**3GPP TSG-RAN WG2 Meeting #102 R2-1809100**

**Busan, South Korea, May 21 – 25, 2018**

**Agenda item:** 11.1.3

**Source:** Qualcomm Inc (Rapporteur)

**Title:** Report on configuration for routing and QoS support in arch group 1

**Document for:** Discussion and Decision

# Introduction

**For arch 1a, TR section 8 defines four bullets for functional support of Adapt:**

1. Identification of the UE-bearer for the PDU,
2. Routing across the wireless backhaul topology,
3. QoS-enforcement by the scheduler on DL and UL on the wireless backhaul link,
4. Mapping of UE user-plane PDUs to backhaul RLC channels,

**These are the identifier options for each of these bullets:**

1. Identification of UE-bearer for the PDU, based on (options):
* UE-bearer Id
* UE-id + UE-specific bearer Id
1. Routing across the wireless backhaul topology, based on (options):
2. UE-bearer Id
3. UE-id
4. IAB-node Id (downstream)/IAB-donor Id (upstream)

Routing of UP traffic for IAB-nodes (e.g. for OAM support) can use the same set of identifiers.

Routing of SRBs (CP alternatives 1-3) and F1-AP (CP alternative 4) can be based on an IAB-node-Id.

1. QoS enforcement by scheduler, based on (options):
2. UE-bearer Id
3. UE-specific bearer-Id
4. QoS-Id
5. Mapping of UE UP PDUs to backhaul RLC channels (options):
6. Adapt above MAC: They could use all the same RLC channel
7. Adapt above RLC: Mapping uses the same Id as QoS enforcement

**This leads to the following set of identifiers to be considered for Adapt:**

* UE-bearer Id
* UE-Id
* UE-specific bearer Id
* IAB-node Id/IAB-donor Id
* QoS-Id

The UE-specific bearer Id may be deterministically mapped to the LCID of the backhaul RLC channel. In this case, Adapt would not have to separately carry a separate UE-specific bearer Id.

**Further assumptions:**

* Adapt is generated on access IAB-node for northbound PDUs and on IAB-donor DU for southbound PDUs.
* Adapt is not modified along the path across wireless backhaul.

**We need to consider:**

* Generation of Adapt Id at initial node where Adapt is generated
* Processing of Adapt Id at final node where Adapt is terminated
* Processing of Adapt Id at intermediate node

**Generation of Adapt Id at initial node where Adapt is generated**:

* UE-bearer Id:
	+ At access-IAB-node, deterministically mapped from F1-U GTP-U TEID, which is configured on UE-bearer’s DU based on native F1-AP procedures.
	+ At IAB-donor DU, deterministically mapped from F1-U GTP-U TEID of arriving fronthaul PDU.
* UE-Id:
	+ At access-IAB-node, mapped from C-RNTI; mapping needs to be configured when UE-bearer is established.
	+ At IAB-donor DU, mapped from F1-U GTP-U TEID; mapping needs to be configured when UE-bearer is established.
* UE-specific bearer-Id:
	+ At access-IAB-node, deterministically mapped from LCID of arriving access PDU.
	+ At IAB-donor DU, mapped from F1-U GTP-U TEID; mapping needs to be configured when UE-bearer is established.
* IAB-node/donor-DU Id:
	+ At access-IAB-node, based on value configured on node; could be deterministically mapped from existing Id, e.g. CGI or PCI, or needs to be configurated when IAB-node attaches to topology.
	+ At IAB-donor DU, based on value configured on node; could be deterministically mapped from existing Id, e.g. CGI or PCI, or needs to be configured when IAB-donor is integrated.
* QoS-Id:
	+ At access-IAB-node, mapped from QoS class identifier configured for access bearer. Mapping may be semi-static, e.g. configured when IAB-node attaches to topology, or bearer-specific, e.g. configured when UE-bearer is established.
	+ At IAB-donor DU, mapped from DSCP value or F1-U GTP-U TEID of arriving fronthaul PDU. Mapping may be semi-static, e.g. configured when IAB-node attaches to topology, or bearer-specific, e.g. configured when UE-bearer is established.

**Processing of Adapt Id at final node where Adapt is terminated**

* UE-bearer Id:
	+ At access-IAB-node, deterministically mapped to F1-U GTP-U TEID, which is configured on UE-bearer’s DU based on native F1-AP procedures.
	+ At IAB-donor DU, deterministically mapped to F1-U GTP-U TEID of PDU forwarded on fronthaul.
* UE-Id:
	+ At access-IAB-node, mapped to C-RNTI; mapping needs to be configured when UE-bearer is established.
	+ At IAB-donor DU, mapped from F1-U GTP-U TEID; mapping need to be configured when UE-bearer is established.
* UE-specific bearer-Id:
	+ At access-IAB-node, deterministically mapped from LCID of arriving access PDU.
	+ At IAB-donor DU, mapped to F1-U GTP-U TEID; mapping needs to be configured when UE-bearer is established.
* IAB-node/donor-DU Id:
	+ At access-IAB-node, PDU is terminated when IAB-node-Id value on Adapt matches that configured for access-IAB-node.
	+ Ad IAB-donor DU, PDU is forwarded to fronthaul when IAB-donor Id value on Adapt matches that configured for IAB-donor DU.
* QoS-Id:
	+ At access-IAB-node, not used.
	+ At IAB-donor DU, it may be mapped to DSCP value of PDU forwarded on fronthaul.

**Processing of Adapt Id at intermediate nodes**

1. Identification of UE-bearer for the PDU: None
2. Routing across the wireless backhaul topology: The IAB-node matches the routing Id on Adapt to an entry in the routing table which determines the backhaul link where the PDU has to be forwarded. The routing table contains entries for routing in downstream direction. It holds separate entries for routing in upstream direction. For spanning tree topologies, upstream routing can be based on a default route entry.
* If done via UE-bearer Id, the routing table needs to be reconfigured when the UE-bearer is established or released at access IAB-node.
* If done via UE-Id, the routing table needs to be reconfigured when the UE connects to or leaves access IAB-node.
* If done via IAB-node/IAB-donor-Id, the routing table needs to be reconfigured when the topology changes.
1. QoS enforcement by scheduler: Scheduler matches the identifier used for QoS enforcement to an entry in a scheduling policy table, selects an RLC channel and applies corresponding scheduling policy when forwarding PDU.
* If done via UE-bearer Id, the policy table needs to be reconfigured when UE-bearer is established or released at access IAB-node.
* If done via UE-specific bearer Id, the mapping between UE-specific bearer-Id and RLC channel needs to be configured when backhaul link is established or, potentially, when new RLC-channels are added to the backhaul link. The UE-specific bearer-Id may also be deterministically mapped to the LCID of the RLC channel. .
* If done via QoS-Id, the mapping between QoS-Id and RLC channel needs to be configured when backhaul link is established or, potentially, when new RLC-channels are added to the backhaul link.

**Configuring entity of adapt identifiers**

* Adapt identifiers are configured by a centralized control function.
* The centralized control function is contained in the CU-CP.

**Protocols used for configuration of adapt identifiers**

Since the configuring entity of adapt identifiers is collocated with the CU-CP, the following protocols can be used for configuration of adapt identifiers:

* RRC for configuration via MT on IAB-node
* F1-AP for configuration via DU on IAB-node

**For arch 1b, TR section 8 defines three bullets for functional support of Adapt:**

1. Routing across the wireless backhaul topology,
2. QoS-enforcement by the scheduler on DL and UL on the wireless backhaul link,
3. Mapping of UE user-plane PDUs to backhaul RLC channels,

The same identifiers can be used to support these functions are for arch 1a. Also, the same identifier generation and processing is used as discussed for arch 1a.

**Document for:** Discussion and Decision

# Discussion

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