**3GPP T****SG-RAN WG2 Meeting #124 *R2-23xxxxx***

**Chicago, USA, Nov. 13th – 17th, 2023**

**Agenda item: 7.9.1**

**Source: Huawei, HiSilicon**

**Title: RRC open issues for Rel-18 Multi-path**

**Document for: Discussion**

1. Introduction

During running CR drafting and updating, some open issues were identified. In this contribution, the open issue list is provided which can be taken as a reference for further discussion and issue tracking.

1. Discussion

## 2.1 Comments collection

In [Post123bis][417][Relay] Rel-18 relay RRC multi-path CR (Huawei), companies are invited to review the existing issues in table 1, and add new issues in table 2.

## Table 1: the existing open issues

|  |  |  |
| --- | --- | --- |
| Issue no. | Issue description and status | Rapporteur’s suggestion |
| Issue#1. **Terminologies/definitions** of Multi-path, SL indirect path, N3C indirect path. (Common to scenario 1 and scenario 2) | After initial offline among WI CR editors and the post email discussion on [Post123][413] RRC CR for MP relay, the following definitions are captured in the endorsed CR R2-2309310:   |  | | --- | | **Multi-path:** Mode of operation of a remote UE in RRC\_CONNECTED configured with one direct path on which the UE connects to gNB using NR Uu, and one indirect path on which the UE connects to the same gNB via a relay UE using L2 U2N relay operation or non-3GPP connectivity.  **N3C indirect path:** In multi-path, the indirect path on which the remote UE connects to network via a relay UE using non-3GPP connectivity.  **SL indirect path:** In Multi-path, the indirect path on which the L2 U2N Remote UE connects to network via a L2 U2N Relay UE. |   It was observed that some companies may still have comments on the wording, and there is misalignment between stage 2 CR and RRC CR. For instance, L2 U2N Relay/relay UE on indirect path is used in RRC CR, but MP relay UE is used instead in stage 2 CR, thus some companies propose to add the definition of MP relay UE in RRC as well.  During CR update in [Post123][407], the definitions are updated to below, which seems clearer.  **Multi-path:** Mode of operation of a UE in RRC\_CONNECTED configured with one direct path on which the UE connects to gNB using NR Uu, and one indirect path on which the UE connects to the same gNB via another UE using PC5 unicast link or Non-3GPP Connection.  **MP remote UE**: A UE configured with Multi-path. When the connectivity of indirect path is PC5 unicast link, the MP remote UE is acting as a L2 U2N Remote UE. When the connectivity of indirect path is Non-3GPP Connection, the MP remote UE is acting as a N3C remote UE.  **MP relay UE**: A UE that provides connectivity of indirect path to a MP remote UE. When the connectivity is PC5 unicast link, the MP relay UE is acting as a L2 U2N Relay UE. When the connectivity is Non-3GPP Connection, the MP relay UE is acting as a N3C relay UE.  **SL indirect path:** In Multi-path, the indirect path using PC5 unicast link.  **N3C indirect path:** In multi-path, the indirect path using Non-3GPP Connection. | Continue the discussion during CR update. |
| Issue#2.1 Whether the PC5 unicast link can be maintained during **direct path addition/release** and **direct path change without indirect path change** procedures. (Scenario 1 only) | The issue has impact on RRC spec, i.e. when the Remote UE receives the direct path addition/release command or direct path change without indirect path change command, if it maintains the indirect path by default, the SL configurations in source side will be taken as baseline, on top of which the target configuration applied. But this kind of handling may not work in case of security update during the path management procedures.  In email discussion [Post123][407], it is assumed the source PC5 link will be maintained during direct path addition, but whether/how it can be maintained in all cases has not be discussed/confirmed, thus some dedicated discussion is needed. | To be discussed. |
| Issue#3-1. Stop condition for connected relay UE or in case of idle/inactive relay UE triggered to connected state by PC5-RRC. (Scenario 1 only) | This issue is under discussion in [Post123][407].  Regarding which message to be used as PC5-RRC trigger, there was no conclusion from [Post123][407]. In [Post123bis][417] CR update, the CR rapporteur suggests to use RemoteUEInformationSidelink which is majority view in [Post123][407], and no companies raised objection. Therefore rapporteur understand this way is acceptable.  Regarding how to handle T420-like time, the left issue is stop condition for connected relay UE or in case of idle/inactive relay UE triggered to connected state by PC5-RRC. | RemoteUEInformationSidelink is used in the CR update, which can be further checked by companies in CR discussion.  To discuss the stop condition for connected relay UE or in case of idle/inactive relay UE triggered to connected state by PC5-RRC. |
| Issue#3-2. Whether T420-like time is applicable for scenario 2. | In [Post123bis][417], companies raised a question that whether T420-like time is applicable for scenario 2, for which a EN was added. | To be discussed. |
| Issue#3-3. Whether/how to identify Rel-18 relay UE supporting PC5-RRC trigger from Rel-17 relay UE not supporting PC5-RRC trigger by gNB when configuring an idle/inactive relay UE to remote UE. | In RAN2#123bis meeting, based on companies’ proposal, RAN2 discussed and made a WA that Rel-17 Relay UE can be used in Rel-18 MP, because from Relay UE perspective Rel-18 MP operation has no difference from Rel-17 L2 U2N Relay operation other than the PC5-RRC trigger. Then the next question is whether/how to identify Rel-18 relay UE supporting PC5-RRC trigger from Rel-17 relay UE not supporting PC5-RRC trigger by gNB. There were two views:  Option 1. no solution is needed, which means gNB has no way to differentiate the two kinds of relay UE and needs to configure SRB1 with duplication in all cases.  Option 2. Rel-18 UE can indicate the support of PC5-RRC trigger to remote UE and let remote UE report it to gNB.  The rapporteur understands this can be further discussed in next meeting, if no conclusion can be achieved on option 2, it means we fall back to option1. And this issue can be closed. | To be discussed. |
| Issue#4-1. Which message is used for **indirect path failure reporting.** (Common to scenario 1 and scenario 2) | This issue has been discussed in previous meeting, but no conclusion was achieved, the following options are on table:  1. indirect path failure is reported via the *MCGFailureInformation* message  2. indirect path failure is reported via the *SidelinkUEInformationNR* message  3. indirect path failure is reported via a new message  In [Post123bis][417], the CR rapporteur suggests to use new message to accommodate scenario 1 and scenario 2, only one company (OPPO) made comment and propose to use SUI. | New message (i.e. IndiretPathFailureInformation) is used for indirect path failure reporting in scenario 1 and scenario 2 in the CR update, which can be further checked by companies in CR discussion. |
| Issue#4-2. For **indirect path failure reporting**,   * which failure type can be included; | In [Post123bis][417], companies have different view on whether failure type and available relay UE info/measurement results can be included. Although the rapporteur understands it would be good to align with legacy failure reporting/recovery mechanism, i.e. to have failure type and available info, it can be further discussed in the meeting. | To be discussed. |
| Issue#4-3. For **indirect path failure reporting**,   * whether available relay info/measurement results can be include; | In [Post123bis][417], companies have different view on whether failure type and available relay UE info/measurement results can be included. Although the rapporteur understands it would be good to align with legacy failure reporting/recovery mechanism, i.e. to have failure type and available info, it can be further discussed in the meeting. | To be discussed. |
| Issue#5. Editor’s Note: FFS how to handle relayUE-HO. (Scenario 1 only) | The issue has been discussed in previous meeting, but no consensus was achieved. The options on table include:  Option 1: NW ensures that before relay UE’s HO, the indirect path is released at remote UE.  Option 2: relay UE indicates Uu HO in notification message to remote UE in Rel-17 way, and remote UE can suspend indirect path and wait for NW reconfiguration. | To be discussed. |
| Issue#6. Which message is used to report relay UE in scenario 2, and whether multiple relay UEs can be reported. (Scenario 2 only) | This issue has not been discussed in previous meetings. The candidates may include:  1. relay UE(s) is reported via UE information procedure.  2. relay UE(s) is reported via UE Assistance Information.  3. relay UE(s) is reported via measurement reporting.  In [Post123bis][417] CR update, the CR rapporteur suggests to use UE Assistance Information, and no companies raised objection. Therefore rapporteur understand this way is acceptable. | UE Assistance Information is used in the CR update, which can be further checked by companies in CR discussion. |
| Issue#7. Whether/how idle/inactive relay UE can be reported in scenario 2. (Scenario 2 only) | This issue has been discussed in previous meetings, but no conclusion was achieved. If the reporting is allowed, which UE ID to be reported, there are following options:  1. S-TMSI for idle relay UEs, and I-RNTI for inactive relay UEs.  2. new UE IDs.  According to RAN2#123 meeting that Reporting of idle/inactive relay UEs in scenario 2 is not supported in Rel-18, this issue can be considered as concluded. | Already addressed. |
| Issue #x1: whether to support path activation/deactivation for better power saving in MP | This issue has not been discussed, and was suggested to be added in open issue list by companies. | Can be considered as enhancement and discussed with lower priority. |
| Issue #x2: Regarding direct path addition/change/release, confirm the following signaling design:  Case 1. For direct path addition, i.e. the L2 Remote UE already has accessed network via a L2 U2N Relay UE, to switch PCell from indirect path to direct path, Rel-17 indirect-to-direct path switch procedure and signaling (reconfigurationWithSync) can achieve the purpose.  Case 2: For direct path change, legacy PCell change procedure and signaling (reconfigurationWithSync) can achieve the purpose.  Case 3: For direct path release,  3.1: if indirect path is to be released together with direct path, RRCRelease message can achieve the purpose.  3.2: if only direct path is release meanwhile the PCell is to be switched to indirect path after direct path is release, Rel-17 direct-to-indirect path switch procedure and signaling (pathSwitchConfig included in reconfigurationWithSync) can achieve the purpose. | Considering several companies made comments on indirect path procedure, it may be useful to clarify/confirm the logic of the signaling design logic.  If companies have strong concerns on the current design, text proposals are welcome, so that discussion can be triggered based on that. | Discussion can be triggered by company contributions, otherwise can be further checked during CR discussion. |

## Table 2: collect companies views on other/more open issues

|  |  |  |
| --- | --- | --- |
| Company name | Issue description | Comments or suggestions |
| Xiaomi | Whether UE can report available candidate relay UE measurement result in indirect path failure recovery message. Which message can be used is covered by issue#4. | If direct path fails, UE can report available cell measurement result in MFI. So that NW can choose the appropriate cell to perform direct path recovery, e.g. direct path change. Following the same logic, UE shall be able to report available relay UE measurement result during indirect path failure recovery message. So that NW can choose the appropriate relay UE to perform indirect path recovery, e.g. indirect path change.  [Lenovo] We have same view as Xiaomi which align with the legacy principle.  [Rapp] Merged into issue#4. |
| Xiaomi | How relay UE forward SIB1 in MP.  In R17, relay UE would forward SIB1 in unsolicited way according to following spec,  ‘The L2 U2N Relay UE initiates the Uu message transfer procedure when at least one of the following conditions is met:  …  1> upon unsolicited SIB1 forwarding to the connected L2 U2N Remote UE or upon receiving the updated *SIB1* from network;’  However, in MP, the serving cell of remote UE and relay UE may be different. The forwarded SIB1 is useless and result in additional signaling overhead. | If remote UE’s serving cell is different from relay UE’s serving cell, relay UE doesn’t forward SIB1 to remote UE. Relay UE can acquire remote UE’s serving cell ID in discovery message by implementation.  [Rapp] it seems the unsolicited SIB1 forwarding does not apply to the connected remote UE, so no forwarding issue in MP. |
| Sharp | Redundant report of *ConfigFailure* during T4xx  T4xx is stopped upon reception of *RRCReconfigurationCompleteSidelink* message.  However, *RRCReconfigurationFailureSidelink* could also be received during T4xx is running..  It results reporting *ConfigFailure* to NW by *SidelinkUEInformation*.  After that, when T4xx is expired, Indirect path failure information is used to report failure type t4xx-Expiry to NW.  So the report of *ConfigFailure* during T4xx is running is redundant. | Restrict the report of *ConfigFailure* only when T4xx is not running.  5.8.9.1.8 Reception of an *RRCReconfigurationFailureSidelink* by the UE  The UE shall perform the following actions upon reception of the *RRCReconfigurationFailureSidelink*:  1> stop timer T400 for the destination, if running;  1> continue using the configuration used prior to corresponding *RRCReconfigurationSidelink* message;  1> if UE is in RRC\_CONNECTED:  2> perform the sidelink UE information for NR sidelink communication procedure, as specified in 5.8.3.3 if T4xx is not running or clause 5.10.15 in TS 36.331 [10];  [Rapp] For clarification, the current agreement is T4xx is stopped upon receiving PC5 RLC Ack of the RRCReconfigurationComplete message in case SRB1 with duplication is configured. So for now it is not relevant to PC5 reconfiguration. We can wait for the further downselection for PC-RRC trigger. |
| Sharp | According to the CR, the relay UE is always released if *sl-IndiretPathAddChange* is released.    A UE configured with MP could experience the direct-to-indirect path switch. In this case, *sl-IndiretPathAddChange* has to be released, However, the target relay UE could be the same as the source relay UE.  The release of the source relay UE is no necessary in this case, and it could be kept. | The relay UE could be identified to avoid unnecessary release.  1> else if *sl-IndirectPathAddChange* is set to *release*:  2> consider the SL indirect path is released and release the corresponding configurations;  2> indicate to upper layer (to trigger the PC5 unicast link release) with the L2 U2N Relay UE which identity is different from the identity included in *sl-PathSwitchConfig*.  [Rapp] Yes, I understand this is covered by Issue#2, i.e. if PC5 unicast can be maintained, when and how the remote UE determine to maintain. |
| NEC | How to identify Rel-17 relay UE by gNB since PC5 based method is only available for Rel-18 relay UE in idle/inactive?  Rel-17 relay UE doesn’t support PC5 based method for trigging idle/inactive relay UE to entering RRC connected. | This issue has been discussed in previous meetings, but no conclusion was achieved. And it is not covered by any post email discussion now, thus further discussion is needed in next meeting.  [Rapp] Agree, this is added in the table 1 as issue 3-3. |
| Samsung | #Issue 1   * A. Non-3GPP connectivity vs. non-3GPP connection * B. Relay UE with N3C indirect path | 1. In most of places of RRC, “non-3GPP connection” is used. However, two places (i.e., definitions of multi-path and N3C indirect path) use “non-3GPP connectivity”. It is better to align. 2. Company suggest to use “relay UE N3C indirect path”. How about use a short name with similar format as Rel-17, e.g., N3C relay UE, N3C remote UE. Meanwhile, in section 3.1, we can add the definitions.   [Rapp] Thanks for the suggestions. I think the v9\_Rapp of the RRC CR reflected the suggested changes. |
| Samsung | #Issue 5   * Handling of relayUE-HO | This issue is also applicable for scenario 2.  [Rapp] My understanding is that there is no NotificationMessageSidelink, so this issue is not relevant to scenario 2. |
| Samsung | Triggering of indirect path failure information, which includes in Clause 5.7.3c.2 of current running CR:   * upon detecting a SL indirect path failure, including sidelink radio link failure on the PC5 unicast link or Uu failure of the L2 U2N Relay UE; * upon detecting a N3C indirect path failure, including N3C connection failure and Uu radio link failure of the relay UE with N3C indirect path | Some triggering is missing, e.g.,   * T4xx expiry * receiving NotificationMessageSidelink message with indicationType of relayUE-HO, relayUE-CellReselection, relayUE-Uu-RRC-Failure   According to the setting of failureTypeIndirectPath IE, the failure can be also caused by two cases, 1) receiving NotificationMessageSidelink message, 2) cell change.   * The case of “cell change” can be covered by “receiving NotificationMessageSidelink”.   [Rapp] Thanks for the suggestions. As discussed online and explained in CR, cell change does not equal to receiving NotificationMessageSidelink which can be only used in the case remote UE already setup unicast link, and the online conclusion is how to determine cell change is reuse Rel-17 handling, i.e. left to UE implementation. Other than this, I think the v9\_Rapp of the RRC CR reflected the suggested changes. |
| Lenovo | Regarding the case of the direct path addition after UE has the indirect path already, the failure may happen in the PC5 link or Uu interface of the indirect path. Specifically, the remote UE may receive the notification message from relay UE due to e.g Uu RLF in the indirect path when UE is performing the direct path addition procedure. Or the remote UE may detect RLF on PC5 link in the first path when UE is performing the second direct path addition procedure. Same situation happens in direct path change case. | Suggest to discuss the case that the remote UE detects PC5 RLF or receives the notification message/PC5 unicast release message from relay UE when UE is performing the direct path addition/change procedure.  [Rapp] Thanks for the comments. In general, we do not see critical issue other than what we have discussed and agreed. My understanding is that once the indirect-to-direct path switch succeed, the UE can use indirect path failure reporting recovery mechanism in MP. Before that, i.e. MP is not configured successfully, the legacy Rel-17 behavior should apply. |
| Lenovo | The RLF may happen in the direct path during indirect path addition/change. Specifically, when the timer for the indirect path addition/change is running, the remote UE detects RLF on direct path. | Suggest to discuss this case that RLF on direct path is declared when UE is performing indirect path addition/change.  [Rapp] similar to the above reply, once indirect path addition/change procedure succeed, the UE can use direct path failure reporting recovery mechanism in MP. Before that, i.e. MP is not configured successfully, the legacy Rel-17 behavior should apply. |
| CATT | In the last RAN2 meeting, the following working assumption is reached:  Working assumption:  Rel-17 relay UEs can be considered as candidate target UEs for MP procedures.  If this working assumption can be confirmed, it should further discuss whether enhancement is needed to help the gNB decide when to use the new PC5-RRC signaling to trigger IDLE/INACTIVE relay UE enter CONNECTED. | Further discussion on this issue is needed in the next meeting to determine whether gNB should be aware of the relay UE’s release.  [Rapp] Issue 3-3 is added in table 1. |
| CATT | In Uu CA, SCell activation/deactivation was introduced for further power saving, whether path activation/deactivation should be introduction for MP case for better power saving? | This issue has not been discussed, it had better discuss this in the next meeting to conclude on this issue.  [Rapp] It seems the basic MP functionality is not impacted without indirect path activation/deactivation, so we suggest to add this as low priority issue/enhancement. |
| Lenovo | In Rel-17, we handle the cases including relayUE-Uu-RLF, relayUE-HO, relayUE-CellReselection relayUE-Uu-RRC-Failure related to notification message. Only relayUE-CellReselection was discussed and concluded as follows. We need to further cover the remaining cases including relayUE-Uu-RLF, relayUE-HO, relayUE-Uu-RRC-Failure since RAN2 think it is normal case rather than rare case.  *upon the MP relay UE cell change to a different cell from the target cell commanded by the gNB, the remote UE considers that there has been an indirect path change/addition failure.* | Suggest to discuss the case that the remote UE receives notification message due to relayUE-Uu-RLF, relayUE-HO, relayUE-Uu-RRC-Failure when UE is performing indirect path addition/change.  [Rapp] similar to the above reply, once indirect path addition/change procedure succeed, the UE can use direct path failure reporting recovery mechanism in MP. Before that, i.e. MP is not configured successfully, the legacy Rel-17 behavior should apply. |
| InterDigital | In RAN2#119bis-e, it was agreed to support release of both the direct path and indirect path:  Agreements:  Proposal 1-1A (modified): The following cases are to be supported for Scenario 1.  A. The remote UE operating only on the direct path adds the indirect path under the same gNB;  B. The remote UE operating only on the indirect path adds the direct path under the same gNB;  C. The remote UE operating in multi-path releases the indirect path;  D. The remote UE operating in multi-path releases the direct path;  G. The remote UE operating in multi-path changes to a new relay UE for the indirect path while keeping the direct path under the same gNB. FFS if this case would be supported via separate release-and-add (A+C in separate reconfigurations) or a single switch procedure (e.g. similar to i2i service continuity).  Proposal 1-1B (modified): The following case is to be not supported for Scenario 1 as a group mobility scenario.  F. The remote UE configured with multi-path keeps the serving relay UE for the indirect path and the serving cell of the remote UE for the direct path while the serving relay UE changes the serving cell of the relay UE under the same gNB;  In the running CR, the network can release the indirect path, but it seems a direct path release cannot be performed in a single step. | To be consistent, it would be preferable to have a similar approach for the direct path as for the indirect path (i.e., *sl-IndirectPathAddChange is set to release*)  [Rapp] Thanks for the comments. For direct path release, in CR drafting, two cases are considered:  1: if indirect path is to be released together with direct path, RRCRelease message can achieve the purpose, so that new signaling is not needed.  2: if only direct path is release meanwhile the PCell is to be switched to indirect path after direct path is release, then Rel-17 direct-to-indirect path switch signaling and procedure can achieve the purpose, thus new signaling is not needed.  But considering several companies made comments on indirect path procedure, it may be useful to clarify/confirm the following signaling design logic:  Regarding direct path addition/change/release, confirm the following signaling design:  Case 1. For direct path addition, i.e. the L2 Remote UE already has accessed network via a L2 U2N Relay UE, to switch PCell from indirect path to direct path, Rel-17 indirect-to-direct path switch procedure and signaling (reconfigurationWithSync) can achieve the purpose.  Case 2: For direct path change, legacy PCell change procedure and signaling (reconfigurationWithSync) can achieve the purpose.  Case 3: For direct path release,  3.1: if indirect path is to be released together with direct path, RRCRelease message can achieve the purpose.  3.2: if only direct path is release meanwhile the PCell is to be switched to indirect path after direct path is release, Rel-17 direct-to-indirect path switch procedure and signaling (pathSwitchConfig included in reconfigurationWithSync) can achieve the purpose. |
| Lenovo | Before indirect path is added for MP case, the UE maintains a C-RNTI. Then, the gNB sends the *RRCReconfiguration* message to the L2 Remote UE to add an indirect path on top of a direct path. Referring to Configuration of SL indirect path in the running CR (38.331), the network provides L2 U2N Remote UE configuration as specified in 5.3.5.16. according to RRC specification, a C-RNTI is mandatorily indicated to the L2 U2N Remote UE in the first *RRCReconfiguration*. The UE may be allocated two different C-RNTIs till this step. While in legacy, there is only one C-RNTI maintained in a single MAC entity. | To discuss whether the second C-RNTI is needed for indirect path addition.  [Rapp] Thanks for pointing this out, I will try to directly clarify this in next updated version of RRC CR, which seems to be easy. |

1. Updated open issue list

Based on the companies’ inputs in clause 2.1, as well as the comments received in CR discussion, the open issue list is updated in which the issues are classified to three types:

* **Type 1: Stage 3 issues, for which the rapporteur would suggest to check in CR discussion**
* **Type 2: Essential open issues, for which the rapporteur would suggest to discuss in next meeting with high priority**
* **Type 3: Non-critical issues/enhancements, for which the rapporteur would suggest to discuss with lower priority**

### Type 1: Stage 3 issues

|  |  |  |
| --- | --- | --- |
| Issue no. | Issue description and status | Rapporteur’s suggestion |
| Issue#1-1. Confirm the following new **Terminologies/definitions** to be used for MP:  **Multi-path:** Mode of operation of a UE in RRC\_CONNECTED configured with one direct path on which the UE connects to gNB using NR Uu, and one indirect path on which the UE connects to the same gNB via another UE using PC5 unicast link or Non-3GPP Connection.  **MP remote UE**: A UE configured with Multi-path. When the connectivity of indirect path is PC5 unicast link, the MP remote UE is acting as a L2 U2N Remote UE. When the connectivity of indirect path is Non-3GPP Connection, the MP remote UE is acting as a N3C remote UE.  **MP relay UE**: A UE that provides connectivity of indirect path to a MP remote UE. When the connectivity is PC5 unicast link, the MP relay UE is acting as a L2 U2N Relay UE. When the connectivity is Non-3GPP Connection, the MP relay UE is acting as a N3C relay UE.  **SL indirect path:** In Multi-path, the indirect path using PC5 unicast link.  **N3C indirect path:** In multi-path, the indirect path using Non-3GPP Connection. | In email discussion [Post123bis][417], the definitions are already reflected in the latest CR version based on companies’ comments. | Continue the wording refinement during CR update. |
| Issue#1-2. Confirm to use new message (i.e. *IndiretPathFailureInformation*) for indirect path failure reporting in scenario 1 and scenario 2. | In email discussion [Post123bis][417], the CR rapporteur suggests to use new message to accommodate scenario 1 and scenario 2, only one company (OPPO) made comment and propose to use SUI. | Can be further checked by companies in CR discussion. |
| Issue#1-3. Confirm to use UEAssistanceInformation to report relay UE in scenario 2. | In email discussion [Post123bis][417], the CR rapporteur suggests to use UE Assistance Information, and no companies raised objection. Therefore rapporteur understand this way is acceptable. | Can be further checked by companies in CR discussion. |
| Issue #1-4: Regarding direct path addition/change/release, confirm the following signaling design:  Case 1. For direct path addition (i.e. the L2 Remote UE already has accessed network via a L2 U2N Relay UE), to switch PCell from indirect path to direct path, Rel-17 indirect-to-direct path switch procedure and signaling (reconfigurationWithSync) can achieve the purpose.  Case 2: For direct path change, legacy PCell change procedure and signaling (reconfigurationWithSync) can achieve the purpose.  Case 3: For direct path release,   * 3.1: if indirect path is to be released together with direct path, RRCRelease message can achieve the purpose. * 3.2: if only direct path is released meanwhile the PCell is to be switched to indirect path after direct path is release, Rel-17 direct-to-indirect path switch procedure and signaling (pathSwitchConfig included in reconfigurationWithSync) can achieve the purpose. | Several companies made comments on direct path management procedure, it may be useful to clarify/confirm the logic of the signaling design logic in the current CR. And if companies have strong concerns on the current design, text proposals are welcome, based on which discussion can be triggered. | Discussion can be triggered by company contributions, otherwise can be further checked during CR discussion. |

### Type 2: Essential open issues

|  |  |  |
| --- | --- | --- |
| Issue#2-1 Whether the PC5 unicast link can be maintained during **direct path addition/release** and **direct path change without indirect path change** procedures. (Scenario 1 only) | The issue is going to impact UE behaviors in RRC spec, but has not been discussed yet. | To be discussed in next meeting. |
| Issue#2-2. Stop condition of T420-like timer, when relay UE is in idle/inactive state and triggered to connected state by PC5-RRC, or when relay UE is in connected state. (Scenario 1 only) | In RAN2 #123bis meeting, the following agreement was achieved,  If RRCReconfigurationComplete is transmitted in indirect path, reuse R17 Legacy T420 stop condition (i.e., PC5 RLC ACK of RRCReconfigurationComplete in indirect path) for new T420-like timer. Else, down-select next meeting from the following options for the stop condition:  Option 1: PC5 connection is established (i.e., PC5-S unicast link establishment procedure is complete).  Option 2: upon reception of RRCReconfigurationCompleteSidelink. | To be discussed in next meeting. |
| Issue#2-3. To address the Editor Note: whether T4xx is applicable to scenario 2. | In [Post123bis][417], companies raised a question that whether T420-like time is applicable for scenario 2, for which a EN was added. | To be discussed in next meeting. |
| Issue#2-4. Whether/how to identify Rel-18 relay UE supporting PC5-RRC trigger from Rel-17 relay UE not supporting PC5-RRC trigger by gNB when configuring an idle/inactive relay UE to remote UE. | In RAN2#123bis meeting, there were two views:  Option 1. no solution is needed, which means gNB has no way to differentiate the two kinds of relay UE and needs to configure SRB1 with duplication in all cases.  Option 2. Rel-18 UE can indicate the support of PC5-RRC trigger to remote UE and let remote UE report it to gNB. | To be discussed in next meeting. |
| Issue#2-5. For indirect path failure reporting, to address the Editor Note: FFS whether the detailed report types other than indirectPathAddChangeFailure, path failure,Uu-RLF, Uu failure, PC5-RLF can be included. | In [Post123bis][417], companies have different view on whether failure type can be included. | To be discussed in next meeting. |
| Issue#2-6. For indirect path failure reporting, whether available relay info/measurement results can be include. | In RAN2 #123bis, RAN2 discussed whether available relay UE info/measurement results can be included, but no conclusion was achieved. | To be discussed in next meeting. |
| Issue#5. To address the Editor’s Note: FFS how to handle relayUE-HO. (Scenario 1 only) | The issue has been discussed in previous meeting, but no consensus was achieved. The options on table include:  Option 1: NW ensures that before relay UE’s HO, the indirect path is released at remote UE.  Option 2: relay UE indicates Uu HO in notification message to remote UE in Rel-17 way, and remote UE can suspend indirect path and wait for NW reconfiguration. | To be discussed in next meeting. |

### Type 3: Non-critical issues/enhancements

|  |  |  |
| --- | --- | --- |
| Issue 3-1: whether to support path activation/deactivation for better power saving in MP. | This issue was raised by companies. | Can be considered as enhancement and discussed with lower priority. |

1. References

[1] R2-23xxxxx, RRC Running CR for Rel-18 Multi-path, Huawei HiSilicon.