**3GPP TSG-RAN WG2 Meeting #119bis-e R2-22xxxxx**

**E-meeting, 10th - 19th October 2022**

**Source: Ericsson**

**Title:****Summary of AI 8.9.3, Service Continuity Enhancements**

**Agenda Item:** **8.9.3**

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

# Introduction

This contribution provides summary of contributions under 8.9.3 on service continuity for L2 UE-to-Network (U2N) relays. The summary aims to consolidate common issues across all the submitted contributions.

# Discussion

### 2.1 New Measurement Events

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| R2-2209371 | CATT | Proposal 2:The new events (e.g., event Y3 and Y4) introduced for indirect-to-indirect path switching can be: Event Y3: Serving L2 U2N Relay UE becomes worse than threshold1 and candidate L2 U2N Relay UE becomes better than threshold2; or Event Y4: Serving L2 U2N Relay UE becomes worse than candidate L2 U2N Relay UE. Proposal 3:The legacy Event Y2 (Candidate L2 U2N Relay UE becomes better than threshold) can also be used for indirect-to-indirect path switching scenarios. |
| R2-2209460 | NEC | Proposal 1: RAN2 to define new trigger events for indirect-to-indirect path switching, including:   1. New Event 1: Serving L2 U2N Relay UE becomes worse than threshold1 and candidate L2 U2N Relay UE becomes better than threshold2; 2. New Event 2: Candidate L2 U2N relay UE becomes offset better than serving L2 U2N relay UE. |
| [R2-2209498](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209498.zip) | OPPO | Proposal 1: Introduce a measurement event to directly compare the measurement result of the serving relay and the target relay for the indirect-to-indirect path switch purpose. |
| [R2-2209584](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209584.zip) | Intel Corporation | Proposal 6: RAN2 to decide whether measurement events X2 and Y2 from Release 17 can be reused for indirect-to-indirect path switching. FFS whether an offset term needs to be introduced  Proposal 8: The same measurement event to compare serving relay SL-RSRP to neighbouring relay SL-RSRP should be applicable to both intra-gNB and inter-gNB indirect-to-indirect path switching scenarios. |
| [R2-2209642](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209642.zip) | Ericsson | RAN2 to consider defining new measurement events based on both individual thresholds and offset differences between the PC5 measurements for an indirect-to-indirect path switch procedure based on the following: Event Z1: Serving L2 U2N Relay UE becomes worse than threshold1 and Candidate L2 U2N Relay UE becomes better than threshold2 Event Z2: Candidate L2 U2N Relay UE becomes an offset better than better than Serving L2 U2N Relay UE |
| [R2-2209730](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209730.zip) | China Telecom | Proposal 2: New A3-like event could be introduced for indirect-to-indirect path switching. Proposal 3: New A5-like event could be introduced for indirect-to-indirect path switching. |
| [R2-2209770](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209770.zip) | Apple | Proposal 1: To support indirect-to-indirect path switch, introduce a new A5-like measurement event X3 that serving L2 U2N relay UE becomes worse than threshold1 and candidate L2 U2N Relay UE becomes better than threshold2. |
| [R2-2209820](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209820.zip) | Vivo | Proposal 1: At least introduce a new measurement event that the serving relay PC5 link quality is worse than a threshold and a candidate neighbor relay’s PC5 link quality is above another threshold. Other solutions may not be precluded (e.g. direct comparison based solution) |
| [R2-2209841](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209841.zip) | Qualcomm | Proposal 1: 1: New Event is defined as following: Serving L2 U2N Relay UE becomes worse than threshold1 and candidate L2 U2N Relay UE becomes better than threshold2. Propsoal 2: For the same measurement quantity, additional new Event could be defined as : the candidate L2 U2N Relay UE becomes offset than the serving L2 U2N Relay UE. |
| [R2-2209882](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209882.zip) | Xiaomi | Proposal 1: Following events are introduced to support indirect-to-indirect path switch, Z1: Serving L2 U2N Relay UE becomes worse than threshold1 and candidate L2 U2N Relay UE becomes better than threshold2. Z2: Candidate L2 U2N relay UE becomes offset better than serving L2 U2N Relay UE. Proposal 2: In Z2, the measurement result quantity of candidate and serving relay UE can be the same or different. Different offsets are used for different scenarios. |
| [R2-2209901](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209901.zip) | ZTE, Sanechips | Proposal 6: It is suggested to define the two new measurement report events for indirect-to-indirect path switching:  Event Z1: serving L2 U2N relay UE becomes worse than threshold A and candidate L2 U2N relay UE becomes better than threshold B;  Event Z2: candidate L2 U2N relay UE becomes offset better than serving L2 U2N relay UE. |
| [R2-2209975](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209975.zip) | Spreadtrum Communications | Proposal 6: Introduce new measurement reporting events for indirect-to-indirect path switch as following: Serving relay becomes worse than threshold1 and candidate relay becomes better than threshold2. Candidate relay is better than serving relay with an offset. |
| [R2-2210014](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210014.zip) | Samsung | Proposal 1: RAN2 to introduce new event for indirect-to-indirect path switch: serving L2 U2N Relay UE becomes worse than threshold1 and candidate L2 U2N Relay UE becomes better than threshold2. |
| [R2-2210112](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210112.zip) | Huawei, HiSilicon | Proposal 6: To agree the following new measurement events for indirect-to-indirect path switching： Event1: Candidate Relay UE becomes offset better than the serving Relay UE Event2: Serving Relay UE becomes worse than threshold 1 and candidate Relay UE becomes better than threshold 2 |
| [R2-2210137](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210137.zip) | CMCC | Proposal 3: Introduce measurement event for i2i as, Event XX: Serving relay UE becomes worse than threshold-1, and the candidate relay UE becomes better than threshold-2. |
| [R2-2210442](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210442.zip) | Interdigital France R&D, SAS | Proposal 3: Introduce a measurement event for serving L2 U2N Relay UE becomes worse than threshold1 and candidate L2 U2N relay UE becomes better than threshold2 |
| [R2-2210474](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210474.zip) | Sharp | Proposal 1: A5-like is appropriate for Sidelink Relay link quality measurement events and not necessary for A3-like.  Proposal 3: No additional new measurement events are needed. |
| [R2-2210578](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210578.zip) | LG Electronics France | Proposal 1: A new measurement event type needs to be introduced for I2I path switching. (Event 1) serving L2 U2N relay UE becomes worse than threshold 1 and the candidate L2 U2N relay UEs becomes better than threshold2 (Event 2) serving L2 U2N relay UE becomes worse than threshold 1 (reusable the existing event X2 in rel-17 U2N relay) |
| [R2-2210223](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210223.zip) | Sony | Proposal 4: RAN2 to agree that a new measurement event: Candidate L2 U2N relay UE becomes offset better than serving L2 U2N relay UE, is introduced. |

**Rapp Summary:**

Majority of companies are in favour of introducing a new measurement event based on individual thresholds. Further, an event based on the offset based direct comparison of the PC5 measurements also features in most company contributions. Furthermore, apart from one company, there is no opposition to not introduce more than one type of measurement event for the indirect-to-indirect path switch procedure. Based on this understanding, the following are the proposals:

1. **For i2i path switch procedure, introduce two new measurement events based on individual thresholds and an offset for direct comparison. For offset, at least when using the same measurement type for the serving and candidate U2N relay UE. FFS for the case of different SL measurement types**
2. **Based on P1, the following two events are to be introduced:**

**Event Z1: Serving L2 U2N Relay UE becomes worse than threshold1 and Candidate L2 U2N Relay UE becomes better than threshold2.**

**Event Z2: Candidate L2 U2N Relay UE becomes an offset better than Serving L2 U2N Relay UE.**

### 2.2 Measurements and Timers

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| R2-2209371 | CATT | Proposal 4:The legacy measurement quality of SL-RSRP and SD-RSRP can be directly reused for indirect-to-indirect path switching scenarios.  Proposal 6:Timer T420 can be reused for indirect-to-indirect path switching scenarios. |
| [R2-2209498](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209498.zip) | OPPO | Proposal 2:In Rel-18 service continuity, for scenario-A, the legacy T304 can be reused, and for scenario B, the legacy T420 can be reused.  Proposal 3: In Rel-18 service continuity, for scenario C and scenario D, RAN2 discusses reusing the T420. |
| [R2-2209901](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209901.zip) | ZTE, Sanechips | Proposal 7: For inter-gNB indirect-to-direct path switch, the contents in RRC Reconfiguration message for Remote UE is the same as legacy NR RRC Reconfiguration with sync. And the existing T304 is used. Proposal 8: T420 and the SL path switch configuration within ReconfiguraionWithSync specified for intra-gNB direct-to-indirect path switch could be reused for inter-gNB direct-to-indirect path switch. |
| [R2-2209975](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209975.zip) | Spreadtrum Communications | Proposal 5:SL-RSRP and SD-RSRP are reused as the SL measurement quantity for serving relay, SD-RSRP is reused as the SL measurement quantity for the candidate relays in the case of indirect to indirect path switch. |
| [R2-2209584](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209584.zip) | Intel Corporation | Proposal 5: The new measurement event for indirect-to-indirect path switching can be based on SL-RSRP or on the SD-RSRP if SL-RSRP is not available. |
| [R2-2210014](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210014.zip) | Samsung | Proposal 2: RAN2 to discuss potential impact of comparing SL-RSRP of serving Relay UE and SD-RSRP of candidate Relay UE. |

**Summary:**

Quite a few companies intend to re-use the previously defined measurement quantities and timers (for intra-gNB scenarios) in the inter-gNB scenario. One company also suggests studying the potential impacts of a direct comparison between SL-RSRP and SD-RSRP.

1. **For i2i scenario, re-use the SL-RSRP or SD-RSRP measurement quantities for path switching. FFS: how to compare SL-RSRP of serving U2N relay UE and SD-RSRP of candidate U2N relay UE**
2. **For i2i scenario, when SL-RSRP is unavailable, SD-RSRP is used as the measurement quantity.**
3. **For i2d path switch scenario, re-use the existing T304 timer**
4. **For d2i and i2i path switch scenarios, re-use the existing T420 timer.**

### 2.3 Decision on Path Type

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| R2-2209371 | CATT | Proposal 7:The source gNB is responsible for choosing the target gNB and the best target cell or the best target relay UE belongs to the target gNB. |
| [R2-2209642](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209642.zip) | Ericsson | Proposal 1: For d2i, i2d and i2i scenarios, the source gNB should decide on the new path type (i.e., direct, or indirect path). |
| [R2-2209820](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209820.zip) | Vivo | Proposal 2:RAN2 confirms whether it is RAN2 or RAN3 that concludes the issue on how/who to decide the path type and decide the target cell/target Relay for the Remote UE to switch to. Proposal 3:For inter-gNB D2I/I2D/I2I path switch, RAN2 confirm it is the target gNB that decides the path type and the target Relay (if indirect path is selected), in case RAN2 decides to resolve this issue.  Proposal 3a:If Proposal 3 is agreed, inform RAN3 about the RAN2 conclusion. |
| [R2-2209841](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209841.zip) | Qualcomm Incorporated | Proposal 1: 3: Follow the work split: It is left to RAN3 to discuss which RAN node determines the target Relay UE/path type and the exchange information between the source RAN node and taret RAN node. |
| [R2-2209901](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209901.zip) | ZTE, Sanechips | Proposal 1:Based on measurements from L2 U2N remote UE, the source gNB decides the new path type, i.e. direct path or indirect path. |
| [R2-2210014](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210014.zip) | Samsung | Proposal 3:RAN2 to wait for RAN3 decision on which node to decide target path and target Relay UE in inter-gNB path switch scenarios. |
| [R2-2210137](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210137.zip) | CMCC | Proposal 1:Source gNB decides path switching type, i.e., direct or indirect. |
| [R2-2210578](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210578.zip) | LG Electronics France | Proposal 2:We can discuss which one, serving gNB or target gNB will decide the path type (e.g., direct or indirect) when inter-gNB HO. (Option 1) The serving gNB decides the final path type, e.g., direct path or indirect path of remote UE. (Option 2) The target gNB decides the final path type, e.g., direct path or indirect path of remote UE. |
| [R2-2210112](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210112.zip) | Huawei, HiSilicon | For inter-gNB path switching, the target/new path type (either indirect or direct) is decided by the source gNB. When the source gNB decides to switch the UE to an indirect path, it has to further select the target relay UE. |

**Summary:**

There is a slight majority among companies for the source gNB to decide on the new path type (i.e., direct, or indirect), one company thinks it should be the target gNB that decides, one company proposes to discuss the work split between RAN2/RAN3 while two other companies suggest leaving this to RAN3 and one company proposes to down-select between the two options in RAN2. From the discussion in RAN3, companies would need RAN2’s evaluation on potential impacts of some of the solutions. To avoid a ping-pong between the two groups and to make progress, RAN2 can make the decision and inform RAN3. In addition, this topic is under RAN2’s purview (in terms of reported measurements) and at least warrants a discussion.

1. **For d2i, i2d and i2i scenarios, the source gNB decides on the path type (i.e., direct, or indirect path)**

### 2.4 Decision on Target U2N Relay UE

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| R2-2209371 | CATT | Proposal 8:The target gNB is responsible for deciding the final target cell or the final target relay UE under the cell. |
| [R2-2209498](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209498.zip) | OPPO | Proposal 4:RAN2 confirm that target gNB should perform the final target relay UE configuration and source gNB perform relay UE selection among multiple configurations coming from multiple target gNB, or the procedure can up to RAN3 to decide. |
| [R2-2209520](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209520.zip) | Mediatek inc. | Proposal -1:The target gNB selects the target Relay UE for path switch. |
| [R2-2209584](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209584.zip) | Intel Corporation | Proposal 4:For support of inter-gNB scenarios B/D of switching from a direct/indirect to an indirect, RAN2 to discuss and decide whether the source gNB or the target gNB chooses the target Relay UE for the Remote UE.  Proposal 4.1: For support of inter-gNB scenarios of switching to indirect path, if RAN2 decides that the source gNB chooses the target Relay UE for the Remote UE, the target Relay UE ID is forwarded to the target gNB e.g using an inter-node message. Proposal 4.2: For support of inter-gNB scenarios of switching to indirect path, if RAN2 decides that the target gNB chooses the target Relay UE for the Remote UE, the source gNB can forward the Relay UE IDs for candidate relay UEs along with associated measurement results to the target gNB using e.g inter-node RRC signalling. |
| [R2-2209642](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209642.zip) | Ericsson | For inter-gNB d2i and i2i scenarios, the decision on the target U2N relay UE is based on: The source gNB preselecting the list of candidates i.e., U2N relay UEs under target gNB coverage and sending the list to the target gNB The target gNB based on this list, makes the final decision on the target U2N relay UE. |
| [R2-2209730](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209730.zip) | China Telecom | Proposal 1:For inter-gNB direct-to-indirect path switching, the source gNB selects target relay UE.  Proposal 4:For inter-gNB indirect-to-indirect path switching, the source gNB selects target relay UE. |
| [R2-2209770](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209770.zip) | Apple | Proposal 2: For inter-gNB direct-to-indirect and indirect-to-indirect path switch, RAN2 down-select the following two solutions on how relay UE is selected: Alt-1: Source gNB determines target relay UE with extra procedure to acquire its RRC state before path switch decision. And L2 ID of selected target relay UE is included in handover request message. Alt-2: Target gNB determines target relay UE based on SL measurements of candidate relay UEs forwarded by target gNB in handover request message. Proposal 3: If Alt-1 of Proposal 2 is agreed, L2 ID of the selected target relay UE is required to be included in Handover request message. Proposal 4: If Alt-2 of Proposal 2 is agreed, L2 ID(s) and their SL measurements of the candidate relay UE(s) served by target gNB are required to be included in Handover request message. |
| [R2-2209820](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209820.zip) | Vivo | Proposal 2:RAN2 confirms whether it is RAN2 or RAN3 that concludes the issue on how/who to decide the path type and decide the target cell/target Relay for the Remote UE to switch to. Proposal 3:For inter-gNB D2I/I2D/I2I path switch, RAN2 confirm it is the target gNB that decides the path type and the target Relay (if indirect path is selected), in case RAN2 decides to resolve this issue.  Proposal 3a:If Proposal 3 is agreed, inform RAN3 about the RAN2 conclusion. |
| [R2-2209841](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209841.zip) | Qualcomm Incorporated | Proposal 1: 3: Follow the work split: It is left to RAN3 to discuss which RAN node determines the target Relay UE/path type and the exchange information between the source RAN node and taret RAN node. |
| [R2-2209882](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209882.zip) | Xiaomi | Proposal 3:Target gNB selects the target relay UE, since it is more clear about the status of candidate relay UEs in its coverage.  Proposal 4:For the target gNB selection of target relay UE, source gNB shall provide candidate relay UEs’ information to target gNB including the relay UE’s source L2 ID, the serving cell of the relay UE and the PC5 link quality of the relay UE. |
| [R2-2209943](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209943.zip) | Lenovo | Proposal 3: Target gNB is responsible for selecting the target relay UE. |
| [R2-2210014](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210014.zip) | Samsung | Proposal 3:RAN2 to wait for RAN3 decision on which node to decide target path and target Relay UE in inter-gNB path switch scenarios. |
| [R2-2210112](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210112.zip) | Huawei, HiSilicon | For inter-gNB path switching, the target/new path type (either indirect or direct) is decided by the source gNB. When the source gNB decides to switch the UE to an indirect path, it has to further select the target relay UE. |
| [R2-2210137](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210137.zip) | CMCC | Proposal 2:RAN2 discuss the following alternatives for selection of target Relay UE: Alt 1: source gNB selects one target Relay UE and sends the ID related information to the target gNB Alt 2: source gNB sends a list of candidate target Relay UE information to the target gNB for selection |
| [R2-2210278](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210278.zip) | Kyocera | Proposal 1: Source gNB should select the target relay UE in both Scenarios B and D.  Proposal 2: Source gNB should be allowed to select the target relay UE based on its RRC state in both Scenarios B and D. |
| [R2-2210442](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210442.zip) | Interdigital France R&D, SAS | Proposal 1: The source gNB selects the target relay UE in the inter-gNB direct/indirect to indirect service continuity scenarios. |
| [R2-2210578](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210578.zip) | LG Electronics France | Proposal 3: If the serving gNB decides indirect path type, we can discuss which one decides the final target relay UE (e.g., serving gNB or target gNB) when inter-gNB HO. (Option 1) the serving gNB decides the final target relay UE. (Option 2) the target gNB decides the final target relay UE.  Proposal 4: If the target gNB decides indirect path type, we can discuss which one decides the final target relay UE (e.g., serving gNB or target gNB) when inter-gNB HO. (Option 1) the serving gNB decides the final target relay UE (serving gNB provides only one candidate relay UE ID) (Option 2) the target gNB decides the final target relay UE (serving gNB provides multiple candidate relay |

**Summary:**

Some companies prefer the target gNB to decide on the target U2N relay UE, while other companies prefer the source gNB to decide. Yet other companies think we should discuss the issue and prefer to leave this decision to RAN3. Like the discussion in Section 2.3, RAN3 would need RAN2’s evaluation for certain aspects of this topic. In addition, there is RRC impact with respect to sending measurements over the Xn interface and this needs to be discussed.

1. **For d2i and i2i scenarios, down-select from the two options below:**

**Alt-1: Source gNB to make the final decision on the target U2N relay UE**

**Alt-2: Target gNB to make the final decision on the target U2N relay UE**

In addition, depending on the outcome of P4, the corresponding source gNB actions also need to be captured.

1. **If Alt-1 of P8 is chosen, for d2i and i2i scenarios, the source gNB provides at least the selected L2 ID of the target U2N relay UE to the target gNB.**
2. **If Alt-2 of P8 is chosen, for d2i and i2i scenarios, the source gNB provides at least L2 IDs of a list of candidate U2N relay UEs to the target gNB.**

### 2.5 Lossless Path Switch

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| [R2-2209371](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209371.zip) | CATT | Proposal 10: RAN2 to discuss the solution to solve the problem of data loss during path switch. |
| [R2-2209498](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209498.zip) | OPPO | Proposal 7: Reuse the conclusion of UL lossless delivery made in Rel-17 for Rel-18 inter-gNB path switch, i.e. no spec impact for ensuring UL PDCP lossless behaviour in indirect-to-direct path switch (assume it is a corner case or can be addressed by network implementation). |
| [R2-2209584](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209584.zip) | Intel Corporation | Proposal 1: Support of lossless delivery during path switching for e.g due to PC5 RLF is not considered in this Release 18. |
| [R2-2209820](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209820.zip) | Vivo | Proposal 4: For inter-gNB D2I/I2D/I2I path switch and intra-gNB I2I path switch, no Spec impact in Uu/PC5 is needed to support the lossless data delivery. Proposal 5: RAN2 decides for inter-gNB D2I/I2D/I2I path switch whether the inter-gNB DL data forwarding and DL data path switching should be discussed and concluded by RAN2 or RAN3. Inform RAN3 of RAN2 conclusion. |
| [R2-2209901](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209901.zip) | ZTE, Sanechips | Proposal 10: It is suggested to consider the lossless delivery for DL data forwarding during path switching. |
| [R2-2210112](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210112.zip) | Huawei, HiSilicon | Proposal 8: Discuss how to avoid DL data loss during the inter-gNB path switch. Proposal 9: Discuss how to avoid UL data loss during the inter-gNB path switch. |
| [R2-2210137](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210137.zip) | CMCC | Proposal 4: RAN2 is suggested to discuss lossless path switching for inter gNB scenario. Proposal 5: RAN2 is suggested to discuss the restriction for network implementation for DL and UE implementation for UL in transmitting PDCP entity to avoid data loss. |

**Summary:**

Some companies think there is no spec impact required to support lossless data delivery while others think this should be studied for inter-gNB path switch. This was already discussed in Rel-17 with the conclusion that in both UL/DL lossless delivery during path switch is done using the PDCP status report with no spec impact. At least from the contributions, it is unclear if there are additional scenarios to be covered for the inter-gNB case as compared to Rel-17.

1. **Reuse Rel-17 DL/UL lossless delivery using PDCP status reports with no specification impact.**

### 2.6 INM

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| --- | --- | --- |
| [R2-2209371](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209371.zip) | CATT | Proposal 9**:** The candidate relay UE ID(s) and the related measurement result(s) can be sent to the target gNB via inter-node message, besides the legacy candidate cell information. |
| [R2-2209498](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209498.zip) | OPPO | Proposal 6:To include the measurement result of candidate relay UEs into handoverPreparationInformation. |
| [R2-2209882](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209882.zip) | Xiaomi | Proposal 3: The candidate relays and its measurement result should be indicated to target node during handover preparation.  Proposal 4**:** HandoverPreparationInformation could be reused to carry this information. |
| [R2-2209901](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209901.zip) | ZTE, Sanechips | Proposal 5:The candidate relay UEs’ information are included in INM RRC message (i.e. HandoverPreparationInformation). |
| [R2-2209943](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209943.zip) | Lenovo | Proposal 1: Target Cell ID should be added in handover request in the case that indirect path is selected as target. Proposal 2: The following information related to candidate relay UE should be included in handover request by source gNB. One or more than one candidate relay UE is included in the handover request. Measurement result of the link between the remote UE and the candidate relay UE. |

**Summary:**

The contents and details of the INM is dependent on the progress of the decision on target U2N relay UE in Section 2.4. Hence, no proposals are made in this section.

### 2.7 Source U2N Relay UE Reconfiguration

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| --- | --- | --- |
| [R2-2209460](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209460.zip) | NEC | Proposal 2: RAN2 to consider when to reconfigure Relay UE to release the configuration of relay channel(s) for inter-gNB I2D path switching and inter-gNB I2I path switching. |
| [R2-2209371](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209371.zip) | CATT | Proposal 5: The source gNB can send the RRCReconfiguration message to the source U2N Relay UE to release the remote UE context at any time after the source gNB sends the RRCReconfiguration message with sync to the remote UE, without the target gNB indication. |
| [R2-2210101](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210101.zip) | Nokia, Nokia Shanghai Bell | Proposal 3: RAN2 to discuss the possible solutions to indicate to the relay UE the delivery of the remote UE’s RRC reconfiguration message when the serving gNB configures the relay UE to perform inter-gNB HO and the remote UE’s HO or path switching simultaneously. |

**Summary:**

The issue discussed by the companies relates to the RRCReconfiguration of the source U2N relay UE before RRCReconfigurationwithSync has been received by the remote UE. One company also discusses this issue in the context of a source U2N relay UE handover. Rapp’s understanding is that this is mostly up to gNB implementation and does not foresee any specification impact. However, this can be discussed to see if it cannot be left up to gNB implementation.

1. **RAN2 to discuss RRCReconfiguration of the source U2N relay UE during the remote UE’s path switch procedure.**

# Conclusion

Easy Proposals

1. **For i2i path switch procedure, introduce two new measurement events based on individual thresholds and an offset for direct comparison. For offset, at least when using the same measurement type for the serving and candidate U2N relay UE. FFS for the case of different SL measurement types**
2. **Based on P1, the following two events are to be introduced:**

**Event Z1: Serving L2 U2N Relay UE becomes worse than threshold1 and Candidate L2 U2N Relay UE becomes better than threshold2.**

**Event Z2: Candidate L2 U2N Relay UE becomes an offset better than Serving L2 U2N Relay UE.**

1. **For i2i scenario, re-use the SL-RSRP or SD-RSRP measurement quantities for path switching. FFS: how to compare SL-RSRP of serving U2N relay UE and SD-RSRP of candidate U2N relay UE**
2. **For i2i scenario, when SL-RSRP is unavailable, SD-RSRP is used as the measurement quantity.**
3. **For i2d path switch scenario, re-use the existing T304 timer**
4. **For d2i and i2i path switch scenarios, re-use the existing T420 timer.**

To be Discussed

1. **For d2i, i2d and i2i scenarios, the source gNB decides on the path type (i.e., direct, or indirect path)**
2. **For d2i and i2i scenarios, down-select from the two options below:**

**Alt-1: Source gNB to make the final decision on the target U2N relay UE**

**Alt-2: Target gNB to make the final decision on the target U2N relay UE**

1. **If Alt-1 of P8 is chosen, for d2i and i2i scenarios, the source gNB provides at least the selected L2 ID of the target U2N relay UE to the target gNB.**
2. **If Alt-2 of P8 is chosen, for d2i and i2i scenarios, the source gNB provides at least L2 IDs of a list of candidate U2N relay UEs to the target gNB.**
3. **Reuse Rel-17 DL/UL lossless delivery using PDCP status reports with no specification impact.**

Low priority

1. **RAN2 to discuss RRCReconfiguration of the source U2N relay UE during the remote UE’s path switch procedure.**

# Proposals not included

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| [R2-2209460](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209460.zip) | NEC | Proposal 2: RAN2 to consider when to reconfigure Relay UE to release the configuration of relay channel(s) for inter-gNB I2D path switching and inter-gNB I2I path switching.  Proposal 3: RAN2 to consider the failure of PC5 unicast link establishment during path switching to trigger the RRC Reconfiguration failure procedure. |
| [R2-2209498](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209498.zip) | OPPO | Proposal 5: Except the determination of when to release the PC5 unicast link with the source relay UE, the legacy Rel-17 direct-to-indirect path switch procedure can be reused for indirect-to-indirect path switch procedure as described in TS 38.300. |
| [R2-2209371](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209371.zip) | CATT | Proposal 1: The inter-gNB direct-to-indirect and indirect-to-direct path switching do not need RRM measurement enhancement in RAN2.  Proposal 5: The source gNB can send the RRCReconfiguration message to the source U2N Relay UE to release the remote UE context at any time after the source gNB sends the RRCReconfiguration message with sync to the remote UE, without the target gNB indication.  Proposal 11: The remote UE performs RRC re-establishment in a cell or a relay UE when the path switching failure. |
| [R2-2209520](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209520.zip) | Mediatek Inc. | Proposal -2: Discuss the criteria for the target gNB for making HO admission control for inter-gNB path switch considering target Relay UE in RRC\_IDLE/RRC\_INACTIVE. Proposal -3: Study the possibility for providing more information to target gNB for relay selection for inter-gNB path switch considering target Relay UE in RRC\_IDLE/RRC\_INACTIVE.  Proposal -4: Discuss the case where Relay UE’s the serving cell changes during relay selection for inter-gNB path switch considering target Relay UE in RRC\_IDLE/RRC\_INACTIVE. |
| [R2-2209584](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209584.zip) | Intel Corporation | Proposal 2: Timing of PC5 link release between remote UE and the relay UE for inter-gNB indirect-to-direct path switching is up to UE implementation and can be initiated by either the Remote UE or by the Relay UE.  Proposal 3: Aligned with RAN3, RAN2 to agree that source gNB or serving gNB of the Remote UE triggers path switching for the L2 U2N Remote UE.  Proposal 7: For the case of intra gNB indirect to indirect path switching, it is up to serving gNB to choose relay UE based on measurement results received from the Remote UE. |
| [R2-2209642](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209642.zip) | Ericsson | For inter-gNB d2i and i2i scenarios, the following should be agreed about the paging-based mechanism to transit the target U2N relay UE in IDLE/INACTIVE state to the CONNECTED state: In RRC\_INACTIVE state, RAN2 to confirm that it is up to gNB implementation to page the target U2N relay UE before the path switch command is sent to the remote UE. In RRC\_IDLE state, RAN2 to not pursue the enhancements required for the paging solution. |
| [R2-2209770](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209770.zip) | Apple | Proposal 6: CHO-like path switching solution can be discussed only if time permits after the discussion on the basic solutions.  Proposal 7: RAN2 agree that DAPS like solution is not in the scope. |
| [R2-2209882](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209882.zip) | Xiaomi | Proposal 2: If both Uu measurements and candidate relay measurements of a same target gNB are available, path switching to direct path shall be prioritized if the Uu measurement is good. |
| [R2-2210101](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210101.zip), [R2-2210102](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210102.zip) | Nokia, Nokia Shanghai Bell | Proposal 1: RAN2 to discuss how to solve the issue of prolonged path switching preparation time due to reconfiguration of the target relay UE for remote UE’s path switching. Proposal 2: RAN2 to agree the remote UE can be configured to make HO or path switching instead of initiating RRC connection re-establishment when the connected relay UE performs HO.  Proposal 1: RAN2 to discuss solutions in selecting a relay UE in RRC Idle/Inactive state for service continuity during path switching to indirect path. Proposal 2: RAN2 to discuss how to handle the path switching failure caused by the relay UE’s cell reselection during remote UE’s indirect path switching. |
| [R2-2210112](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210112.zip) | Huawei, HiSilicon | Proposal 4: Introduce the Allowed-List/Block-List to restrict candidate relay UE’s serving cell.  Proposal 1: In inter-gNB indirect-to-direct path switching, the HO preparation between source gNB and target gNB is performed in the same way as legacy inter-gNB HO, without additional RAN2/RAN3 spec impact. |
| [R2-2210223](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210223.zip) | Sony | Proposal 1: RAN2 to agree that conditional handover is supported in Rel-18 UE sidelink relay for switching from direct to indirect path as well as switching from indirect to direct path. Rel-16 CHO procedure is the baseline.  Proposal 2: RAN2 to agree that Relay UE is configured with events X1, X2, Y1 and Y2 independently from remote UE. Proposal 3: RAN2 to support group handover for service continuity in Rel-18 UE sidelink relay. Proposal 5: RAN2 to discuss how the serving gNB be aware of the target relay’s serving gNB. |
| [R2-2209975](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2209975.zip) | Spreadtrum Communications | Proposal 1: RAN2 agrees that the measurement configuration, measurement reporting and measurement events for intra-gNB indirect-to-direct path switch are reused for inter-gNB indirect-to-direct path switch. Proposal 3: RAN2 agrees that the measurement configuration, measurement reporting and measurement events for intra-gNB direct-to-indirect path switch are reused for inter-gNB direct-to-indirect path switch. |
| [R2-2210278](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210278.zip) | Kyocera | Proposal 4: RAN2 should incorporate CHO-like service continuity for all the scenarios defined in WID.  Proposal 3: For Scenarios B and D, relay UEs should be provide its RRC state to the remote UE. |
| [R2-2210442](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210442.zip) | Interdigital France R&D, SAS | Proposal 2: If RAN2 decides that measurements and/or RRC state of the potential target relay UEs is needed, this information should be provided by the remote UE |
| [R2-2210474](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Docs/R2-2210474.zip) | Sharp | Proposal 2: NW and/or UE should consider not only PC5 link quality but also Uu link quality of relay UE. |

# Reference

1. R2-2209371 Consideration on Service Continuity Enhancements for L2 U2N Relay, CATT, RAN2#119bis, Electronic, October 2022
2. R2-2209460 Considerations on Service Continuity Enhancement, NEC Corporation, RAN2#119bis, Electronic, October 2022
3. R2-2209498 Discussion on further enhancement of service continuity, OPPO, RAN2#119bis, Electronic, October 2022
4. R2-2209520 Inter-gNB path switch to Relay UE in RRC\_Idle, RRC\_Inactive, MediaTek Inc., RAN2#119bis, Electronic, October 2022
5. R2-2209584 Service continuity enhancements for L2 U2N relay, Intel Corporation, RAN2#119bis, Electronic, October 2022
6. R2-2209642 Inter-gNB Aspects of Service Continuity for Layer-2 UE-to-Network Relays, Ericsson España S.A., RAN2#119bis, Electronic, October 2022
7. R2-2209730 Service continuity enhancements for L2 U2N relay, China Telecom, RAN2#119bis, Electronic, October 2022
8. R2-2209770 Discussion on Service continuity enhancement of L2 U2N relay, Apple, RAN2#119bis, Electronic, October 2022
9. R2-2209820 On service continuity enhancement for L2 U2N relay, vivo, RAN2#119bis, Electronic, October 2022
10. R2-2209841 Service continuity for UE-to-Network relay, Qualcomm Incorporated, RAN2#119bis, Electronic, October 2022
11. R2-2209882 Discussion on service continuity enhancement, Xiaomi, RAN2#119bis, Electronic, October 2022
12. R2-2209901 Service continuity enhancement for L2 U2N relay, ZTE, Sanechips, RAN2#119bis, Electronic, October 2022
13. R2-2209943 Service continuity in L2 U2N relay case, Lenovo, RAN2#119bis, Electronic, October 2022
14. R2-2209975 Service continuity enhancements support for L2 U2N relay, Spreadtrum Communications, RAN2#119bis, Electronic, October 2022
15. R2-2210014 Service continuity enhancements for L2 U2N relay, Samsung, RAN2#119bis, Electronic, October 2022
16. R2-2210101 Discussion on service continuity enhancement for Inter-gNB path switching of L2 U2N relay, Nokia, Nokia Shanghai Bell, RAN2#119bis, Electronic, October 2022
17. R2-2210102 Discussion on service continuity enhancement for Inter-gNB path switching via relay UE in RRC\_IDLE/INACTIVE state, Nokia, Nokia Shanghai Bell, RAN2#119bis, Electronic, October 2022
18. R2-2210112 Discussion on Service Continuity, Huawei, HiSilicon, RAN2#119bis, Electronic, October 2022
19. R2-2210137 Service continuity on U2N relay, CMCC, RAN2#119bis, Electronic, October 2022
20. R2-2210223 Service continuity enhancements for UE sidelink relay, Sony, RAN2#119bis, Electronic, October 2022
21. R2-2210278 L2 U2N inter-gNB service continuity, Kyocera, RAN2#119bis, Electronic, October 2022
22. R2-2210442 Open Issues on Service Continuity for Rel18, InterDigital France R&D, SAS, RAN2#119bis, Electronic, October 2022
23. R2-2210474 Service Continuity Enhancements for Layer-2 U2N Relay, Sharp, RAN2#119bis, Electronic, October 2022
24. R2-2210578 Service continuity enhancements for L2 U2N relay, LG Electronics France, RAN2#119bis, Electronic, October 2022