3GPP TSG-RAN WG2 #113bis-e R2-21xxxxx

Electronic meeting, April 12th – 20th 2021

Agenda Item: 8.4.3

Source: CATT (Email discussion rapporteur)

Title: [Post113-e][057][ IAB17] CHO and DAPS for IAB (CATT)

Document for: Discussion

# Introduction

This document captures the outcome of the following email discussion [1]

* [Post113-e][057][IAB17] CHO and DAPS for IAB (CATT)

 Scope: Collect comments on the (potential) usage of CHO and DAPS, starting from agreements and previous input and discussions. Identify options / potential ways forward, easy agreements and discussion points. Detail level: Should focus on the next steps agreements.

 Intended outcome: Report

 Deadline: Long

This email discussion is divided in two phases:

* **Phase I** with the deadline on Tuesday March 23 1100 UTC (3am PST) for companies to provide their views.
* **Phase II** with deadline on Friday March 26 1100 UTC (3am PST) for companies to provide their views on the summary and suggested proposals.

As a reminder, the following agreements have been reached in previous meetings:

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| * **RAN2 Agreements**

**RAN2#112e*** CHO and potential IAB-specific enhancements of CHO is on the table.
* DAPS and potential IAB-specific enhancements of DAPS is not precluded for now (but as there is no PDCP it is not clear how to support DAPS).

**RAN3#113e*** Will indicate regarding P3 that R2 doesn’t understand what is asked by “DAPS-like”, Ask R3 to clarify what they want to achieve.
* RAN2 to discuss CHO and start with intra-donor CHO until RAN3 has made progress on inter-donor IAB-node migration.
* R2 confirm the intention Rel-16 CHO is / can be used for IAB-MT (FFS whether any modification is needed).
* R2 assumes that Rel-16 specification is the baseline for the configuration of default route, IP address(es) and target path for intra-donor CHO.
* **RAN3 Agreements**

**RAN3#111e****Discuss how to support simultaneous connectivity with 2 donors, to reduce service interruption; potential solutions may include dual-protocol-stack solutions (“DAPS-like”); FFS whether the same solution also applies to descendant nodes****The simultaneous connectivity dual-protocol-stack solutions (“DAPS-like”) of an IAB node should allow at least DL simultaneous transmission of BH traffic carried on BH RLC channels, on the paths to both donors.****Rel-16 CHO can be considered as baseline for the discussion of CHO for IAB; further analysis is expected****Rel-16 CHO is supported for INTRA-donor migration of IAB-MT****FFS whether the descendant nodes and UEs receive RRC reconfiguration messages before migrating IAB node connects to target path****RAN3 further studies “DAPS-like” solution after RAN2 has conclusions** |

Rapporteur encourages the participating delegates to provide your contact information in this table.

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| Company | Contact: Name (E-mail) |
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# Discussion

## CHO

Rel-16 CHO is used for handover and RLF recovery for the purpose of service robustness. During Rel-17 eIAB discussion, both RAN2 and RAN3 agreed to take Rel-16 CHO as baseline for IAB-MT. At the first step, we can discuss if the use cases of Rel-16 CHO, i.e., handover and RLF recovery can be applicable to IAB-MT.

**Q1: Do you agree that the use cases for IAB-MT CHO should be handover and RLF recovery? If no,** **please provide the use case you suggested.**

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| **Company** | **Yes/No** | **Comments (if any)** |
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In last meeting, RAN2 agreed to discuss CHO and start with intra-donor CHO until RAN3 has made progress on inter-donor IAB-node migration. Since inter-donor CHO has been postponed, we don’t discuss it in this email discussion. For intra-donor CHO, we find two potential cases: 1) intra-CU and intra-donor-DU CHO; and 2) intra-CU and inter-donor-DU CHO.

The possible differences between the two cases are:

* BAP address of migration IAB-node: In case 1, the BAP address of migration IAB-node can be unchanged during migration. In case 2, the destination DU can allocate another BAP address to the migration IAB-node. It may impact routing procedure.
* Migration IAB-node DU cell: In case 1, migration IAB-node DU cell for descendant IAB-nodes/UEs can be unchanged. In case 2, IAB-node DU cell could be reconfigured considering the resource pools in different donor-DUs. It may impact the mobility of descendant IAB-nodes/UEs, for example, whether the descendant IAB-nodes/UEs perform handover.

**Q2: Do you agree that we can discuss intra-CU/intra-DU CHO and intra-CU/inter-DU CHO separately? If yes, please identify potential issues you considered. If most companies answer no, we can consider common solution for the two cases.**

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| **Company** | **Yes/No** | **Comments (if any)** |
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In last meetings, several open issues of CHO have been discussed in companies’ contributions. We list them as below.

**Open Issue 1: CHO execution condition**

CHO execution condition has been discussed in R2-2100226, R2-2101315, R2-2100359, R2-2100802, R2-2100903. The mentioned conditions are listed below.

* Condition 1: condEventA3;
* Condition 2: condEventA5;
* Condition 3: type-4 RLF indication;
* Condition 4: type-2 RLF indication;
* Condition 5: Event A4.

We think condition 1, 2, and 3 are supported in Rel-16 specification and the 3 conditions can be applied to IAB-MT CHO without specification revision. Other conditions need more discussion and verification.

**Q3: Do you agree that condEventA3, condEventA5 and type-4 RLF indication can be applied to IAB-MT CHO?**

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| **Company** | **Yes/No** | **Comments (if any)** |
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**Q4: Please provide your suggestion on other CHO execution condition(s), such as condition 4 and condition 5 above, and provide your comments/explanations for further discussion.**

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| **Company**  | **Additional CHO execution condition** | **Comments/explanations to your suggested option if any** |
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**Open Issue 2:** **Impacts on descendant IAB-nodes/UEs**

The behaviors of descendant IAB-nodes/UEs were discussed in R2-2100359, R2-2100478, R2-2101283, R2-2100754, R2-2101766, and R2-2101071. Some issues are mentioned as following:

* CHO for descendant IAB-node(s) combined with CHO for migration IAB-node;
* Pre-reconfiguration for descendant IAB-node(s);
* Resource efficiency considering the reserved resources for descendant IAB-node(s)/UEs;
* Etc.

**Q5: Would you like to discuss the impacts on descendant IAB-nodes/UEs? If yes, please provide your comments/explanations for the potential issue(s).**

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| **Company** | **Potential Issues** | **Comments/explanations** |
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**Q6: Do you see any other CHO issues, if not already discussed above?**

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| **Company** | **Other CHO issues** |
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## DAPS-like

RAN3 considered the use cases of load balancing, robustness and reduction of service interruption for inter-donor topology adaptation in LS [R3-211326](file:///F%3A%5C%5C3GPP%5C%5CRAN3%5C%5C2021%5C%5CRAN3%23111-e%5C%5CChairmans_Notes%5C%5CInbox%5C%5CR3-211326.zip). However, RAN3 assumed that a DAPS-like solution for backhauling should be defined by RAN2. Then we can discuss the use cases for DAPS-like solution first.

**Q7: Which use case(s) do you prefer for DAPS-like solution, e.g., load balancing, robustness and reduction of service interruption?**

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| **Company** | **Answer** | **Comments** |
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In RAN2#112e, RAN2 deprioritized DAPS implicitly because it is not clear how to support DAPS of no PDCP in IAB-node. However, RAN3 agreed DAPS-like solution in RAN3#110e at the same time. Since it is not clear what the DAPS-like solution is, we need to confirm the basic understanding on DAPS-like solution.

Generally speaking, when the migration IAB-node performs inter-CU handover, the serviced UEs (including the UEs in subtree) have to perform handover with PDCP re-establishment. Similar to Rel-16 DAPS handover, dual-PDCP sublayers should be applied. In this case, other nodes (such as IAB-donor, UE’s accessed IAB-node and UE) will be impacted. If the migration IAB-node performs intra-CU migration, it is possible that PDCP sublayer is not involved. In this case, only the migration IAB-node is impacted. So we would like to confirm the involved sublayers and nodes for better understanding.

**Q8: Should PDCP sublayer be involved in DAPS-like solution?**

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| **Company** | **Yes/No** | **Comments (if any)** |
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**Q9: Based on Q8, which node(s) should be impacted by DAPS-like solution?**

* **Option 1: migration IAB-node only;**
* **Option 2: migration IAB-node and other node/UE, such as the UE’s accessed IAB-node.**

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| **Company**  | **Preferred option** | **Comments if any** |
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RAN3 discussed NRDC and DAPS-like solution for inter-donor migration. NRDC has been taken as baseline. Currently, it is not clear the relationship between DC and DAPS-like solution. In Rel-16, only PCell is kept during DAPS handover for UE. We are not sure if this restriction is applied to DAPS-like solution for IAB-node, that is, only PCell is kept for IAB-node during DAPS-like procedure. Another explanation is that IAB-node can receive data from source path and a redundant path simultaneously. It looks like split data actually.

**Q10: Please provide your understanding on the relationship between DC and DAPS-like solution. For example, do you think only PCell is kept for IAB-node during DAPS-like procedure, or the DL simultaneous transmission comes from source path and a redundant path?**

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| **Company** | **Answer** | **Comments** |
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Except for above discussion, some other issues could be identified, such as one or two BAP entities for the migration IAB-node which had been discussed in last meeting.

**Q11: Would you like to discuss more detailed issues for DAPS-like solution? If yes, please provide your comments/explanations for the potential issue(s).**

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| **Company** | **Potential Issues** | **Comments/explanations** |
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# Conclusion

To be updated

# Reference

1. Draft RAN2#113-e Chairman Notes
2. RAN3\_111-e\_agenda\_with\_Tdocs20210204\_EOM
3. R2-2102288 Summary of [AT113-e][030][eIAB] Reply LS DAPS-like solution (Ericsson) Ericsson
4. R2-2102364 Reply LS on DAPS-like solution for service interruption reduction
5. [R3-211326](file:///F%3A%5C3GPP%5CRAN3%5C2021%5CRAN3%23111-e%5CChairmans_Notes%5CInbox%5CR3-211326.zip) LS on DAPS-like solution for IAB
6. R2-2102238 Report from email discussion [Post112-e][066][eIAB] Topology Adaptation Qualcomm Incorporated discussion Rel-17
7. R2-2101071 Consideration of topology adaptation enhancement for R17-IAB Huawei, HiSilicon discussion Rel-17 NR\_IAB\_enh-Core
8. R2-2100359 Discussion on Topology adaptation enhancements Intel Corporation discussion Rel-17 NR\_IAB\_enh-Core
9. R2-2100802 Further consideration of topology adaptation enhancements for eIAB Kyocera discussion Rel-17
10. R2-2100903 Topology adaptation enhancements in IAB Sony discussion Rel-17 NR\_IAB\_enh-Core
11. R2-2101261 Topology adaptation enhancements for IAB AT&T discussion
12. R2-2100886 Discussion on topology adaptation enhancements in eIAB Networks Apple discussion Rel-17 NR\_IAB\_enh-Core
13. R2-2101283 Considerations on topology adaptation enhancements in IAB ZTE, Sanechips discussion Rel-17
14. R2-2101315 On IAB Topology Adaptation InterDigital discussion Rel-17 NR\_IAB\_enh-Core
15. R2-2101798 RAN2 impacts of Rel.17 IAB topology adaptation enhancements Futurewei Technologies discussion R2-2010490
16. R2-2100360 Discussion on RAN3 LS of DAPS-like solution Intel Corporation discussion Rel-17 NR\_IAB\_enh-Core
17. R2-2101449 On IAB Inter-donor Topology Adaptation Ericsson discussion NR\_IAB\_enh-Core
18. R2-2100226 CHO and DAPS CATT discussion NR\_IAB\_enh-Core
19. R2-2101109 CHO in IAB system Lenovo, Motorola Mobility discussion Rel-17
20. R2-2101766 Discussion on Resource Reservation for CHO ETRI discussion Rel-17 NR\_IAB\_enh-Core
21. R2-2100478 On inter-CU Topology Adaptation Enhancements vivo discussion NR\_IAB-Core
22. R2-2101450 LS on DAPS-like solution for service interruption reduction Ericsson LS out Rel-17 NR\_IAB\_enh-Core To:RAN3