3GPP TSG-RAN WG2 Meeting #117 Electronic R2-220xxxx

Online, 21 Feb – 03 Mar 2022

**Agenda item: 8.7.1**

**Source: Huawei, HiSilicon**

**Title: Report of [AT117-e][615][Relay] Relay running CR to 38.331 (Huawei)**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report of the following email discussion:

**[AT117-e][615][Relay] Relay running CR to 38.331 (Huawei)**

      Scope: Review and update the CR in R2-2202819.

      Intended outcome: Agreeable CR

      Deadline:  Tuesday 2022-03-01 1200 UTC

The discussion includes two phases.

* Phase I is to collect companies views on the resolutions to the existing stage 3 issues as captured in open issue list marking as “CR rapporteur handled”. The suggested deadline for companies' feedback: Monday W2, 2022-02-28 0800 UTC.
* Phase II is to update the CR according to phase I consensus and allow companies some time to review the updated CR. The deadline is Tuesday W2, 2022-03-01 1200 UTC.

The expected output of this discussion is the running CR including both of phase I and phase II consensus for agreement.

# 2 Contact Points

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# 3 Phase I discussion

**3.1 Resolutions to the existing open issues in RRC CR**

All the Editor’s Notes in the latest version of SL relay RRC running CR in R2-2201811 were captured in the open issue list R2-2201721. In R2-2202820, we discuss the open issues classified as “CR rapporteur handled” except the ones discussed in other offlines.

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| **Issue Index** | **Description** | **Suggested handling** | **Reason to add/remove the issue** | **Status** |
| O1.16 | [Open issue from tdoc R2-2201508] FFS on the definition of out-of-coverage UE in RRC CR | CR rapporteur handled | Due to the proposal in R2-2201508 related 38.331 stage-3 open issue:Proposal 8: Agree the update on 5.8.x3.3 Selection and reselection of NR sidelink U2N Relay UE in RRC running CR.We have the corresponding open issue | To be discussed in this offline |
| O1.17 | [FFS point from R2#116b agreement] Whether L3 relaying support is signalled implicitly or explicitly in SIB12. | CR rapporteur handled | Due to the agreement made in RAN2 #116b:Whether L3 relaying support is signalled implicitly by indicating the support of discovery, or signalled independently from support of discovery, can be discussed in stage 3 drafting.And due to the following EN in 331 running-CREditor’s Note: RAN2 to further discuss whether L3 relaying support is signalled via an explicit indication in SIB12.We have the corresponding open issue | Under-discussion in [Pre117-e][601][Relay] Discovery and relay re/selection. |
| O1.18 | [FFS point from R2#116b agreement]FFS on detailed signalling to differentiate between support of relay vs. non-relay discovery in SIB12. | CR rapporteur handled | Due to the agreement made in RAN2 #116b:The UE can determine from SIB12 whether the gNB supports relay discovery and/or non-relay discovery. Details (including whether SIB12 signalling can differentiate between support of relay vs. non-relay discovery and whether the support is indicated explicitly or implicitly) can be discussed as part of stage 3 CR drafting.We have the corresponding open issue | Under-discussion in [Pre117-e][601][Relay] Discovery and relay re/selection. |
| O4.05 | [FFS point from R2#116 agreement] Confirm the working assumption to use reconfigurationWithSync to indicate direct-to-indirect path switch | CR rapporteur handled | Due to the working assumption made in RAN2#116：Working assumption:The existing reconfigurationWithSync is used to indicate direct-to-indirect path switch to Remote UE.We have the corresponding open issue | To be discussed in this offline |
| O6.09 | [FFS point from R2#116 agreement] FFS on the signalling for the U2N Relay UE to determine to monitor POs for a U2N Remote UE in RRC\_CONNECTED state.  | CR rapporteur handled. | Due to the agreement made in RAN2 #116 and RAN2 #116bis:Recommendation 2-1 [23/24]: Paging message is forwarded by relay UE to remote UE by sending only the complete PagingRecord relevant to that remote UE.Recommendation 2-2 [18/24]: For Relay UE in RRC\_CONNECTED configured with paging CSS, RAN2 not pursue explicit signalling to indicate RRC-state of remote-UE. Further detail is left to RRC running-CR discussion.Recommendation 2-3 [20/23]: Use RRCReconfiguration for Network to carry paging message to the RRC\_CONNECTED relay UE in dedicated fashion.We have the corresponding open issue. | To be discussed in this offline |
| O6.12 | [Open issue from tdoc R2-2201508] FFS on the configuration of Uu RLC bearer for relaying service | CR rapporteur handled | Due to the proposal in R2-2201508 related 38.331 stage-3 open issue:Proposal 1: RAN2 to select one alternative to configure Uu RLC bearer for relaying service (i.e. the bearers associated with Uu SRAP):‐ Option 1: reusing existing RLC-BearerConfig, by handling the servedRadioBearer as 1a: modifying the condition as NW will only configure the field to a configured SRB or DRB i.e. non-relaying RLC channel. 1b: L2 U2N Relay UE ignoring the field.‐ Option 2: introducing new RLC configuration.We have the corresponding open issue | Under-discussion in [Pre117-e][605][Relay] Open issues on relay control plane procedures. |
| O6.13 | [Open issue from tdoc R2-2201508] FFS on the terminology of Uu/PC5 RLC channel would be used for L2 U2N Relay operation. | CR rapporteur handled | Due to the proposal in R2-2201508 related 38.331 stage-3 open issue:Proposal 2: The terminology of Uu/PC5 RLC channel would be used for L2 U2N Relay operation.We have the corresponding open issue. | To be discussed in this offline |
| O6.15 | [Open issue from tdoc R2-2201508 ]FFS on whether to use the same message (Remote InformationSidelink) for SIB request and Paging information provision, and same message (UuMessageTransferSidelink) for SIB forwarding and Paging delivery | CR rapporteur handled | Due to the proposal in R2-2201508 related 38.331 stage-3 open issue:Proposal 4: RAN2 to confirm that the same message (RemoteInformationSidelink) is used for SIB request and Paging information provision.Proposal 5: RAN2 to confirm that the same message (UuMessageTransferSidelink) is used for SIB forwarding and Paging delivery.I.e., the following Editor Notes in running CR 38.331 should be addressed.*Editor’s note: Updates would be needed if it is conclude two separate messagas for paging information and SIB request at later meetings.**Editor’s note: Updates would be needed if it is conclude two separate messagas for paging and SIB forwarding at later meetings.*We have the corresponding open issue. | To be discussed in this offline |
| O6.16 | [FFS point from R2#116 agreement] FFS value and name for T300-like, T301-like, T319-like | CR rapporteur handled | Due to the agreement made in RAN2 #116:Proposal 17: Remote UE uses different timers (FFS: value and/or name) for access (T300-like), resume (T319-like) and re-establishment (T301-like) compared to those for legacy Uu procedures [23/23]We have the corresponding open issue. | To be discussed in this offline |

The proposed resolutions are given below and most of the changes have been made in R2-2202819.

**[O1.16] OoC definition in relay (re)selection**

**Proposal 1: Agree the update on 5.8.x3.3 Selection and reselection of NR sidelink U2N Relay UE in RRC CR.**

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| 5.8.x3.3 Selection and reselection of NR sidelink U2N Relay UEA 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 serving cell (RRC\_IDLE)~~out of coverage [FFS the definition of OOC], as defined in TS 38.304 [20], clause 8.2~~; or1> if ~~the serving frequency is used for NR sidelink communication and~~ 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*:*~~Editor’s Note: For L2 Remote UE, the definition/meaning of OoC for NR sidelink discovery/communication needs alignment between TS38.304 and TS38.331.~~* 2> if the UE does not have a selected NR sidelink U2N Relay UE; or.... |

**[O4.05] Confirm the working assumption to use reconfigurationWithSync to indicate direct-to-indirect path switch**

**Proposal 2: Keep the existing change in RRC CR of reusing** ***ReconfigurationWithSync* to indicate direct-to-indirect path switch.**

**[06.09] FFS on the signalling for the Connected U2N Relay UE to determine whether to monitor POs for a remote UE based on PC5-RRC signalling received from the remote UE**

For this issue, the rapporteur adds more thinking about the whole procedure of paging monitoring based on existing RAN2 agreements:

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| RAN2 agreements:* For L2 relay UE in RRC\_CONNECTED and L2 remote UE(s) in RRC\_IDLE/RRC\_INACTIVE, we specify signalling for delivery of the remote UE’s paging through dedicated RRC message. Network implementation decision whether to use it (or keep the relay UE on BWP with CSS).
* Relay UE in RRC\_CONNECTED, if configured with paging CSS, can determine whether to monitor POs for a remote UE based on PC5-RRC signalling received from the remote UE. FFS on the signalling contents and for the case of idle/inactive relay UE.
* Recommendation 2-2 [18/24]: For Relay UE in RRC\_CONNECTED configured with paging CSS, RAN2 not pursue explicit signalling to indicate RRC-state of remote-UE. Further detail is left to RRC running-CR discussion.
* Recommendation 1-1c (modified): For SIB-update in case of RRC\_IDLE/RRC\_INACTIVE remote UE(s), rely on relay UE to send updated SIB(s) to remote UE, no new signalling is to be introduced [17/23]. For SIB-update in case of RRC\_CONNECTED remote UE(s), rely on network to send updated SIB(s) when they are updated, no further restriction in specification [15/23]. Remote UE de-configure SI-request w.r.t relay UE implicitly when entering into RRC\_CONNECTED state [10/13].
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The rapporteur understand from network perspective, it can either keep the relay UE on BWP with CSS or use dedicated RRC message to carry paging message. Then in Relay UE side, it can only expect the dedicated RRC signalling of paging message when there is no CSS on its active BWP, in other cases, it has to monitor paging message for the Remote UE after receiving the paging related info in *RemoteUEInformationSidelink*.

From remote UE’s perspective, according to the agreement made in RAN2 #116bis, RRC state of remote UE will not be exchanged explicitly via PC5-RRC regarding SIB/paging forwarding for idle/inactive remote UE. Instead, it was agreed that remote UE should de-configure the requested SIB when entering RRC\_CONNECTED state to inform relay UE stop SIB forwarding. The rapporteur understands the same handling should apply to paging case as well.

**To sum up, the complete paging monitoring procedure should be below:**

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| 1. In remote UE side, the idle/inactive remote UE indicates paging related info to the relay UE in *RemoteUEInformationSidelink*; and when entering connected state it de-configures/releases the paging relate info to relay UE.
2. In relay UE side,
* upon reception of paging related info from a remote UE, it shall:
* if the relay UE is in idle/inactive state, it shall monitor paging message in Uu interface for the Remote UEs;
* else if the relay UE is in connected state, and if it is configured with CSS on active BWP, it shall monitor paging message in Uu interface for the Remote UEs
* else if the relay UE is in connected state, and if it is NOT configured with CSS on active BWP, it shall report remote UE’s paging UE ID to network, and expect the paging message to be sent in the dedicated RRC message in Uu interface.
* after the paging related info released by the remote UE, the relay UE should release the paging UE ID to network if it has reported the info to network, e.g. by updating SUI.
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**Revised Proposal 3: For paging monitoring, the procedure in above box should be captured in RRC CR.**

**[06.13] Terminology of Uu/PC5 RLC channel**

**Proposal 4: The terminology of Uu/PC5 RLC channel would be used for L2 U2N Relay operation.**

**[06.15] Whether to use the same message (RemoteInformationSidelink) for SIB request and Paging information provision and same message (UuMessageTransferSidelink) for SIB forwarding and Paging delivery**

**Proposal 5: Keep the existing PC5-RRC message of *RemoteUEInformationSidelink* to include both of requested SIB and paging related info, and keep the existing PC5-RRC message of *UuMessageTransferSidelink* to include both of forwarded SIB and paging record.**

**[06.16] FFS value and name for T300-like, T301-like, T319-like**

About the legacy T300, T301 and T319, it is the common understanding that more time is needed for the two-hop access (i.e. remote UE accessing network via relay) than one-hop legacy access. But there is no clear consensus on whether new value is enough or new timer name is needed.

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| RAN2 agreements:* Remote UE uses different timers (FFS: value and/or name) for access (T300-like), resume (T319-like) and re-establishment (T301-like) compared to those for legacy Uu procedures [22/23]
* Introduce new fields in SIB1 for T300-like/T319-like/T301-like timers to be used by L2 remote UE. For these timers, on top of existing stop conditions as for the legacy timers, add extra stop condition for relayed scenario, i.e., “the (re)selected relay becomes unsuitable” for T300-like timer, “relay (re)selection” for T319-like timer, and “the (re)selected relay becomes unsuitable” for T301-like timer. FFS whether the legacy stop-condition of “when the selected cell becomes unsuitable” is still applicable to T301.
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In the current RRC running CR, there is a new field added to configure the separate timer value to the remote UE, but not touching the timer name, this is because except the timer value as well as additional stop condition of relay (re)selection, all the other handling of the timer for remote UE is the same with legacy. Reuse the legacy timer name with new configuration of timer value would be the most straightforward way to do the change, while defining new timer value will create unnecessary complexity in the spec which is also different to future proof and maintenance.

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| SIB1 ::= SEQUENCE { cellSelectionInfo SEQUENCE { q-RxLevMin Q-RxLevMin, q-RxLevMinOffset INTEGER (1..8) OPTIONAL, -- Need S q-RxLevMinSUL Q-RxLevMin OPTIONAL, -- Need R q-QualMin Q-QualMin OPTIONAL, -- Need S q-QualMinOffset INTEGER (1..8) OPTIONAL -- Need S } OPTIONAL, -- Cond Standalone cellAccessRelatedInfo CellAccessRelatedInfo, connEstFailureControl ConnEstFailureControl OPTIONAL, -- Need R si-SchedulingInfo SI-SchedulingInfo OPTIONAL, -- Need R servingCellConfigCommon ServingCellConfigCommonSIB OPTIONAL, -- Need R ims-EmergencySupport ENUMERATED {true} OPTIONAL, -- Need R eCallOverIMS-Support ENUMERATED {true} OPTIONAL, -- Need R ue-TimersAndConstants UE-TimersAndConstants OPTIONAL, -- Need R uac-BarringInfo SEQUENCE { uac-BarringForCommon UAC-BarringPerCatList OPTIONAL, -- Need S uac-BarringPerPLMN-List UAC-BarringPerPLMN-List OPTIONAL, -- Need S uac-BarringInfoSetList UAC-BarringInfoSetList, uac-AccessCategory1-SelectionAssistanceInfo CHOICE { plmnCommon UAC-AccessCategory1-SelectionAssistanceInfo, individualPLMNList SEQUENCE (SIZE (2..maxPLMN)) OF UAC-AccessCategory1-SelectionAssistanceInfo } OPTIONAL -- Need S } OPTIONAL, -- Need R useFullResumeID ENUMERATED {true} OPTIONAL, -- Need R lateNonCriticalExtension OCTET STRING OPTIONAL, nonCriticalExtension SIB1-v1610-IEs OPTIONAL}...UE-TimersAndConstants ::= SEQUENCE { t300 ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000}, t301 ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000}, t310 ENUMERATED {ms0, ms50, ms100, ms200, ms500, ms1000, ms2000}, n310 ENUMERATED {n1, n2, n3, n4, n6, n8, n10, n20}, t311 ENUMERATED {ms1000, ms3000, ms5000, ms10000, ms15000, ms20000, ms30000}, n311 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10}, t319 ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000}, ..., [[ t300-RemoteUE-r17 ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000} OPTIONAL, -- Need S t301-RemoteUE-r17 ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000} OPTIONAL, -- Need S t319-RemoteUE-r17 ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000} OPTIONAL -- Need S ]]}

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| ***UE-TimersAndConstants* field descriptions** |
| ***t300-RemoteUE***Indicates the timer value of T300 used by L2 U2N Remote UE. If the field is absent, the timer value indicated in t300 applies to L2 U2N Remote UE. |
| ***t301-RemoteUE***Indicates the timer value of T301 used by L2 U2N Remote UE. If the field is absent, the timer value indicated in t301 applies to L2 U2N Remote UE. |
| ***t319-RemoteUE***Indicates the timer value of T319 used by L2 U2N Remote UE. If the field is absent, the timer value indicated in t319 applies to L2 U2N Remote UE. |

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Based on above, the current change can enable different timer value to be configured to remote UE, meanwhile keep the spec simple and more maintainable. Thus it is proposed to keep the change.

**Proposal 6: Keep the existing change in RRC CR of introducing new fields of “t300-RemoteUE-r17” “t301-RemoteUE-r17” “t319-RemoteUE-r17” to configure Remote UE with the separate timer value.**

Considering the above proposals are quite straightforward, the rapporteur see no need to ask companies to confirm the proposals one by one. Instead, companies can leave comments in the following table if they have serious concerns to the proposals. If it is the case, please indicate your reason of disagree and the proposed change.

**Table 1: Comments on the above proposal 1-6 for the existing open issues in RRC CR.**

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| Company | Proposals you disagree | Comments and proposed change |
| OPPO | P1 | This change seems to treat out-of-coverage as RRC\_IDLE, which to me is not correct, i.e., OOC != IDLE. And our understanding is that the OOC definition in 304 does not considering cross-carrier case (but just limited to intra-carrier case), which is the status since LTE, so no big need to revise that, we can simply follow the legacy way (as in R16) to clarify the inter-carrier case. |
| OPPO | P3 | We do not think the explicit RRC state claiming is needed in the procedure text, since it has been removed from signalling already. I.e., the following text is sufficient1. In remote UE side, the idle/inactive remote UE indicates paging related info to the relay UE in *RemoteUEInformationSidelink*; ~~and when entering connected state it de-configures/releases the paging relate info to relay UE~~.
2. In relay UE side,
* upon reception of paging related info from a remote UE, it shall:
* if the ~~relay UE is in idle/inactive state~~ paging related info is configured, it shall monitor paging message in Uu interface for the Remote UEs;
* else ~~if the relay UE is in connected state~~, ~~and~~
	+ if it is configured with CSS on active BWP, it shall monitor paging message in Uu interface for the Remote UEs
	+ else ~~if the relay UE is in connected state, and if it is NOT configured with CSS on active BWP,~~ it shall report remote UE’s paging UE ID to network, and expect the paging message to be sent in the dedicated RRC message in Uu interface.
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| OPPO | P4 | Although we understand the intention of Rapp, we observe that “RLC bearer” were used in legacy spec as well for sidelink, would this lead to a change to legacy spec? |
| Qualcomm | P1 | Same view as OPPO. The current text is not technique correct (i.e., IDLE==out of coverage). And we also suggest 331 rapporteur to align with 304 rapporteur. |
| Qualcomm | P3 | We prefer Rapporteur previous version, which is clearer and aligned with the wording of agreements. Although we understand some company may not want to have explicit RRC state in spec, we are not sure whether RAN2 have sufficient time to confirm there is no issue if removing all RRC state related text. At this late stage, we prefer to first make spec technique correct, instead of discussing how to make the procedure work by removing RRC state. |
| Qualcomm | P4 | We think it is related to offline#620. In current spec, “Uu/PC5 RLC channel” is identified by LCID. Then, if it is agreed to use Uu/PC5 RLC channel ID instead in offline#620, it may cause confusion if we keep using “Uu/PC5 RLC channel”.  |
| Qualcomm | P6 | 1. Although the current way may work, we suggest Rapporteur to check view of Rapporteur of 38.331 and 36.331, because current 38.331 and 36.331 don’t use this style (i.e., t3xx-Remote\_\*)
2. Current field description is not sufficient. At least, it should be clarified that the remote UE shall ignore the legacy one.
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| MediaTek | P3 | We have the same understanding as OPPO for the wording. Meanwhile, for the revised P3, maybe the highlighted part is not needed since when Remote UE goes to connected, the network should be aware of it and then there may be no need for Relay UE to update this. after the paging related info released by the remote UE, the relay UE should release the paging UE ID to network if it has reported the info to network, e.g. by updating SUI. |
| Xiaomi | P1 | We agree with rapp the OoC in relay is not the same as NR sidelink communication. In sidelink, the OoC is determined by the availability of cellular coverage on sidelink frequency. The related text of 38.304 is quoted as below,

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| If the UE detects at least one cell on the frequency which UE is configured to perform NR sidelink communication on fulfilling the S criterion in accordance with clause 8.2.1, it shall consider itself to be in-coverage for NR sidelink communication on that frequency. If the UE cannot detect any cell on that frequency meeting the S criterion, it shall consider itself to be out-of-coverage for NR sidelink communication on that frequency. |

But in Relay, the OoC should be determined by the availability of cellular coverage on any frequency, not just sidelink frequency. Otherwise, remote UE may select relay UE even it’s in good coverage of NW on frequency other than sidelink frequency. But we also think the ‘(RRC\_IDLE)’ in the first bullet should be removed, since it may be confusing. |
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**3.2 Anything missing**

Companies are encouraged to review the RRC CR submitted in R2-2202819 and add the new identified issue or suggestions to improve CR quantity.

**Table 2: Comments on other parts apart from the existing open issues in RRC CR.**

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| Company | Section | Issues identified | Proposed change |
| Xiaomi | 6.2.2 | In the CR, SL-TxResourceReqList-v17xy is introduced to provide both remote UE and relay UE related information. However, as in R16, the SL-TxResourceReq is used to provide peer UE’s information, i.e. remote UE in U2N relay. The maximum length of this list is maxNrofSL-Dest-r16, which stands for Maximum number of destination for NR sidelink communication. If relay UE’s information is also included in this IE, it will occupy one entry of the list, which would reduce the maximum number of communication UEs for relay UE. | Define separate IE out of SL-TxResourceReqList-v17xy to include relay UE information, e.g. relay UE source ID and sl-LocalIdentity-Request-r17. |
| Xiaomi | 6.2.2 | In the CR, SL-TxResourceReqList-v17xy is introduced to request both discovery and communication transmission resource. The maximum length of this list is maxNrofSL-Dest-r16. However, maxNrofSL-Dest-r16 stands for Maximum number of destination for NR sidelink communication. Discovery is not included in the definition, which may result in confusion. Similar issue exists in maxNrofSL-Dest-1-r16. | Update the definition of maxNrofSL-Dest-r16 and maxNrofSL-Dest-1-r16 to include both communication and discovery. |
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3.2 Phase II discussion

TBD

# 4 Conclusion

# 5 References

1. R2-2202819 Introduction of SL relay Huawei, HiSilicon CR Rel-17 38.331 16.7.0 2910 - B NR\_SL\_relay-Core
2. R2-2202820 Stage3 open issues handling for RRC CR Huawei, HiSilicon discussion Rel-17 NR\_SL\_relay-Core