**3GPP TSG-RAN2 #116-e R2-211xxxx**

**Electronic meeting, November 1st – November 12th, 2021**

**Agenda item:**8.4.3 (NR\_IAB\_enh-Core)

**Source:** vivo (Rapporteur)

**Title:** [AT116-e][033][eIAB] CP-UP separation (vivo)

**Document for:** Discussion and Decision

# 1. Introduction

This offline discussion aims to progress on impact of CP-UP separation and attempt to close open issues based on the contributions submitted to AI 8.4.3:

* [AT116-e][033][eIAB] CP-UP separation (vivo)

Scope: Progress impact of CP-UP separation, based on contributions to this meeting. Identify agreements, discussion points, can also capture open issues. Attempt to close open issues.

Intended outcome: Report

Deadline: Tuesday W2 (online CB)

The document consists of Phase -1 and Phase -2, the deadline of each phase is outlined as follow:

Phase -1: to settle scope what is agreeable etc, deadline: Thursday W1 Nov 4 1200 UTC

Phase -2: to formulate agreeable proposals, deadline: Thuesday W2 Nov 9 10:00 UTC.

Please note that the **Phase-2 deadline is different from the normal deadline Schedule 1** set by the Chair (which is by Thursday W2 Nov 11), as this document is supposed to be discussed at the IAB CB (13:35-14:55 UTC) on Tuesday W2.

# 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 (Rapporteur) | Ming WEN (ming.wen@vivo.com) |
| Huawei, HiSilicon | Yulong Shi (shiyulong5@huawei.com) |
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# 3 Phase-1 Discussion

## 3.1 Common aspects for both scenario 1/2

3.1.1 Configuration on F1-C transfer (MCG, SCG, or both)

With regard to the configuration on F1-C transfer, it is proposed in [1][2][4] that a solution similar to the one adopted in LTE can be considered, in which the *f1c-TransferPath* was introduced indicating whether the LTE or NR or both legs should be used in EN-DC deployment. In particular, the introduction of a new field *f1C-TransferPath-r17* can be used to indicate whether the SCG or the MCG or both should be used by the IAB node.

Though [5] also agrees the F1-C traffic transfer path configuration can be “(MCG, SCG, both)”, this may not be a future-proof way if multi-connectivity is supported. Therefore [5] proposes that RAN2 can tentatively discuss if it is agreeable to consider a configuration of indicating the used cell group ID.

**Q1:** **Which option do you prefer to support the configuration of F1-C traffic on the indication of the the leg(s) used for transferring the F1-C traffic (i.e., via the MCG, or the SCG or both the MCG and SCG).**

* **Option 1: a new field, e.g., *f1c-TransferPath-r17* ENUMERATED {MCG, SCG, both}, is indicated to IAB-MT;**
* **Option 2: a specific cell group ID (to be used for F1-C transfer) is indicated to IAB-MT.**

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| Company | Option 1/2 | Detailed Comments |
| Huawei, HiSilicon | Option 1 | This is more like R16 manner for F1 over LTE.  Multi-connectivity should not be considered. |
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Summary: TBD

3.1.2 Whether F1-C is transferred over BH or RRC

RAN2 achieved the following agreements:

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| * F1-C over RRC and F1-C over BAP should not be supported simultaneously on the same parent link. |

Both [4][5] discuss how to support such agreement by identifying the following two options:

* Option 1: F1-C-over-BAP is selected as long as BH RLC CH for F1-C is configured.
* Option 2: An explicit configuration is sent to the IAB-MT by indicating either F1-C-over-BAP or F1-C-over-RRC

Contribution [4] considers that from the cell group configuration, the IAB node knows whether the BAP configuration is configured or not configured over that cell group. The IAB node also knows whether F1-C transfer via RRC or via BH should be used over the CG selected to be used to transfer the F1-C, e.g., according to the the *f1c-TransferPath-r17* configuration.

**Q2: Which option do you prefer to make IAB node be aware of whether to use F1-C transferring over BH or F1-C transferring over RRC?**

* **Option 1: F1-C-over-BAP is selected as long as BH RLC CH for F1-C is configured**
* **Option 2: An explicit configuration is sent to the IAB-MT by indicating either F1-C-over-BAP or F1-C-over-RRC**

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| Company | Option 1/2 | Detailed Comments |
| Huawei, HiSilicon | Option 1, but | Option 1 should be clarified as “as long as the BH RLC CH for F1-C on the indicated CG is configured”, where the CG is indicated by Q1. |
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Summary: TBD

3.1.3 Donor-capable node vs. non-donor-capable node during cell selection

The contribution [2] observes that the current mechanism cannot distinguish donor-capable node from non-donor-capable node during cell selection. Based on the current spec, both the donor-capable and the non-donor-capable gNB will broadcast the IAB-support indication, which may cause the IAB-MT to select a non-donor-capable M-gNB. In case that the non-donor-capable MN could not find a donor-capable SN for the IAB-node, the IAB-node will not work. Therefore, the IAB-node should be aware of the actual capability of the parent node, i.e., whether the gNB allows “F1 over BAP” or only allows “F1-C over RRC”. This gives the IAB-node the right to decide whether to select a non-donor-capable M-gNB.

**Q3: Do you think that IAB-node should be able to know whether the gNB allows “F1 over BAP” or only allows “F1-C over RRC” during cell selection, in case the gNB broadcasts *iab-Support*?**

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| Company | Yes/No | Detailed Comments |
| Huawei, HiSilicon | Yes | The “non-donor-capable” issue is discussed in R3. Regardless of that, the indication from gNB to tell IAB-MT whether gNB providing “F1 over BAP” or “F1 over RRC” like service will help IAB-MT’s cell selection. |
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Summary: TBD

## 3.2 Scenario 1 specific issues

During RAN2#113bis-e, the following agreements were made for the CP-CU separation topic:

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| **From RAN2#113bis-e**   * SRB2 can be used for F1-C transport in CP/UP-separation scenario 1 (FFS other cases) * Split SRB2 can be used for F1-C transport in CP/UP-separation scenario 2 (FFS other cases) |

It is proposed in [3] that ‘Only SRB2 is used for F1-C transport in CP/UP-separation scenario 1’, thus the open issue can be closed by removing ‘FFS on other cases’, if this proposal can be acknowledged by the majority.

**Q4: Do you agree that for scenario 1 only SRB2 is used for F1-C transport in CP/UP-separation scenario 1?**

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| Company | Agree/Disagree | Detailed Comments |
| Huawei, HiSilicon | Agree | This is the agreement already. |
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Summary: TBD

## 3.3 Scenario 2 specific issues

In this section, the overall structure is outlined as:

* first to confirm if other cases are needed (e.g., SRB3),
* then to discuss how to support split SRB2,
* other (miscellaneous) issues .

3.3.1 FFS on the need of SRB3

[1][3][4] propose that SRB3 is NOT used for F1-C transport in scenario 2 as such would require more specification work without any extra benefit compared to split SRB2 requirement, while [5][6] hold the opposite view towards this issue. The arguments for both sides are generalized as follows:

* Arguments for NOT supporting SRB3:
  + F1AP messages can be treated as lower priority compared with essential RRC messages, no need to transfer F1-C traffic via SRB3. [1]
  + Requires extra standardization efforts in RAN3. A new Xn procedure may be needed so that the MN can request the SN to establish the SRB3 (This procedure already exists in the RAN3 specification for the fast MCG link recovery, but not for IAB.). [3][4]
* Arguments for supporting SRB3:
  + Over Xn interface, the split SRB2 establishment may be refused by the SN. In this case, the SRB3 can be used for the F1-C traffic transfer. [5]
  + RRC messages from the IAB node can be delayed by RRC messages from UEs, if only split SRB2 is used in scenario 2. This is because the RRC messages (transmitted via SRB0/1) from descendant IAB/UEs are included into an RRC container (e.g., ULInformationTransfer), and then transferred to the SCG using split SRB2.[6]

Based on the above contributions, companies are invited to express their views on the support of SRB3 in scenario 2.

**Q5: Which option do you prefer to support F1-C transport in scenario 2?**

* **Option 1: Only Split SRB2 (i.e., SBR3 is NOT supported)**
* **Option 2: SRB3 (in addition to the already agreed split SRB2)**

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| Company | Option 1/2 | Detailed Comments |
| Huawei, HiSilicon | Option 1 | How to ensure the split SRB2 establishment in Xn is the R3 issue, based on the R2 agreement on supporting split SRB2.  Latency is not that critical requirement for F1-C over RRC. The key point is for reliability. |
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Summary: TBD

3.3.2 How to support Split SRB2

Currently, only if the PDCP&RLC data volume is greater than the threshold, the RRC message may have the chance to be transmitted via the secondary RLC entity, as described in the excerpt from TS 38.323. Therefore some enhancements may be needed for the support of split SRB2 in scenarios 2.

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| else (i.e. the PDCP duplication is deactivated for the RB or the RB is a DAPS bearer):  - if the split secondary RLC entity is configured; and  - if the total amount of PDCP data volume and RLC data volume pending for initial transmission (as specified in TS 38.322 [5]) in the primary RLC entity and the split secondary RLC entity is equal to or larger than *ul-DataSplitThreshold*:  - submit the PDCP PDU to either the primary RLC entity or the split secondary RLC entity;  <unrelated part is omitted>  - else:  - submit the PDCP PDU to the primary RLC entity. |

[3][4][5] propose that the IAB-MT should be able to use SCG for the F1-C traffic transmission via split SRB2 in scenario 2, if configured. Specifically, [4][5] proposes that the prerequisite for the use of SCG should be that *f1C-TransferPath-r17* (as discussed in Section 3.1.1) is configured to ‘SCG’ or ‘both’.

Companies are invited to answer the following question that if the autonomous modification is agreeable or not.

**Q6: Do you agree that the IAB-MT can autonomously modify the *primaryPath* to SCG leg to support F1-C transport in scenario 2** **via split SRB2?**

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| Company | Agree/Disagree | Detailed Comments |
| Huawei, HiSilicon | See comments | Not sure about the meaning of “autonomously modify”.  Maybe the first proposal to be achieved is the intention as rapporteur’s summary “the IAB-MT should be able to use SCG for the F1-C traffic transmission via split SRB2 in scenario 2, if configured”  In our understanding, the path of split SRB2 is controlled by the paramters of “*primaryPath*” in 38.331. |
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Summary: TBD

3.3.3 Other (miscellaneous) issues

Contribution [5] proposes to discuss that what should the IAB-MT do if the split SRB2 RRC message contains both F1-C traffic and other information unrelated to IAB. Two potential candidate solutions are also proposed in the contribution: follow legacy split SRB2 method or follow the configuration of F1-C transfer path.

**Q7: Which option do you prefer if the split SRB2 RRC message contains both F1-C traffic and other information unrelated to IAB?**

* **Option 1: follow legacy split SRB2 method.**
* **Option 2: follow the configuration of F1-C transfer path.**
* **Option 3: please specify.**
* **…**

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| Company | Option 1/2/3… | Detailed Comments |
| Huawei, HiSilicon | Option 2 | If CU considers other information is more important to follow legacy split SRB2 method, then donor implementation will not configured the F1-C transfer path.  So, it the F1-C transfer path is configured, it is assumed that other information can also use the same path/method as F1-C, i.e. option 2, from CU implementation.  Maybe, option 2 should be“follow the configuration of F1-C transfer path, if configured.” |
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Summary: TBD

As also discussed in Section 3.3.1, [6] observes that because the RRC messages (transmitted via SRB0/1) from descendant IAB/UEs are included into an RRC container (e.g., ULInformationTransfer), and transferred to the SCG using split SRB2, therefore the RRC messages from the IAB node can be delayed by RRC messages from UEs, this will further delay the connection control of the IAB node and be problematic. In order to solve the issue observed in the contribution, [6] proposes that a SRB for transferring RRC messages for IAB nodes should be different from a split SRB 2 which is used for transferring RRC messages for UE.

**Q8: Do you agree that a SRB for transferring RRC messages for IAB nodes should be different from a split SRB 2 which is used for transferring RRC messages for UE** **in the CP/UP-separation scenario 2?**

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| Company | Agree/Disagree | Detailed Comments |
| Huawei, HiSilicon |  | We should trust donor configuration. BTW, the SRB to be used is specficied for each RRC message in current RRC. Does the proposal intend to make many modification on the spec? |
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Summary: TBD

# 4 Phase-2 Discussion

TBD

# 5. Conclusions

TBD

# 6. References

1. R2-2109614 Inter-donor CU topology migration, topology redundancy and CP-UP separation Intel Corporation discussion Rel-17 NR\_IAB\_enh-Core
2. R2-2109786 F1 over NR access link and CHO Huawei, HiSilicon discussion Rel-17 NR\_IAB\_enh-Core
3. R2-2110293 Miscellaneous issues on CP-UP separation vivo discussion Rel-17 NR\_IAB\_enh-Core
4. R2-2110888 Remaining Issues Related to CP/UP Separation in IAB Network Ericsson discussion NR\_IAB\_enh-Core
5. R2-2111088 CP-UP separation and other topology adaptation issues Samsung Electronics discussion NR\_IAB\_enh-Core
6. R2-2111157 Remaining issues on enhancements of topology adaptation and congestion mitigation LG Electronics Inc. discussion Rel-17 NR\_IAB\_enh-Core