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

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| OPPO | Qianxi Lu | qianxi.lu@oppo.com |
| Qualcomm | Peng Cheng | chengp@qti.qualcomm.com |
| Ericsson | Antonino Orsino | antonino.orsino@ericsson.com |
| CATT | Hao Xu | xuhao@catt.cn |
| vivo | Boubacar | kimba@vivo.com |
| ASUSTeK | Lider Pan | lider\_pan@asus.com |
| Sharp | Chongming Zhang | Chongming.zhang@cn.sharp-world.com |
| InterDigital | Martino Freda | martino.freda@interdigital.com |
| Kyocera | Henry Chang | henry.chang@kyocera.com |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

# 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.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **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-CR  Editor’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**

**Clarification on “has no serving cell”=?RRC\_IDLE**

**The intention is not to exclude inactive UE. When the normal Uu inactive UE moves out of the Uu coverage, it will enters RRC\_IDLE state. The first 1> is to cover the case that there is no Uu RSRP to determine if the UE can act as a remote UE, so it has no relation with the coverage of sidelink frequency.**

**Please note the description is not new, it was introduced in Rel-16 for SL communication for instance as below:**

|  |
| --- |
| 5.8.2 Conditions for NR sidelink communication operation The UE shall perform NR sidelink communication operation only if the conditions defined in this clause are met:  1> if the UE's serving cell is suitable (RRC\_IDLE or RRC\_INACTIVE or RRC\_CONNECTED); and if either the selected cell on the frequency used for NR sidelink communication operation belongs to the registered or equivalent PLMN as specified in TS 24.587 [57] or the UE is out of coverage on the frequency used for NR sidelink communication operation as defined in TS 38.304 [20] and TS 36.304 [27]; or  1> if the UE's serving cell (RRC\_IDLE or RRC\_CONNECTED) fulfils the conditions to support NR sidelink communication in limited service state as specified in TS 23.287 [55]; and if either the serving cell is on the frequency used for NR sidelink communication operation or the UE is out of coverage on the frequency used for NR sidelink communication operation as defined in TS 38.304 [20] and TS 36.304 [27]; or  1> if the UE has no serving cell (RRC\_IDLE); |

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

|  |
| --- |
| 5.8.x3.3 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 serving cell (RRC\_IDLE)~~out of coverage [FFS the definition of OOC], as defined in TS 38.304 [20], clause 8.2~~; or  1> 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:

|  |
| --- |
| 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]. |

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:**

|  |
| --- |
| 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. |

**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.

|  |
| --- |
| 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. |

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.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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  ]]  }   |  | | --- | | ***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. | |

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.**

|  |  |  |
| --- | --- | --- |
| 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.  [Rapp] The intention is not to exclude inactive UE. When the normal Uu inactive UE moves out of the Uu coverage, it will enters RRC\_IDLE state. The first 1> is to cover the case that there is no Uu RSRP to determine if the UE can act as a remote UE, so it has no relation with the coverage of sidelink frequency. Please also see the clarification added in discussion part. |
| 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 sufficient   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~~ 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.   [Rapp] Not sure I misunderstood something, but if the remote UE does not release the paging related info when entering connected state in your proposed change, the relay UE needs to continue the paging monitoring even though no paging will go for this connected remote UE?  [OPPO] we did not try to say “the remote UE does not release the paging related info when entering connected state”, i.e., we agree the paging related info should be deconfigured upon entering connected state. Our point is just no need to mention the RRC state explicitly in the spec. if the comment is on the “~~and when entering connected state it de-configures/releases the paging relate info to relay UE~~”, we are fine to keep it.  And for the other changes in relay UE side, the relay UE will have the paging related info in any case, no way to enter the “else” branch.  [OPPO] with reverting the deletion of “~~and when entering connected state it de-configures/releases the paging relate info to relay UE~~”, should be OK? |
| 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?  [Rapp] No, there is no intention to change legacy spec. in [Pre117-e][605], majority support to introduce new signalling of Uu/PC5 RLC configuration for relay case, then the terminology of “Uu/PC5 RLC channel” will be applied to the relaying RLC bearers only.  [OPPO] Our comment is w.r.t the description in R2-2202820  Regarding terminology of Uu/PC5 RLC channel, both **RLC channel** and **RLC bearer** are used during discussion on bearer mapping. Although we do not see much difference between the two terminologies, it may improve the readability of specifications by choosing a Relay specific terminology to differentiate legacy Uu/PC5 RLC bearer and Relay/Remote UE’s Uu/PC5 RLC bearer sometimes. In this sense, **RLC channel** seems better and it is already used in stage 2 running CR and SRAP specification.  i.e., the usage of RLC bearer (as already in legacy spec) can be avoided anyway,  But we do not have strong view here, i.e., we are OK to rely on RRC-rapp to adopt the proper wording. |
| 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.  [Rapp] Please see the reply to OPPO and also the added clarification in discussion part. |
| 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”.  [Rapp] Please see the reply to OPPO on P4. |
| 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.   [Rapp] Ok, we can make the clarification that the remote UE ignore the legacy one somewhere, it would be reflected in the phase II CR update. |
| 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.  [Rapp] Please see the reply to OPPO on P3.  For the part highlighted in green, I am not sure if network is aware of which remote UE moves to connected state from idle. Because in Uu, the gNB cannot associate a connected UE with idle UE ID (e.g. paging UE ID). |
| 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,   |  | | --- | | 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.  [Rapp] Please see the clarification on why only IDLE is here added in discussion part. I am ok to remove it, seems it creates a lot of confusion… |
| Ericsson | P1 | Even with the clarification from the Rapporteur, still we think that what is propose create confusion and may be misleading. |
| Ericsson | P3 | We also agree with OPPO regarding the wording. Also, we are not sure about he statements from Rapporteur of “*am not sure if the network is always aware when a remote UE moves to connected state from idle.*” Isn’t is so that the network is always aware of the RRC state of its UEs? We are a bit confused…  Another comment we have on the procedural text wording, is that the text should be more aligned with the RRC TS terminology. Not sure if “In remote UE side” and “In relay UE side” is a nice terminology to use. Also, good to refer to RRC messages or field whenever possible (as OPPO mentioned in his suggested text). |
| Ericsson | P4 | In Uu we don’t have RLC channel but instead RLC bearer. At least for Uu we should keep the same terminology as, in practise, we are not creating anything new but just a configuration that is tailored for relay. In this sense, calling it RLC channel would be a NBC change with respect to legacy.  Better to align with what we already have rather than creating new (confusing) terminology. |
| Ericsson | P6 | Similar comment from QC. Instead of adding the new timer in *ue-TimersAndConstants* it would be better to create a new *ue-TimersAndConstants-SL-Relay* and include the new timer there. This is because ue-TimersAndConstants  is optional.  In this case we don’t need to capture in the spec that a UE should ignore legacy fields that are mandatory (a very bad practise that we already did for the timer T304 in the reconfigurationwithsync. |
| CATT | P1 | We propose to change the description of OOC to “1> if the UE ~~has no serving~~ can’t found a suitable cell ~~(RRC\_IDLE)out of coverage [FFS the definition of OOC], as defined in TS 38.304 [20], clause 8.2~~; or” |
| vivo | P1 | We are ok with rapporteur’s intention to add normative text for OoC definition in relay (re)selection. To address the confusion raised by above companies, we suggest to some changes on top of existing text.  **Change #1**: remove RRC\_IDLE and change “serving” cell to “suitable” cell, similar view as CATT commented.  **Change #2**: keep the reference and make sure it’s correct, i.e., this is not the OoC definition for sidelink operation in 8.2, but rather the legacy OoC definition for cell camping in clause 4.5.  For example:  1> if the UE has no suitable cell ~~(RRC\_IDLE)~~, as defined in TS 38.304 [20], clause 4.5 |
| vivo | P6 | For the name, we share the view as Ericsson, i.e., to create a new *ue-TimersAndConstants-SL-Relay* and include the timers with new values there.  For the value, it seems that they are copied from the existing values of legacy T300, T301 and T319. We understand that the agreement to introduce new timers is due to the existing timer value may be not enough for L2 relay scenario. And thus we suggest to double the existing values considering two hop, or alternatively at least some new values longer than the existing values should be introduced.  In addition, it’s noticeable that all timers are put in SIB1 but the SIB1 size limitation may be a problem in some deployment as below in TS 38.331.  *NOTE: The physical layer imposes a limit to the maximum size a SIB can take. The maximum SIB1 or SI message size is 2976 bits.*  So, we suggest to move them from SIB1 to SIB12 as SIB12 is necessary for sidelink relay and currently the SIB12 segmentation mechanism can avoid the size limitation issue as SIB1. |
| Nokia | P1 | The addition of the UE’s RRC state is misleading and technically not correct. We agree with majority to define the out-of-coverage and omit RRC\_IDLE. |
| Nokia | P3 | Can agree to OPPO’s wording wrt the RRC states. |
| Nokia | P4 | Wait for #620 outcome. We agree with Ericsson’s view that there are only RLC bearers but no RLC channels. The issue originates from the 1:1 mapping between RLC and LCID discussed by RAN3 for the correct mapping between DU and CU. We rather prefer not to introduce a misleading terminology. |
| Nokia | P6 | Wrt the naming we prefer Ericsson’s proposal. |
| Sharp | P3 | We are ok with Rapporteur previous version. However, as a complementation, the PC5 connection release, which could also result in the “de-configures/releases the paging relate info to relay UE”, should be considered.  It is proposed that  after the paging related info released by the remote UE or the PC5 connection with the remote UE which has provided the paging related info is released, the relay UE should release the paging UE ID to network if it has reported the info to network, e.g. by updating SUI. |
| InterDigital | P3 | We think the procedure associated with the remote UE should be tied to the RRC state. So when the remote UE moves to IDLE/INACTIVE, it configures the paging. When the remote UE moves to RRC\_CONNECTED, it releases the paging info.  At the relay, the indication to the network to enable/disable the dedicated RRC signalling is triggered by the signalling received by the remote UE (which does not explicitly contain the state).  The above is consistent with the agreements made.  We are therefore fine with the procedure in the box above proposal 3. |

**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.**

|  |  |  |  |
| --- | --- | --- | --- |
| 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.  [Rapp] I understand this was discussed in [Pre117-e][604][Relay] Open issues on relay adaptation layer (OPPO), for sure the CR will be updated according to the conclusions made in the offline. |
| 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.  [Rapp] True. Some existing description for SL communication should be extended to cover discovery as well. This will be considered when we update the CR in phase II. |
| ASUSTeK | 5.8.9.3 | It is possible that SL RLF may occur to a PC5 unicast link for SL communication with other UE.  The current procedural text does not check whether the destination with SL RLF is the relay UE. The RRC connection re-establishment procedure should be initiated only when SL RLF occurs on the relay UE. We suggest to correct it. | The condition check should consider if the destination with SL RLF is the relay UE. For example:  2> if UE is in RRC\_CONNECTED:  3> if the UE is connected with a L2 U2N Relay UE via PC5-RRC connection (i.e. the UE is a L2 U2N Remote UE) and the specific destination is the L2 U2N Relay UE:  4> initiate the RRC connection re-establishment procedure as specified in 5.3.7.  3> else:  4> perform the sidelink UE information for NR sidelink communication procedure, as specified in 5.8.3.3; |
| ASUSTeK | 5.3.7.3a | According to the procedural text, when T311 is running and a suitable relay UE is selected, the UE applies the SL-RLC0 configuration. The UE may have applied the CCCH configuration before applying the SL-RLC0 configuration. In this case, the lower layer of the UE has both RLC entity for SRB0 and RLC entity for SL-RLC0. The UE should have single RLC entity at a time for sending the *RRCReestablishmentRequest* message. | We suggest to add release of RLC entity for SRB0 in clause 5.3.7.3a:  Upon selecting a suitable L2 U2N Relay UE, the L2 U2N Remote UE shall:  …  1> release RLC entity for SRB0; |
| ASUSTeK | 5.3.7.3 | According to the procedural text, when T311 is running and a suitable cell is selected, the UE applies the CCCH configuration. The UE may have applied the SL-RLC0 configuration before applying the CCCH configuration. In this case, the lower layer of the UE has both RLC entity for SRB0 and RLC entity for SL-RLC0. The UE should have single RLC entity at a time for sending the *RRCReestablishmentRequest* message. | We suggest to add release of RLC entity for SL-RLC0 in clause 5.3.7.3:  Upon selecting a suitable NR cell, the UE shall:  …  1> release RLC entity for SL-RLC0; |
| ASUSTeK | 6.3.5 | The agreement on sidelink resource allocation mode configuration for L2 U2N remote UE (i.e. the U2N Remote UE can only be configured to use resource allocation mode 2 for data to be relayed) was not reflected in the endorsed RRC running CR.  Since both fields ***sl-ScheduledConfig*** and ***sl-UE-SelectedConfig*** already included descriptions about configuration limitations (highlighted), we think it is justified to also add the related configuration limitation for L2 U2N remote UE to reflect the above agreement for completeness. | | *SL-PHY-MAC-RLC-Config* field descriptions | | --- | | *…* | | ***sl-ScheduledConfig***  Indicates the configuration for UE to transmit NR sidelink communication based on network scheduling. This field is not configured simultaneously with sl-UE-SelectedConfig. For L2 U2N relay, this field cannot be configured to a U2N Remote UE. | | ***sl-UE-SelectedConfig***  Indicates the configuration used for UE autonomous resource selection. This field is not configured simultaneously with *sl-ScheduledConfig*. For L2 U2N relay, only this field can be configured to a U2N Remote UE. | | ***…*** | |
| Sharp | 5.3.5.8.3 | In the CR, when Txxx expiry (Path switch failure),  *3> revert back to the UE configuration used in the source PCell;*  Based on this, in indirect to direct switch failure, UE could revert the SL-RLC1 configuration for SRB1 which should have been released in the PC5 link release with relay UE. The SRB1 would associate with SL-RLC1.  In the subsequent reestablishment procedure, if a cell is selected, UE would “re-establish RLC for SRB1” (5.3.7.4).  The RLC here (5.3.7.4) should be Uu RLC but not the SL-RLC1.  So the SL-RLC1 config should not be reverted back. And Uu RLC for SRB1 should be established. | It is proposed that  5.3.5.8.3  3> revert back to the UE configuration used in the source PCell excluding PC5 RLC configuration if configured;  5.3.7.4 Actions related to transmission of *RRCReestablishmentRequest* message  …  1> re-establish PDCP for SRB1;  1> if the UE is connected with a L2 U2N Relay UE via PC5-RRC connection (i.e. the UE is a L2 U2N Remote UE):  2> apply the default configuration of SL-RLC1 as defined in 9.2.x for SRB1;  1> else:  12> (re-)establish RLC for SRB1;  12> apply the default configuration defined in 9.2.1 for SRB1;  1> configure lower layers to suspend integrity protection and ciphering for SRB1; |
| InterDigital | 5.8.9.x2.2 | The handling for RRC\_CONNECTED remote UE is not considered for the transmission of the RemoteUEInformationSidelink | Include the following text in this clause:  The L2 U2N Remote UE in RRC\_CONNECTED shall:  1> if the UE has not transmitted *RemoteUEInformationSidelink* since entering into RRC\_CONNECTED  2> include neither *sl-PagingInfo-RemoteUE nor sl-Requested-SI-List* in the *RemoteUEInformationSidelink*   1. submit the *RemoteUEInformationSidelink* message to lower layers for transmission; |
| InterDigital | 5.8.9.x3.2 | In the clause: “upon receiving the SIB request from the connected L2 U2N Remote UE”. This may apply if the SIB is already available at the relay UE. If this is not the case, the relay UE needs to perform the request first. So forwarding occurs only when the SIB is available. | Change this clause to:  *1> upon having available any SIB that is requested ~~receiving the SIB request from~~ by the connected L2 U2N Remote UE as indicated in sl-Requested-SI-List in the RemoteUEInformationSidelink;* |
| InterDigital | 5.8.9.x3.2 | In the clause “upon receiving the updated SIBs requested by the connected L2 U2N Remove UE from the network”, this seems to say that if a remote UE requests a SIB at some point from the relay UE, the relay UE will always forward that SIB. However, if SI forwarding is deconfigured, this should not be the case. | Change the clause to:  *1> upon receiving ~~the~~ anyupdated SIBs having been requested by the connected L2 U2N Remote UE from network, if the connected L2 U2N Remote UE has requested that SIBs be forwarded;* |
| InterDigital | 5.8.9.x3.2 | In the clause “include sl-SystemInformationDelivery if the SystemInformation message received from the network is requested by the L2 U2N Remote UE” does not account for the case when the remote UE requests SI and the remote UE already has it (does not need to receive from the network).  It would be simpler just to refer to the triggers for initiating the transmission of the message based on SI triggers above. | Change the clause to:  *1> include sl-SystemInformationDelivery if any of the conditions for initiating Uu message transfer procedure related to System Information are met ~~if the System Information message received from network is requested by the L2 U2N Remote UE;~~* |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**3.3 Left recommendations from R2-2203591 [Pre117-e][609][Relay] Summary of AI 8.7.2.1 Control plane procedures (InterDigital)**

|  |  |
| --- | --- |
| Recommendation # | Rapporteur suggested handling |
| Recommendation 8: Update the running CR to disable relay UE sending SI update to the remote UE when the remote UE enters RRC\_CONNECTED. | As clarified in email of [Pre117-e][609], the stage CR already captured this aspect and the RRC signalling allow the remote UE to release the requested SI to relay UE.  If companies think above is not sufficient, please give proposed change in Table 3 and let other companies to review. |
| Recommendation 9: Discuss observations 1-3, 6 from R2-2202471 in the running CR discussion. | The rapporteur understands paging monitoring is covered by P3 in 3.1, we can discuss there if P3 is sufficient or not. |
| Recommendation 10: Update the running CR to capture that relay reselection can occur following transmission of the RRCSetupRequest and before the connection is established. | The rapporteur understands the key point of the recommendation is to say when cell selection is performed according to existing procedure, a UE capable or already connected to a relay UE is allowed to perform relay (re)selection as long as the conditions in 5.8.x3.3 are satisfied. This is not specific to setup case, but also applies to other cell selection and reselection, which is captured as a generic NOTE 2 in 5.8.x3.3.   |  | | --- | | NOTE 2: For L2 U2N Remote UE in RRC\_IDLE/INACTIVE, the cell (re)selection procedure as specified in TS 38.304 [20] and relay (re)selection procedure as specified in 5.8.x3.3 are performed independently and up to UE implementation to select either a cell or a L2 U2N Relay UE. |   If companies think this is not enough, please give proposed change in Table 3 and let other companies to review. |
| Recommendation 1: RAN2 discuss whether the remote UE provides the relay UE an indication whether to use the same i\_s to determine the PO in RRC\_INACTIVE as in RRC\_IDLE. | The rapporteur understands this is a new Rel-17 feature agreed just now for Uu paging. Considering we usually do not prioritize the combination of new features in the same release, so the rapporteur suggest not to pursue it in Rel-17 due to limited time. |
| Recommendation 3: A remote UE in RRC\_IDLE/RRC\_INACTIVE receiving NotificationMessageSidelink message with indicationType as relayUE-CellReselection or relayUE-HO and deciding to keep the PC5-RRC connection assumes that a cell reselection occurs. RAN2 discusses how to capture the cell ID acquisition at the remote UE in the running CR if the cell change occurs to the relay. | As discussed in email and online, companies understand that upon reception of the notification, remote UE should recognize there is Uu failure case of the relay UE, so it should pay attention and check if the cell ID in discovery has been changed before it perform any CP procedure via this relay.  If companies think the existing RRC CR is not sufficient, please give proposed change in Table 3 and let other companies to review. |
| Recommendation 4: RAN2 discuss whether the relay UE sends notification message to the remote UE upon CHO triggered at the relay UE. | The rapporteur understands we has discussed if remote UE/relay UE can be configured with CHO, and there was no consensus. Considering it is not an essential issue, the rapporteur suggests not to further discuss CHO related issue for L2 relay operation, i.e. L2 relay UE and remote UE cannot be configured to perform CHO in Rel-17. |
| Recommendation 5: RAN2 discuss whether the relay UE sends notification message to the remote UE upon failed re-establishment. | The rapporteur understands the case we are discussing is that the relay UE experience a Uu RLF and sends Notification to remote UE already, and remote UE decides to keep the PC5 connection. In this case, it is not clear what’s the usage of this subsequent cause indicating reestablishment failure. If the relay wants to release the remote UE, it can perform legacy PC5 connection release, and if it wants to keep the remote, it should continue on recovery of RRC connection.  In addition, this new cause type has been discussed for several meetings, and there was no consensus. Thus the rapporteur suggests not to repeat the same discussion considering limited time. |
| Recommendation 11: RAN2 discuss whether the AS layer sends an indication to upper layer for service request upon reception of a message via SL-RLC0 | The rapporteur understands this point has been raised in previous RRC running CR discussion, and there was no big support, because most of companies think it can be an implementation indication via the internal interface which we usually do not specify much.  Considering this is not an essential issue, the rapporteur suggest not to pursue it. |
| Recommendation 16: RAN2 discuss whether new triggers for reporting SidelinkUEInformationNR (in addition to legacy triggers) are needed for reporting the source L2 ID by a relay UE. | To be discussed in 3.4.3. |

If companies disagree the rapporteur suggested handling, please leave your comments below with your suggested RRC CR change. If only question from companies, but without detailed suggestions, there would be no chance/enough time to adopt it in Rel-17.

**Table 3 Comments one the above left recommendations.**

|  |  |  |
| --- | --- | --- |
| Company | Recommendations # | Comments and proposed change |
| Ericsson | Recommendation 5 | Our understanding of the scenario is that the relay UE perform RRC reestablishment and wants to keep the PC5 connection (thus no PC5-S release) but from a remote UE point of view is good if is informed by the relay UE as the remote UE may trigger cell/relay reselection (and PC5-S release) right away without waiting for the relay UE to restore the connection.  This may save quite a lot of time since the RRC reestablishment procedure may last several second.  For these reason, we think if may be useful to agree on Recommendation 5 |
| OPPO | R5 | We hold the same understanding as running-CR rapp that it is useless should not be pursued.  For the comment by Ericsson, it is confusing, in case the intention is “remote UE may trigger cell/relay reselection (and PC5-S release) right away without waiting for the relay UE to restore the connection”, as clarified by running-CR rapp, the current PC5-RRC message can be already used to notify remote UE upon RLF, so should be sufficient? |
| Xiaomi | R5 | It’s agreed remote UE may choose to wait for potential recovery even after RLF notificaiton. If relay UE’s reestablishment is failed, remote UE should be notified to avoid unnecessary waiting.  Regarding rapp’s comment below, we think this seems to introduce different handling for reestablsiehment failure and other failure cases, i.e. HOF or RLF.  ‘If the relay wants to release the remote UE, it can perform legacy PC5 connection release’  So, we would prefer a common desging to handle all the failure cases, i.e. notificaiton message based. |
| Sharp | Recommendation 3 | We think the reception of notification could trigger remote UE to acquire the cell ID of relay UE, e.g. reception of discovery of relay UE and check if it is changed.  5.8.9.x4.4 Actions related to reception of *NotificationMessageSidelink* message  Upon receiving the *NotificationMessageSidelink*, the U2N Remote UE shall:  1> if the *indicationType* is included:  2> if the UE is L2 U2N Remote UE in RRC\_CONNECTED:  3> initiate the RRC connection re-establishment procedure as specified in 5.3.7;  2> else if the UE is L3 U2N Remote UE, or L2 U2N Remote UE in RRC\_IDLE or RRC\_INACTIVE:  3> if the PC5-RRC connection with the U2N Relay UE is determined to be released:  4> perform the PC5-RRC connection release as specified in 5.8.9.5.  3> else maintain the PC5-RRC connection and acquire the serving cell ID of the relay UE;  4> consider a cell reselection occurs if the serving cell ID is changed; |
| Sharp | Recommendation 5 | Actually, based on legacy Uu behaviour, in Relay UE there are many other abnormal cases will lead Relay UE to release Uu RRC connection locally (i.e. not due to RRCRelease message) including failed re-establishment. Although these abnormal cases will not happen frequently, they should be handled correctly. They can be recognized as a single cause value when sending notification to remote UE. |
| InterDigital | R8 | We do not agree with rapporteur’s suggested handling. Similar to the procedure discussed in P3 for paging, for system information, the remote UE needs to configured/deconfigure SI forwarding at the remote UE when the RRC state changes. For such a procedure, handling of the UE should be captured in stage 3 (not only in stage 2). |
| InterDigital | R10 | We think the rapporteur has misinterpreted the recommendation. The recommendation suggests to have consistency between the resume procedure and the connection establishment procedure and have both mention the case of relay reselection occurring during the procedure.  The suggested change is to add the following in the connection establishment case:  1> if cell reselection occurs while T300 or T302 is running:  1> if relay reselection occurs while T300 is running   1. perform the actions upon going to RRC\_IDLE as specified in 5.3.11 with release cause 'RRC connection failure'; |
| InterDigital | R3 | The existing CR is not sufficient – no where does the remote UE check the cell ID in the discovery message following reception of the indication message. Furthermore, the discovery message may not be transmitted frequently enough for the remote UE to receive it promptly, or the remote UE may not be monitoring discovery from the attached relay.  The suggestion is to indicate that new SI (including SIB1) is forwarded by the relay UE not only when the network updates the SIB, but also when there is updated SIB as a result of a cell change (e.g. relay reselection or relay HO)  In 5.8.9.x3.2, make the following changes:  The L2 U2N Relay UE initiates the Uu message transfer procedure when one of the following conditions is met:  1> upon receiving *Paging* message related to the connected L2 U2N Remote UE from network;  1> upon receiving the SIB request from the connected L2 U2N Remote UE as indicated in *sl-Requested-SI-List* in the *RemoteUEInformationSidelink*;  1> upon receiving the updated SIBs requested by the connected L2 U2N Remote UE from network resulting from SIB update or cell change at the relay UE; |
| vivo | Recommendation 10 | We understand that the keypoint of Recommendation 10 is a bit different from the NOTE2 as the rapporteur explained. Our concern is that when the relay re-selection happens during the RRC establishment procedure, do we handle it as **“RRC connection failure” and inform it to upper layers** ? If the answer is YES, then Recommendation 10 is valid. Actually, the handling is common to RRC establishment and resume procedures |
| Kyocera | R5 | In our view, the need for having reestablishment failure cause value is helpful for the remote UE. In case the relay UE experiences reestablishment failure our understanding is that currently the relay UE has 3 options:   1. send nothing to the remote UE 2. send notification message to the remote UE w/ Uu RLF cause 3. send PC5-S message to release the remote UE.   With option 1, we don’t think it allows the remote UE to understand the Uu connection situation, as the remote UE should probably perform relay re-selection.  With option 2, the remote UE may assume the relay UE will perform reestablishment, so the remote UE may decide to remain connected with the current relay UE.  With option 3, the remote UE may perform relay reselection back to the same relay UE.  Adding the reestablishment failure cause value to the notification message gives the remote UE a better idea of whether it should release the PC5 connection, perform relay reselection (but not towards the same relay UE). |
|  |  |  |
|  |  |  |
|  |  |  |

**3.4 Left recommendations from R2-2202200 [Pre117-e][604][Relay] Open issues on relay adaptation layer (OPPO)**

|  |
| --- |
| Recommendation 3-2b [17/19]: In SUI, when reporting a particular destination L2 ID associated with discovery, RAN2 not pursue explicit relay type indication to differentiate between relay-discovery and non-relay-discovery. |
| Recommendation 3-1a-2 [?/19]: RAN2 discuss whether to report 1) source L2 ID to be used to establish PC5 link with L2 relay UE (i.e., used to send DCR message) or 2) source L2 ID of relay-related discovery transmission to gNB (by assuming it is also the source L2 ID used to send DCR message if model-B discovery is used). And if the latter one is adopted, RAN2 discuss how to handle the case where model-A discovery is used by relay UE. |
| Recommendation 3-1c [?/19]: Relying RRC running-CR discussion on how to specify the initiation condition for source L2 ID reporting, at least including when source L2 ID is updated. |
| Recommendation 3-2d: When L2-relay UE report destination L2 ID of peer UE (i.e., ID of L2-remote UE), RAN2 discuss whether to report an indicator on whether local ID allocation is required [2/6] or not [4/6]. |

**3.4.1 Recommendation 3-2b on explicit relay type indication in SUI to differentiate between relay-discovery and non-relay-discovery**

The rapporteur understands there are two issues requiring the differentiation between relay-discovery and non-relay discovery, i.e. authorization and dedicated configuration of Uu threshold.

1. Authorization

SA2 and RAN3 have agreed that the information on the authorization status of non-relay discovery and relay case are provided to gNB separately as captured in RAN3 BL CR in R3-221587 as below.

9.3.1.x 5G ProSe Authorized

This IE provides information on the authorization status of the UE to use the 5G ProSe services.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| 5G ProSe Direct Discovery | O |  | ENUMERATED (authorized, not authorized, ...) | Indicates whether the UE is authorized for 5G ProSe Direct Discovery |
| 5G ProSe Direct Communication | O |  | ENUMERATED (authorized, not authorized, ...) | Indicates whether the UE is authorized for 5G ProSe Direct Communication |
| 5G ProSe Layer-2 UE-to-Network Relay | O |  | ENUMERATED (authorized, not authorized, ...) | Indicates whether the UE is authorized for 5G ProSe Layer-2 UE-to-Network Relay |
| 5G ProSe Layer-3 UE-to-Network Relay | O |  | ENUMERATED (authorized, not authorized, ...) | Indicates whether the UE is authorized for 5G ProSe Layer-3 UE-to-Network Relay |
| 5G ProSe Layer-2 Remote UE | O |  | ENUMERATED (authorized, not authorized, ...) | Indicates whether the UE is authorized for 5G ProSe Layer-2 Remote UE |

Note that the authorization information is not for network to guess if the UE is request relay service or non-relay service, but to allow network to ensure that the radio resource and configuration can only be provided to the authorized UE, which is already captured in RAN3 BL CR in R3-221587 as “**If the 5G ProSe Authorized IE includes one and more IEs set to “not authorized”, the NG-RAN node shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant ProSe service(s).**” Therefore the rapporteur observes network should be informed that the resource request is for relay or non-relay discovery. Otherwise there is no way to perform the SA2/RAN3 agreed authorization.

**Observation 1: Network should be informed that the discovery request is for relay discovery (L2 relay, L2 remote, L3 relay) or non-relay discovery for authorization.**

2. Dedicated configuration of Uu threshold

In relay case, the transmission of discovery is limited to the case that the UE is in the middle or edge of the Uu cell coverage for coverage enhancement and also to avoid interference to normal Uu link. But for non-relay discovery/communication, there is no such restriction. Thus the network is likely to provide different dedicated configuration to relay discovery and non-relay discovery, not only on Uu threshold but also for the discovery resource pool. For instance, relay can be configured with dedicated RP, while non-relay will be configured with shared RP or vice versa. Companies argued the authorization information can help network to guess which type of discovery is requested by the UE, however, if the UE is authorized as relay/non-relay then there is no way for the network to differentiated. Therefore the rapporteur observes network should be informed that the resource request is for relay or non-relay discovery for proper dedicated configuration of discovery resource as well as the Uu threshold.

**Observation 2: Network should be informed that the resource request is for relay or non-relay discovery to provide proper dedicated configuration of Uu threshold and discovery resource.**

Based on above, the rapporteur suggest to make the signalling clear and clean as LTE and propose:

**Propose 7: UE needs to indicate the discovery type when requesting discovery configuration in SUI, to allow network performing authorization and providing dedicated configuration.**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Technical arguments |
| Ericsson | Agree | We agree with the Rapporteur’s analysis, and we think that the discovery type is needed for the network to authorize the UE.  We also understood the counter argument is that the network may authorize blindly the UE for both non-relay and relay discovery but this is not in line with what agreed by RAN3 and not the directions that we should take. |
| Xiaomi | Comments | We understadn the authorization is done in upper layer, which is invisible at AS, so no need to inform relay or non-relay discoveyr in SUI.  For the resource allocation, we understand it’s not clear whether resource for relay and non-relay discovery should be separate or shared. If they use shared resource there seems to be no need to differentiate relay or non-relay discovery. |
| Sharp | Agree |  |
| Qualcomm | Comments | Although we don’t think it is original intention, we can follow majority. But **we want to confirm that is just indication between {relay discovery, non-relay discovery} without further indication bit =>please confirm** |
| vivo | Agree | We share the similar view as rapporteur. We think that the discovery type (L2 relay, L2 remote, L3 relay, non-relay) should be informed to the network for UE authorization. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3.4.2 Recommendation 3-1a-2 on which source L2 ID to be reported by remote UE**

The rapporteur understands during the email discussion companies think both of the following options are feasible but option 1) may have more requirement on remote UE side.

Option 1) source L2 ID to be used to establish PC5 link with L2 relay UE (i.e., used to send DCR message)

Option 2) source L2 ID of relay-related discovery transmission to gNB (by assuming it is also the source L2 ID used to send DCR message if model-B discovery is used).

However, the rapporteur see option 2) may not work, and would like to check companies view first.

As illustrated in the below figure, the discovery procedure and PC5 connection establishment procedure are to be performed between relay UE and remote. Even for model B in the left figure, we see the remote UE assigned source L2 ID for discovery and DCR are different (otherwise the discovery and unicast will share the same <remote UE L2 ID, relay UE L2 ID> pair which is unaligned with SA2/RAN2 understanding.), then if remote UE reports L2 ID #1, the relay UE can not recognize the remote UE after path switch based on L2 ID #1. Then it means remote UE needs to report the source L2 ID #4 to be used for PC5 connection, i.e. option1.

Remote

Relay

Discovery request <1, 2>

Discovery response <3, 1>

DCR <4, 3>

SMC <3, 4>

<SRC ID, DST ID>

Remote

Relay

Discovery <3, 1>

DCR <4, 3>

SMC <3, 4>

**Proposal 8: Remote UE shall report source L2 ID to be used to establish PC5 link with L2 relay UE (i.e., used to send DCR message) to network which is to be configured to the target relay UE during path switch**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Technical arguments |
| Ericsson | No strong view | We think that Option 1 it may be simpler but we can go with majority if Option 2 if preferred. |
| OPPO | Agree | Based on the latest S2 progress, they are about to confirm what R2 asked for in the LS last meeting, i.e., the source ID used for discovery/communication should be different. Then option-1 logically does not work.  The latest conclusion from S2 (LS in draft format)  SA2 confirms the assumption from RAN2 that discovery and data are ALWAYS associated to different destination L2 IDs for a particular UE, and confirms that the assumption is valid for both relay and non-relay discovery, and valid for both model A and model B discovery with the agreed changes in CR0075 as attached. |
| ASUSTeK | Agree |  |
| Xiaomi | Comments | We understand this question depends on SA2 design. To complete the WI, we can leave it to UE implementation to inclue which L2 ID. |
| Sharp | Agree | In addition, we may need to check whether the same source L2 ID will be used to send DCR message for different L2 relay UE. |
| Qualcomm | No:  Option 1 needs LS to SA2 for issue checking on spec impact of L2 ID management  Option 2 needs further design | Option 1 has SA2 impact because it mandates remote UE to use the same source L2 ID irrespective of different L2 relay UE. As we know, the principle of L2 ID management is that source L2 ID is dedicated to one PC5 link. We think it will break this principle. So, if Option 1 is agreed, we think one LS needs to send to SA2 for issue checking.  [OPPO] not sure if I follow the “SA2 impact”, I thought option-1 is not to prevent the implementation of “source L2 ID is dedicated to one PC5 link”, e.g., if a same remote UE would like to use different source ID for relay-1 and relay-2 (e.g., originally it camps on relay-1, then switch to direct path, then switch to relay-2), it can report the updated source-ID to network.  For the issue of Option 2 mentioned by Rapporteur, we think it can be resolved in this way: remote UE provides its source L2 ID for discovery to relay UE when the PC5 link establishment  [OPPO] not sure I follow, the point is the SA2 has already clearly say discovery and communication would use different ID (as requested by R2 last meeting), how for R2 to revert it? |
| vivo | Agree | From our understanding, option 1 is feasible but option 2 is not feasible since SA2 confirms that discovery and data are always associated to different destination L2 IDs for a particular UE |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3.4.3 Recommendation 3-1c on how to specify the initiation condition for source L2 ID reporting, at least including when source L2 ID is updated**

In rapporteur’s understanding, the intiation condition is quite striaightfoward, i.e.

* for relay UE when it has interest in being a L2 relay UE, then it should report the source L2 ID (e.g. together with the discovery configuration request), and when the interest/reported info has been changed, it should also send SUI to update the reporting.
* for remote UE when it has interest in being a remote UE (i.e. can be switched from direct link to indirect link), then it should report the source L2 ID, and when the interest/reported info has been changed, it should also send SUI to update the reporting.

**Proposal 9: Capture the above intiation condition in RRC CR for reporting source L2 ID for L2 relay UE and L2 remote UE.**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Technical arguments |
| Ericsson | Agree but | We think that also the case on when the source L2 ID changes should trigger the SUI message.  Also, we need to cover the case on when the relay UE performs handover or change the serving cell. |
| OPPO | Agree | For the comment by Ericsson:  The L2 ID update case should be covered by “when the interest/reported info has been changed” as described by rapp above.  And we are not sure why HO/cell-change should lead to a report.. |
| ASUSTeK | Agree with comment | We assume that the above initiation condition for relay UE is already in RRC\_CONNECTED. That is, upon the relay UE in RRC\_CONNECTED is configured by upper layer to become a L2 relay UE, the SUI for reporting source L2ID is triggered.  However, in case the target relay UE for path switching is in RRC\_IDLE/INACTIVE, we think **relay UE should trigger to report source L2 ID after RRC connection establishment/resumption** (which is initiated due to reception of the RRC Reconfiguration Complete message from remote UE) so that gNB can recognize the target relay UE and then provide at least the Uu configuration for SRB1 and local ID of the remote UE to relay UE for forwarding the RRC Reconfiguration Complete message to gNB. |
| Xiaomi | Disagree with ‘interest’ based condition | We prefer to replace ‘interest’ with ‘capable’.  In other relay/remote procedures of running CR, the initiation is based on UE is capable of relay/remote, e.g. discovery message transmssion.  If we introduce interest based initiation only in L2 ID report procedure, this may result in a UE, which is capable of relay but has no interest in being relay, performs discovery transmission according to Uu threshold and can be selected by remote UEs, but the relay UE doesn’t report L2 ID.  So, the modification is given as following,   * for relay UE when it is capable of being a L2 relay UE, then it should report the source L2 ID (e.g. together with the discovery configuration request), and when the reported info has been changed, it should also send SUI to update the reporting.   for remote UE when it is capable of being a remote UE (i.e. can be switched from direct link to indirect link), then it should report the source L2 ID, and when thereported info has been changed, it should also send SUI to update the reporting. |
| Sharp | Agree |  |
| Qualcomm | Agree with Ericsson | We think it is necessary to explicitly capture that “the source L2 ID changes should trigger the SUI message”. We disagree “interest changes” == “source L2 ID changes”. If it is common understanding that source L2 ID change should trigger SUI, we don’t understand why RAN2 takes much time to change another wording for the same intention. |
| vivo | Agree with comments | We agree the above initiation conditions.  We want to further clarify that relay UE will reportsource ID of relay-related discovery transmission and remote UE will report source ID to be used to establish PC5 link with L2 relay UE |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**3.4.4 Recommendation 3-2d on whether to indicate the local ID allocation is required when L2-relay UE report destination L2 ID of peer UE (i.e., ID of L2-remote UE)**

The rapporteur understands this question is related to the signaling design of SUI, and according the Monday agreements below, the field for discovery configuration request as *sl-TxResourceReqListDisc* and for relay communication as *sl-TxResourceReqListCommRelay* are added.

Recommendation 3-2a [18/19]: L2-remote, L2-relay, L3-remote and L3-relay UE report destination L2 ID for discovery transmission. L2-relay-UE, L3-remote-UE and L3-relay-UE report (i.e., except L2-remote-UE) destination L2 ID for established PC5 link for relaying.

Recommendation 3-2c [16/19]: For the destination L2 ID reporting for discovery and for established PC5 link for relay, add a new IE (i.e., instead of reusing the existing field sl-DestinationIdentity).

Recommendation 3-1a-1 [19/19]: L2 relay UE report source L2 ID of relay-related discovery transmission to gNB.

SidelinkUEInformationNR-r16::= SEQUENCE {

criticalExtensions CHOICE {

sidelinkUEInformationNR-r16 SidelinkUEInformationNR-r16-IEs,

criticalExtensionsFuture SEQUENCE {}

}

}

SidelinkUEInformationNR-r16-IEs ::= SEQUENCE {

sl-RxInterestedFreqList-r16 SL-InterestedFreqList-r16 OPTIONAL,

sl-TxResourceReqList-r16 SL-TxResourceReqList-r16 OPTIONAL,

sl-FailureList-r16 SL-FailureList-r16 OPTIONAL,

lateNonCriticalExtension OCTET STRING OPTIONAL,

nonCriticalExtension SidelinkUEInformation-v17xy-IEs OPTIONAL

}

SidelinkUEInformation-v17xy-IEs ::= SEQUENCE {

sl-TxResourceReqListDisc-r17 SL-TxResourceReqListDisc-r17 OPTIONAL,

sl-TxResourceReqListCommRelay-r17 SL-TxResourceReqListCommRelay-r17 OPTIONAL,

...

}

SL-TxResourceReqListDisc-r17 ::= SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-TxResourceReqDisc-r17

SL-TxResourceReqDisc-r17 ::= SEQUENCE {

sl-DestinationIdentityDisc-r17 SL-DestinationIdentity-r16,

sl-SourceIdentity-RelayUE-r17 SL-SourceIdentity-r17 OPTIONAL,

sl-CastTypeDisc-r17 ENUMERATED {broadcast, groupcast},

sl-TxInterestedFreqListDisc-r17 SL-TxInterestedFreqList-r16,

disc-Type-r17 ENUMERATED {relay, non-Relay},

...

}

SL-TxResourceReqListCommRelay-r17 ::= SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-TxResourceReqCommRelay-r17

SL-TxResourceReqCommRelay-r17 ::= SEQUENCE {

sl-DestinationIdentityU2N-r17 SL-DestinationIdentity-r16 OPTIONAL,

sl-TxInterestedFreqListU2N-r17 SL-TxInterestedFreqList-r16,

sl-LocalID-Request-r17 ENUMERATED {true} OPTIONAL,

sl-PagingIdentity-RemoteUE-17 SL-PagingIdentity-RemoteUE-17 OPTIONAL, -- Cond L2RelayUE

ue-Type-r17 ENUMERATED {relayUE, remoteUE},

...

}

}

SL-InterestedFreqList-r16 ::= SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF INTEGER (1..maxNrofFreqSL-r16)

SL-TxResourceReqList-r16 ::= SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-TxResourceReq-r16

SL-TxResourceReq-r16 ::= SEQUENCE {

sl-DestinationIdentity-r16 SL-DestinationIdentity-r16,

sl-CastType-r16 ENUMERATED {broadcast, groupcast, unicast, spare1},

sl-RLC-ModeIndicationList-r16 SEQUENCE (SIZE (1.. maxNrofSLRB-r16)) OF SL-RLC-ModeIndication-r16 OPTIONAL,

sl-QoS-InfoList-r16 SEQUENCE (SIZE (1..maxNrofSL-QFIsPerDest-r16)) OF SL-QoS-Info-r16 OPTIONAL,

sl-TypeTxSyncList-r16 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-TypeTxSync-r16 OPTIONAL,

sl-TxInterestedFreqList-r16 SL-TxInterestedFreqList-r16 OPTIONAL,

sl-CapabilityInformationSidelink-r16 OCTET STRING OPTIONAL

}

SL-TxInterestedFreqList-r16 ::= SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF INTEGER (1..maxNrofFreqSL-r16)

SL-QoS-Info-r16 ::= SEQUENCE {

sl-QoS-FlowIdentity-r16 SL-QoS-FlowIdentity-r16,

sl-QoS-Profile-r16 SL-QoS-Profile-r16 OPTIONAL

}

SL-RLC-ModeIndication-r16 ::= SEQUENCE {

sl-Mode-r16 CHOICE {

sl-AM-Mode-r16 NULL,

sl-UM-Mode-r16 NULL

},

sl-QoS-InfoList-r16 SEQUENCE (SIZE (1..maxNrofSL-QFIsPerDest-r16)) OF SL-QoS-Info-r16

}

SL-FailureList-r16 ::= SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-Failure-r16

SL-Failure-r16 ::= SEQUENCE {

sl-DestinationIdentity-r16 SL-DestinationIdentity-r16,

sl-Failure-r16 ENUMERATED {rlf,configFailure, spare6, spare5, spare4, spare3, spare2, spare1}

}

When the relay/remote/non-relay request discovery configuration, it needs to include *sl-DestinationIdentityDisc*. In case of L2 relay UE, it needs to include its source L2 ID in *sl-SourceIdentity-RelayUE* according to Monday agreement.

When the relay/remote UE requests communication configuration for the established PC5 communication, it needs to include *sl-TxResourceReqListCommRelay*. In case of L2 relay UE, when it reports the remote UE’s destination ID for communication, it is in DCR/SMC phase, i.e. remote UE does not send first RRC message to relay UE yet, so the relay UE can not request local UE ID at that time point, it can include remote UE’s paging UE ID or indicate request for local UE ID via a explicit signalling later.

**Proposal 10: L2 relay UE can request the local ID allocation for a remote UE via explicit indication in SUI.**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Technical arguments |
| Ericsson | Agree |  |
| ASUSTeK | Agree |  |
| Xiaomi | Comments | We understand the request for local ID allocation can occurs after first RRC message reception. So, it may be unnecessary to include explict indication to request local ID allocation. |
| Sharp | Agree |  |
| Qualcomm | Comments | Although it is a minor issue, Rapporteur’s below explanation confused me:  “*When the relay/remote UE requests communication configuration for the established PC5 communication, it needs to include sl-TxResourceReqListCommRelay. In case of L2 relay UE, when it reports the remote UE’s destination ID for communication, it is in DCR/SMC phase, i.e. remote UE does not send first RRC message to relay UE yet*,”  We don’t understand why it is in “DCR/SMC phase”. According to current agreement, only after relay UE received the SRB0 message with default PC5 RLC channel, it can send SUI to gNB for local ID request. Could Rapporteur explain how remote UE can send SRB0 message with default PC5 RLC channel in DCR/SMC phase? |
| vivo | Agree |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Please company check the above SUI message design, and provide suggested change if any in Table 4

**Table 4 Comments one SUI message design.**

|  |  |
| --- | --- |
| Company | Comments and proposed change |
| ASUSTeK | Source L2ID of remote UE is missing in the above SUI message design. |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

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