**3GPP TSG-RAN WG2 Meeting #118-e R2-22xxxxx**

**E-meeting, May 9 - 20, 2022**

**Agenda item:** 6.4.1.3

**Source:** Qualcomm Incorporated (Rapporteur)

**Title:** [AT118-e][067][eIAB] 38300 - Discussion

**Document for:** Discussion

# Introduction

This document captures:

* [AT118-e][067][eIAB] 38300 (Qualcomm)

Scope: 1. Address the remaining TS issues from tdocs submitted under AI 6.4 (and below), except those issues addressed in specific discussion. Review collect comments identify agreement points, points for online CB etc. 2. Progress the CR, merge all TS impacts into a single CR.

Intended outcome: Report, CR

Deadline: 1 for CB W2 Wed (CB only if needed, attempt offline agreement), 2 CR agreement is expected in Post meeting discussion

**This discussion has two phases:**

**Phase 1 deadline: Tue May 17, 10:00 UTC (to have time for preparation to Wed CB if necessary)**

**Phase 2 deadline: TBD**

**This discussion document only includes proposals, which may be controversial. Other proposals, which are of editorial nature or potentially less controversial, have been captured in R2-22xxxxx draft CR to 38300 minor changes.**

# Phase 1: Discussion

## On section: 4.7.4.5 OTA timing synchronization

Proposals by R2-2205147 on OTA timing synchronization:

|  |
| --- |
| 4.7.4.5 OTA timing synchronization An IAB-DU is subject to the same downlink timing alignment of a gNB. The IAB-DU may use the received downlink signal from a parent as a reference to control its downlink timing using TA in conjunction with an additional Tdelta parameter received by the collocated IAB-MT from the parent via MAC-CE. |

**Q1: Do you agree on this addition by R2-2205147 to section 4.7.4.5 on OTA timing synchronization?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Fine with this clarification. |
| vivo | Agree |
| Apple | Agree |
| NEC | Agree |
| Samsung | Agree (proponent) |
| ZTE | Agree |
| Kyocera | We agree with the proposal. |
| Lenovo | Agree |
| Intel | Agree |
| Huawei, HiSilicon | No strong view |

## On section: 5.3.5.3          Uplink timing control

Proposal by R2-2205147:

|  |
| --- |
| The gNB (/IAB-DU or IAB-donor-DU) determines the desired Timing Advance setting and provides that to the UE (/ IAB-MT). The UE/IAB-MT uses the provided TA to determine its uplink transmit timing relative to the UE's/IAB-MTs observed downlink receive timing. |

**The Rapporteur agrees that IAB-DU or IAB-donor-DU should be added. The brackets are fine, too. However, we may want to state a little more, such as “gNB (including IAB-DU and IAB-donor-DU)”. This ends up being:**

|  |
| --- |
| The gNB (including IAB-DU and IAB-donor-DU) determines the desired Timing Advance setting and provides that to the UE (or IAB-MT). The UE/IAB-MT uses the provided TA to determine its uplink transmit timing relative to the UE's/IAB-MTs observed downlink receive timing. |

**Q2: Do you agree on the Rapporteur’s proposed rewording of the rewording proposed by R2-2205147?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Fine with rapporteur’s change. |
| vivo | Agree |
| Apple | Agree with the rapporteur’s suggestion.  (The tdoc number seems to be wrong, should be R2-2205147.) |
| NEC | Agree |
| Samsung | Agree (proponent). Also OK with rapporteur’s suggestion. Please note Apple’s comment that the tdoc number is wrong. |
| ZTE | Agree |
| Kyocera | We agree with the rapporteur’s suggestion. |
| Lenovo | Fine with the Rapporteur’s version. |
| Intel | Ok with rapporteur’s update. |
| Huawei, HiSilicon | No strong view |

## On section: 6.11.1 Services and Functions

Proposals by R2-2204898 and R2-2205256:

**Both contributions propose to include BAP header rewriting to the BAP services and functions.**

|  |
| --- |
| 6.11.1 Services and Functions The main service and functions of the BAP sublayer include:  - Transfer of data;  - Routing of packets to next hop;  - Determination of BAP destination and BAP path for packets from upper layers;  - Determination of egress BH RLC channels for packets routed to next hop;  - Differentiating traffic to be delivered to upper layers from traffic to be delivered to egress link;  - Flow control feedback and polling signalling;  - BH RLF detection indication, BH RLF recovery indication, and BH RLF indication.  - BAP header rewriting |

**Q3: Do you agree that BAP header rewriting is added under the BAP services and functions?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Fine with this addition. |
| vivo | Agree |
| Apple | Agree |
| NEC | Agree |
| Samsung | Agree |
| ZTE | Agree |
| Kyocera | We agree with the addition. |
| Lenovo | Agree |
| Intel | Agree |
| Huawei, HiSilicon | Agree |

## On section: 6.11.3 Routing, BAP Header Rewriting and BH-RLC-channel Mapping on BAP sublayer

Proposal by R2-2204794 on adding Rel-17 re-routing enhancements to Rel-16 re-routing section:

|  |
| --- |
| …  The IAB-node can receive multiple routing configurations with the same destination BAP address but different BAP path IDs. These routing configurations may resolve to the same or different egress BH links.  In case the BH link resolved from the routing entry is considered *unavailable* for this packet, the IAB-node may perform local rerouting as defined in TS38.340 [31], i.e., select another BH link by considering only the packet’s BAP address and by disregarding the BAP path ID for intra-donor DU re-routing, or select another BH link by disregarding both the packet’s BAP address and BAP path ID for inter-donor DU re-routing. In this manner, the packet can be delivered via an alternative path as defined in TS 38.340 [31].  …  The IAB-node may rewrite the BAP routing ID in the packet’s BAP header under the following circumstances:  A packet is routed between two IAB topologies via a boundary IAB-node as defined in TS 38.401[31]. In this case, the BAP routing ID carried by the received BAP PDU is allocated by the IAB-donor-CU of the ingress IAB topology, while the BAP routing ID carried by the BAP PDU after header rewriting is allocated by the IAB-donor-CU of the egress IAB topology.  An upstream packet is locally re-routed to a different IAB-donor-DU than indicated by the BAP address in the BAP header of the received packet. The rewritten BAP header carries the BAP address of the alternative IAB-donor-DU and the BAP path ID for a path to this alternative IAB-donor-DU. BAP header rewriting for upstream inter-IAB-donor-DU local rerouting is only applied if neither routing nor local re-routing without header rewriting resolve to an available BH link.  … |

**The Rapporteur believes that this addition is incorrect. This section introduces the concept of local re-routing introduced in Rel-16, which is also supported in Rel-17. This should not be mixed up with Rel-17 inter-donor-DU re-routing using header-rewriting, which is a special case of local re-routing, and which is already captured here.**

**Q4a: Do you agree with the Rapporteur’s view?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| LGE | Yes | We see no issue without this clarification and this change may not be needed. |
| Vivo | Agree | Agree with the rapporteur that this paragraph is for intra-donor-DU local routing. |
| Apple | No strong view | We are not sure the proposal in R2-2204794 is absolutely needed. On the other hand, from a spec reader’s perspective it is not immediately clear that the paragraph is confined to Rel-16 or intra-donor local re-routing. Thus, the paragraph may be clarified in this regard. |
| NEC | Agree |  |
| Samsung | Not really | We have similar view as Apple. Some clarification may be needed although it need not be the originally proposed change. |
| ZTE | No | We think the clarification is necessary for the spec reader to understand the different handling of egress BH link selection for intra-donor DU and inter-donor DU re-routing. |
| Kyocera | Yes | We think there is no issue with the current specification. |
| Lenovo | Yes | There is no issue for the current specification, and we can keep with the original description for intra-DU rerouting. |
| Intel | See comment | Since local re-routing includes both intra-donor DU and inter-donor DU scenario, instead of having all details in stage-2, we think referring to TS38.340 is enough. Hence, we think we can just delete “i.e., select another BH link by considering only the packet’s BAP address and by disregarding the BAP path ID” to avoid the ambiguity, where details can be found in TS38.340. |
| Huawei, HiSilicon | No strong view |  |

Proposal by R2-2204898 on link unavailability due to IAB-node migration:

|  |
| --- |
| A BH link may be considered *unavailable* in case the BH link has RLF. A parent link may be considered *unavailable* after a BH RLF detection indication has been received on this parent link and before a subsequent BH RLF recovery indication has been received on the same parent link. For DL traffic, a BH link may be considered *unavailable* due to congestion derived from flow-control feedback information, as defined in TS 38.340 [31]. For UL traffic, after inter-donor-DU migration of an IAB-node, the egress BH link corresponding to the BAP Routing ID of a received BAP PDU with the BAP address of the original IAB-donor-DU, may be considered unavailable. |

**The Rapporteur has the following problems with this CR:**

* **There is no inter-donor-DU migration. There is only intra-CU and inter-CU IAB-node migration.**
* **During IAB-node migration, the source parent link always becomes unavailable, not only if the IAB-donor-DU has changed.**
* **The lengthy term “the egress BH link corresponding to the BAP Routing ID of a received BAP PDU with the BAP address of the original IAB-donor-DU” can be better captured as “the source parent link”.**

**The Rapporteur therefore proposes the following rewording of R2-2204898:**

|  |
| --- |
| For UL traffic, after IAB-node migration, the BH link to the source parent node may be considered unavailable. |

**Q4b: Should the source parent-node BH link after IAB-node migration be included under “unavailable” BH links? If yes, do you agree on the above rewording proposed by the Rapporteur of the addition proposed by R2-2204898?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | No change is needed and even rapporteur’s change may not be needed. In our understanding, unavailable of source link during IAB-node migration is natural behaviour. If this is added here, do we also add similar sentence for UE handover in stage-2 spec? We don’t think it is needed. |
| Vivo | Fine for the change of the Rapporteur. |
| Apple | Yes, fine with the rewording proposed by the Rapporteur. |
| NEC | Agree |
| Samsung | We agree with LGE that no change appears needed. If we adopt this change proposed by the rapporteur, other parts of the specs may be affected. |
| ZTE | We also think no change is needed. This is not R17 specific issue. If we allow this, should we also change the R16 spec since R16 also support IAB-node migration. |
| Kyocera | Yes. We’re fine with the rapporteur’s wording. |
| Lenovo | Fine with the Rapporteur’s version. |
| Intel | Agree with LG and ZTE, we also think no change is needed. |
| Huawei, HiSilicon | Not critical, but we are fine with the rapporteur’s update.  Also, we suggest to further update “For UL traffic, during IAB-node migration, the BH link to the source parent node may be considered unavailable.” |

Proposals by R2-2205256 on link unavailability:

|  |
| --- |
| A BH link may be considered *unavailable* for local rerouting in case the BH link has RLF. A parent link may be considered *unavailable* after a BH RLF detection indication has been received on this parent link and before a subsequent BH RLF recovery indication has been received on the same parent link. For DL traffic, a BH link may be considered *unavailable* for some routing ID for local rerouting due to congestion derived from flow-control feedback information, as defined in TS 38.340 [31]. |

**The Rapporteur believes that the addition of “for local rerouting” should NOT be included since the BH link is considered unavailable for ROUTING in general, not only for LOCAL RErouting.**

**The Rapporteur also proposes to change “some routing ID” to “a BAP routing ID”.**

**This would end up being:**

|  |
| --- |
| A BH link may be considered *unavailable* in case the BH link has RLF. A parent link may be considered *unavailable* after a BH RLF detection indication has been received on this parent link and before a subsequent BH RLF recovery indication has been received on the same parent link. For DL traffic, a BH link may be considered *unavailable* for a BAP routing ID due to congestion derived from flow-control feedback information, as defined in TS 38.340 [31]. |

**Q4c: Do you agree with the Rapporteur’s rewording of the rewording proposed by R2-2205256?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| LGE | Yes | Rapporteur’s rewording seems fine. |
| vivo | Yes | Fine for the change of the Rapporteur. |
| Apple | Yes |  |
| NEC | Agree |  |
| Samsung | Yes with comments | OK with first proposal from rapporteur (not to add ‘for local rerouting’). Regarding the second change, we prefer a more precise wording (strictly speaking, a link is not considered available/unavailable for a routing ID but rather for a packet), e.g. the following wording:  For DL traffic, a BH link may be considered *unavailable* for a BAP PDU carrying a certain BAP routing ID due to congestion derived from flow-control feedback information related to this BAP routing ID, as defined in TS 38.340 [31]. |
| ZTE | Agree |  |
| Kyocera | Yes | We agree with the rapporteur’s suggestion. |
| Lenovo | Yes | Fine with the Rapporteur’s version. |
| Intel | Yes |  |
| Huawei, HiSilicon | Yes, but | As to the “re-routing change”, based on the rapp’s comment ” **The Rapporteur believes that the addition of “for local rerouting” should NOT be included since the BH link is considered unavailable for ROUTING in general, not only for LOCAL RErouting.** ” we should add “for routing”, to avoid the ambiguity this will be considered for re-establishment like RLF. |

## On section: 9.2.3.4 Conditional Handover

Proposal by R2-2205902

**The following text is proposed to be removed by R2-2205902.**

|  |
| --- |
| CHO is also supported for the IAB-MT . |

**Q5: Do you agree with removal of the above text?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| LGE | Yes | Ok with removal. |
| Vivo | Yes |  |
| Apple | No | The removed text was agreed as a context for the application of CHO for the IAB-MT, we consider it useful to keep it. |
| NEC | No | Same view with Apple. In RAN2 113bis, we have discussed the use case of CHO. It might be better to retain the text.  RAN2 113bis agreement:   * The use cases for IAB-MT CHO should be migration and RLF recovery. * RAN2 should have a common solution for intra-CU/intra-DU CHO and intra-CU/inter-DU CHO. * condEventA3 and condEventA5 are applicable to IAB-MT * FFS if other CHO execution condition is needed (e.g. whether type 2 RLF indication can be used as trigger) |
| Samsung | No | Same view as Apple and NEC. |
| ZTE | No |  |
| Kyocera | Yes | We’re fine with the removal. |
| Lenovo | No | Prefer to keep the original texts. |
| Intel | Yes |  |
| Huawei, HiSilicon | No | Current spec is fine. |

## On section: 9.2.7 Radio Link Failure

Proposals by R2-2204977 and R2-2205902:

|  |
| --- |
| The IAB-DU can transmit a BH RLF detection indication to its child nodes in the following cases:  - The collocated IAB-MT initiates RRC re-establishment;  - The collocated IAB-MT is dual-connected, e.g., configured with CP-UP split/NR-DC/EN-DC, detects BH RLF(s) on all the link(s)providing F1 interface over BAP;  - The collocated IAB-MT has received a BH RLF detection indication from a parent node, and cannot perform UL re-routing for any traffic. |

**Q6: Do you agree with Change 1 and/or Change 2 to the RLF section?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | The change 2 is ok to us, but we are not sure about the change 1. Does it have any problems just to add “CP-UP split” related wording to the existing sentence instead of this much change? |
| Vivo | For Change 1, the original wording seems more concrete.  For Change 2, OK with the change. |
| Apple | For change 1, the second RAN2#116e agreement mentioned in the CR does not supersede the first one. We are fine to reflect both agreements. With this understanding, this case could be updated for example as follows:   * The collocated IAB-MT is dual-connected, detects BH RLF on a BH link, and cannot perform UL re-routing for any traffic. This includes the scenario of an IAB-node operating in CP-UP split, EN-DC or NR-DC, which uses only one link for backhauling and has BH RLF on this BH link, or when all the CG(s) providing F1-over-BAP fail;   Change 2 seems to weaken earlier RAN2 agreements, we prefer not to agree to it. |
| Samsung | Not sure about change 2 (result is more ambiguous if the change is adopted, although to be fair it’s easier to understand).  Wrt change 1, we agree with the intention, but prefer Apple’s wording. |
| ZTE | Both changes are not so necessary. |
| Kyocera | For Change 1, we have similar view as LGE and Apple. So, we’re fine with Apple’s wording.  For Change 2, we support the proposed change. |
| Lenovo | For Change 1, fine with the Apple’s wording.  For Change 2, fine with the change. |
| Intel | Change 1: Not necessary. We think original description in stage-2 is clear. Additionally, CP-UP split is not used in any specification, it also should be avoided here.  Change 2: No. “cannot perform UL re-routing for any traffic” includes two cases: 1) affected by BH RLF indication; 2) congested link. Unable to perform UL re-routing due to congestion at another BH link should not trigger/propagate another BH RLF detection indication to its child IAB-node. |
| Huawei, HiSlicon | Change 1: Support the intention. Fine with Apple’s wording.  Change 2: Either way, the current wording seems fine. |

## On section: 10.4 Measurements to Support Scheduler Operation

Proposals by R2-2205041 and R2-2205147:

**Both contributions propose to include the new BSRs into Section 10.4 on Basic Scheduler Operation. The contributions propose different wordings:**

**Proposal by R2-2205041:**

|  |
| --- |
| Uplink buffer status reports (BSR) are needed to provide support for QoS-aware packet scheduling. In NR, uplink buffer status reports refer to the data that is buffered in for a group of logical channels (LCG) in the UE. Four formats are used for reporting in uplink:  - A short format to report only one BSR (of one LCG);  - A flexible long format to report several BSRs (up to all eight LCGs).  - An extended short format to report one BSR (of one LCG).  - An extended long format to report several BSRs (up to all 256 LCGs).  NOTE: The Extended versions of the BSR formats can only be used by IAB nodes. |

**Proposal by R2-2205147:**

|  |
| --- |
| Uplink buffer status reports (BSR) are needed to provide support for QoS-aware packet scheduling. In NR, uplink buffer status reports refer to the data that is buffered in for a group of logical channels (LCG) in the UE. Eight LCGs and two formats are used for reporting in uplink, except for IAB-MT where up to 256 LCGs are supported:  - A short format to report only one BSR (of one LCG);  - A flexible long format to report several BSRs (up to all eight LCGs/up to all 256 LCGs for an IAB-MT). |

**Q7: Should the new BSRs be included? If so, do you prefer the rewording by R2-2205041 or R2-2205147? Do you prefer a different rewording?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | We prefer R2-2205147 for this clarification since it’s simple and clear. |
| Vivo | OK with the change in **R2-2205041.** |
| Apple | OK with the change in R2-2205041. |
| NEC | R2-2205041 is better. In MAC spec, there are four format of BSR rather than two, two legacy format BSR(short format and long format) and two extended format(introduced in IAB). The changes in R2-2205147 is not complete. |
| Samsung | OK with change in **R2-2205147** (proponents). Regarding the alternative (R2-2205041), we see no need to explicitly mention ‘extended’ versions. At present, we already do not mention all existing formats (truncated Long/Short formats), so if we go down that route, further changes are needed. So we do not agree with NEC that there are 4 formats but rather 8 – but do we need to capture them all?  And finally, the change in **R2-2205147** is more compact. |
| ZTE | Both are acceptable and we sligntly prefer R2-2205041. |
| Kyocera | We’re fine with the change in R2-2205041. |
| Lenovo | Prefer the change in **R2-2205041.** |
| Intel | Yes. Slightly prefer R2-2205041 for stage-2. |
| Huawei, HiSilicon | **R2-2205147** is preferred, similar view as Samsung |

## On section: 10.9 IAB Resource Configuration

Proposals by R2-2205147

**R2-2205147 proposes multiple rewordings and additions for the purpose of clarification.**

|  |
| --- |
| If, the IAB-DU and the IAB-MT of an IAB-node are subject to a half-duplex constraint, as correct transmission/reception by one cannot be guaranteed during transmission/reception by the other and vice versa, e.g., when collocated and operating in the same frequency. If an IAB-node supports enhanced frequency or spatial multiplexing capabilities, additional multiplexing modes can be supported, i.e., simultaneous operation of IAB-MT Rx / IAB-DU Rx, IAB-MT Tx / IAB-DU Tx, IAB-MT Rx / IAB-DU Tx, IAB-MT Tx / IAB-DU Rx. An IAB-node can report its duplexing constraints between the IAB-MT and the IAB-DU via F1AP. An IAB-node can indicate via F1AP whether or not FDM is required for an enhanced multiplexing operation.  …  To facilitate transitioning from IAB-MT to IAB-DU operation and vice versa, guard symbols can be used at the beginning and/or the end of slots where the IAB-node switches operation from its IAB-DU to its IAB-MT function and operation from its IAB-MT to its IAB-DU function, to overcome potentially misaligned symbol boundaries between the IAB-MT domain and the IAB-DU domain (e.g., IAB-MT Rx boundaries are not aligned with the IAB-DU Tx boundaries). Specifically, an IAB-node can indicate to a parent node a number of desired guard symbols, while the parent node can indicate to the IAB-node the number of actually provided guard symbols for specific transitions (MT Rx to DU Tx, MT Rx to DU Rx, MT Tx to DU Tx, MT Tx to DU Rx, DU Rx to MT Tx, DU Rx to MT Rx, DU Tx to MT Tx, and DU Tx to MT Rx).  An IAB-node supporting enhanced multiplexing capabilities, i.e., IAB-MT Rx / IAB-DU Rx, IAB-MT Tx / IAB-DU Tx, IAB-MT Rx / IAB-DU Tx, IAB-MT Tx / IAB-DU Rx, can provide via MAC-CE to a parent node information to facilitate scheduling for enhanced multiplexing operation by the IAB-node, specifically:   * recommended IAB-MT’s Tx/Rx beams, * desired IAB-MT Tx PSD range, * desired parent node’s IAB-DU Tx power adjustment, * required IAB-MT’s uplink transmission timing mode (for setting the IAB-MT transmission time to the transmission time of the IAB-DU). |

**Q8: Do you agree with Change 1, Change 2, Change 3 and Change 4 proposed?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | We are OK with the change 1, 2, and 4. However, the change 3 may not be needed because this specific information may not be suitable for stage-2 spec and can find in stage-3 spec. |
| vivo | OK with change 1. For Change 2,3 and 4, it could be a bit in detail for 38.300. |
| Samsung | OK with all changes (proponent). We do not think these changes are stage-3 level, certainly not Changes 1, 2 and 4. |
| ZTE | OK with change 1. For the othe changes, it looks not so necessary. Anyway we have no strong view with this. |
| Lenovo | OK with change 1, and changes 2,3,4 may not needed for stage-2. |
| Huawei, HiSilicon | Is this supposed to be updated by R1, since the original wording is from R1 LS? |
|  |  |

## On further changes captured in draft CR

**Various minor changes proposed by various contributions have been captured in** **R2-22xxxxx draft CR to 38300 minor changes.**

**Q9: Do you agree with the changes proposed in this draft? Did you add comments into this draft?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | All changes seem editorial and we are fine with this draft. |
| vivo | Agree |
| NEC | Agree |
| Samsung | Looks ok |
| ZTE | Agree |
| Kyocera | We agree with all editorial improvements. |
| Lenovo | Agree |
| Intel | Agree. |

# 3 Conclusion

…

# 4 References

[1] R2-2204794, Miscellaneous IAB Corrections in 38.300, ZTE, Sanechips

[2] R2-2204898, Corrections to 38300, vivo

[3] R2-2204977, Correction on BH RLF detection indication, Lenovo (Beijing) Ltd

[4] R2-2205041, Clarification on extended BSR of eIAB for TS 38.300, NEC

[5] R2-2205147, Miscellaneous eIAB corrections to 38.300, Samsung R&D Institute UK

[6] R2-2205256, Corrections on rerouting in TS 38.300 for eIAB, Huawei, HiSilicon

[7] R2-2205902, Miscellaneous corrections to IAB stage-2 specification, Ericsson