**3GPP TSG-RAN WG2 Meeting #113-eR2-21xxxxx**

**Online, 25th Jan – 5th Feb 2021**

**Agenda item:** 6.2.2

**Source:** vivo (Rapporteur)

**Title:** [Offline-022][IAB] User Plane (vivo)

**Document for:** Discussion and Agreement

# 1 Introduction

This is to report the result of the following email discussion at RAN2#113-e meeting [1].

* [AT113-e][022][IAB] User Plane (vivo)

      Scope: Treat R2-2100224, R2-2100466, R2-2100467, R2-2101281, R2-2101452, R2-2101683, R2-2100468

      Phase 1, determine agreeable parts, Phase 2, for agreeable parts Work on CRs.

      Intended outcome: Reports and Agreed CRs if any is agreeable.

      Deadline: Schedule A

According to the chair’s guidance, this report will be based on the contributions R2-2100224, R2-2100466, R2-2100467, R2-2101281, R2-2101452, R2-2101683, R2-2100468. The document consists of phase-1 and phase-2, the deadline of each phase is outlined as follow:

* Phase 1: determine agreeable parts, deadline: Thursday Jan. 28, 2021.
* Phase 2: for agreeable parts Work on CRs, deadline: Thursday Feb. 4, 2021

# 2 Contact Information

To make it easier to find the correct contact delegate in each company for potential follow-up questions, the rapporteur encourages the delegates who provide input to provide their contact information in this table:

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| --- | --- |
| Company | Contact: Name (E-mail) |
| vivo | Kimba Dit Adamou, Boubacar (kimba@vivo.com) |
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# 3 Discussion

## 3.1 On BAP corrections

3.1.1 R2-2100224 [2] (Clarification on the buffer type)

The contribution [2] states in the CR that the buffer size in flow control feedback is DL buffer and should be clarified to avoid any ambiguity. The following change is proposed:

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| 5.3.1 Flow control feedback For a link, the BAP entity at the IAB-MT shall:  - when a flow control feedback is triggered due to the buffer load in downstream direction exceeding a certain level, or  - when a BAP Control PDU for flow control polling is received at the receiving part, the transmitting part of this BAP entity shall:  - construct a BAP Control PDU for flow control feedback per BH RLC channel, if configured by RRC, in accordance with clause 6.2.3;  - construct a BAP Control PDU for flow control feedback per BAP routing ID, if configured by RRC, in accordance with clause 6.2.3;  <text omitted> |

**Q1: Do you agree the clarification on the buffer type of flow control feedback in R2-2100224 [2]?**

|  |  |  |
| --- | --- | --- |
| Company | Agree as is; Agree with changes; Disagree | Detailed Comments |
| Samsung | Agree as is |  |
| LG | Disagree | We think there is no ambiguity because 38.300 clearly describes that a flow control feedback is supported only for downstream direction in Rel-16 IAB.  Another concern is that RAN2 is discussing an upstream flow control feedback for Rel-17 IAB enhancement. If the upstream flow control is agreed to support for Rel-17 IAB, we need to remove this change again. So, we think this change is not needed.  [CATT] The executor is IAB-MT so ambiguity exists. Note 38.300 is stage 2 and 38.340 is stage3 in details. We cann’t rely on stage 2 specification to solve ambiguity in stage 3 specification always.  The 2nd reason verifies the necessity of this change in Rel-16 actaully. |
| CATT | Agree as is |  |
| Ericsson | No strong view, but no essential change | TS 38.300 states that “Further, flow control is supported on BAP sublayer, where the IAB-node can send feedback information on the available buffer size for an ingress BH RLC channel or BAP routing ID to its parent node.”.  Hence it does not seem necessary to change the BAP spec on this functionality. |
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**Conclusion:**

3.1.2 R2-2100466 [3] and R2-2100467 [4] (Correction on the illustration of BAP entity)

* R2-2100467 [4]

The paper [4] discusses the modelling of Control PDU handling in BAP entity and a companion CR is also submitted for the correction on the illustration of BAP entity.

Firstly [4] observes that the handling of Control PDU is explicitly modelled for PDCP and RLC entities but the corresponding part for BAP control PDU is missing in TS 38.340. Further, the paper discusses the nessecity of introducing the handling of BAP Control PDU, as the current BAP modelling can neither explicitly nor implicitly reflect this functionality.

In summary, [4] proposes to explicitly model the functionality of BAP Control PDU handling in BAP entity.

**Q2: Do you agree functionality of BAP Control PDU handling should be explicitly modelled in BAP entity?**

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| --- | --- | --- |
| Company | Agree/Disagree | Detailed Comments |
| Samsung | Agree in principle but… | Please see our comments to Q3. |
| LG | See commnet | “Figure 4.2.2-1 shows one example of the functional view of the BAP sublayer. This functional view should not restrict implementation. The figure is based on the radio interface protocol architecture defined in TS 38.300 [2].”  Considering the above description in the current BAP specification, we think this change for BAP control PDU may not be needed because the figure is an example and informative. However, we have no strong view and it would be good to have clear description. So, if majority company want this change, we can accept the change. |
| CATT | Agree |  |
| Ericsson | Disagree | Section 5.3.1 clearly describes on how to handle the BAP control PDU and that seems sufficiently clear.  Additionally, the new figure proposed in R2-2100466 is not entirely correct, since for example it seems that routing is applied to the BAP control PDU at the transmitter, but this is not the case for a BAP control PDU. Also at the receiver side, it is not clear what is the operation of “BAP header removal” for a BAP control PDU.  This change is not essential, and RAN2 should not spend time in clarifying something that is already clear from other places of the spec. |
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**Conclusion:**

* R2-2100466 [3]

The companion CR in [3] made the following changes:

1. Introduce the functionality of BAP Control PDU handling.

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| 4.2.2 BAP entities <text omitted>  In the example of Figure 4.2.2-1, the receiving part on the BAP entity delivers BAP PDUs to the transmitting part on the collocated BAP entity. Alternatively, the receiving part may deliver BAP SDUs to the collocated transmitting part. When passing BAP SDUs, the receiving part removes the BAP header and the transmitting part adds the BAP header with the same BAP routing ID as carried on the BAP PDU header prior to removal. Passing BAP SDUs in this manner is therefore functionally equivalent to passing BAP PDUs, in implementation. The following specification therefore refers to the passing of BAP Data Packets.  Besides, BAP entity also generates, delivers/receives BAP Control PDU(s) as described in clause 6.1.2. BAP Control PDU can only be exchanged between an IAB-node and its parent/child node, the destination can be determined based on the type of BAP Control PDU (e.g., the destination of flow control polling is invariably the child node) and there is no BAP routing ID in the BAP header.    Figure 4.2.2-1. Example of functional view of BAP sublayer |

If your answer to Q2 is ‘**Agree**’, then please further provide your comments on Q3.

**Q3: Do you agree the introduction to the functionality of BAP Control PDU handling in R2-2100466 [3]?**

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| --- | --- | --- |
| Company | Agree as is; Agree with changes; Disagree | Detailed Comments |
| Samsung | Agree with changes | OK with the idea behind the 1st change (but wording needs further discussion). Ok with the idea behind the 2nd change (but figure is misleading in our view, as it implies routing is applied to a BAP CE). |
| LG | Agree with changes | We prefer to have simple generic description like followings:  “- BAP entity generates, delivers/receives BAP Control PDU(s) as described in clause 6.1.2. BAP Control PDU can only be exchanged between an IAB-node and its parent/child node.” |
| CATT | Agree with changes | Agree with Samsung. |
| Ericsson | Disagree | For the Figure, please see our answer to Q2. We are not sure that the present figure correctly captures the handling of the BAP control PDU as described in Section 5.3.1  For the 2nd change, we agree with LG. It is not clear what “the destination can be determined based on the type of BAP Control PDU”. |
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**Conclusion:**

1. The paper [3] also proposes the following editorial modifications. (For details please refer to R2-2100466 [3])
   1. Replace *defaultUL-BH-RLC-channel* with *defaultUL-BH-RLC-Channel*.
   2. Update **routing ID** to **BAP routing ID**.

**Q4: Do you agree the editorial modifications proposed in R2-2100466 [3]?**

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| --- | --- | --- |
| Company | Agree as is; Agree with changes; Disagree | Detailed Comments |
| Samsung | Agree as is |  |
| LG | Agree as is |  |
| CATT | Agree as is |  |
| Ericsson | Agree as is |  |
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**Conclusion:**

3.1.3 R2-2101281 [5] (Miscellaneous corrections)

The following editorial modifications are made in [5], they are listed as follows (for details please refer to R2-2101281 [5]):

1. Correct “BH information” to “BH Information”
2. Correct “defaultUL-BH-RLC-channel” to “defaultUL-BH-RLC-Channel”
3. Correct “clause 6.2.3” to “clause 6.2.3.1”
4. Correct “routing ID(s)” to “BAP routing ID(s)”
5. Correct “poll” to “polling”
6. Correct “clause 6.2.3” to “clause 6.2.3.2”
7. Correct “clause 6.2.3” to “clause 6.2.3.3”
8. Remove “feedback” from “flow control feedback polling”

**Q5: Do you agree the editorial changes proposed by R2-2101281 [5]?**

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| --- | --- | --- |
| Company | Agree as is; Agree with changes; Disagree | Detailed Comments |
| Samsung | Agree with a), b) and d) as is  Agree with issue raised in e) but… | Wrt c), f) and g), we do not think it’s essential.  Wrt e), we agree that the current text: “When a flow control poll is to be transmitted over an egress link, the…” could be improved, but do not think the proposed fix settles the issue. We would propose something along the following lines:  “When ~~a~~ flow control poll**ing query *[or command]*** is to be transmitted over an egress link, the…”  Wrt h), we do not think the proposed change is needed – we are in fact polling for (= requesting) feedback. |
| LG | Agree as is, but | Fine with all changes.  However, we think that this kind of editorial CR should be the rapporteur’s CR, not company’s CR. It may be good to contact spec rapporteur first, rather than submitting the CR. |
| CATT | Agree a), b),d), e), h), no strong opinoion on c). f), g) |  |
| Ericsson | Agree as is |  |
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**Conclusion:**

3.1.4 R2-2101452 [6] and R2-2101683 [7] (Handling of Unknown and Reserved Values in the BAP Header)

* R2-2101452 [6]

The paper [6] states that the current mechanism of handling the unkown and reserved values in the BAP header might not be future-proof, as the IAB-node receives a BAP PDU with a BAP header containing reserved or invalid values (possibly the BAP PDU is produced by an IAB-node in later release) will discard the BAP PDU. Therefore, the paper proposes that RAN2 to discuss whether specification work (in Rel.16 or in a future release) is required to solve the issue observed.

From the rapporteur’s point of view, and also proposed by [6], RAN2 should first identify whether it is of interest a deployment scenario in which an “old” Rel.16 IAB node is the next hop for a new IAB node.

**Q6: Do you think that the deployment scenario in which an “old” Rel.16 IAB node is the next hop for a new IAB node is valid?**

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| --- | --- | --- |
| Company | Yes/No | Detailed Comments |
| Samsung | No | It’s not impossible but it doesn’t seem likely. More importantly, we do not think we should be trying to fix this hypothetical issue at this point in time. As the very least, it merits a wider discussion in RAN2 (which we are happy to have, once essential changes are agreed). |
| LG | Maybe | We think that there is no restriction to deploy an “old” Rel-16 IAB node as the next hop for a new Rel-17 IAB node. |
| CATT | No | It should not be discussed in Rel-16. |
| Ericsson | Yes | 3GPP cannot assume a priori that whenever an operator would like to configure a new feature for a new IAB node of Rel-X, it needs to update all the IAB nodes in its network to Rel-X.  3GPP should ensure that inter-operability between IAB nodes of different releases is possible.  From our perspective it is fine to do not agree on a specific solution in Rel-16 time frame, but 3GPP should take into account this scenario in specification work of future IAB releases. |
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**Conclusion:**

If your answer to Q6 is ‘**Yes**’, then please further provide your comments on Q7.

**Q7: RAN2 to consider one of the following approaches to address the issue brought up by [6]:**

**a. The CU provides the “new” IAB node with the BAP header format it can use depending on the path/destination of a BAP PDU, i.e. the CU configures the IAB node such that the BAP header can be understood by a peer receiving IAB node. No changes to Rel.16 spec are needed.**

**b. Avoid the IAB node discarding a received BAP PDU if it contains unknown/reserved values, as long as the DESTINATION/PATH fields can be decoded, and the IAB node is not an IAB access node for the BAP PDU. Changes to Rel.16 spec. are needed (see Annex for the possible changes required).**

**c. No enhancements at this moment (not needed, or can be specified when necessary).**

**d. other approach (please specify).**

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| --- | --- | --- |
| Company | Option a/b/c.. | Detailed Comments |
| Samsung | c |  |
| LG | Option b or c | Given that D/C field, R bits, DESTINATION address, and PATH id fields are only included in the header of a BAP data PDU, even though an “old” Rel-16 IAB node is the next hop for a new Rel-17 IAB node, we think that BAP data PDU may have no issue with reserved/invalid value in the header.  The concerned problem can be occurred only when a Rel-16 IAB node receives a BAP control PDU having a reserved/invalid value for Rel-17/18 IAB enhancement and then this BAP control PDU needs to be forwarded to the next hop Rel-17 IAB node.  However, a BAP control PDU has no destination address/path ID and only one hop transmission is allowed so far. It is not sure when to allow multi-hop transmissions for a BAP control PDU and actually use this future-proof change. Anyway we are open to discuss and prefer option b or c. |
| Ericsson | a, or b | We do not have strong preference between A, and B.  A has the advantage that no changes are needed in Rel.16. However, A implies that if the operator would like to configure a certain feature to a “new” IAB node that cannot be done if there is an “old” IAB node along the path, since all transmitters and receivers must support and be configured with the same functionalities, i.e. it is not possible to fully exploit the new functionalities of the new IAB node.  B is better from a technical point of view because it allows a “new” IAB node to fully exploit its new functionalities without causing any packet discards at the “old” IAB node of the next hop. Cons is that it requires changes to Rel.16 specification. |
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**Conclusion:**

* R2-2101683 [7]

Two main modifications are proposed in contribution [7].

Firstly the paper [7] states that in the current specification, following erroneous data are the missing cases when it comes to the handling of Unknown and Reserved Values in the BAP Header:

1. Upstream data arrives at the donor-DU, with BAP address in the header NOT mathcing the IAB-donor-DU’s BAP address, but BAP address included in the DL routing table.
2. Upstream data arrivies at the inter-mediate IAB-node, with BAP address in the header NOT matching the IAB-node’s BAP address, but BAP address included in the the DL routing table.

In summary, the section 5.5 should capture all cases and the first change is proposed as:

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| 5.5 Handling of unknown, unforeseen, and erroneous protocol data When a BAP PDU contains reserved or invalid values, or;  At the trasmitting side, when a BAP PDU contains a BAP address which is not included in the configured BH Routing Configuration, or;  At the receiving side of IAB-donor-DU, when a BAP PDU that contains a BAP address which is not the BAP address of this node is received, the BAP entity shall:  - discard the BAP PDU. |

**Q8: Do you agree the modification to subclause 5.5 in R2-2101683 [7]?**

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| --- | --- | --- |
| Company | Agree as is; Agree with changes; Disagree | Detailed Comments |
| Samsung | Disagree (but…) | We think that the current text could be improved. However we are not sure that cases A) or B) are very realistic/common. This being said, it is true that the current text does not differentiate between e.g. DL routing and UL routing tables. |
| LG | Disagree | We think that when upstream data arrives, the IAB node does not need to checks DL routing table. If the IAB node checks DL routing table for upstream data, it is bad implementation.  We also think that checking unknown/unforeseen/erroneous protocol data is implementation. But, the proposed changes restricts implementation. |
| CATT | Disagree | We think current description is clear. |
| Ericsson | Disagree | It is not clear what is the issue here. As LG stated, for the upstream, the donor DU obviously does not have a BH Routing configuration configured, so the donor will only check the BAP address in the BAP header. So, the original text is not wrong.  Additionally, with the proposed change, it is not considered anymore the access IAB node. Instead, in the original text, also the access IAB node is required to check the BAP address.  Also, it is not clear why the transmitting side should be in charge of discarding something. That should be the task in the receiver, and in any case it does not need to be specified. |
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**Conclusion:**

Secondly, the paper [7] states that the procedures of BAP entity are described in clause 5.2, 5.3, 5.4, and 5.5, but all clauses except for 5.2 are missing when describing the procedures of BAP entity in the BAP entity establishment related part in section 5.1.1. The following change is proposed:

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| 5.1.1 BAP entity establishment When upper layers request establishment of a BAP entity, the node shall:  - establish a BAP entity;  - follow the procedures in clause 5.2, 5.3, 5.4, and 5.5. |

**Q9: Do you agree the modification to subclause 5.1.1 in R2-2101683 [7]?**

|  |  |  |
| --- | --- | --- |
| Company | Agree as is; Agree with changes; Disagree | Detailed Comments |
| Samsung | Agree as is |  |
| LG | Disagree | Even though the RLC and PDCP specifications has more procedures, these procedures are intentionally not addressed in the entity establishment section. We believe that common understanding in 3GPP so far is that all procedures can be performed even without addressing all procedures in entity establishment section. We think that same policy should be applied to BAP specification too. If this change is agreed, RLC and PDCP specifications should be also changed unnecessarily. |
| CATT |  | Referring to other L2 specification, such as PDCP, only data transfer procedure is mentioned during PDCP entity establishment. Not sure such change is needed. |
| Ericsson | No strong view, no essential change |  |
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**Conclusion:**

## 3.2 On User Plane corrections

In this section, only one paper (R2-2100468 [8]) is included. There are three modifications proposed in the CR:

1. Pre-emptive BSR can not only be transmitted to parent IAB-DU(s), but also to parent IAB-donor-DU(s), the description in clause 5.4.7 should be updated to include the IAB-donor-DU case.
2. There are two types of Guard Symbols MAC CEs, i.e., Provided Guard Symbols MAC CE and Desired Guard Symbols MAC CE, the former one is transmitted from IAB-donor-DU or parent IAB-DU to IAB-MT, the latter one is transmitted from IAB-MT to IAB-donor-DU or parent IAB-DU. Thus, for an IAB-MT, only Provided Guard Symbols MAC CE can be received.

The description in clause 5.18.1 for the reception of Guard Symbols MAC CE is not accurate, the plural form of *Guard Symbols MAC CEs* should be revised to singular form.

1. The MAC subheader of Pre-emptive BSR is identified with eLCID, rather than LCID.

**NOTE:** The MAC rapporteur suggests not to pursue the 2nd change, as he thinks there is no chance for confusion with the existing text, and no fundamental reason to make this change.

**Q10: Do you agree the changes proposed by R2-2100468 [8]?**

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| --- | --- | --- | --- | --- |
| Company | Agree/Disagree | | | Detailed Comments |
| 1stChange | 2ndChange | 3rdChange |
| Samsung | Yes | No | Yes | Wrt 1st change, it is true that, for instance, in clause 5.18.19 (Guard symbols for IAB) we say ‘parent IAB-DU or IAB-donor-DU’ and that the proposed change would increase consistency and accuracy.  Also, in 38.300 we make a clear distinction between IAB-DU and IAB-donor-DU. IAB-DU is defined as ‘gNB-DU functionality supported by the IAB-node’ i.e. it does NOT include IAB-donor-DU. So we think 1st change is needed.  3rd change is also needed in our view (what we currently have in the spec is incorrect).  Wrt 2nd Change, 5.18.19 details not only actions upon reception of a MAC CE (Provided Guard Symbols) as claimed in [8], but also actions needed to be performed for generation and transmission of a MAC CE (Desired Guard Symbols).  Additionally, section 5.18.10 (Recommended Bit Rate) also talks about generation of a MAC CE (following triggering of a Recommended bit rate query), and so clearly 5.18 does not just focus on reception of MAC CEs. So we think there is no need to remove the plural ‘s’. There’s no confusion that could result from the current text in our view. |
| LG | Agree | Disagree | Agree |  |
| CATT | Agree | Disagree | Agree | 2nd, in 6.1.3.22, it is stated “The Guard Symbols MAC CEs (i.e. Provided Guard Symbols MAC CE and Desired Guard Symbols MAC CE) are identified…” |
| Ericsson | Yes | Yes, but | Agree | 2nd change: 5.18.1 states “This clause specifies the requirements upon reception of the following MAC CEs”. Hence, the change seems correct, but Section 6.1.3.22 mentions Guard Symbols MAC CEs. So maybe the title of that section should also be changed and aligned with section 6.1.3.20 Recommended bit rate MAC CE which also consists of two separate MAC CEs. |
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**Conclusion:**

# 4 Conclusion

**TBD**

# 5 References

1. RAN2 113-e Chairman Notes 2021-01-25 0900 UTC
2. R2-2100224 Clarify the Buffer Type in Flow Control Feedback CATT CR Rel-16 38.340
3. R2-2100466 Correction on the illustration of BAP entity vivo CR Rel-16 38.340 16.3.0
4. R2-2100467 Discussion on the modelling of BAP layer vivo discussion NR\_IAB-Core
5. R2-2101281 Miscellaneous corrections on IAB in 38.340 ZTE, Sanechips CR Rel-16 38.340 16.3.0
6. R2-2101452 Handling of Unknown and Reserved Values in the BAP Header Ericsson discussion
7. R2-2101683 Miscellaneous corrections to 38.340 for IAB Huawei, HiSilicon (Rapporteur) CR Rel-16 38.340 16.3.0
8. R2-2100468 Corrections on the description of Pre-emptive BSR and Guard Symbols MAC CEs vivo CR Rel-16 38.321 16.3.0