3GPP TSG-RAN WG3 #117bis-e [R3-22](https://ericsson-my.sharepoint.com/personal/filip_barac_ericsson_com/Documents/WORK/3GPP.exe/Meetings/RAN3%23113-e.exe/Meetings/RAN3%23113/chairnotes/Inbox/R3-214141.zip)5928

Online, 10th Oct – 18th Oct 2022

Agenda Item: 16.3

Source: Qualcomm (moderator)

Title: Summary of Offline Discussion on CB: # SLRelay2\_ServiceContinuity

Document for: Approval

# Introduction

**CB: # SLRelay2\_ServiceContinuity**

**- Discuss on source gNB node or target gNB decides the new path type, i.e., either indirect or direct? Source gNB or target gNB selects the target cell?**

**- Discuss on the preference on options for selection of target Relay UE, e.g. option 1/2/3.**

(Qualcomm - moderator)

Summary of offline disc [R3-225928](file:///C:\Users\shakrish\OneDrive%20-%20Qualcomm\Desktop\Dropbox\Pentari%20Systems\RAN3\117-bis-e%20Oct%202022\CB\CB%20%23%20SLRelay2_ServiceContinuity\Inbox\R3-225928.zip)

# For the Chair’s Notes

# Phase-II Discussion

# Phase-I Discussion

## Which node selects the target U2N relay UE?

This is the open issue from last meeting:

Continue analyzing the following options for selection of target Relay UE:

* Option 1: source gNB selects one target Relay UE and sends the ID related information to the target gNB
* Option 2: source gNB sends a list of candidate target Relay UE information to the target gNB for selection
* Option 3: source gNB provides also the measurement information of Remote UE to the target gNB for selection of target Relay UE

To assist the discussion, the moderator has tried to summarize a few pros/cons for the above options based on a few submitted papers:

**Option 1:**

**Pros**: Option 1 has the following advantages: 1) alignment with legacy HO; 2) alignment of the direct/indirect to indirect and indirect to direct procedures 3) simplified Xn signaling (**Interdigital**)

**Cons:** If the source node decides the path type/the target relay UE, it may **increase the possibility to cause handover failure**, while the target node option could avoid such problem. If the decision on the path type/ the target relay UE is up to the target node, the potential HO failure problem and the potential Too-Late handover problem brought by the source node option could be avoided, with limited spec impact (**Samsung**)

**Option 2:**

**Pros:** We believe that Option-1 is a subset of Option-2 if there was only one U2N relay UE candidate in the list. In addition, the target gNB would perform the admission control procedure to check if the path switch procedure can be allowed in the target gNB. Therefore, Option-1 could result in high chances of rejection as compared to **Option-2 where are more candidates to choose from**. Thereby Option-1 increases the latency in the path switch procedure as the source gNB initiates new signaling to another candidate target gNB (**Ericsson**)

**Cons:** There is not much benefit in Option 2 i.e., source gNB sending a list of candidate target Relay UE information to the target gNB for selection as all the candidate relay UEs proposed by source gNB can still be rejected by target gNB and this might mean split responsibilities (source to select path type and target to select relay UE) (**Qualcomm**)

**Option 3:**

**Pros:** Target gNB selects the target relay UE, since it is **more clear about the status of candidate relay UEs in its coverage** (**ZTE**)

Cons:

* The measurement information in Option-3 **does not provide any additional information** to the target gNB. This is because, the measurement report to initiate a path switch procedure is triggered based on measurement events and the report itself **consists of only those U2N relay UEs which satisfy a certain threshold criterion**. Hence, reporting such measurements to the target gNB cannot help in discerning between them and are unnecessary **(Ericsson, QC…)**
* In options 2 and 3, the network cannot decide between path switch/HO to a cell vs path switch to a relay because such **decisions would be made in different nodes** **(Interdigital)**
* In options 2 and 3, how to handle the case where the potential target relay UEs are under the coverage of different (more than one) target gNBs is not clear and **could further complicate Xn signalling** (**Interdigital**)
* Measurements of the Uu link by the target relay UE are only available at the target gNB for target relay UEs **which are in RRC\_CONNECTED** (**Interdigital**)

**Q: Companies are requested to provide their preference among Options 1-3 and justify against the cons provided by the moderator.**

|  |  |  |
| --- | --- | --- |
| Company | Option 1, 2 or 3 | Comment |
| Qualcomm | Option 1 | We don’t see much benefit in Option 3 mainly because of con#1 listed by moderator (only those U2N relay UEs which satisfy a certain threshold criterion are anyway reported in measurement report and don’t think target gNB selecting the relay UE based on its Uu signal strength would help much in reducing HO failures).  Regarding Option 2, we are not sure whether/why a target relay UE would be rejected due to admission control so frequently thereby necessitating to send a list of candidate relay UEs for down-selection? Also, if we agree source gNB selects target path type (in section 4.2) and target gNB selects the final relay UE, this would result in split responsibilities and seems a little convoluted.  Option 1 seems sufficient, and we don’t think this would result in increase of HO failures due to incorrect target relay UE selection. |
|  |  |  |

## Which node should decide on the new path type i.e., direct or indirect path?

E///, Observation 1: The source gNB already has all the Uu measurements to the target cells and PC5 measurements to all the candidate relay UEs to decide on the path type.

E///, Proposal 1: For d2i, i2d and i2i scenarios, the source gNB should decide on the new path type i.e., direct or indirect path.

ZTE, Proposal 9: 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.

HW, Proposal 1b: **Source gNB will select the target cell if it decides to switch the UE to a direct path** or select the target relay UE if it decides to switch the UE to an indirect path.

QC, Proposal 3: In case of inter-gNB path switching, **source gNB should decide the target cell** (and hence target gNB) in case there are multiple candidates for the path switching

Consider an example provided in [2], where a UE is connected via direct path to cell 1 (gNB1) and configured with RRM measurement configurations. Say the RRM event is met, and the UE sends measurementReport with multiple candidates for path switching

* Alt 1: switch to a direct path in cell 2 (gNB2)
* Alt 2: switch to an indirect path via relay UE A in cell 3 (gNB2)
* Alt 3: switch to an indirect path via relay UE B in cell 3 (gNB2)
* Alt 4: switch to an indirect path via relay UE B in cell 4 (gNB3)

**Q2:** If both Uu measurements and candidate relay measurements towards **different** target gNBs are available and there are multiple suitable candidates (as shown in Alt 1-4), how is target gNB and target path type selected? In other words, **what is the order among i) target gNB selection, ii) target path type selection and iii) target relay UE selection?**

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| --- | --- | --- |
| Company | Order among i), ii) and iii) | Comment |
| Qualcomm | i) 🡪 ii) 🡪 iii) | i) Source gNB first selects the target gNB (e.g., gNB2)  ii) Source gNB then selects the target path type (e.g., indirect)  iii) Source gNB then selects the target relay UE (e.g, relay UE A) |
|  |  |  |

**Q3.** Which node (source gNB or target gNB) selects the target path type?

|  |  |  |
| --- | --- | --- |
| Company | Source gNB or Target gNB | Comment |
| Qualcomm | Source gNB | Target gNB selecting target path type would mean Option 3 in Q1 and need signaling of PC5 measurements between remote UE to each candidate relay UE over Xn |
|  |  |  |

**Q4:** If both Uu measurements and candidate relay measurements towards the **same** target gNB are available, should the path switching to a direct path be prioritized if the Uu measurement is good?

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| --- | --- | --- |
| Company | Yes/No | Comment |
| Qualcomm | Not sure | Not sure how we can categorize if the Uu measurement is “good” (define an absolute RSRP threshold?). Also, wouldn’t such kind of path type prioritization be up to implementation and there need not be any spec impacts, right? |
|  |  |  |

## Enhancements to HANDOVER REQUEST in Xn

For direct/indirect to indirect path switching, several signaling enhancements to Xn: HANDOVER REQUEST has been proposed in [1]-[12].

**Q5: Companies are requested to provide their preference among the following to be included in Xn: HANDOVER REQUEST:**

1. Remote UE L2 ID
2. Target relay L2 ID. FFS if single or multiple
3. Serving cell of the relay UE
4. PC5 link quality of the relay UE

|  |  |  |
| --- | --- | --- |
| Company | Yes/No for  a)-d) | Comment |
| Qualcomm | a), b) | For b), single relay L2 ID is sufficient (Option 1 in Q1) |
|  |  |  |

## Enhancements to NG based handovers

QC, Proposal 1: For inter-gNB path switching scenarios, RAN3 should specify mechanisms to support service continuity for L2 U2N relays in both Xn and NG based handovers

NOK: For NG-HO, add target Relay UE ID in the Source NG-RAN Node to Target NG-RAN Node Transparent Container IE.

**Q6: Companies are requested to provide their view whether to specify mechanisms to support service continuity for L2 U2N relays in NG based handovers as well?**

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| --- | --- | --- |
| Company | Yes/No | Comment |
| Qualcomm | Yes | WID is not clear. But SA2 is studying NG based handovers as well, so RAN3 should also support this. |
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# Conclusion, Recommendations

If needed

# References

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| [1] | [R3-225355](file:///D:\会议硬盘\TSGR3_117bis-e\Docs\R3-225355.zip) | Inter-gNB aspects of Service Continuity for L2 U2N Relays (Ericsson) |
| [2] | [R3-225416](file:///D:\会议硬盘\TSGR3_117bis-e\Docs\R3-225416.zip) | Service continuity enhancements for L2 relays (Qualcomm Incorporated) |
| [3] | [R3-225426](file:///D:\会议硬盘\TSGR3_117bis-e\Docs\R3-225426.zip) | Inter-node path switching for U2N relays (China Telecommunication) |
| [4] | [R3-225457](file:///D:\会议硬盘\TSGR3_117bis-e\Docs\R3-225457.zip) | Discussion on Support Service Continuity Enhancements (Nokia, Nokia Shanghai Bell) |
| [5] | [R3-225500](file:///D:\会议硬盘\TSGR3_117bis-e\Docs\R3-225500.zip) | Selection of the target relay UE for service continuity (InterDigital) |
| [6] | [R3-225546](file:///D:\会议硬盘\TSGR3_117bis-e\Docs\R3-225546.zip) | SL relay: Inter-gNB mobility (Huawei) |
| [7] | [R3-225708](file:///D:\会议硬盘\TSGR3_117bis-e\Docs\R3-225708.zip) | (TP to TS 38.401) Further discussion on service continuity enhancement (Samsung) |
| [8] | [R3-225755](file:///D:\会议硬盘\TSGR3_117bis-e\Docs\R3-225755.zip) | (TP to TS 38.401) Consideration on service continuity enhancement for L2 U2N relay (LG Electronics) |
| [9] | [R3-225794](file:///D:\会议硬盘\TSGR3_117bis-e\Docs\R3-225794.zip) | Discussion on Service Continuity Enhancements for SL relay (CATT) |
| [10] | [R3-225802](file:///D:\会议硬盘\TSGR3_117bis-e\Docs\R3-225802.zip) | Service continuity on U2N relay (CMCC) |
| [12] | [R3-225467](file:///D:\会议硬盘\TSGR3_117bis-e\Docs\R3-225467.zip) | Further study on multi-path relay and service continuity of L2 U2N relay (ZTE) |