**3GPP TSG-RAN WG3 Meeting #119-bis-eR3-231901**

**Online, April 17th – 26th 2023**

Agenda Item: 13.2

Source: Ericsson (moderator)

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

Document for: Approval

# Introduction

The deadline for providing replies to Phase 1 is **Wednesday, April 19th at 15.59 UTC.**

**Relevant papers:**

**[CATT1275]** Enhancements for mobility of IAB-node together with Ues (CATT)

**[QC1309]** Topology adaptation for mobile IAB (Qualcomm Inc.)

**[Fuj1329]** Discussion on IAB-node DU migration (Fujitsu)

**[Fuj1330]** Discussion on IAB-node consecutive partial migrations (Fujitsu)

**[ZTE1357]** Discussion on inter-donor migration in mobile IAB scenario (ZTE)

**[Len1440]** Discussion on mobile IAB-node inter-donor topology adaptation (Lenovo)

**[Len1441]** IAB-MT and IAB-DU migrate to different IAB-donors (Lenovo)

**[Nok1470]** Discussion on Support IAB-node mobility (Nokia, Nokia Shanghai Bell)

**[Nok1471]** Support for mobile IAB (Nokia, Nokia Shanghai Bell)

**[Can1479]** Discussion on MT and DU Migrations of Mobile IAB-node (CANON Research Centre France)

**[Hua1483]** (TP for NR\_mobile\_IAB BL CR for TS 38.401/38.413/38.473): Support of mobility for mobile IAB (Huawei)

**[Xmi1524]** Discussion on IAB-node mobility (Xiaomi)

**[Eri1535]** Migration Procedure for Mobile IAB-Nodes (Ericsson)

**[Sam1717]** Discussion on DU migration (Samsung)

**[Sam1718]** Discussion on multiple partial migration (Samsung)

# For the Chairman notes

**TBW**

# Discussion

## mIAB-DU inter-donor migration

### Target selection for mIAB-DU migration

An RAN3#119 agreement states:

**Target donor CU selection for mIAB-DU migration and triggering conditions for F1 setup can be up to source CU implementation (unless it is justified that this is not possible) or based on OAM configuration at the source CU.**

Papers **[Hua1483]** and **[ZTE1357]** propose various criteria for choosing the target CU for mIAB-DU migration, whereas the above agreement states that target selection is up to source CU implementation. If the intention is to make the agreement somewhat more concrete, RAN3 could discuss the below potential proposal.

**PP: The mIAB-DU’s source CU choses the target CU for mIAB-DU migration from a pre-/OAM-configured list of candidate target CUs in the area where the mIAB-node is located.**

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| **Company** | **Agree/disagree** | **Comment** |
| **Ericsson** | **Agree** | The current agreement is quite OK, but maybe we do need a bit more details for the stage-2 text. |
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**Summary:**

**Proposal:**

### Informing the mIAB-DU about the target CU for mIAB-DU migration

Another RAN3#119 agreement states:

**When triggering the F1 Setup procedure on the mIAB-node, the source logical mIAB-DU’s CU to include the information of target logical mIAB-DU’s CU (e.g. IP address, gNB-ID).**

Most companies propose that the source CU indicates to the mIAB-DU the gNB-ID of target CU. Some companies argue that it may be beneficial/needed to include the IP address(es) of the target CU as well.

**PP-1: When triggering the F1 setup from the mIAB node to the target CU for mIAB-DU migration, the source CU indicates to the mIAB-DU:**

* **The gNB-ID of mIAB-DU’s target CU.**
* **Optionally, the IP address(es) of mIAB-DU’s target CU.**

Based on the contributions, if the source CU does not provide the target CU’s IP address, the mIAB node should either obtain it from the OAM, or it can be pre-configured with the mapping between gNB-IDs and IP addresses of candidate target CUs for mIAB-DU migration.

**PP-2: The mIAB-node may obtain the IP address of target CU for mIAB-DU migration:**

* **From the OAM, after indicating the target gNB-ID to the OAM.**
* **Based on the target gNB-ID selected by the source CU, and a preconfigured mapping between candidate target CU gNB-IDs and their IP addresses.**

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| **Company** | **Agree/disagree** | **Comment** |
| **Ericsson** | **Agree to both** | The F1 setup requires that mIAB-node knows the IP address of the target CU. If the source CU does not provide the IP address, we need to clarify how the IP address is obtained. |
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**Summary:**

**Proposal:**

### Informing mIAB-DU’s target CU about mIAB-MT’s CU

To initiate the IAB Transport Migration Management procedure towards the mIAB-MT’s CU, the target CU for mIAB-DU migration needs to know the gNB-ID of the mIAB-MT’s CU and the ID of the mIAB-MT at this CU. The two most popular options are:

* **Option A:** Via XnAP signalling from the mIAB-DU’s source CU.
* **Option B:** Via F1AP signalling from the target logical mIAB-DU.

**Q: How does the target CU for mIAB-DU migration obtain the gNB-ID of the mIAB-MT’s CU and the ID of the mIAB-MT at this CU - by means of Option A or Option B?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **See comment** | Option B is indeed independent on the XnAP connectivity between the source and target CU, which makes it attractive. However, this information alone is insufficient for executing the F1 setup between the target logical mIAB-DU and the target CU. Namely, for the mIAB-MT’s donor DU to properly execute IP-to-BAP mapping of the F1 SETUP RESPONSE sent from the target CU to the target logical mIAB-DU, the mIAB-DU’s target CU needs to know how to properly set the IP header of the packet carrying the F1 SETUP RESPONSE. We should discuss whether the source CU or some other node should provide this information to the target CU.  **Conclusion**: only after we have determined the full set of info that needs to be provided to the target CU, can we decide how to provide it. |
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**Summary:**

**Proposal:**

### Additional information needed at the mIAB-DU’s target CU

As explained above, RAN3 needs to discuss two essential issues:

* **Enabling F1 setup towards target CU:** Before the target logical mIAB-DU initiates the F1 setup towards the target CU, the target CU needs to learn how to properly set the IP header fields of the packet carrying the TNL association-related messages and the F1 SETUP RESPONSE message.
* **The content of IAB TRANSPORT MIGRATION MANAGEMENT REQUEST message from target CU to the mIAB-MT’s CU:** Target CU needs to know how to populate this message. In Moderator’s understanding, the target CU needs to know the traffic profile pertaining to the source logical mIAB-DU.

**PP: The target CU for mIAB-DU migration needs to be notified about the following:**

* **Traffic profile of the source logical mIAB-DU’s traffic.**
* **BH information of the source logical mIAB-DU’s traffic.**

This information can be provided to the target CU according to the following options:

* **Option A:** via XnAP signalling from the mIAB-DU’s source CU.
* **Option B:** via F1AP signalling from the mIAB-DU, which obtains this information from its source CU.

**Q: How should the mIAB-DU’s target CU receive the traffic profile and BH information of the source logical mIAB-DU’s traffic, according to Option A or Option B?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **PP4: agree**  **Q4: A** | **PP4:** it is reasonable to assume that the traffic profile of the (source logical) mIAB-DU before the first UE HO is equivalent to the traffic profile of the (target logical) mIAB-DU after the last UE HO.  **Q4:** We are not sure how Option B would work – the F1 SETUP RESPONSE cannot be delivered to the target logical mIAB-DU before the IAB Transport Migration Management procedure between the target CU and the mIAB-MT’s CU has been executed successfully. This means the mIAB-DU’s source CU should indicate the traffic profile and BH info to the target CU. |
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**Summary:**

**Proposal:**

### XnAP ID of the mIAB-MT in the IAB TRANSPORT MIGRATION MANAGEMENT REQUEST message sent from mIAB-DU’s target CU to the mIAB-MT’s CU

The target CU needs to initiate the IAB Transport Migration Management procedure towards mIAB-MT’s CU.

**PP: The “Non-F1-Terminating IAB-donor UE XnAP ID” in the IAB TRANSPORT MIGRATION MANAGEMENT REQUEST message sent from mIAB-DU’s target CU to the mIAB-MT’s CU is generated by the mIAB-MT’s CU.**

Furthermore, the following needs to be discussed: what should be the “F1-Terminating IAB-donor UE XnAP ID” in the IAB TRANSPORT MIGRATION MANAGEMENT REQUEST message sent from mIAB-DU’s target CU to the mIAB-MT’s CU?

There are at least the following options:

* **Option A:** The UE XnAP ID previously “owned” by the mIAB-DU’s source CU.
* **Option B:** The UE XnAP ID generated by the mIAB-DU’s target CU.

**Q: In the IAB TRANSPORT MIGRATION MANAGEMENT REQUEST message sent from mIAB-DU’s target CU to the mIAB-MT’s CU, what should be the “F1-Terminating IAB-donor UE XnAP ID”?**

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| **Company** | **Agree/disagree** | **Comment** |
| **Ericsson** | **PP: Agree**  **Q: needs to be further discussed** | **Q: both options have issues:**   * Neither Option A nor Option B are “by the book”, given that the mIAB-MT may have never “visited” either of them. * During mIAB-DU migration, both the source and the target CU may need to run TMM procedures towards the mIAB-MT’s CU. Assuming A is agreeable, is it formally OK that both source and target CUs use the same set of (“F1-Terminating IAB-donor UE XnAP ID”, “Non-F1-Terminating IAB-donor UE XnAP ID”) to interact with the mIAB-MT’s CU? * Option A, where mIAB-DU’s target CU “inherits” the mIAB-MT’s UE XnAP ID from the mIAB-DU’s source CU may not be feasible, since the UE XnAP ID may be occupied at the present CU. |
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**Summary:**

**Proposal:**

### Traffic release at source logical mIAB-DU

After mIAB-DU migration, the backhaul resources used for proxying the traffic of the source logical mIAB-DU need to be released at the CU of the mIAB-MT.

**Q: How to handle the release of backhaul resources of the mIAB-MT’s CU used for proxying the traffic of the source logical mIAB-DU?**

* **Option A: The mIAB-DU’s source CU initiates the IAB Transport Migration Management procedure towards the mIAB-MT’s CU and requests the release?**
* **Option B: The CU of mIAB-MT initiates the IAB Transport Migration Modification procedure towards the mIAB-DU’s source CU to notify about the release?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **A** | The release should be requested by the mIAB-DU’s source CU – only the mIAB-DU’s source CU knows when the last UE has been handed over from the source logical mIAB-DU to the target logical mIAB-DU. |
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**Summary:**

**Proposal:**

## Miscellaneous issues

### Capturing mIAB-MT HO and mIAB-DU migration in stage2

**PP: Capture the mIAB-MT HO and mIAB-DU migration as separate procedures in TS 38.401.**

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| **Company** | **Agree/disagree** | **Comment** |
| **Ericsson** | **Agree** |  |
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**Summary:**

**Proposal:**

### Confirming the RAN2 agreements about BH transport

**PP: Confirm the following RAN2 agreements:**

* **For the upstream data handling at the BAP of mobile IAB MT, the F1AP BAP configuration for each logical DU should be configured/controlled by the DU’s respective donor-CU via the corresponding F1AP connection.**
* **For the downstream data handling arriving at the mobile IAB-node, the upper layers (e.g., IP layer) can differentiate the data to different logical DUs based on, e.g., the IP address.**

**Q: Should the IP address in the DL packet used for differentiation be the source IP address or destination IP address?**

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| **Company** | **Agree/disagree** | **Comment** |
| **Ericsson** | **PP: Agree**  **Q: perhaps source IP** | Q: It is perhaps more convenient that the differentiation is done based on the source IP address, since, in that case, the addresses so far used only by the source logical mIAB-DU may be, from now on, used by the target logical mIAB-DU as well. |
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**Summary:**

**Proposal:**

### “No PDU session” indication in NGAP HO signalling

**PP: Do you agree to the CR for TS 38.413 Support for mobile IAB in [Nok1471]?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes, but see comment** | Shouldn’t the new IE also be included in the NGAP HANDOVER REQUIRED message? |
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**Summary:**

**Proposal:**

### “mobile-IAB authorized” indication in NGAP HO signalling

A RAN3#119 agreement states:

**NGAP Initial Context Setup Request, UE Context Modification Request and HO Request to include an IE with code points “mobile-IAB authorized”, “mobile-IAB not-authorized”.**

**PP: Would you agree to a CR mirroring the TP for TS 38.413 provided in [Hua1483]?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes** |  |
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**Summary:**

**Proposal:**

### mIAB-MT HO and mIAB-DU migration towards different donors

**PP: Turn into an agreement the WA stating that the mIAB-MT and its co-located mIAB-DU can be handed over/migrated to different donor CUs.**

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| **Company** | **Agree/disagree** | **Comment** |
| **Ericsson** | **Agree** | RAN3#119 agreements *de facto* confirmed the WA. |
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**Summary:**

**Proposal:**

### Inclusion of mIAB-MT’s ULI with UE’s location update

**PP: Introduce a new *IAB-MT User Location Information* IE into the existing User Location Information NGAP IE.**

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| **Company** | **Agree/disagree** | **Comment** |
| **Ericsson** | **Agree** |  |
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**Summary:**

**Proposal:**

## Multiple consecutive partial migrations

### Retaining the mIAB-MT’s XnAP UE IDs at relevant CUs

**PP: For consecutive partial migrations:**

* **The mIAB-DU’s CU retains the UE XnAP IDs of the IAB-MT as long as the co-located mIAB-DU is connected.**
* **The mIAB-MT’s source donor CU retains the mIAB-MT’s UE XnAP ID until it has notified the mIAB-DU’s CU that the resources used for traffic proxying have been released.**

With respect to the second bullet, in **[Hua1483]** it is proposed that the source CU must retain the mIAB-MT’s ID if the mIAB-MT is connected. However, the source CU must retain the mIAB-MT’s ID even after the mIAB-MT’s HO – it needs to do so until it has notified the mIAB-DU’s CU that the resources used for traffic proxying have been released. The Moderator assumes that the notification should be sent after the mIAB-MT HO.

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| **Company** | **Agree/disagree** | **Comment** |
| **Ericsson** | **Agree** |  |
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**Summary:**

**Proposal:**

### The interaction between the 3 CUs during consecutive partial migrations

The “three CUs” are:

* The mIAB-DU’s CU.
* The source CU for mIAB-MT’s HO.
* The target CU for mIAB-MT’s HO.

**PP-1: For consecutive partial migration, after the mIAB-MT HO is completed, the mIAB-MT’s source CU provides to the mIAB-DU’s CU inside the IAB TRANSPORT MIGRATION MODIFICATION REQUEST message:**

* **The UE XnAP ID assigned to the mIAB-MT by the target CU.**
* **The gNB-ID of the target CU.**

**PP-2: For consecutive partial migration, after the mIAB-MT HO is completed, the mIAB-DU’s CU sends the IAB TRANSPORT MIGRATION MANAGEMENT REQUEST message to the mIAB-MT’s target CU, including the UE XnAP ID assigned to the mIAB-MT by the mIAB-MT’s target CU as the “Non-F1-Terminating IAB-donor UE XnAP ID”.**

**PP-3: For consecutive partial migration, during the Xn handover preparation procedure, the mIAB-MT’s source CU sends to the mIAB-MT’s target CU:**

* **The mIAB-MT’s UE XnAP ID used by the mIAB-DU’s CU.**
* **The gNB-ID of mIAB-DU’s CU.**

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| **Company** | **Agree/disagree** | **Comment** |
| **Ericsson** | **Agree to all** |  |
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**Summary:**

**Proposal:**