**3GPP TSG-RAN WG3 Meeting #117-bis-eR3-225937**

**Online, October 10th – 18th 2022**

Agenda Item: 13.2

Source: Ericsson (moderator)

Title: CB # IAB2\_Mobility - Summary of email discussion

Document for: Approval

# Introduction

The deadline for providing replies to Phase 1 is **Wednesday, October 12th at 15.59 UTC.**

**Relevant papers:**

[Eri5345] The Migration Procedure for Mobile IAB-Nodes (Ericsson)

[QC5359] Topology adaptation for mobile IAB (Qualcomm Inc.)

[Fuj5434] Discussion on IAB-node mobility (Fujitsu)

[Fuj5435] Discussion on IAB full migration (Fujitsu)

[ZTE5439] Discussion on inter-donor migration in mobile IAB scenario (ZTE)

[Nok5454] IAB-DU migration based on dual-DU (Nokia, Nokia Shanghai Bell)

[Len5488] Discussion on mobile IAB-node inter-donor topology adaptation (Lenovo)

[Len5489] Inter-donor full migration procedure of mobile IAB-node (Lenovo)

[Hua5680] Discussion on partial migration for mobile IAB (Huawei)

[Hua5681] Discussion on full migration for mobile IAB (Huawei)

[Sam5714] Discussion on IAB-node mobility (Samsung)

[Sam5715] Discussion on full migration procedure (Samsung)

[Xmi5752] Discussion on IAB-node mobility (Xiaomi)

# For the Chairman notes

**TBW**

# Discussion

We continue discuss the general principles of mIAB mobility procedure and the aspects of mIAB-DU HO that do not directly depend on these general principles.

## Execution of multiple consecutive partial migrations

The RAN3#117-e agreements allow for consecutive partial migrations of an mIAB-node, with the Rel-17 solution as the baseline. In this case, the mIAB-DU does not change its donor-CU, while the mIAB-MT does. It needs to be discussed:

* Which entity decides upon triggers the inter-donor HO of mIAB-MT.
* Which entity triggers the inter-donor F1 transport migration for the mIAB-DU.

The issues were discussed in papers [Xmi5752], [ZTE5439] and [Hua5680].

**Potential proposal 1-1: The inter-donor HO of mIAB-MT is decided and triggered by the donor CU serving the mIAB-MT.**

**Q1-1: Do you agree to Potential proposal 1-1?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes** | The CU serving the mIAB-MT knows best when it is time to hand over the mIAB-MT. |
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The Moderator also makes the following initial proposal:

**Potential proposal 1-2: For inter-donor partial migration, the donor CU serving the mIAB-DU decides and triggers the inter-donor F1 transport migration for the mIAB-DU.**

**Q1-2: Do you agree to Potential proposal 1-2?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes** | This is in line with the Rel-17 principle of partial migration, where the F1 transport migration is initiated by the F1-terminating donor. |
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However, to be able to trigger inter-donor F1 transport migration for the mIAB-DU, the donor CU serving the mIAB-DU needs to be notified about the imminent inter-donor HO of the co-located mIAB-DU. This issue was raised in [ZTE5439], [Sam5714], [Nok5454] and [Xmi5752]. The Moderator makes the following initial proposal, based on the proposal from [Nok5454]:

**Potential proposal 1-3: For inter-donor partial migration, the source donor CU for the inter-donor mIAB-MT HO informs the donor CU serving the mIAB-DU about the mIAB-MT HO.**

**Q1-3: Do you agree to Potential proposal 1-3?**

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| **Ericsson** | **Yes** |  |
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For setting up resources for inter-donor F1 transport migration, the donor CU serving the mIAB-DU and the target donor CU for the mIAB-MT HO need to coordinate. It needs to be discussed how does the two donor CUs “find each other” (as formulated in [Xmi5752]). Assuming the previous proposal is agreeable, the “contact details” of the target donor CU for the mIAB-MT HO can be provided to the donor CU serving the mIAB-DU by the source donor CU for the mIAB-MT HO.

**Q1-4: Which “contact details” of the target donor CU for the mIAB-MT HO are provided to the donor CU serving the mIAB-DU by the source donor CU for the mIAB-MT HO?**

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| **Company** | **Answer** |
| **Ericsson** | gNB ID of the target, IP address, mIAB-MT ID(s) |
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Papers [QC5359] and [Fuj5434] discuss the use of Rel-17 F1 Transport Migration procedure to multiple subsequent partial migrations of mIAB-node. With respect to the previous question, there may exist Xn connectivity between the donor CU serving the mIAB-DU and the target donor CU for the mIAB-MT. [QC5359] proposes that, the donor CU serving the mIAB-DU and the target donor CU for the mIAB-MT HO can coordinate by directly exchanging Xn IAB Transport Migration messages.

**Q1-5: Do you agree that, for partial migration of mIAB-node, the donor CU serving the mIAB-DU and the target donor CU for the mIAB-MT HO can directly exchange Xn IAB Transport Migration messages, in case direct Xn connectivity exists (or is established) between the two donor CUs?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes** | (If our understanding is right, the issue at hand is: which node should negotiate with the target for mIAB-MT HO the F1 transport migration for mIAB-DU traffic: the F1-terminating node or the source for the mIAB-MT HO? Our answer is based on that understanding.)The F1-terminating donor should negotiate F1 transport migration with the target donor CU for the mIAB-MT HO. |
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[Len5488] proposes to reuse the IAB Transport Migration Management procedure, to release the resources under IAB-donor-CU2 and to set up the resources under IAB-donor-CU3 for offloaded traffic, for consecutive partial migrations of mobile IAB-node. The Moderator believes that this proposal is implied in Q1-5.

## Support for scenarios with no Xn/IP connectivity between donors

The support for these scenarios was discussed in [Eri5345], [QC5359], [Nok5454], [Hua5680], [Sam5714], [ZTE5439] and [Len5488]. The two key issues in the discussion are:

* Whether to support partial inter-donor migration via NGAP.
* Whether to support inter-donor mIAB-node migration via NGAP.

**Q2-1: Should RAN3 specify NG-based partial inter-donor migration for mIAB-nodes?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes** | **Xn** is typically (albeit not always) **established between neighbour gNBs**. Lack of support for NG-based partial migration would mean that the mIAB-DU would need to be migrated between donors quite frequently. As soon as the mIAB-node leaves the radio coverage of the neighbour of the F1-terminating donor CU, the mIAB-DU will need to be migrated at every mIAB-MT inter-donor HO from that point onwards. |
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**Q2-2: Should RAN3 specify NG-based inter-donor migration for mIAB-nodes?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes** | **Xn connectivity between donor CUs cannot be ensured along the entire path** of the mIAB-node, so, inter-donor migration, including the inter-donor migration of the mIAB-DU should be supported.In addition, we think that the following options should be considered:* Xn-based forwarding, where a donor CU with an Xn connection to the mIAB-DU’s donor and the mIAB-MT’s donor can relay the XnAP messages between the donors.
* Using the mIAB-node as the relay for communication between the donors.
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## Details of mIAB-DU inter-donor migration and UE HO

Papers [Fuj5435], [QC5359], [Nok5454] and [Hua5681] discuss the migration of F1 connection of mIAB-DU and the HO of served UEs.

**Potential proposal 3-1: RAN3 to downselect between Alt1 and Alt2 for implementing two logical mIAB-DUs.**

**Q3-1: Do you agree to Potential proposal 3-1?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes** | We have liaised RAN1, RAN2 an RAN4. **It is quite clear from the LS replies that Alt1 is less complex, with less spec impact**. There is no reason to ask the other WGs the same question again. |
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Before it starts handing over the served UEs towards the target donor, the source donor needs to know the IDs of the cells served by the second logical mIAB-DU.

**Q3-3: How should the source donor CU for mIAB-DU migration find out the cell IDs served by the second logical mIAB-DU?**

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| **Company** | **Answer** |
| **Ericsson** | **Via XnAP, from the target donor CU for mIAB-DU migration.** For mIAB-DU migration, similar to partial migration, the source CU should send a request asking the target CU to accept the mIAB-DU, indicating the necessary resources. Some kind of “mIAB-DU context” should be provided. In the response, the target CU can indicate to the source CU the NCGIs of cells served by the second logical mIAB-DU.  |
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Before it starts handing over the served UEs towards the target donor, the source CU also needs to know that the second logical mIAB-DU established an F1 connection towards the target CU.

**Q3-3: How should the source donor CU for mIAB-DU migration learn that the second logical mIAB-DU has successfully established an F1 connection towards the target CU?**

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| **Company** | **Answer** |
| **Ericsson** | **Via XnAP, from the target donor CU for mIAB-DU migration.** Similar logic as in the previous answer - target CU can indicate to the source CU the NCGIs of cells served by the second logical mIAB-DU. This could serve as an implicit indication that the F1 has been established. |
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## mIAB-DU inter-donor migration

Whether an mIAB-DU can execute inter-donor migration, while the co-located mIAB-MT stays connected to the same donor CU before and after the mIAB-DU migration, is discussed in papers [Eri5345], [QC5359], [Xmi5752], [Len5488], [Sam5714] and [Hua5681].

**Q4: Can an mIAB-DU execute inter-donor migration while the co-located mIAB-MT stays connected to the same donor CU before and after the mIAB-DU migration?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes** | * If mIAB-DU migration cannot be executed without an mIAB-MT HO, this would mean that the **CU serving the mIAB-MT decides about the migration of the F1 connection of the mIAB-DU**. **This does not make any sense at all**. The migration of the F1 connection shall exclusively be in the hands of the F1-terminating CU.
* Moreover, it may hold that the F1-terminating CU has a larger coverage than the RRC-terminating CU.
* We do not understand **how the decoupling introduces a new architecture**. Does Rel-17 partial migration introduce a new architecture? Of course not. Remember that we already agreed that the mIAB-MT and mIAB-DU can be served by different donors. Does that introduce a new architecture? No. The term “anchor CU” is just a term denoting the F1-terminating CU.
* If we tie the mIAB-DU migration to the mIAB-MT HO, the **mIAB-DU migration may fail because a new mIAB-MT HO may occur before mIAB-DU migration is over**. This is quite likely to happen in areas covered by small cells.
* Conversely, decoupling mIAB-DU migration from mIAB-MT HO enables the **decoupling of their respective failures** and **enables gradual HO of the served UEs**.
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