**3GPP TSG-RAN WG2 Meeting #124** **R2-23xxxxx**

Chicago, US, 13th – 17th Nov, 2023

**Title:** Discussion on the non-F1 BAP SDU in BAP running CR

**Source:** Huawei, HiSilicon

**Agenda item:** 7.12.1

**Document Type:** Discussion and Decision

# Introduction

* [Post123bis][560][mIAB] BAP CR (Huawei)

      Scope: Reflect agreements. CR endorsement, update of related Open Issues

      Intended outcome: Endorsed Running CR (+ OI)

      Deadline: Long

# Background

There is some potential concern to the current BAP running CR R2-2311617, as to the below TP for non-F1 traffic handling.

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| At the IAB-node, for a BAP SDU received from upper layers and to be transmitted in upstream direction, the BAP entity shall:- if the Uplink Traffic to Routing ID Mapping Configuration has not been (re)configured by the F1AP associated with the (logical) DU, where this BAP SDU is received, after the last (re)configuration of *defaultUL-BAP-RoutingID* by RRC:- select the BAP address and the BAP path identity as configured by *defaultUL-BAP-RoutingID* in TS 38.331 [3] for non-F1-U packets;- else:- for the BAP SDU encapsulating an F1-U packet:- select an entry from the Uplink Traffic to Routing ID Mapping Configuration with its traffic type specifier corresponds to the destination IP address and TEID of this BAP SDU;- for the BAP SDU encapsulating a non-F1-U packet:- select an entry from the Uplink Traffic to Routing ID Mapping Configuration with its traffic type specifier corresponds to the traffic type of this BAP SDU;- select the BAP address and the BAP path identity from the BAP routing ID in the entry selected above;- if the selected entry is configured with *Non-F1-terminating IAB-donor Topology Indicator* IE:- consider this BAP Data PDU as data to be routed to non-F1-terminating donor topology.NOTE 1: Uplink Traffic to Routing ID Mapping Configuration may contain multiple entries for F1-C/non-F1 traffic (for mobile IAB-node, this case occurs when considering both configurations received from two F1AP). It is up to IAB node's implementation to decide which entry is selected.NOTE 2: It is up to mobile IAB-node’s implementation to deicide the logical DU where a BAP SDU encapsulating a non-F1 packet is considered to be received from. (the non-F1 traffic does not have to be confined/associated with one specific logical DU) |

Rapporteur claimed that in the RAN2 reflector:

* the TP never states that each DU must have its own OAM
* the TP never states that non-F1 traffic is confined to the DU
* the TP never states that non-F1 traffic is restricted to OAM
* non-F1 traffic **CAN** be considered to be received from one DU by IAB-node **IMPLEMENTATION**
* If the OAM traffic comes from MT, it is not under scope of this NOTE/TP/CR
* If the non-F1 traffic uses the BH, it is not under scope of this NOTE/TP/CR

The importance of using normative text change:

* RAN2 agreement-1: “For the upstream data handling at the BAP of mobile IAB MT, RAN2 assume that the F1AP BAP configuration for each logical DU should be configured/controlled by the DU’s respective donor-CU via the corresponding F1AP connection”
	+ It means “the F1AP is associated with the (logical) DU”.
* RAN2 agreement-2: “RAN2 understands that the F1AP (re)configured BAP configuration to one DU will not impact/override the usage of default BAP configuration by another DU.”
* So, for each BAP SDU, whether it can use the *defaultUL-BAP-RoutingID* depends on whether Uplink Traffic to Routing ID Mapping Configuration has not been (re)configured by the F1AP.
* In order to achieve/implement the agreenment-2, at least for F1 traffic, we need to clarify:
	+ Whether the logical DU1’s F1 data can use the *defaultUL-BAP-RoutingID* only needs to check the whether Uplink Traffic to Routing ID Mapping Configuration has not been (re)configured by the F1AP, which is associated with logical DU1 (rather than logical DU2/not impacted by the situation in logical DU2)
* For non-F1 traffic, rapporteur intends to use the above similar handling as F1 traffic, meanwhile it should NOT require all F1 traffic to be restricted to a certain logical DU.
	+ i.e. Whether the non-F1 data, if considered as received from logical DU1, can use the *defaultUL-BAP-RoutingID* only needs to check the whether Uplink Traffic to Routing ID Mapping Configuration has not been (re)configured by the F1AP, which is associated with logical DU1 (rather than logical DU2/not impacted by the situation in logical DU2)
* Then, trying to apply the normative text also to non-F1 traffic, the *magic* NOTE2 comes:
	+ Mobile IAB-node’s implementation can consider the non-F1 BAP SDT as received from either logical DU, in order to execute the normative text change.
	+ It clarifies that this NOTE2 does not require/restrict that non-F1 traffic have to be confined/associated with one specific logical DU.

With all those analyse, we received comments from Qualcomm/CATT as below:

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| Companies | Comments from RAN2 reflector  | Replies from rapporteur |
| Qualcomm | This implies that during DU migration, **UL F1 SDUs** are treated differently than **UL non-F1 SDUs**:  * For **UL F1 SDUs**, only the associated F1AP configuration is used.
* For **UL non-F1 SDUs**, either F1AP configuration can be used.

This needs to be described in the BAP spec. You have two options to do that:**Option 1:** change the flow of the procedure to capture F1 SDUs separately from non-F1 SDUs.**Option 2:** keep the Rel-16/17 procedure and discuss DU migration as a special case in a NOTE.Since DU migration can be regarded as a special case, Option 2 is fine.The present CR version shown in the box below is **incorrect** since it **precludes non-F1 SDUs**, which do not have an associated F1AP. | The above **discussed TP is to handling the determination of using F1AP configuration vs. RRC default configuration.**If/after the F1AP is determined to be used, then we have the issue on “which logical DU’s F1AP to use”. And the non-F1 case is handled by another NOTENOTE 1: Uplink Traffic to Routing ID Mapping Configuration may contain multiple entries for F1-C/non-F1 traffic (for mobile IAB-node, this case occurs when considering both configurations received from two F1AP). It is up to IAB node's implementation to decide which entry is selected.*Also see the comments from LGE: “For the CATT’s comment, we think that the NOTE1 is to clarify that one mapping table have multiple entries and it is up to implementation which entry is selected among multiple entries, but the NOTE2 is to clarify that it is up to implementation how to decide a mapping configuration for non-F1 traffic when logical DUs exist.”* |
| CATT | We have the same understanding with QC that non-F1 should be treated differently to F1 traffic, because F1 is DU specific data but non-F1 is not.For F1 traffic, only the associated F1 configuration can be used.For non-F1 traffic, either F1AP configuration for logical DUs can be used (since the IP addresses configured via RRC for non-F1 are used for the entire IAB-node rather than a specific DU).Regarding the latest CR in folder, Note 2 newly added is not ok. If we have following Note 2, the non-F1 data will be treated as the F1 data being treated. As a result, Note 1 for non-F1, that there may be multiple F1 configuration entries for non-F1 will be an invalid clarification.  |
| Qualcomm | It precludes non-F1 traffic since it only considers traffic associated with a DU, and non-F1 traffic is not associated with a DU.The text proposed by the rapporteur is technically INCORRECT:… IAB-node can consider either logical DU as the corresponding logical DU for each non-F1 BAP SDU, by implementation. I am stressing, as I already did multiple times before, that non-F1 traffic is NOT associated with a specific DU! E.g., OAM-traffic = non-F1 traffic can already be running before the first DU is even up. **It doesn’t matter if we capture the handling of two DUs via a Note or by updating the procedure as long it is technically correct, and presently, it isn’t!**There is no agreement that each DU must have its own OAM. There is no agreement that non-F1 traffic is confined to the DU.There is no agreement that non-F1 traffic is restricted to OAM.You are introducing a constraint, which has never been discussed, and which certainly has never been agreed. This constraint precludes OAM support for the MT, since the MT is certainly not associated with either of the DUs. This is unacceptable.  | As clarified multiple times (and also in the NTOE2) that NOTE2 does not require/restrict that non-F1 traffic have to be confined/associated with one specific logical DU.*Also see the comment from Fujitsu: “The non-F1 traffic can be* ***considered*** *as received from a specific logical DU by implementation for the convenience to use the configuration of that logical DU. This does not mean that a non-F1 traffic is associated with a logical DU.”*Another facts are replied in the RAN2 reflector, that there could be some logical DU specific non-F1 traffic (not saying “all”).* There exists (logical)DU first, then OAM/non-F1 traffic and F1AP setup later;
* Different logical DU may send OAM traffic to different OAM server (for different configuration) (then, this is kind of per logical DU non-F1 traffic);
* IAB node implementation knows which logical DU each non-F1 traffic is received from.
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| CATT | There indeed is problem if we adopt v10, as the change to the procedure text in 5.2.1.2.1 precludes dealing the non-F1 as non-DU specific data.The change to procedure text as well as Note 2 lead to the implementation where non-F1 is treated like F1 which is DU specific data and therefore can only use the associated F1 configuration. We assume this is a special implementation to treat non-F1 as F1, but this does not follow the common understanding.In our view, TP1 specifies the approach to deal non-F1 in the same way as F1  traffic, and therefore excludes the possibility of dealing the non-F1 traffic as non-DU specific data. On whether to associate non-F1 with DU, we don’t think it should be specified. In other words, whether IAB-node treats the non-F1 data in the same way as F1 can just up to implementation. |
| CATT | For each BAP SDU of non-F1 received from higher layer, configurations from F1AP for both logical DUs can be used. That means if only there is one logical DU configured via F1AP, the F1 configuration will be used rather than default BAP configuration.So, regarding the example you raised below, if DU1 is configured by F1AP while DU2 is not, the IAB should use DU1’s F1AP configuration (means default BAP cannot be used).That treatment for non-F1 is based on the fact that non-F1 is not DU specific traffic.If both configurations of F1AP are configured for both DUs, it’s up to IAB’s implementation which one is used for a BAP SDU of non-F1, whereas considering the BAP SDU coming from that DU is an redundant step. I believe the motivation to “consider” a BAP SDU of non-F1 from a specific DU (i.e., associating the BAP SDU to that DU) in current TP is just for aligning the dealing for non-F1 with that for F1, because F1 is DU specific traffic. But I don’t know why we should impose such constraint to non-F1. | See above reply. And “Namely that the F1P is associated with logical DU and the BAP SDU is considered as received from logical DU.” |
| Qualcomm | Indeed, with the addition of the red text, all non-F1 SDUs that are not associated with a logical DU are dropped from the BAP procedure. |

With all above clarification, it seems Qualcomm is fine with the proposed TP, based on the RAN2 reflector comments “The present text for UL mapping is a little awkward as it refers to non-F1 traffic that is associated with a DU vs. non-F1-traffic that is not associated with a DU. Neither RAN2 nor RAN3 never made that distinction. However, I believe the text now captures the RAN2 agreements and is technically correct. I hope all companies feel the same.”

Then, the latest comments from CATT are received:

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| The procedure text still precludes the reasonable treatment for non-F1 which is not associated to any logical DU.The procedure text as well as Note2 restricts each BAP SDU of non-F1 **must** be attached to a specific logical DU. But that is not the common understanding nor agreement from any working group.The highlight in bracket seems conflicts with the preceding red sentence.-    if the Uplink Traffic to Routing ID Mapping Configuration has not been (re)configured by the F1AP associated with the (logical) DU, where this BAP SDU is received, after the last (re)configuration of *defaultUL-BAP-RoutingID* by RRC:NOTE 2:  It is up to mobile IAB-node’s implementation to deicide the logical DU where a BAP SDU encapsulating a non-F1 packet is considered to be received from. (the non-F1 traffic does not have to be confined/associated with one specific logical DU)I suggest we firstly discuss whether each BAP SDU of non-F1 should associated to a specific logical DU before we doing this change. (I think we have the consensus the non-F1 traffic is not belonging to any DU originally.)To be honest, in my understanding, it can be a kind of implementation, but it’s not reasonable to have such restriction to non-F1 in spec. If you like this implementation you can do this by yourself, because the legacy procedure does not preclude the implementation you like. But if you change the procedure text, you will preclude other ways of implementation for non-F1.I believe the only thing need to do now is how to capture the non-F1 treatment which is different to F1 treatment, i.e., non-F1 can use both F1AP configurations. * We propose following revised NOTE2 from QC with soften words (to better adapt to the implementation you like):

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| NOTE 2:  ~~For an F1 BAP SDU received from upper layers of a mobile IAB-node with two logical DUs, the BAP entity considers only those Uplink Traffic to BH RLC Channel Mapping Configurations that have been provided via F1AP of this BAP SDU’s DU.~~ For a non-F1 BAP SDU received from upper layers of a mobile IAB-node with two logical DUs, the BAP entity may consider~~s~~ the Uplink Traffic to BH RLC Channel Mapping Configurations provided via F1AP of both logical DUs. |

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# Discussion

**Question 1: Can you accept to endorse the TP in the R2-2311617 (see the beginning of section 2), with following understanding?**

* **“**the F1AP associated with the (logical) DU, where this BAP SDU is received**” +** NOTE2 **“**It is up to mobile IAB-node’s implementation to deicide the logical DU where a BAP SDU encapsulating a non-F1 packet is considered to be received from. (the non-F1 traffic does not have to be confined/associated with one specific logical DU)”
* **The above TP is not intended to require/restrict that non-F1 traffic have to be confined/associated with one specific logical DU.** (if companies really want, we can even capture this bullet as agreement.)

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| **Company** | **Yes/No** | **Comments/Suggestion/Compromise TP?** |
| CATT | See comments | It’s true NOTE2 says “It is up to mobile IAB-node’s implementation to deicide the logical DU where a BAP SDU encapsulating a non-F1 packet is considered to be received from”, but the IAB-node should decide a logical DU where each non-F1 BAP SDU comes from, right? Because the change to the procedure text **“**the F1AP associated with the (logical) DU, where this BAP SDU is received**”** cannot work otherwise. We realize the point of this issue actually is how to choose the config among the F1AP configurations of different DUs and default BAP for non-F1. The change to procedure text (as well as NOTE 2) in R2-2311617is based on the implementation where the non-F1 only considers F1AP configuration of one logical DU, i.e., assumes only the F1AP config from a chosen DU can be used for **one** non-F1 BAP SDU. It implies the default BAP configuration cannot be used for the BAP SDU when the chosen DU is configured by F1AP. The chosen DU is decided by mobile IAB-node, as NOTE2 clarify. This implementation for non-F1 is similar with that for F1 traffic, the difference is that a specific DU should be chosen for non-F1. Another implementation resides in the understanding that non-F1 does not belong to any DU originally thus it can consider F1AP configurations of both logical DUs (which QC and CATT try to emphasize). In other words, it assumes both F1AP configs are considered for one BAP SDU of non-F1. It implies the default BAP configuration cannot be used when either DU is configured by F1AP. When both DUs are configured by F1, which F1AP config to be used for **one** BAP SDU of non-F1 is up to mobile IAB-node. This implementation is different to that for F1 traffic.So, now we have two implementations:1. Non-F1 considers F1AP configuration of **one** logical DU
2. Non-F1 considers F1AP configurations of **both** logical DUs

In our view, both options can work and both of them are aligned with *NOTE1: Uplink Traffic to Routing ID Mapping Configuration may contain multiple entries for F1-C/non-F1 traffic (for mobile IAB-node, this case occurs when considering both configurations received from two F1AP). It is up to IAB node's implementation to decide which entry is selected.*Therefore, both options should be considered. We propose following compromise TP to capture both implementations:NOTE 2:  For an F1 BAP SDU received from upper layers of a mobile IAB-node with two logical DUs, the BAP entity considers only those Uplink Traffic to BH RLC Channel Mapping Configurations that have been provided via F1AP of this BAP SDU’s DU. For a non-F1 BAP SDU received from upper layers of a mobile IAB-node with two logical DUs, the BAP entity considers the Uplink Traffic to BH RLC Channel Mapping Configurations provided via F1AP of one logical DU and it’s up to mobile IAB-node’s implementation to determine the logical DU; or the BAP entity considers the Uplink Traffic to BH RLC Channel Mapping Configurations provided via F1AP of the both logical DUs. |
| Qualcomm | Propose alternative solution: | At the IAB-node, for a BAP SDU received from upper layers and to be transmitted in upstream direction, the BAP entity shall:- if for a BAP SDU encapsulating an F1-C packet the Uplink Traffic to Routing ID Mapping Configuration has not been (re)configured by the F1AP associated with the (logical) DU, where this BAP SDU is received, after the last (re)configuration of *defaultUL-BAP-RoutingID* by RRC, or,- if for a BAP SDU encapsulating a non-F1 packet the Uplink Traffic to Routing ID Mapping Configuration has not been (re)configured by the F1AP associated with any of the (logical) DUs on the IAB-node after the last (re)configuration of *defaultUL-BAP-RoutingID* by RRC:- select the BAP address and the BAP path identity as configured by *defaultUL-BAP-RoutingID* in TS 38.331 [3];- else:- for the BAP SDU encapsulating an F1-U packet:- select an entry from the Uplink Traffic to Routing ID Mapping Configuration, which is associated with the (logical) DU, where this BAP SDU is received, and whose traffic type specifier corresponds to the destination IP address and TEID of this BAP SDU;- for the BAP SDU encapsulating an F1-C packet:- select an entry from the Uplink Traffic to Routing ID Mapping Configuration, which is associated with the (logical) DU, where this BAP SDU is received, and whose traffic type specifier corresponds to the traffic type of this BAP SDU;for the BAP SDU encapsulating a non-F1 packet:- select an entry from the Uplink Traffic to Routing ID Mapping Configuration associated with any of the (logical) DUs on the IAB-node, whose traffic type specifier corresponds to the traffic type of this BAP SDU;- select the BAP address and the BAP path identity from the BAP routing ID in the entry selected above;- if the selected entry is configured with *Non-F1-terminating IAB-donor Topology Indicator* IE:- consider this BAP Data PDU as data to be routed to non-F1-terminating donor topology.NOTE: Uplink Traffic to Routing ID Mapping Configuration may contain multiple entries for F1-C traffic. It is up to IAB node's implementation to decide which entry is selected. |
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# Conclusion

TBD

# Reference