**3GPP TSG RAN WG2 Meeting #116bis-e R2-220xxxx**

Electronic meeting, 17th – 25th Jan 2022

Agenda Item: 8.4.3

Source: Intel Corporation (Rapporteur)

Title: [draft] Summary of 8.4.3 UE caps

Document for: Discussion and Decision

# Introduction

This paper provides a summary of contributions submitted to A.I. 8.4.3 in RAN2-116bis-e meeting. The UE capabilities are mainly focusing on following aspects:

* LCG extension
* Type-2 and type-3 RLF indication
* F1-C over RRC via NR access link
* BAP header rewriting and Local rerouting

Moreover, this paper also discusses how to handle R17 eIAB RAN1/RAN4 related UE capabilities.

# Discussion

### RAN1/RAN4 related UE Capabilities

[3] discussed RAN1 related feature list and UE capabilities. However, based on agreement from RAN2-116e meeting, Rapporteur believes RAN1/RAN4 feature groups is aimed to work in the mega CR and will not be covered in separate WI.

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| For Rel17 NR UE caps: * Aim to Work on mega CRs (one mega CR for TS38.306 and one for TS38.331) to incorporate all RAN1/RAN4 feature groups. ​There could be exceptions, case by case.
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Moreover, RAN1 feature list of eIAB is also included in UE capability mega CR R2-2201653 (TS38.306) [8] and R2-2201654 (TS38.331) [9]. Following UE capabilities are discussed, including:

* Case 6 and case 7 timing alignment reception
* DL Tx power adjustment
* Guard symbol report reception
* Restricted IAB-DU beam reception
* Recommended IAB-MT beam transmission
* Simultaneous transmission and reception of an IAB-node from multiple parents

Companies are welcome to review and discuss RAN1 feature list of eIAB in AI 8.0.2.

Based on above summary and observation, the rapporteur proposes:

**Proposal 1: R17 eIAB RAN1/RAN4 feature groups and UE capabilities are discussed together with mega CR.**

### LCG Extension

[1][2][3][4][5] propose to define a UE capability for LCG extension, which is optional with capability signaling for IAB-MT. [1][4] further propose this UE capability should be included in the parent IE *MAC-ParametersCommon*. [1][3] also propose to define a new feature group for LCG extension.

In RAN2 #116e meeting, it was agreed that LCG extensions is supported as an optional capability.

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| * Support of Extended BSR by an IAB-MT is an optional capability.
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It was also captured in the TS38.331 running CR R2-2111604 [10]:

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| MAC-ParametersCommon ::= SEQUENCE { lcp-Restriction ENUMERATED {supported} OPTIONAL, dummy ENUMERATED {supported} OPTIONAL, lch-ToSCellRestriction ENUMERATED {supported} OPTIONAL, ..., [[ recommendedBitRate ENUMERATED {supported} OPTIONAL, recommendedBitRateQuery ENUMERATED {supported} OPTIONAL ]], [[ recommendedBitRateMultiplier-r16 ENUMERATED {supported} OPTIONAL, preEmptiveBSR-r16 ENUMERATED {supported} OPTIONAL, autonomousTransmission-r16 ENUMERATED {supported} OPTIONAL, lch-PriorityBasedPrioritization-r16 ENUMERATED {supported} OPTIONAL, lch-ToConfiguredGrantMapping-r16 ENUMERATED {supported} OPTIONAL, lch-ToGrantPriorityRestriction-r16 ENUMERATED {supported} OPTIONAL, singlePHR-P-r16 ENUMERATED {supported} OPTIONAL, ul-LBT-FailureDetectionRecovery-r16 ENUMERATED {supported} OPTIONAL, -- R4 8-1: MPE tdd-MPE-P-MPR-Reporting-r16 ENUMERATED {supported} OPTIONAL, lcid-ExtensionIAB-r16 ENUMERATED {supported} OPTIONAL ]], [[ spCell-BFR-CBRA-r16 ENUMERATED {supported} OPTIONAL ]], [[ srs-ResourceId-Ext-r16 ENUMERATED {supported} OPTIONAL ]], [[ lcg-ExtensionIAB-r17 ENUMERATED {supported} OPTIONAL ]]} |

Based on above summary and observation, the rapporteur proposes:

**Proposal 2a [already agreed]: Confirm to define a new UE capability for LCG Extension in *MAC-ParametersCommon* as optional UE capability for IAB-MT.**

**Proposal 2b [for discussion]: Define a new feature group for LCG Extension.**

### Type-2 and Type-3 RLF Indication

For UE capability, [1][4] propose to define separate UE capabilities for RLF detection and recovery RLF indication, while [5] proposes one UE capability is defined for both type-2 and type-3 RLF indication, as it is unlikely that only one of type-2 and type-3 RLF indication is supported by IAB-MT.

However, based on RAN2 #116e meeting agreements,

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| * A node can transmit type-3 indication only if it previously sent type-2 indication, i.e., type-3 indication cannot be triggered without triggering type-2 indication previously.
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It only requires type-3 RLF indication can be triggered if a type-2 RLF indication is sent beforehand. It is still possible that one IAB-node only sends type-2 RLF indication without indicating the recovery of BH link RLF to its child IAB-nodes, i.e. one IAB-node can support type-2 RLF indication without supporting type-3 RLF indication.

Moreover, it was agreed in RAN2 #116e meeting to use “BH RLF detection indication” and “BH RLF recovery indication” to replace type-2 and type-3 RLF indication.

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| * [032] To agree that the following terms are used:

-  Type-2:  “BH RLF detection indication”, -  Type-3: “BH RLF recovery indication”  |

Based on above summary, the rapporteur proposes:

**Proposal 3a [easy agreement]: Define UE capability for BH RLF detection indication and BH RLF recovery indication as optional UE capability for IAB-MT. FFS whether use single or two separate UE capabilities.**

[1][3] propose to define a new feature group for new RLF indication introduced in R17, i.e. RLF detection indication and RLF recovery indication. With that, the rapporteur proposes:

**Proposal 3b [for discussion]: Define a new feature group for RLF detection and recovery RLF indication handling.**

### F1-C transfer in NR-DC

F1-C transfer in CP/UP separation for NR-DC scenario 1 and scenario 2 were discussed and agreed to be supported in Rel-17. In [1][2][3][4][5], it is proposed to define a new UE capability for CP/UP separation. Different feature names are proposed, for example F1-C over non-F1-termination node [1], F1-C over NR RRC [4], F1-C via NR access link [5]. Rapporteur believes further details of the field name of this UE capability can be left FFS.

Based on above summary, the rapporteur proposes:

**Proposal 4a [easy agreement]: Define a UE capability ‘*f1c-OverNRRRC’* for CP/UP separation as optional UE capability for IAB-MT.**

**Proposal 4b [for discussion]: Define a new feature group for F1AP over NR RRC.**

As for the parent IE of CP/UP separation UE capability, two options are summarized based on contributions [1][2][4][5]:

* MR-DC parameter (included in *GeneralParametersMRDC*) [4]
* UE-NR-Capability [1][5]

Recalling F1-C transfer in CP/UP separation is defined for NR-DC scenario 1 and scenario 2, [1] further proposes to include this new UE capability as a separate capability in NR-DC, i.e. *NRDC-Parameters* as its parent IE.

Based on above summary, the rapporteur proposes:

**Proposal 4c [for discussion]: Parent IE of UE capability *‘f1c-OverNRRRC*’ is *NRDC-Parameters* under *UE-NR-Capability*.**

### BAP Header Rewriting and Rerouting

In [3], BAP header rewriting as UE capability is proposed as feature group component under new feature group “BAP (re-routing)”. [4] proposes two separate UE capabilities, one for header rewriting based inter-topology routing, including inter-donor CU IAB-MT migration, another for header rewriting based local-rerouting. In [5], it is proposed IAB-MT indicates only whether the IAB-MT supports BAP header rewriting, regardless inter- or intra-topology. In [6], IAB-MT is proposed to indicate BAP-header rewriting UE capability for inter-donor CU routing, while proposed to indicate UL local rerouting UE capability for all local rerouting scenarios, including inter-donor DU rerouting and intra-donor DU local rerouting.

All contributions consider this UE capability for BAP header rewriting as an optional UE capability for IAB-MT.

Additionally, rapporteur notice that, for BAP-header rewriting based inter-donor DU local re-routing, it can use either “BAP header rewriting” UE capability or use “UL local rerouting” UE capability, considering “UL local rerouting” UE capability can include both intra- and inter-donor DU local rerouting scenarios for Rel-17 new trigger conditions.

Based on above summary, the rapporteur proposes:

**Proposal 5a [easy agreement]: Define new UE capability “BAP header rewriting” for inter-donor CU routing as optional UE capability for IAB-MT.**

**Proposal 5b [for discussion]: FFS how to capture inter-donor DU re-routing UE capability:**

* **Option 1) Extend “BAP header rewriting” UE capability to cover inter-donor DU re-routing,**
* **Option 2) Define new UE capability for “UL local rerouting” to cover both inter-donor DU and Rel-17 intra-donor DU local rerouting.**

For local rerouting, [6] further proposes to define different UE capabilities for local re-routing based on different trigger conditions, e.g. type-2/type-3 RLF indication, type-4 RLF indication or congestion. While [4] proposes a single UE capability to cover all scenarios of local re-routing for the cases where BAP header rewriting is needed.

Based on above summary, the rapporteur proposes:

**Proposal 5c [for discussion]: FFS for UL local rerouting, whether use a single UE capability or separate UE capabilities for different trigger conditions.**

# Conclusion

Based on the discussion above and summary from contributions submitted to RAN2 #116bis-e meeting AI 8.4.3 on R17 eIAB RAN2 related UE capability, the following is proposed:

**Easy agreement**:

**Proposal 1: R17 eIAB RAN1/RAN4 feature groups and UE capabilities are discussed together with mega CR.**

**Proposal 2a: Confirm to define a new UE capability for LCG Extension in *MAC-ParametersCommon* as optional UE capability for IAB-MT.**

**Proposal 3a: Define UE capability for BH RLF detection indication and BH RLF recovery indication as optional UE capability for IAB-MT. FFS whether use single or two separate UE capabilities.**

**Proposal 4a: Define a UE capability ‘*f1c-OverNRRRC’* for CP/UP separation as optional UE capability for IAB-MT.**

**Proposal 5a: Define new UE capability “BAP header rewriting” for inter-donor CU routing as optional UE capability for IAB-MT.**

**For discussion**:

**Proposal 2b: Define a new feature group for LCG Extension.**

**Proposal 3b: Define a new feature group for RLF detection and recovery RLF indication handling.**

**Proposal 4b: Define a new feature group for F1AP over NR RRC.**

**Proposal 4c: Parent IE of UE capability ‘*f1c-OverNRRRC*’ is NRDC-Parameters underUE-NR-Capability.**

**Proposal 5b: FFS how to capture inter-donor DU re-routing UE capability:**

* **Option 1) Extend “BAP header rewriting” UE capability to cover inter-donor DU re-routing,**
* **Option 2) Define new UE capability for “UL local rerouting” to cover both inter-donor DU and Rel-17 intra-donor DU local rerouting.**

**Proposal 5c: FFS for UL local rerouting, whether use a single UE capability or separate UE capabilities for different trigger conditions.**

# References

[1] R2-2200354 UE capabilities for Rel-17 eIAB Intel Corporation

[2] R2-2200355 UE capabilities for Rel-17 eIAB Intel Corporation

[3] R2-2201055 IAB UE feature list Nokia

[4] R2-2201300 UE capability issues for eIAB HW

[5] R2-2201352 Discussion on R17 IAB-MT capabilities ZTE

[6] R2-2201609 On eIAB capabilities Ericsson

[7] R2-2111451 Running CR to 37.340 for eIAB Vivo

[8] R2-2201653 Release-17 UE capabilities based on R1 and R4 feature lists (TS38.306) Intel Corporation

[9] R2-2201654 Release-17 UE capabilities based on R1 and R4 feature lists (TS38.331) Intel Corporation

[10] R2-2111604 Running CR to 38.331 eIAB Ericsson