3GPP TSG-RAN WG3 #119bis-e R3-231900

Online, April 17 - 26, 2023

Agenda Item: 13.1

Source: Xiaomi (Moderator)

Title: Summary of CB: # IAB1\_General

Document for: Discussion

# Introduction

This paper captures the following CB discussion:

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| **CB: # IAB1\_General**  **- Continue discussions and converge on NGAP Initial UE message to include an optional “mobile IAB-node indication”**  **- Discuss and converge on TAC update at the mIAB-DU**  **- Discuss and converge on SA2’s request for positioning of onboard UEs via NRPPs using TRPs of the mobile IAB-node**  **- Discuss and converge, if possible, on handling of the ULI for the UEs served by mIAB node (content, signaling and nodes involved)**  **- Discuss Mobile TRPs and what information is needed to be exchanged to support them**  (moderator - Xiaomi)  Summary of offline disc [R3-231900](file:///C:\Users\lilisi\AppData\Local\Temp\BNZ.643cae93713f756a\Inbox\R3-231900.zip) |

The CB has the following phases:

**Phase I：Converge on open issues. Deadline is Wednesday, April 19, 2023, 18:00 UTC.**

**Phase II：Work on the CRs/LS If needed.**

The following contributions are included in this CB:

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| [R3-231307](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231307.zip) | Workplan for Rel-18 mobile IAB (Qualcomm Inc. (Rapporteur)) | Work Plan |
| [R3-231308](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231308.zip) | Discusssion on issues related to SA2 VMR (Qualcomm Inc.) | discussion |
| [R3-231356](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231356.zip) | Discussion on SA2 issues and mobile IAB authorization (ZTE) | discussion |
| [R3-231482](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231482.zip) | Discussion on UE positioning and additional ULI for VMR (Huawei) | discussion |
| [R3-231522](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231522.zip) | Discussion on support of MBSR (Xiaomi) | discussion |
| [R3-231523](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231523.zip) | Support of MBSR (Xiaomi, Ericsson, Qualcomm, CATT) | CR1153r, TS 38.473 v17.4.1, Rel-18, Cat. B |
| [R3-231532](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231532.zip) | Discussion of SA2 FS\_VMR Solutions (Ericsson) | discussion |
| [R3-231533](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231533.zip) | (draftCR TS 38.305) Introduction of MBSR (Ericsson, Xiaomi, Qualcomm Inc., CATT) | draftCR |
| [R3-231534](file:///D:\会议硬盘\TSGR3_119bis-e\Docs\R3-231534.zip) | (CR TS 38.455) Support for MBSR Location Information (Ericsson, Xiaomi, Qualcomm Inc., CATT) | CR0101r, TS 38.455 v17.4.0, Rel-18, Cat. B |

# For the Chairman’s Notes

# Discussion - Phase I

The workplan in R3-231307 was floated on the reflector several before submission and no comments were received. The Moderator proposes that the workplan is marked as “noted”.

**Proposal 0: Workplan in R3-231307 to be marked as “noted”.**

**Q0: Do you agree with this proposal? Comments?**

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| **Company** | **Yes/No** | **Comments** |
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In RAN3 119 meeting, the following agreements and TBC were captured.

*RAN3#119:*

*Reply LS on FS\_VMR solutions review to SA2 agreed in* [*R3-231011*](Inbox\R3-231011.zip)

*With respect to mobile IAB, for issues concerning the control of UE access to MBSR using CAG function no enhancement is needed and no replies are foreseen from RAN3 on this matter.*

*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”.*

*To be continued: NGAP Initial UE message to include an optional “mobile IAB-node indication”.*

In the Reply LS to SA2 R3-231011, RAN3 agreed to further discuss point#2 (TAC issue), point#6 (positioning issue) and point#7 (additional ULI), according to the content in R3-231011.

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| *RAN3 would like to thank SA2 for their Reply LS on FS\_VMR solutions review (R3-230032/ S2-2211437).*  *Regarding SA2’s requests on points #1, #2, #6, and #7, RAN3 provides the following replies:*  *- For point#1 (regarding KI#1): RAN3 is still discussing procedures and configurations for mobile IAB and has so far not identified any new OAM configuration parameters. RAN3 will provide information on additional parameters to be configured on the mobile IAB by OAM, if any, when these discussions have been finalized.*  *- For point#2 (regarding KI#3): Regarding TAC, RAN3 has agreed:*  *Capture on stage 2 that the TAC/RANAC broadcast by the mobile IAB-DU can be changed in order to reflect the mIAB-node’s physical location. It needs to be further discussed how the mobile IAB-DU’s TAC/RANAC is changed and what Stage 3 impacts are (if any).*  *RAN3 will inform SA2 on further progress regarding TAC for mobile IAB, if any.*  *- For point#6 (regarding KI#5): RAN3 needs to conduct further discussions to converge on a solution. RAN3 will inform SA2 for any progress.*  *- For point#7 (regarding KI#6): RAN3 believes that the functionality requested to provide UE location in point#7 can be accommodated within Rel-18.* |

In this AI, companies provided discussion papers, CRs and draft LS on the following issues

* “mobile IAB-node indication” in NGAP initial UE message;
* TAC update at the mIAB-DU, for point#2 (regarding KI#3);
* MBSR (i.e. mobile TRP or mobile IAB-node) involved positioning, for point#6 (regarding KI#5);
* Additional ULI, for point#7 (regarding KI#6);

For point#2 (TAC issue), the details had been discussed in previous RAN3 meetings and there’re some agreements in AI13.3, and most companies provided their views in AI13.3, so it is suggested to discuss TAC issue in AI13.3. If there’re some progresses needed to be captured in the LS (if any) to SA2, we can further discuss the details in 2nd round according to the discussions.

**In Phase 1, the plan is to converge on solutions for mobile IAB-node indication, MBSR involved positioning, additional ULI.**

**In phase 2, the plan is to prepare the CRs/TP/LS (if needed) according to the 1st round discussion.**

## Mobile IAB-node indication in NGAP

This issue is discussed in paper R3-231308 (Qualcomm), R3-231356 (ZTE) and R3-231532(E///) in AI 13.1, and also discussed in paper R3-231442(Lenovo) in AI 13.2.

As stated in many papers, SA2 has already captured the following normative text in TS 23.501, vs. 18.0, section 5.35A.1:

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| *For a MBSR node, it provides a mobile IAB-indication to the IAB-donor-CU when the RRC connection is established as defined in TS 38.331 [28]. When the mobile IAB-indication is received, the IAB-donor-CU selects an AMF that supports IAB-node with mobility and includes the mobile IAB-indication in the N2 INITIAL UE MESSAGE as defined in TS 38.413 [34] so that the AMF can perform mobile IAB authorization.* |

Based on the above text, R3-231308 (Qualcomm), R3-231356 (ZTE), R3-231532(E///) and R3-231442(Lenovo) proposed to include mobile IAB-node indication” in NGAP Initial UE message.

In addition, R3-231356 (ZTE) indicates that RAN2 has no consensus on whether to include the mobile IAB-node indication in Msg5, which seems not aligned with SA2, it is proposed RAN3 to send LS to RAN2 about RAN3 discussion progress. But according to RAN2's latest agreement in RAN2’s Monday online session, RAN2 agreed to introduce mobile IAB-node indication in Msg5, so there’s no need to send the LS.

**Q1: Proposals for mobile IAB-node indication:**

**Proposal 1-1: RAN3 agrees to include “mobile IAB-node indication” in NGAP Initial UE message so that the AMF can perform mobile IAB authorization.**

**Proposal 1-2: RAN3 agrees that the IAB-donor-CU selects an AMF that supports mobile IAB-node based on the mobile IAB-node indication received via Msg5.**

**Do you agree with these proposals? Comments?**

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| **Company** | **Yes/No** | **Comments** |
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**Summary:**

## MBSR involved positioning for point#6 (regarding KI#5)

The support of MBSR involved positioning is the requested by SA2’s LS R3-230032/ S2-2211437, and RAN3 agreed to further discuss the solutions and impacts according to the Reply LS in R3-231011.

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| - For point#6 (regarding KI#5): RAN3 needs to conduct further discussions to converge on a solution. RAN3 will inform SA2 for any progress. |

In this AI, R3-231308 (Qualcomm), R3-231482 (HW), R3-231356 (ZTE), R3-231522(Xiaomi) and R3-231532(E///) provided discussion papers on their understandings on SA2’s solution and potential RAN3 impacts. And there’re some CR/TP/LS provided as well.

3.2.1 Confirm the understandings on SA2’s stage2

In the discussion papers, all the companies discussed this issue based on the stage2 procedure captured in the SA2’s agreed CR [S2-2301478](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_154AHE_Electronic_2023-01/Docs/S2-2301478.zip) “MT-LR procedure for when a MBSR is involved in the location of a UE” quoted as follows (the RAN3 related impacts are highlighted in blue):



And below are some relevant texts for RAN3 discussion:

4. LMF derives if any MBSR(s) is involved in the positioning of the target UE based on the cell-ID used for positioning measurements in the step 3. The AMF serving the target UE may indicate that the serving cell is an MBSR (if applicable). When the MBSR was integrated as a TRP (IAB-DU) with a gNB, the LMF may determine from in a TRP information exchange procedure that the cell-ID belongs to the MBSR and/or the UE-ID (GPSI) associated with MBSR. As the MBSR can be mobile the LMF may need to determine an updated location of the MBSR by either performing step 5-7 (option 1) or performing step 8-10 (option 2) if option 1 is not feasible. If several MBSRs were derived, then step 5-7 or step 8-10 are be performed for each MBSR.

<Omitted part>

11. [Conditional] The LMF performs one of the positioning procedures with the target UE described in clauses 6.11.1 and 6.11.2. To reduce the timing offset of the positioning measurements, the UE positioning procedure may be scheduled with the same scheduled location time as the MBSR positioning in step 6 or 9. If Network Assisted procedure is used, as in 6.11.2, the NG-RAN may provide the MBSR updated location and velocity information to the LMF as part of the NRPPa procedure.

To make the discussion simple, it is suggested that RAN3 have common understandings on the SA2’s stage2 flow first, and then discuss the spec impacts and detail signalling design.

According to the discussion papers, the following understandings need to be confirmed with the group.

**Understanding 1: LMF needs to be aware of the TRP is MBSR (i.e. mobile TRP) before UE positioning** [according to the description in step 4, LMF needs to know whether the TRP is mobile before UE positioning, and then perform either option 1 or option 2 during UE positioning]

**Understanding 2, LMF obtains an updated location and velocity information of the MBSR by performing either option 1 or option 2 during positioning, which means both options needs be supported**. [according to the description in step 4, if the TRP involved in the positioning is MBSR, LMF performs either option 1 or option 2. However, R3-231482 (HW) argues that there’re some issues for option 1 in case of inter-donor DU migration and partial migration, it is moderator’s understanding that the issue can be solved by OAM or other means, which needs to be further discussed in 3.2.4, and SA2 is aware of this issue, so it is clearly stated in SA2’s CR that if option 1 is not feasible option 2 is used, which means the option 1 needs to be supported even through it’s not feasible sometimes.]

**Understanding 3, If Network Assisted procedure is used (i.e. UL related positioning is performed), LMF obtains an updated location and velocity information of the MBSR as part of NRPPa procedure**. [according to the description in step 11, if RAN assisted procedure is used, i.e. LMF decides to use UL related positioning methods for UE positioning, which means the TRPs involved in this UE positioning will measure the UL SRS and report the measurement results to LMF, LMF will calculate the UE location based on the measurement results, so providing the updated location and velocity information of the involved MBSRs along with the measurement results can help LMF to calculate the UE location accurately]

**Q2: Understandings on SA2 stage2 procedure for MBSR involved positioning:**

* **Understanding 2-1: LMF needs to be aware of the TRP is MBSR (i.e. mobile TRP) before UE positioning.**
* **Understanding 2-2, LMF obtains an updated location and velocity information of the MBSR by performing either option 1 or option 2 during positioning (option 2 can be performed if option 1 is not feasible), which means both options needs be supported by specifications.**
* **Understanding 2-3, If Network Assisted procedure is used (i.e. UL related positioning is performed), LMF obtains an updated location and velocity information of the MBSR as part of NRPPa procedure.**

**Do you agree with these understandings? Comments?**

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| **Company** | **Yes/No** | **Comments** |
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**Summary:**

3.2.2 New TRP type

To support the above understanding 2-1, it is proposed to introduce a new TRP type in NRPPa/F1AP in the following papers R3-231308 (Qualcomm), R3-231482 (HW), R3-231356 (ZTE), R3-231522(Xiaomi) and R3-231532(E///). If this can be agreed, RAN3 can further discuss the corresponding stage2 CR as proposed in R3-231533(Ericsson, Xiaomi, Qualcomm Inc., CATT) and stage 3 CRs as proposed in R3-231534(Ericsson, Xiaomi, Qualcomm Inc., CATT) for NRPPa and R3-231523(Xiaomi, Ericsson, Qualcomm, CATT) for F1AP.

**Q3: Proposals about new TRP type for MBSR:**

**Proposal 3-1, RAN3 agrees to introduce a new TRP type for MBSR in NRPPa/F1AP.**

**Proposal 3-2, if P3-1 is agreed, RAN3 agrees to capture the stage2 description as proposed in R3-231533.**

* **Stage 2 CR in R3-231533**

**MBSR (Mobile base Station Relay):** mobile IAB-node as defined in TS 23.273 [35]. A MBSR can be a RP, TP or TRP

**Proposal 3-3, if P3-1 is agreed, RAN3 agrees to add a new codepoint (e.g. “mobile TRP” or “MBSR”) in the TRP Type IE in the TRP Information IE in NRPPa/F1AP as proposed in R3-231534 and R3-231523.**

* **Stage 3 CR for NRPPa in R3-231534 and F1AP R3-231523**

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| >>TRP type | M |  | ENUMERATED (prs-only-tp, srs-only-rp, tp, rp, trp, …, mbsr) | TS 38.305 [18] | YES | reject |

[Moderator’s note: companies are invited to provide the views on the naming of this new mobile TRP type, as some companies suggested that whether we need to align the naming in RAN specifications, either mbsr or mobile trp.]

**Do you agree with these proposals? Comments?**

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| **Company** | **Yes/No** | **Comments** |
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**Summary:**

3.2.3 Location and velocity information of MBSR

To support option 1, it is requested to provide location and velocity information including the corresponding timestamp via NRPPa/F1AP TRP exchange procedure in R3-231308 (Qualcomm), R3-231482 (HW), R3-231356 (ZTE), R3-231522(Xiaomi) and R3-231532(E///).

As stated in SA2’s stage2 procedure, the location and velocity information are obtained via MO-LR procedure in step 6, which is triggered by the TRP information request message in step 5, and the information obtained in step 6 is provided to LMF via TRP information response message in step 7, this indicates that the information transferred over NRPPa/F1AP should refer to the location and velocity information in LPP spec as MBSR MBSR is considered as a UE from the LMF perspective. Few companies may have different views on whether the location information and timestamp should refer to the existing IEs in NRPPa/F1AP or the IEs in LPP, and some companies think that the existing NG-RAN Access Point Position is designed for static TRP which does not cover all the types of coordinates for a MBSR’s location info, and the existing timestamp IE is SFN type for measurement timing control, which is not suitable for this case the above understandings are discussed in R3-231308 (Qualcomm), R3-231522(Xiaomi) and R3-231532(E///), the detail signalling reference can refer to R3-231532(E///).

In addition, papers in R3-231308 (Qualcomm), R3-231522(Xiaomi) and R3-231532(E///) think that the location and velocity information should also be introduced in measurement related messages, this is to support the step 11 in SA2’s stage procedure (i.e. understanding 2-3)

**Q4: Proposals about location and velocity information over NRPPa/F1AP:**

**Proposal 4-1, RAN3 agrees that the location and velocity information of MBSR as well as the timestamp should be provided via NRPPa/F1AP TRP exchange procedure.**

**Proposal 4-2, if P4-1 is agreed, RAN3 agree to introduce a new type of TRP information (i.e. mobile TRP location info including location, velocity and timestamp) in NRPPa/F1AP spec to request MBSR’s location and velocity information via MO-LR procedure.**

**Proposal 4-3, RAN3 agrees that location and velocity information of MBSR as well as the timestamp should be provided in measurement result IE when UL related positioning is performed.**

[Moderator’s note: the stage2 and stage3 details can be discussed in 2nd round if the above proposals are agreeable]

**Do you agree with these proposals? Comments?**

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3.2.4 MBSR UE ID

To support option 2, it is requested to provide MBSR’s UE ID via NRPPa/F1AP TRP exchange procedure before UE positioning, which is discussed in R3-231308 (Qualcomm), R3-231482 (HW), R3-231356 (ZTE), R3-231522(Xiaomi) and R3-231532(E///).

In addition, R3-231532(E///) thinks that the need for the mIAB-MT UE ID is common to both Option 1 (for the LMF to be aware of the IAB-MT UE ID associated to a specific TRP before UE positioning) and Option 2 (to trigger the MT-LR procedure) agreed by SA2.

According to SA2’s conclusion in TR 23.700-05-i00 and SA2’s agreed CR [S2-2301478](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_154AHE_Electronic_2023-01/Docs/S2-2301478.zip), GSPI is agreed to be introduced as MBSR’s UE ID for this issue, majority of companies in RAN3 proposed to introduce GPSI as MBSR’s UE ID to support SA2’s conclusion, but R3-231482 (HW) thinks that SUPI can also be considered as GPSI may not be available sometimes, R3-231482 (HW) also mentioned security issue of using GPSI/SUPI and would like to check with SA3.

It is moderator’s understanding that RAN3 can follow SA2’s decision as SA2 already had a comprehensive discussion on which ID to be used. In addition, the moderator thinks that NG-RAN node knows SUPI may have security issue, instead of GPSI.

**Q5: Proposals about MBSR’s UE ID over NRPPa/F1AP:**

**Proposal 5-1, RAN3 agrees to include MBSR’s UE ID (i.e. GPSI) in NRPPa/F1AP TRP information response message so that LMF can perform LT-LR procedure to obtain MBSR’s location.**

[Moderator’s note: companies are invited to provide views on either GPSI or SUPI is used as MBSR’s UE ID]

**Proposal 5-2, RAN3 discuss whether to check with SA3 on the security issue.**

**Do you agree with these proposals? Comments?**

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**Summary:**

3.2.4 Issues in case of inter-donor DU migration and partial migration

It was observed that there may be some issues in case of inter-donor DU migration and partial migration, as mentioned in paper R3-231482 (HW), R3-231522(Xiaomi) and R3-231532(E///).

Before we discuss this issue, one thing needs to be clarified is that the selected MBSRs for a UE positioning may be or may not be the served MBSR of the UE, this understanding is based on the description in step 4 in SA2’s CR, i.e. “If several MBSRs were derived, then step 5-7 or step 8-10 are be performed for each MBSR”.

Based on the above understanding, one of the issues discussed in the above papers is that the TRP information (e.g. cell ID and the hosted gNB as well as the TRP ID) of a MBSR may change after inter-donor DU migration, the LMF may select a MBSR for UE positioning with outdated information.

And the following solutions had been discussed in the papers:

* Option A: LMF can initiate new TRP information exchange procedure by receiving the notification from OAM
* Option B: LMF can initiate new TRP information exchange procedure by receiving the notification from UE-AMF as it is aware of the cell ID change.

But it is the moderator’s understanding that both solutions are not that perfect, the OAM-based solution may not update the information in time, and the UE AMF-based solution requires there is at least one UE served by the MBSR so that the UE AMF can trigger the notification.

Another issue discussed in R3-231482 (HW), if IAB-MT and IAB-DU connects to different donors, the LMF that connects to UE-AMF may be different from the LMF that connects to MBSR-AMF, it is the moderator’s understanding that it’s always the LMF that connects to UE AMF (i.e. F1-terminating donor) to manage the UE location service, but the scenario may be possible, it seems an inter-LMF issue, which should be discussed in SA2.

**Q6: Proposals about issues in case of inter-donor migration and partial migration:**

**Proposal 6-1, the TRP information of MBSR including cell ID and TRP ID changes after inter-donor DU migration.**

**Proposal 6-2, RAN3 discuss whether OAM-based trigger or UE-AMF-based trigger for LMF initiating new TRP information exchange procedure is enough or not.**

**Proposal 6-3, if IAB-MT and IAB-DU connect to different donors, RAN3 observes that the LMF that connects to UE AMF may be different from the LMF that connects to MBSR AMF, the corresponding discussion is not in RAN3’s scope.**

**Do you agree with these proposals? Comments?**

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| **Company** | **Yes/No** | **Comments** |
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**Summary:**

## Additional ULI

3.3.1 Providing additional ULI to UE AMF

The support of additional ULI is the requested by SA2’s LS R3-230032/ S2-2211437, and RAN3 agreed to further discuss the solutions and impacts according to the Reply LS in R3-231011.

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| - *For point#7 (regarding KI#6): RAN3 believes that the functionality requested to provide UE location in point#7 can be accommodated within Rel-18.* |

In this AI, R3-231482 (HW), R3-231356 (ZTE), and R3-231532(E///) provided their views on the potential issues and RAN3 impacts, in addition, R3-231309 (QC) and R3-231524(Xiaomi) also provided the views about this issue in AI 13.2.

According to the discussions in the above papers, most companies think that the IAB-DU’s donor-CU (i.e. the serving gNB of the UE) should provide the IAB-MT’s ULI along with UE ULI over NGAP, R3-231532(E///) thinks that since RAN3 has agreed to pursue a dynamic TAC solution, the TAC of the mIAB-DU will reflect the location of the mIAB node, and thus no ULI enhancements are needed, but this does not against to provide the serving cell ID of IAB-MT.

Regarding the detail information in the additional ULI, based on the contributions, no companies against to provide the serving cell ID of the IAB-MT. But companies may have different views on whether to provide the TAC and time information.

**Q7: Proposals about providing additional ULI over NGAP**

**Proposal 7-1, RAN3 agrees that the IAB-DU’s donor-CU includes ULI of the IAB-MT as an additional ULI together with UE ULI over NGAP.**

**Proposal 7-2, RAN3 agree that at least the serving cell ID of the IAB-MT is included in the additional ULI, FFS on TAC and time information.**

**Do you agree with these proposals? Comments?**

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| **Company** | **Yes/No** | **Comments** |
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**Summary:**

3.3.2 IAB-MT and IAB-DU are connected to different IAB-donors

For the scenarios where IAB-MT and IAB-DU are connected to different IAB-donors, the IAB-DU’s donor-CU needs to know the serving cell ID of IAB-MT, the following options are proposed in the related papers:

* Option A, the serving cell ID is passed from the IAB-MT’s donor-CU to IAB-DU’s donor CU (along with the the gNB-ID of the mIAB-MT’s CU, which already agreed in RAN3 previous meeting)
* Option B, the serving cell ID is passed from IAB-DU to IAB-DU’s donor CU via F1AP message.

**Q8: Proposal about providing additional ULI in case of the IAB-MT’s donor and IAB-DU’s donor are different**

**Proposal 8, RAN3 discuss the following options for IAB-DU’s donor to obtain the IAB-MT’s serving cell ID in case IAB-MT and IAB-DU are connected to different IAB-donors**

**- Option A, the serving cell ID of IAB-MT is passed from the IAB-MT’s donor-CU to IAB-DU’s donor CU**

**- Option B, the serving cell ID of IAB-MT is passed from IAB-DU to IAB-DU’s donor CU**

**Do you agree with this proposal? Comments?**

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| **Company** | **Yes/No** | **Comments** |
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**Summary:**

# Discussion - Phase II

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# References

[1] RP-221815, WID on Mobile IAB for NR, 3GPP TSG RAN#96, Budapest, Hungary, June 2022