of transmission mode is indicated by upper layers to AS layer along with a destination L2 ID to use for the transmission. In SA2 TS 23.304, there is no support of using different cast types for Discovery service and no indication of the discovery cast type to AS layer. So, how can AS layer decide what casttype to set in the SCI, without upper layer indication?  We think that we should send an LS to SA2, and, wait for their response before we add the groupcast transmission mode support in RAN2 specs. Also, it is not clear what is the benefit of using groupcast transmission mode in AS layer when HARQ feedback is disabled and upper layers do not provide separate indication for casttype. Hence, suggest to delete groupcast casttype support from specs. |
| Samsung | Yes | We do not think that the cast type is restricted for SL discovery message and we understand this is what RAN2 has assumed so far under this WI. So unicast and groupcast as well as broadcast can be applied for the SL discovery message. We are open to consult with SA2. |
| CATT | Yes | Same view as vivo |
| Apple | Check with SA2 | We share the understanding that all discovery messages can be supported with L1 broadcast. It seems there is no strong justification to use groupcast type if HARQ FB is not used. We can check with SA2 on this. |
| LG | Yes | We think it doesn’t need to make cast type restrictions for discovery messages. Groupcast can be transmitted HARQ disabled and HARQ enable/disable is indicated in SCI. This operation is the same as unicast. So, discovery messages can be transmitted groupcast/unicast with HARQ disabled as well as broadcast. There is not problem to apply any cast type for discovery message in AS layer, but we need to check SA2. |
| Lenovo | Yes | We can consult with SA2. we are open to support all cast type. |
| Nokia | Check with SA2 | We tend to answer “yes” – and may check with SA2. |
| MediaTek | Yes |  |
| Xiaomi | Check with SA2 | We are not convinced that there needs to be a restriction (we can be open), however our understanding is that 23.304 does not consider other cast types. |
| Ericsson | Yes | No need to bother SA2, all cast type should be supported, which is already agreed by RAN2. According to RAN1 spec, both SCI format 2-a and 2-b, support groupcast without HARQ FB  We don’t think there is any issue to support any cast type.  In addition, if we limit to certain cast type for discovery, we may introduce unnecessary restriction on what L2 ID can be used for discovery, this is unnecessary. |

**Q2-4c: Do you think that Discovery message can be sent using Unicast?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Yes | The discovery message is somehow similar to DCR message which can be both transmitted in unicast/broadcast manner. So, we don’t think there is any problem to support unicast. RLC UM mode can also be used for unicast. |
| OPPO | Yes |  |
| Qualcomm | No | * Similar concerns for missing casttype indication from upper layers to AS layer for discovery messages, as clarified in Q2-4b * Additionally, for unicast we need to discuss two cases separately and there are issues   **Unicast Case 1: When discovery is sent outside of unicast link context**   * Casttype/transmission mode should not be considered unicast. It is just using the Destination L2 ID for a specific UE. In this case, message can be treated as DCR message.   **Unicast Case 2: When discovery is sent in unicast mode after unicast link setup**   * RAN2 did not agree on unicast link setup as necessary for discovery messages transmission. Whether unicast link setup is necessary before discovery message transmission has to be discussed first. * PDCP format for unicast SL SRBs, when transmitted in the unicast link context is different than SL-SRB0. Sl-SRB4 unicast PDCP format has to be agreed. * Destination L2 ID used for unicast messages has to be the same for both DRBs/SRBs for the unicast link. Violates the agreement “Discovery and data are transmitted to different Destination L2 IDs”   With these issues, we think it is not straight forward to include unicast casttype support in specs. Again we need to wait for input from SA2 before adding support. Hence, suggest to remove unicast casttype support in specs. |
| Samsung | Yes | Same as Q2-4b |
| CATT | Yes |  |
| Apple | No | As the L2 Destinations ID are separate for discovery/communication, SL discovery message sent to unciast address will happen before PC5 link setup. This just create an exceptional case, which we shall avoid. |
| LG | Yes | Especially, we think the response discovery message in discovery model B can be transmitted using unicast. |
| Lenovo | Yes |  |
| Nokia | No | Agree with QC and Apple |
| MediaTek | No | It would be strange if UC is used as this means there is no need discover the peer. |
| Xiaomi | No | Also agree with QC and Apple |
| Ericsson | Yes | We don’t think there is any issue to support any cast type.  In addition, if we limit to certain cast type for discovery, we may introduce unnecessary restriction on what L2 ID can be used for discovery, this is unnecessary. |

### CBR measurement for discovery in dedicated and/or shared pool [V353][Z652]

Current Spec requires the UE to perform CBR measurement for NR SL discovery transmission upon reception of SIB12/dedicated SL configurations, but the specific procedure on how the UE measures CBR for NR SL discovery transmission is missing in the current TS 38.331.

R2-2204564 thinks that we should confirm CBR measurement is supported for NR SL discovery transmission. Furthermore, consider the prioritization between dedicated/shared discovery pools as well as the pool configured in dedicated signaling (e.g. in *tx-PoolMeasToAddModList*), it should be further checked which pools should be measured, especially when the UE is configured with dedicated discovery pool or shared pools.

**Q2-5a: Do you think that CBR measurement is supported for NR SL discovery transmission?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Yes |  |
| OPPO | Yes |  |
| Qualcomm | Yes |  |
| Samsung | Yes |  |
| CATT | Yes |  |
| Apple | Yes |  |
| LG | Yes |  |
| Lenovo | Yes |  |
| Nokia | Yes |  |
| MediaTek | Yes |  |
| Xiaomi | Yes |  |
| Ericsson | Yes |  |

**Q2-5b: For RRC CONNECTED UE, when the UE is configured with at least dedicated discovery pool, which following pool(s) do you think that CBR measurement should be performed?**

Option-1: The pools configured in *tx-PoolMeasToAddModList* (which may include not only pools in *sl-DiscTxPoolSelected* even if configured)

Option-2: The pools configured in *sl-DiscTxPoolSelected* (dedicated discovery pool)

Option-3: The pools configured in *sl-TxPoolSelectedNormal* (shared pool for discovery)

Option-4: The pools configured in *sl-TxPoolExceptional* (exceptional pools)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option** | **Comment** |
| vivo | Option-1, option-2, option-4 | Option-1 is needed for CONNECTED UE as it should be controlled by gNB.  Option-4 is also needed when e.g. the sensing result is not available in in *sl-DiscTxPoolSelected*. |
| OPPO | See comment | We do not see the point from this Q, since it seems to discuss the legacy UE behavior.  So we do not see a need to rediscuss the need of case-1/3/4 here.  For case-2, discovery pool, at least we see the need of CBR measurement for mode-2, and if included in *tx-PoolMeasToAddModList* for mode-1. |
| Qualcomm | Option-1, option-2, option-4 |  |
| Samsung | See comment | We share the view from OPPO that this CBR measurement does not have to be differentiated from normal NR SL communication. |
| CATT | Option-1, option-2, option-4 |  |
| Apple | Option 1, Option 2 |  |
| LG | See comment | We share the same view with Samsung and OPPO. There is no need to make a differentiation from normal NR SL communication. |
| Lenovo | Option1,2,4 |  |
| Nokia | comment | Agree with Oppo |
| MediaTek |  | share the view from OPPO |
| Xiaomi |  | Share views expressed by Oppo |
| Ericsson |  | Share the same view as OPPO |

**Q2-5c: For RRC IDLE/INACTIVE UE, when the UE is configured with at least dedicated discovery pool, which following pool(s) do you think that CBR measurement should be performed?**

Option-1: The pools configured in *tx-PoolMeasToAddModList* (which may include not only pools in *sl-DiscTxPoolSelected* even if configured)

Option-2: The pools configured in *sl-DiscTxPoolSelected* (dedicated discovery pool)

Option-3: The pools configured in *sl-TxPoolSelectedNormal* (shared pool for discovery)

Option-4: The pools configured in *sl-TxPoolExceptional* (exceptional pools)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option** | **Comment** |
| vivo | Option-2, option-4 | See comment in Q2-5b. |
| OPPO | See comment | We do not see the point from this Q, since it seems to discuss the legacy UE behavior.  So we do not see a need to rediscuss the need of case-1/3/4 here.  For case-2, discovery pool, at least we see the need of CBR measurement for mode-2 |
| Qualcomm | Option-2, option-4 |  |
| Samsung | See comment | Same as Q2-5b |
| CATT | Option-2, option-4 |  |
| Apple | Option 2 |  |
| LG | See comment | Same as Q2-5b |
| Nokia | Comment | Agree with Oppo |
| MediaTek |  | share the view from OPPO |
| Xiaomi |  | Share views expressed by Oppo |
| Ericsson |  | Share views expressed by Oppo |

**Q2-5d: For RRC CONNECTED UE, when the UE is configured with shared pool only, which following pool(s) do you think that CBR measurement should be performed?**

Option-1: The pools configured in *tx-PoolMeasToAddModList* (which may include not only pools in *sl-DiscTxPoolSelected* even if configured)

Option-2: The pools configured in *sl-DiscTxPoolSelected* (dedicated discovery pool)

Option-3: The pools configured in *sl-TxPoolSelectedNormal* (shared pool for discovery)

Option-4: The pools configured in *sl-TxPoolExceptional* (exceptional pools)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option** | **Comment** |
| vivo | Option-1, option-3, option4 | See comment in Q2-5b. |
| OPPO | See comment | We do not see the point from this Q, since it seems to discuss the legacy UE behavior.  So we do not see a need to rediscuss the need of case-1/3/4 here.  For case-2, if the Q is for “**when the UE is configured with shared pool only**”, why we need to consider it? |
| Qualcomm | Option-1, option-3, option-4 |  |
| Samsung | See comment | Same as Q2-5b |
| CATT | Option-1, option-3, option4 |  |
| Apple | Legacy behavior, no change needed |  |
| LG | See comment | Same as Q2-5b |
| Lenovo | Option 1,3,4 |  |
| Nokia | Comment | Agree with Oppo |
| MediaTek |  | share the view from OPPO |
| Xiaomi |  | Share views expressed by Oppo |
| Ericsson |  | Share views expressed by Oppo |

**Q2-5e: For RRC IDLE/INACTIVE UE, when the UE is configured with shared pool only, which following pool(s) do you think that CBR measurement should be performed?**

Option-1: The pools configured in *tx-PoolMeasToAddModList* (which may include not only pools in *sl-DiscTxPoolSelected* even if configured)

Option-2: The pools configured in *sl-DiscTxPoolSelected* (dedicated discovery pool)

Option-3: The pools configured in *sl-TxPoolSelectedNormal* (shared pool for discovery)

Option-4: The pools configured in *sl-TxPoolExceptional* (exceptional pools)

|  |  |  |
| --- | --- | --- |
| **Company** | **Option** | **Comment** |
| vivo | Option-3, option4 | See comment in Q2-5b. |
| OPPO | See comment | We do not see the point from this Q, since it seems to discuss the legacy UE behavior.  So we do not see a need to rediscuss the need of case-1/3/4 here.  For case-2, if the Q is for “**when the UE is configured with shared pool only**”, why we need to consider it? |
| Qualcomm | option-3, option-4 |  |
| Samsung | See comment | Same as Q2-5b |
| CATT | Option-3, option4 |  |
| Apple | Legacy behavior |  |
| LG | No |  |
| Nokia | Comment | Agree with Oppo |
| MediaTek |  | share the view from OPPO |
| Xiaomi |  | Share the view expressed by Oppo |
| Ericsson |  | Share views expressed by Oppo |

**Q2-5f: Do you agree the CBR measurement on different pools considering discovery transmission, should be specified and take TP of opt1 in R2-2204564 (See ANNEX) as the baseline?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Yes |  |
| OPPO | No | We actually prefer the version previously provided by RRC-rapp during the discussion on [602], i.e., to avoid a big change since the intention should be clear to all. |
| Qualcomm | Yes |  |
| Samsung | No | We do not see a need to specify the whole CBR measurement procedures separately for SL discovery. CBR measurement on dedicated discovery pool can be clarified. |
| CATT | Yes |  |
| Apple | Yes with comment | Only if dedicagted TX pools are configured. |
| LG | No |  |
| Nokia | No |  |
| MediaTek | No | share the view from OPPO |
| Xiaomi | No |  |
| Ericsson | No | Agree with OPPO, big spec change should be avoided. |

### Cell definition for remote UE

In R2-2205345, it is suggested to change the cell definition of remote UE, to cover the case when the SIB12 is transferred via relay UE. They think for current spec, ‘it can be seen that the language presents the reader with confusion as when related to the scenarios described above (out-of-coverage but with valid resources from SIB12), then there is no cell chosen for NR sidelink operation that has provided SIB12.’ The TP is as follows:

|  |
| --- |
| For, 5.8.13.2 Sidelink discovery monitoring …  2> else if for the cell chosen for NR sidelink discovery reception ~~provides~~ *SIB12* is provided:  And for, 5.8.13.3 Sidelink discovery transmission …  2> else if for the cell chosen for NR sidelink discovery transmission ~~provides~~ *SIB12* is provided |

**Q2-6a: Do you agree the current spec cannot cover the case when UE is out-of-coverage but with valid resources from SIB12 (via relay UE), when about discovery monitoring/transmission?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Yes | OK with the intention. |
| OPPO | No | Seems that even via indirect connection, the “cell chosen for NR sidelink discovery Tx/Rx” is still a valid term? |
| Qualcomm | No |  |
| Samsung | No | We do not see a big problem with current wording. |
| CATT | No |  |
| Apple | No |  |
| LG | No |  |
| Lenovo | No |  |
| Nokia | No |  |
| MediaTek | No |  |
| Xiaomi | Yes | Proponent  Language is confusing, cell chosen does not provide the SIB12 in all cases |
| Ericsson | no |  |

**Q2-6b: Do you agree to take the TP in R2-2205345, Proposal 3 as the baseline?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | No | OK with the intention, but it seems by current TP, the intention is still not clear.  If companies agree to update the spec, the detailed wording may be left to RRC CR rapporteur. |
| OPPO | No | Do not see this as a critical issue. |
| Qualcomm | No | Spec is fine no changes necessary |
| Samsung | No |  |
| CATT | No |  |
| Apple | No |  |
| LG | No |  |
| Lenovo | No |  |
| Nokia | No |  |
| MediaTek | No |  |
| Xiaomi | Yes | grammatical correction to text that currently introduces confusion and possible incorrect understanding |
| Ericsson | No |  |

### RSRP measurement by remote UE

R2-2205357 raised a problem:

1. After connected with relay UE, the remote UE is controlled by relay UE’s serving cell, according to our agreements;
2. How can the remote UE determine that the Uu threshold condition is no longer satisfied and thus the remote UE cannot serve as remote UE anymore?
3. Only with NCI of the Relay UE’s Pcell/camped cell, Remote UE cannot measure the Uu RSRP easily to know when it cannot serve as remote UE anymore.

So the contribution proposes to add the ARFCN and the PCI of Pcell/camped cell in the RRC container of the discovery message from the L2 relay UE to help remote UE evaluate the leaving threshold.

In Monday session, it was agreed:

Proposal 2 (modified): PCI and ARFCN-DL should be provided to remote UE to derive KgNB before remote UE receiving RRCResume/RRCReestablishment message. Discuss offline in [AT118-e][633] whether to use PC5-RRC or the RRC container in discovery message; the availability of target cell ID can also be checked if an issue is found.

So the original question Q2-7a is modified accordingly. And Q2-7b is deleted because where to put ARFCN and PCI is discussed in offline-633.

**Q2-7a: Do you agree the UE should use ARFCN and the PCI of relay UE’s serving cell to evaluate the leaving threshold of being remote UE?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | No | Although we had agreements that remote UE is controlled by relay UE’s serving cell, we think it is more in the context of service, not to judge the leaving condition of being remote UE.  The remote UE should measure the RSRP on its direct Uu anyway, no matter for the cell for which it is indeed in-coverage, or for the relay’s serving cell for which it may or may not be indeed in-coverage.  As for which Uu threshold to compare, it can be the threshold in SIB transferred by relay UE or the Uu threshold that the remote can acquire from its direct Uu, which may be left to remote UE implementation. |
| OPPO | See comment | For issue here, we see somehow this modification is against with the intention of the agreement we made that remote UE should perform cell reselection and relay reselection independently, so agree with the view by vivo.  For the issue raised in 602 (issue-17, P2), we tend to agree that issue is valid, and thus we can disc the issue in P2 |
| Qualcomm | No | We agree with vivo on the leaving condition. Remote UE implementation can directly obtain measurements of the camped cell to determine discovery leaving condition and not use the information via relay UE to make this determination. |
| Samsung | No | We agree with vivo. This can be up to UE implementation. |
| CATT | No | Same view as vivo. |
| Apple | No |  |
| LG | No | We have the same view as vivo. |
| Lenovo | No |  |
| Nokia | No |  |
| MediaTek | No |  |
| Xiaomi | No |  |
| Ericsson | No | Agree with VIVO |







# Conclusion

The summary concludes with the following proposals:

**[Easy]**

**[Cross WG]**

**[For discussion]**

**[Lower priority**]

1. Reference
2. R2-2206056, Summary of AI 6.7.2.5 on Discovery and relay re/selection, vivo (Rapporteur), 3GPP TSG-RAN WG2 Meeting #118 electronic
3. ANNEX

## R2-2205610

#### 5.4.2.2 HARQ process

Each HARQ process is associated with a HARQ buffer.

New transmissions are performed on the resource and with the MCS indicated on PDCCH or indicated in the Random Access Response (i.e. MAC RAR or fallbackRAR), or signalled in RRC or determined as specified in clause 5.1.2a for MSGA payload. Retransmissions are performed on the resource and, if provided, with the MCS indicated on PDCCH, or on the same resource and with the same MCS as was used for last made transmission attempt within a bundle, or on stored configured uplink grant resources and stored MCS when *cg-RetransmissionTimer* or *cg-SDT-RetransmissionTimer* is configured. If *cg-RetransmissionTimer* is configured, retransmissions with the same HARQ process may be performed on any configured grant configuration if the configured grant configurations have the same TBS.

When *cg-RetransmissionTimer* is configured and the HARQ entity obtains a MAC PDU to transmit and LBT failure indication is received from lower layer, the corresponding HARQ process is considered to be pending. For a configured uplink grant, configured with *cg-RetransmissionTimer*, each associated HARQ process is considered as not pending when:

- a transmission is performed on that HARQ process and LBT failure indication is not received from lower layers; or

- the configured uplink grant is initialised and this HARQ process is not associated with another active configured uplink grant; or

- the HARQ buffer for this HARQ process is flushed.

If the HARQ entity requests a new transmission for a TB, the HARQ process shall:

1> store the MAC PDU in the associated HARQ buffer;

1> store the uplink grant received from the HARQ entity;

1> generate a transmission as described below.

If the HARQ entity requests a retransmission for a TB, the HARQ process shall:

1> store the uplink grant received from the HARQ entity;

1> generate a transmission as described below.

To generate a transmission for a TB, the HARQ process shall:

1> if the MAC PDU was obtained from the Msg3 buffer; or

1> if the MAC PDU was obtained from the MSGA buffer; or

1> if there is no measurement gap at the time of the transmission and, in case of retransmission, the retransmission does not collide with a transmission for a MAC PDU obtained from the Msg3 buffer or the MSGA buffer:

2> if there are neither transmission of NR sidelink communication nor transmission of V2X sidelink communication at the time of the transmission; or

2> if the transmission of the MAC PDU is prioritized over sidelink transmission or can be simultaneously performed with sidelink transmission:

3> instruct the physical layer to generate a transmission according to the stored uplink grant.

If a HARQ process receives downlink feedback information, the HARQ process shall:

1> stop the *cg-RetransmissionTimer*, if running;

1> if acknowledgement is indicated:

2> stop the *configuredGrantTimer*, if running.

If the *configuredGrantTimer* expires for a HARQ process, the HARQ process shall:

1> stop the *cg-RetransmissionTimer*, if running;

1> stop the *cg-SDT-RetransmissionTimer*, if running.

1> if a PDCCH addressed to the MAC entity’s C-RNTI has not been received after initial transmission for the CG-SDT with CCCH message to which the *configuredGrantTimer* corresponds:

2> indicate failure to perform SDT procedure to the upper layer.

The transmission of the MAC PDU is prioritized over sidelink transmission or can be performed simultaneously with sidelink transmission if one of the following conditions is met:

- if there are both a sidelink grant for transmission of NR sidelink communication and configured grant(s) for transmission of V2X sidelink communication on SL-SCH as determined in clause 5.14.1.2.2 of TS 36.321 [22] at the time of the transmission, and neither the transmission of NR sidelink communication is prioritized as determined in clause 5.22.1.3.1a nor the transmission(s) of V2X sidelink communication is prioritized as determined in clause 5.14.1.2.2 of TS 36.321 [22]; or

- if there are both a sidelink grant for transmission of NR sidelink communication and configured grant(s) for transmission of V2X sidelink communication on SL-SCH as determined in clause 5.14.1.2.2 of TS 36.321 [22] at the time of the transmission, and the MAC entity is able to perform this UL transmission simultaneously with the transmission of NR sidelink communication and/or the transmission(s) of V2X sidelink communication; or

- if there is only configured grant(s) for transmission of V2X sidelink communication on SL-SCH as determined in clause 5.14.1.2.2 of TS 36.321 [22] at the time of the transmission, and either none of the transmission(s) of V2X sidelink communication is prioritized as determined in clause 5.14.1.2.2 of TS 36.321 [22] or the MAC entity is able to perform this UL transmission simultaneously with the transmission(s) of V2X sidelink communication; or

- if there is only a sidelink grant for transmission of NR sidelink communication at the time of the transmission, and if the transmission of NR sidelink communication is not prioritized as determined in clause 5.22.1.3.1a, or there is a sidelink grant for transmission of NR sidelink communication at the time of the transmission and the MAC entity is able to perform this UL transmission simultaneously with the transmission of NR sidelink communication; or

- if there are both a sidelink grant for transmission of NR sidelink communication and configured grant(s) for transmission of V2X sidelink communication on SL-SCH as determined in clause 5.14.1.2.2 of TS 36.321 [22] at the time of the transmission, and either only the transmission of NR sidelink communication is prioritized as determined in clause 5.22.1.3.1a or only the transmission(s) of V2X sidelink communication is prioritized as determined in clause 5.14.1.2.2 of TS 36.321 [22] and the MAC entity is able to perform this UL transmission simultaneously with the prioritized transmission of NR sidelink communication or V2X sidelink communication; or

- if there is a sidelink grant for transmission of sidelink discovery at the time of the transmission, and if the transmission of sidelink discovery is not prioritized as determined in clause 5.22.1.3.1a, or there is a sidelink grant for transmission of sidelink discovery at the time of the transmission and the MAC entity is able to perform this UL transmission simultaneously with the tranmission of sidelink discovery:

NOTE 1: Among the UL transmissions where the MAC entity is able to perform the transmission of NR sidelink communication prioritized simultaneously, if there are more than one UL transmission which the MAC entity is not able to perform simultaneously, it is up to UE implementation whether this UL transmission is performed.

NOTE 2: Among the UL transmissions that the MAC entity is able to perform simultaneously with all transmission(s) of V2X sidelink communication prioritized, if there are more than one UL transmission which the MAC entity is not able to perform simultaneously, it is up to UE implementation whether this UL transmission is performed.

NOTE 3: Among the UL transmissions where the MAC entity is able to perform the transmission of NR sidelink communication prioritized simultaneously with all transmission(s) of V2X sidelink communication prioritized, if there are more than one UL transmission which the MAC entity is not able to perform simultaneously, it is up to UE implementation whether this UL transmission is performed.

NOTE 4: If there is configured grant(s) for transmission of V2X sidelink communication on SL-SCH as determined in clause 5.14.1.2.2 of TS 36.321 [22] at the time of the transmission, and the MAC entity is not able to perform this UL transmission simultaneously with the transmission(s) of V2X sidelink communication, and prioritization-related information is not available prior to the time of the transmission due to processing time restriction, it is up to UE implementation whether this UL transmission is performed.

NOTE X: Among the UL transmissions where the MAC entity is able to perform the transmission of sidelink discovery prioritized simultaneously, if there are more than one UL transmission which the MAC entity is not able to perform simultaneously, it is up to UE implementation whether this UL transmission is performed.

## R2-2204768

START OF THE CHANGE

5.22.1 SL-SCH Data transmission

5.22.1.1 SL Grant reception and SCI transmission

Sidelink grant is received dynamically on the PDCCH, configured semi-persistently by RRC or autonomously selected by the MAC entity. The MAC entity shall have a sidelink grant on an active SL BWP to determine a set of PSCCH duration(s) in which transmission of SCI occurs and a set of PSSCH duration(s) in which transmission of SL-SCH associated with the SCI occurs. A sidelink grant addressed to SLCS-RNTI with NDI = 1 is considered as a dynamic sidelink grant.

If the MAC entity has been configured with Sidelink resource allocation mode 1 as indicated in TS 38.331 [5], the MAC entity shall for each PDCCH occasion and for each grant received for this PDCCH occasion:

1> if a sidelink grant has been received on the PDCCH for the MAC entity's SL-RNTI:

2> if the NDI received on the PDCCH has not been toggled compared to the value in the previously received HARQ information for the HARQ Process ID:

3> use the received sidelink grant to determine PSCCH duration(s) and PSSCH duration(s) for one or more retransmissions of a single MAC PDU for the corresponding Sidelink process according to clause 8.1.2 of TS 38.214 [7].

2> else:

3> use the received sidelink grant to determine PSCCH duration(s) and PSSCH duration(s) for initial transmission and, if available, retransmission(s) of a single MAC PDU according to clause 8.1.2 of TS 38.214 [7].

2> if a sidelink grant is available for retransmission(s) of a MAC PDU which has been positively acknowledged as specified in clause 5.22.1.3.1a:

3> clear the PSCCH duration(s) and PSSCH duration(s) corresponding to retransmission(s) of the MAC PDU from the sidelink grant.

1> else if a sidelink grant has been received on the PDCCH for the MAC entity's SLCS-RNTI:

2> if PDCCH contents indicate retransmission(s) for the identifed HARQ process ID that has been set for an activated configured sidelink grant identified by *sl-ConfigIndexCG*:

3> use the received sidelink grant to determine PSCCH duration(s) and PSSCH duration(s) for one or more retransmissions of a single MAC PDU according to clause 8.1.2 of TS 38.214 [7].

2> else if PDCCH contents indicate configured grant Type 2 deactivation for a configured sidelink grant:

3> trigger configured sidelink grant confirmation for the configured sidelink grant.

2> else if PDCCH contents indicate configured grant Type 2 activation for a configured sidelink grant:

3> trigger configured sidelink grant confirmation for the configured sidelink grant;

3> store the configured sidelink grant;

3> initialise or re-initialise the configured sidelink grant to determine the set of PSCCH durations and the set of PSSCH durations for transmissions of multiple MAC PDUs according to clause 8.1.2 of TS 38.214 [7].

If the MAC entity has been configured with Sidelink resource allocation mode 2 to transmit using pool(s) of resources in a carrier as indicated in TS 38.331 [5] or TS 36.331 [21] based on full sensing, or partial sensing, or random selection or any combination(s), the MAC entity shall for each Sidelink process:

NOTE 1: If the MAC entity is configured with Sidelink resource allocation mode 2 to transmit using a pool of resources in a carrier as indicated in TS 38.331 [5] or TS 36.331 [21], the MAC entity can create a selected sidelink grant on the pool of resources based on random selection, or partial sensing, or full sensing only after releasing configured sidelink grant(s), if any.

NOTE 2: The MAC entity expects that PSFCH is always configured by RRC for at least one pool of resources in *sl-TxPoolSelectedNormal* and for the resource pool in *sl-TxPoolExceptional* in case that at least a logical channel configured with *sl-HARQ-FeedbackEnabled* is set to *enabled*.

1> if the MAC entity has selected to create a selected sidelink grant corresponding to transmissions of multiple MAC PDUs, and SL data is available in a logical channel:

2> if the MAC entity has not selected a pool of resources allowed for the logical channel:

3> if SL data is available in the logical channel for sidelink discovery:

4> if *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon* is configured according to TS 38.331 [5]:

5> select the *sl-DiscTxPoolSelected* configured in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon* for the transmission of sidelink discovery message;

4> else:

5> select any pool of resources among the configured pools of resources;

3> else if *sl-HARQ-FeedbackEnabled* is set to *enabled* for the logical channel:

4> select any pool of resources configured with PSFCH resources among the pools of resources except the pool(s) in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon,* if configured.

3> else:

4> select any pool of resources among the pools of resources except the pool(s) in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon,* if configured.

2> perform the TX resource (re-)selection check on the selected pool of resources as specified in clause 5.22.1.2;

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#### 5.22.1.2c TX resource pool selection

The MAC entity shall:

1> if SL data is available in the logical channel for sidelink discovery:

2> if *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon* is configured according to TS 38.331 [5]:

3> select the *sl-DiscTxPoolSelected* configured in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon* for the transmission of sidelink discovery message.

2> else:

3> select any pool of resources among the configured pools of resources.

1> else if SL data is available in the logical channel:

2> if *sl-HARQ-FeedbackEnabled* is set to *enabled* for the logical channel:

3> select any pool of resources configured with PSFCH resources among the pools of resources except the pool(s) in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon*, if configured.

2> else:

3> select any pool of resources among the pools of resources except the pool(s) in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon*, if configured.

1> else if an SL-CSI reporting is triggered:

2> select any pool of resources among the pools of resources except the pool(s) in *sl-BWP-DiscPoolConfig* or *sl-BWP-DiscPoolConfigCommon*, if configured.

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| TP START for OPT.1 |

5.5.3.1 General

An RRC\_CONNECTED UE shall derive cell measurement results by measuring one or multiple beams associated per cell as configured by the network, as described in 5.5.3.3. For all cell measurement results, except for RSSI, and CLI measurement results in RRC\_CONNECTED, the UE applies the layer 3 filtering as specified in 5.5.3.2, before using the measured results for evaluation of reporting criteria, measurement reporting or the criteria to trigger conditional reconfiguration execution. For cell measurements, the network can configure RSRP, RSRQ, SINR, RSCP or EcN0 as trigger quantity. For CLI measurements, the network can configure SRS-RSRP or CLI-RSSI as trigger quantity. For cell and beam measurements, reporting quantities can be any combination of quantities (i.e. only RSRP; only RSRQ; only SINR; RSRP and RSRQ; RSRP and SINR; RSRQ and SINR; RSRP, RSRQ and SINR; only RSCP; only EcN0; RSCP and EcN0), irrespective of the trigger quantity, and for CLI measurements, reporting quantities can be either SRS-RSRP or CLI-RSSI. For conditional reconfiguration execution, the network can configure up to 2 quantities, both using same RS type. The UE does not apply the layer 3 filtering as specified in 5.5.3.2 to derive the CBR measurements. The UE does not apply the layer 3 filtering as specified in 5.5.3.2 to derive the Rx-Tx time difference measurements.

The network may also configure the UE to report measurement information per beam (which can either be measurement results per beam with respective beam identifier(s) or only beam identifier(s)), derived as described in 5.5.3.3a. If beam measurement information is configured to be included in measurement reports, the UE applies the layer 3 beam filtering as specified in 5.5.3.2. On the other hand, the exact L1 filtering of beam measurements used to derive cell measurement results is implementation dependent.

The UE shall:

<Irrelevant Texts Omitted>

The UE capable of CBR measurement when configured to transmit NR sidelink communication shall:

1> If the frequency used for NR sidelink communication is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or includedin *sl-ConfigCommonNR* within *SIB12*:

2> if the UE is in RRC\_IDLE or in RRC\_INACTIVE:

3> if the cell chosen for NR sidelink communication provides *SIB12* which includes *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* forthe concerned frequency:

4> perform CBR measurement on pools in *sl-TxPoolSelectedNormal* and *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;

2> if the UE is in RRC\_CONNECTED:

3> if *tx-PoolMeasToAddModList* is included in *VarMeasConfig*:

4> perform CBR measurements on each transmission resource pool indicated in the *tx-PoolMeasToAddModList*;

3> if *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling* or *sl-TxPoolExceptional* is included in *sl-ConfigDedicatedNR* for the concerned frequency within *RRCReconfiguration*:

4> perform CBR measurement on pool(s) in *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling* or *sl-TxPoolExceptional* if included in *sl-ConfigDedicatedNR* for the concerned frequency within *RRCReconfiguration*;

3> else if the cell chosen for NR sidelink communication provides *SIB12* which includes *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* forthe concerned frequency:

4> perform CBR measurement on pool(s) in *sl-TxPoolSelectedNormal* and *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;

1> else:

2> perform CBR measurement on pool(s) in *sl-TxPoolSelectedNormal* and *sl-TxPoolExceptional* in *SidelinkPreconfigNR* for the concerned frequency.

The UE capable of CBR measurement when configured to transmit NR sidelink discovery shall:

1> If the frequency used for NR sidelink discovery is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or includedin *sl-ConfigCommonNR* within *SIB12*:

2> if the UE is in RRC\_IDLE or in RRC\_INACTIVE:

3> if the cell chosen for NR sidelink communication provides *SIB12* which includes *sl-DiscTxPoolSelected, sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* forthe concerned frequency:

4> if *SIB12* includes *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency:

5> perform CBR measurement on pools in *sl-DiscTxPoolSelected* and *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;

4> else:

5> perform CBR measurement on pools in *sl-TxPoolSelectedNormal* and *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;

2> if the UE is in RRC\_CONNECTED:

3> if *tx-PoolMeasToAddModList* is included in *VarMeasConfig*:

4> perform CBR measurements on each transmission resource pool indicated in the *tx-PoolMeasToAddModList*;

3> if *sl-DiscTxPoolSelected*, *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling* or *sl-TxPoolExceptional* is included in *sl-ConfigDedicatedNR* for the concerned frequency within *RRCReconfiguration*:

4> if *sl-DiscTxPoolSelected* is included for NR sidelink discovery in *sl-ConfigDedicatedNR* for the concerned frequency within *RRCReconfiguration*:

5> perform CBR measurement on pool(s) in *sl-DiscTxPoolSelected* and *sl-TxPoolExceptional* if included in *sl-ConfigDedicatedNR* for the concerned frequency within *RRCReconfiguration* ;

4> else:

5> perform CBR measurement on pool(s) in *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling* and *sl-TxPoolExceptional* if included in *sl-ConfigDedicatedNR* for the concerned frequency within *RRCReconfiguration* ;

3> else if the cell chosen for NR sidelink communication provides *SIB12* which includes *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* forthe concerned frequency:

4> if *SIB12* includes *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency:

5> perform CBR measurement on pools in *sl-DiscTxPoolSelected* and *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;

4> else:

5> perform CBR measurement on pools in *sl-TxPoolSelectedNormal* and *sl-TxPoolExceptional* for the concerned frequency in *SIB12*;

1> else:

2> if *SidelinkPreconfigNR* includes *sl-DiscTxPoolSelected* for NR sidelink discovery transmission on the concerned frequency:

3> perform CBR measurement on pools in *sl-DiscTxPoolSelected* and *sl-TxPoolExceptional* for the concerned frequency;

2> else:

3> perform CBR measurement on pools in *sl-TxPoolSelectedNormal* and *sl-TxPoolExceptional* for the concerned frequency in *SIB12*.NOTE 2: In case the configurations for NR sidelink communication and CBR measurement are acquired via the E-UTRA, configurations for NR sidelink communication in *SIB12*, *sl-ConfigDedicatedNR* within *RRCReconfiguration* used in this clause are provided by the configurations in *SystemInformationBlockType28*, *sl-ConfigDedicatedForNR* within *RRCConnectionReconfiguration* as specified in TS 36.331[10], respectively.

NOTE 3: If a UE that is configured by upper layers to transmit V2X sidelink communication is configured by NR with transmission resource pool(s) and the measurement objects concerning V2X sidelink communication (i.e. by *sl-ConfigDedicatedEUTRA-Info*), it shall perform CBR measurement as specified in clause 5.5.3 of TS 36.331 [10], based on the transmission resource pool(s) and the measurement object(s) concerning V2X sidelink communication configured by NR.

NOTE 4: For V2X sidelink communication, each of the CBR measurement results is associated with a resource pool, as indicated by the *poolReportId* (see TS 36.331 [10]), that refers to a pool as included in *sl-ConfigDedicatedEUTRA-Info* or *SIB13*.

Editors Note: FFS to specify that the UE ignores measId(s) that were not indicated in the condExecutionCond/triggerCondition.

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| TP END |