**3GPP TSG-RAN WG2 Meeting #103bis R2-18xxxxx**

**Chengdu, China, Oct 8th – 12th, 2018**

**Agenda item:** 11.1.2

**Source:** Qualcomm Incorporated (Rapporteur)

**Title:** Email discussion [103bis#31][NR - IAB] Adaptation layer in MT

**Document for:** Discussion

# **1. Introduction**

This document contains email discussion:

**[103bis#32][NR - IAB] Unified design (Qualcomm)**

**Intended outcome: attempt to extract a set of limited aspects to help reaching consensus on UP transport of unified design. No new architecture options should be considered.**

**Intended outcome: Report to next meeting**

**Deadline: Thursday 2018-11-01**

This email discussion is based on online discussion:

**F1-U termination**

[R2-1814369](file:///C:\Users\panidx\Documents\RAN\RAN2\103bis%20-%20Chengdu\Docs\R2-1814369.zip) Way forward on F1-U termination Ericsson, AT&T, KDDI discussion Rel-15 FS\_NR\_IAB

*Proposal 1. Further work on IAB for architecture group 1A should only consider solutions based on terminating GTP-U and NR user plane protocol in the IAB node.*

- Qualcomm thinks that we can put some of the GTP-U can be included in the adapt header. Ericsson indicates that we also have the flow control.

- Qualcomm thinks that we should consider this with the unified design and consider user plane transport as well.

- Huawei and Intel thought this is RAN3. Qualcomm explains that this is F1-U and adaptation layer design.

*Proposal 2 If the previous proposal is agreed, the remaining work on architecture group 1A should focus on alternatives d) and e) in figure 8.2.2 – 1 in TR 38.874.*

- Qualcomm thinks that this is a WI level decision

=> Placement of the adaptation layer and details of the adaptation layer should be analysed in view of the unified design

=> Noted

# **2. Discussion**

This discussion aims to identify design examples for the unified design. Each example specifies identifiers carried on F1\*-U, where these identifiers are carried in the L2-header-stack, and how they are processed.

The design examples illustrate how the unified design could be realized, identify potential constraints, and may serve as guide for WI stage. Since these designs are solely examples there won’t be any down selection.

Companies should feel free to propose their favorite design example. We should end up with at least one design example, which rapporteur has already provided below. We may end up with a few. In case there are too many design examples, some consolidation will be done, e.g. combine those that only differ with respect to stage-3 aspects.

The discussion contains two phases:

Phase 1: Collecting design examples for unified architecture

Phase 2: Discussion of design example(s) identified

The TP will contain the design examples proposed (and potentially consolidated) and the comparison among them.

Each design example should address the following points:

* Characteristics: A few points on which of the present TR design aspects are applied to design. This should include how N:1 and 1:1 bearer mapping is supported, LCID space shortage, etc.
* F1\*-U identifiers used and their placement on L2 header stack
* Downstream and upstream processing of F1-U and F1\*-U identifiers and access identifiers by IAB-donor-DU and IAB-node.

It is important to include the processing of F1-U and F1\*-U identifiers so that is becomes clear how the design works.

Please see example 1 below and use this template for further design proposals.

## **2.1 Phase 1: UP examples**

**Example 1 (Qualcomm)**

Characteristics:

* IP termination point can be on IAB-donor-DU or IAB-node
* UE-bearers are N:1-mapped to RLC-channels
* RLC-channels are 1:1-mapped to LCHs
* LCID-space extension necessary to support 1:1 bearer mapping

F1\*-U identifiers and their placement in L2 header stack:

* **UE-bearer-ID** above RLC
  + Needs to be available on L2 for packet processing
* **IAB-node-address** above RLC
  + Needs to be available on L2 for packet processing
  + IAB-node may have multiple addresses, or the address may contain a route-Id for the support of multiple independent routes.
* **LCID** with extended space on MAC-sub-header

Downstream processing of F1-U and F1\*-U identifiers by IAB-donor-DU and IAB-node

**Table 1: Downstream packet processing example 1 (red:** ingress parameters; **blue:** egress parameters)

|  |  |  |
| --- | --- | --- |
|  | **IAB-donor DU** | **IAB-node** |
| **Ingress**  **packet** | On wireline network, packet received from CU holds **F1-U-info** with:   * **UE-bearer-ID (=GTP-U TEID)** | On BH-link, packet received from parent holds **F1\*-U-info** with:   * **UE-bearer-ID** * **IAB-node-address** * **LCID** |
| **Packet**  **processing** | Node derives from packet header and lookup tables:   * **UE-bearer-ID** from **UE-bearer-ID** * **IAB-node-address** based on **UE-bearer-ID** * Egress link type (i.e. if access or BH link) based on **UE-bearer-ID**   + “Access” if UE of UE-bearer-ID is local   + “BH” if UE of UE-bearer-ID is remote * If egress = “Access”, derive:   + Egress link and UE-bearer based on **UE-bearer-ID**   + **LCID** based on **UE-bearer-ID** * If egress = “BH”, derive:   + Egress link based on **IAB-node-address** (routing)   + Egress RLC-channel based on **UE-bearer-ID** (N:1 bearer mapping).   + **LCID** based on 1:1 mapping between RLC channel and LCH. | Node derives from packet headerand lookup tables:   * Ingress RLC channel through 1:1 mapping from **LCID** * Egress link type (i.e. if access or BH link) based on **IAB-node-address**   + “Access” if address is local   + “BH” if address is remote * If egress = “Access”, derive:   + Egress link and UE-bearer from **UE-bearer-ID**   + **LCID** based on **UE-bearer-ID** * If egress = “BH”, derive:   + Egress **IAB-node-address** = Ingress **IAB-node-address**   + Egress link based on **IAB-node-address**   + Egress RLC channel based on ingress RLC channel and **IAB-node-address** (mapping between BH RLC channels)   + **LCID** via 1:1 mapping between RLC channel and LCH. |
| **Egress**  **packet** | On BH link, packet transmitted to child BH-link holds **F1\*-U-info** with:   * **UE-bearer-ID** * **IAB-node-address** * **LCID**   On access link, RLC packet transmitted to UE or MT holds:   * **LCID** | On BH link, packet transmitted to child holds **F1\*-U-info** with:   * **UE-bearer-ID** * **IAB-node-address** * **LCID**   On access link, RLC packet transmitted to UE or MT holds:   * **LCID** |

Upstream processing of F1-U and F1\*-U identifiers by IAB-donor-DU and IAB-node

**Table 2: Upstream packet processing example 1 (red:** ingress parameters; **blue:** egress parameters)

|  |  |  |
| --- | --- | --- |
|  | **IAB-donor DU** | **IAB-node** |
| **Ingress**  **packet** | On BH link, packet received from child holds **F1\*-U-info** with:   * **UE-bearer-ID** * **IAB-node-address** * **LCID**   On access link, RLC packet received from UE or MT holds:   * **LCID** | On BH link, packet received from child holds **F1\*-U-info** with:   * **UE-bearer-ID** * **IAB-node-address** * **LCID**   On access link, RLC packet received from UE or MT holds:   * **LCID** |
| **Packet**  **processing** | Node derives from packet header content and lookup tables:   * Ingress RLC-channel based on **LCID** using 1:1 mapping between RLC channel and LCH. * Ingress link type (i.e. if access or BH link) based on ingress link and **LCID**.   + “Access” if ingress link belongs to UE, or if ingress link belongs to child and **LCID** belongs to child-MT’s access channel.   + “Backhaul” if ingress link belongs to child and andLCID belongs to child’s BH channel. * If ingress = “Access”, derive:   + **UE-bearer-ID** from ingress link and **LCID** * If ingress = “BH”, derive:   + **UE-bearer-ID** from **UE-bearer-ID** | Node derives from packet header content and lookup tables:   * Ingress RLC-channel based on **LCID** using 1:1 mapping between RLC channel and LCH. * Ingress link type (i.e. if access or BH link) based on ingress link and **LCID**.   + “Access” if ingress link belongs to UE, or if ingress link belongs to child and **LCID** belongs to child-MT’s access channel.   + “Backhaul” if ingress link belongs to child and LCID belongs to child’s BH channel. * If ingress = “Access”, derive:   + **UE-bearer-ID** from ingress link and **LCID**   + **IAB-node-address** based on **UE-bearer-ID**   + Egress link based on **IAB-node-address** (routing)   + Egress RLC-channel based on **UE-bearer-ID** (N:1 bearer mapping) * If ingress = “BH”, derive:   + Egress **IAB-node-address** = Ingress **IAB-node-address**   + Egress link based on **IAB-node-address**   + Egress RLC channel based on ingress RLC channel and **IAB-node-address** (mapping between BH RLC channels) * **LCID** via 1:1 mapping between RLC channel and LCH. |
| **Egress**  **packet** | On wireline network, packet transmitted to CU holds **F1-U-info** with:   * **UE-bearer-ID (=GTP-U TEID)** | On BH link, packet transmitted to parent holds **F1\*-U-info** with:   * **UE-bearer-ID** * **IAB-node-address** * **LCID** |

**Example 2 (Company Name)**

Characteristics:

* How is N:1 and 1:1 bearer mapping achieved?
* Is LCID-space extension required?
* Is the design restriciDoes the design restrict IP termination to either IAB-donor-DU or IAB-node?
* Others aspects?

F1\*-U identifiers and their placement in L2 header stack:

* …

Processing of F1-U and F1\*-U identifiers by IAB-donor-DU and IAB-node

**Table 2: UP processing for example 2 (red:** ingress parameters; **blue:** egress parameters)

|  |  |  |
| --- | --- | --- |
|  | **IAB-donor DU** | **IAB-node** |
| **Ingress**  **packet** | F1-U packet received from CU holds **F1-U-info** with:   * **UE-bearer-ID (=GTP-U TEID)** * … | F1\*-U packet received from parent holds **F1\*-U-info** with:   * **…** |
| **Packet**  **processing** | Node derives from **F1-U-info** and lookup tables:   * **…** | Node derives from **F1\*-U info** + lookup tables:   * … |
| **Egress**  **packet** | F1\*-U packet transmitted to child holds **F1\*-U-info** with:   * **…** | F1\*-U packet transmitted to child holds **F1\*-U-info** with:   * **…** |

**…**

* 1. **Phase 2: Discussion**

1. Does the above design example meet the requirements of the unified design? If you believe it doesn’t please provide reasons.

|  |  |
| --- | --- |
| **Company** | **Answer** |
|  |  |
|  |  |

1. Is the above design example technically correct? Is something missing? Should something be changed? Is something unclear or not sufficiently well described?

|  |  |
| --- | --- |
| **Company** | **Answer** |
|  |  |
|  |  |

1. Do you have a different design example in mind which should be captured here? Please describe this scenario, or describe how it would differ from the design example above.

|  |  |
| --- | --- |
| **Company** | **Answer** |
|  |  |
|  |  |

1. Are there other aspects that should be considered for the discussion of the unified design? (Please note that this discussion only addresses UP and not CP)

|  |  |
| --- | --- |
| **Company** | **Answer** |
|  |  |
|  |  |

* 1. **Summary**

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# **3. Text Proposal**

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