**3GPP TSG RAN WG2 Meeting #117-e R2-220xxxx**

Electronic meeting, 21st Feb – 3rd Mar 2022

Agenda Item: 8.4.4

Source: Intel Corporation (Rapporteur)

Title: AI summary of AI 8.4.4 UE capabilities (Intel)

Document for: Discussion and Decision

# Introduction

This paper provides a summary of contributions submitted to A.I. 8.4.4 in RAN2-117-e meeting. The UE capabilities are mainly focusing on following aspects:

* Intra-donor DU local re-routing and inter-donor DU re-routing
* BAP header rewriting
* Differentiation between inter-donor CU partial migration and inter-donor CU for topology redundancy

# Discussion

## UE capability for intra-donor DU local re-routing

[1] [2] proposes no UE capability is introduced for intra-donor DU local re-routing due to following reasons:

1) New triggers agreed in Rel-17 does not have corresponding configurations from IAB-donor CU side [1]

2) Follow the same principle as Rel-16 local re-routing [2]

3) Configuration to congestion triggered local re-routing is performed in downstream at the IAB-DU side [2]

4) IAB-node can be assumed to always perform local re-routing, as no separate capability for reception of type-2 RLF indication and load balancing [6]

Regarding to 4), rapporteur would like to point out first, UE capability for type-2 RLF indication was agreed in RAN2 #116bis-e meeting, which represents the IAB-MT can support handling of BH RLF detection indication and BH RLF recovery indication.

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| Agreement in RAN2 #116bis-e meeting:* [051] Define a new UE capability (1 bit) for ‘BH RLF detection indication and BH RLF recovery indication’ as optional UE capability for IAB-MT.
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Considering the IAB-node may not support both intra-donor DU and inter-donor DU local re-routing at the same time, [3] proposes to define two different UE capabilities for intra-donor DU and inter-donor DU local rerouting.

Regarding to congestion-based re-routing (DL local re-routing), [4] and [5] think the network needs to know whether an IAB-node can support congestion-based re-routing, as it needs to configure congestion threshold for re-routing. On the other hand, [2] thinks configuration to congestion triggered local re-routing is performed in downstream at the IAB-DU side, which is not an IAB-MT’s capability.

The support status of UE capability for Rel-17 intra-donor DU local re-routing is summarized as below:

Support (3): Vivo, Samsung, Intel

Not support (3): HW, ZTE, Ericsson

It seems there’s no consensus or majority view on UE capability for Rel-17 intra-donor DU local re-routing by new trigger conditions based on contributions. Rapporteur proposes to discuss this issue during the online meeting.

**Proposal 1 [for discussion]: RAN2 to discuss whether to define a new UE capability for Rel-17 intra-donor DU local re-routing.**

Furthermore, [4] also thinks some revision is needed for RAN2 #116bis-e meeting agreement, as UL local re-routing in the agreement does not include congestion-based local re-routing, which is a DL local re-routing. A single UE capability for Rel-17 intra-donor DU local re-routing (applicable for both UL and DL) is preferred by [4], as suggested in [AT116bis-e][051][eIAB] UE Caps [7].

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| Agreement in RAN2 #116bis-e meeting:    **[051] The single UE capability is used for all UL local re-routing trigger conditions.**  |

The rapporteur acknowledges that the above agreement has a precondition, which is “**if the UE capability for local re-routing is needed**, a single UE capability is used for all local re-routing trigger conditions”. With that, a clarification agreement is proposed as below:

**Proposal 2: If new UE capability for Rel-17 intra-donor DU local re-routing is defined, it is used for all local re-routing trigger conditions, e.g. flow control feedback (congestion), type-2/3 RLF indication.**

## UE capability for BAP header rewriting

In Rel-17, there are two scenarios of local re-routing that require BAP header rewriting:

1) inter-donor DU re-routing

2) inter-donor CU re-routing

[1][2][6] propose the BAP header rewriting UE capability should cover both scenarios. Compared with intra-donor DU local re-routing, [3][4][5] also think BAP header rewriting-based re-routing needs a separate UE capability.

All companies believe a separate UE capability needs to be defined for BAP header rewriting based local re-routing. The rapporteur proposes with below proposal:

**Proposal 3 [easy agreement]: Define a new UE capability for BAP header rewriting-based local re-routing (including inter-donor DU re-routing and inter-donor CU re-routing) as optional UE capability for IAB-MT.**

## UE capability for inter-donor CU parital migration and topology redundancy

[2][4][5][6] believe that there’s no need to differentiate the capability between inter-donor CU partial migration and inter-donor CU routing for topology redundancy, as the BAP procedure for above two scenarios is the same.

On the other hand, [3] considers separate UE capabilities is needed, as the IAB-node may not be required to support two functionalities at the same time. It is considered by [3] that inter-donor CU partial migration is deployed to allow some traffic being migrated to another topology due to traffic offloading, and inter-donor CU topology redundancy is deployed for robustness. However, rapporteur believes, for inter-donor CU partial migration, there’s only one BH link is available, which means all traffics of the boundary IAB-node are routed from the source topology to another. For inter-donor CU topology redundancy, the boundary IAB-node may offload partial traffic to another topology due to load balancing, etc. From BAP processing point of view, both scenarios require BAP header rewriting from previous routing ID in source topology to new routing ID in target topology, which has no difference.

Therefore, the rapporteur proposes with below proposal:

**Proposal 4 [easy agreement]: No need to differentiate “inter-donor CU routing” UE capability between “inter-donor CU partial migration” and “inter-donor CU routing for topology redundancy”.**

## Feature Group

[2] propose to define new feature group for BAP header rewriting, which includes two sub-features: 1) inter-donor CU routing and local re-routing (inter-donor DU and inter-donor CU). On the other hand, [4][5] think a new feature group is defined for inter-donor CU routing only, as they are proponent to define another feature group for local re-routing.

[3] thinks no need to define new feature group for inter-donor CU routing. [3][4][5] (the proponent to define new UE capability for intra-donor DU local re-routing) propose that new feature group for local rerouting should be introduced, and [4] further explains it should include DL local re-routing and UL local re-routing.

Rapporteur thinks how to define feature group is related to whether UE capability of intra-donor DU local re-routing is supported or not. Therefore, rapporteur proposes RAN2 to down-select between Option A and Option B based on the outcome of Proposal 1.

However, considering feature group is not a critical issue, the rapporteur proposes to deprioritize the discussion.

**Proposal 5 [deprioritize]: RAN2 to down-select between Option A and Option B based on whether UE capability for Rel-17 intra-donor DU local re-routing is supported or not:**

**Option A: If UE capability for Rel-17 intra-donor DU local re-routing is not supported, define a new type of feature group for BAP header rewriting, which includes inter-donor CU routing and inter-donor DU/inter-donor CU re-routing as sub-features.**

**Option B: If UE capability for Rel-17 intra-donor DU local re-routing is supported, define two new types of feature groups:**

**1) Inter-donor CU routing**

**2) Local re-routing, including intra-donor DU local re-routing, inter-donor DU re-routing and inter-donor CU re-routing as sub-features.**

# Conclusion

Based on the discussion above and summary from contributions submitted to RAN2 #117-e meeting AI 8.4.4 on remaining open issues for R17 eIAB RAN2 related UE capability, the following is proposed:

**Easy agreement:**

**Proposal 3: Define a new UE capability for BAP header rewriting-based local re-routing (including inter-donor DU re-routing and inter-donor CU re-routing) as optional UE capability for IAB-MT.**

**Proposal 4: No need to differentiate “inter-donor CU routing” UE capability between “inter-donor CU partial migration” and “inter-donor CU routing for topology redundancy”.**

**For discussion:**

**Proposal 1: RAN2 to discuss whether to define a new UE capability for Rel-17 intra-donor DU local re-routing by new trigger conditions, e.g. flow control feedback, type-2/3 RLF indication.**

**Proposal 2: If new UE capability for Rel-17 intra-donor DU local re-routing is defined, it is used for all local re-routing trigger conditions, e.g. flow control feedback (congestion), type-2/3 RLF indication.**

**Deprioritize:**

**Proposal 5: RAN2 to down-select between Option A and Option B based on whether UE capability for Rel-17 intra-donor DU local re-routing is supported or not:**

**Option A: If UE capability for Rel-17 intra-donor DU local re-routing is not supported, define a new type of feature group for BAP header rewriting, which includes inter-donor CU routing and inter-donor DU/inter-donor CU re-routing as sub-features.**

**Option B: If UE capability for Rel-17 intra-donor DU local re-routing is supported, define two new types of feature groups:**

**1) Inter-donor CU routing**

**2) Local re-routing, including intra-donor DU local re-routing, inter-donor DU re-routing and inter-donor CU re-routing as sub-features.**

# References

[1] R2-2202376 UE capability issues for eIAB Huawei, HiSilicon

[2] R2-2202384 Discussion on R17 IAB-MT capabilities ZTE, Sanechips

[3] R2-2202970 Remaining UE capability for IAB-MT vivo

[4] R2-2203113 eIAB UE capabilities - open issues Samsung Electronics GmbH

[5] R2-2203212 Discussion on UE capability for local rerouting Intel Corporation

[6] R2-2203467 On eIAB capabilities Ericsson

[7] R2-2201912 Summary of discussion [AT116bis-e][051][eIAB] UE Caps (Intel) Intel Corporation