

Source: CATT
Title: Discussion on QoS mapping
Agenda Item: 10.2.12
Document for: Discussion and Decision

1. Introduction

In RAN2#97bis, the QoS topic had the following agreements:

Agreements on QoS layer:

- New AS layer PDU is PDCP SDU
- AS layer header is byte-aligned
- DL packets over Uu are not marked with "Flow ID" at least for cases where UL AS reflective mapping and NAS reflective QoS is not configured for DRB.
- AS layer header include the UL "Flow ID" depending on network configuration

This contribution discusses how to manage the mapping between QoS flow and DRB and how to carry QFI information in UL and DL.

2. Discussion

2.1. When QFI should be aware?

According to RAN2 agreement, in case of DL, UE should be aware of the QFI by either activation of NAS reflective QoS or activation of AS reflective mapping. If both NAS reflective QoS and AS reflective QoS are deactivated, UE may be not aware of the QFI.

For UL, in any case, the gNB should be aware of the QFI to carrier the QFI to UPF over N3 interface.

Proposal 1: UE should be aware of DL QFI only in the cases of either activation of NAS reflective QoS or activation of AS reflective mapping and gNB should always be aware of UL QFI.

2.2. How QFI is aware?

If QFI should be aware, the methods are same for both UL and DL: indicated implicitly by 1-to-1 mapping configuration between QoS flow and DRB or carried explicitly by SDAP header. If the QoS flow is 1-to-1 mapped to DRB, the receiver can be aware of QFI from the mapping configuration between QoS flow and DRB. So SDAP header doesn't have to carry QFI.

If multiple QoS flows are mapped to DRB, the receiver needs the QFI in SDAP header explicitly to distinguish different QoS flow in one DRB.

Proposal 2: Two methods will be supported to be aware of QFI in UL and DL: indicated implicitly by 1-to-1 mapping configuration between QoS flow and DRB or carried explicitly by SDAP header.

2.3. How to handle reconfiguration between 1-to1 mapping and m-to-1 mapping?

In case that 1-to-1 mapping is reconfigured to m-to-1 mapping between QoS flow(s) and one DRB, SDAP PDU(s) will be restructured between the format with QFI field and that without QFI field. However, according to NR pre-processing assumption, most of L2 packets may be buffered in RLC transmission buffer in the format of RLC PDU. If reconfiguration occurs, lots of packets shall be de-capsulated from RLC PDU to PDCP PDU and from PDCP PDU to SDAP PDU to include or remove the QFI field. Furthermore, if PDCP layer activates header

compression function and ciphering function, all the packet in L2 buffer will be deciphered and de-compressed to recovery SDAP PDU. After all the procedure is done, SDAP can add/remove QFI field in the SDAP header, and then do all the transmission processing again. This whole procedure is too complex and introduces processing load for the transmitter.

In other receiver solutions, new mechanism will be introduced to handle co-existence and distinguishing between these two SDAP PDU formats. All these solutions will introduce extra implementation or specification efforts. Hence we propose if there is any possibility for a DRB to be reconfigured between 1-to-1 mapping and m-to-1 mapping, all SDAP PDUs may carry QFI field no matter 1-to-1 mapping or m-to-1 mapping. For example, for some regular services, network can configure to carry QFI even in first 1-to-1 mapping period to avoid complexity caused by reconfiguration between 1-to-1 and m-to-1 mapping. But for some special services, e.g. VoIP, which are overhead-sensitive, 1-to-1 mapping can be kept through whole DRB life cycle to reduce overhead as much as possible. Details are left to network implementation.

Proposal 3: Whether SDAP header includes QFI field or not is explicitly configured by network and even in 1-to-1 mapping case the QFI field may be also present to avoid complexity caused by reconfiguration between 1-to-1 and m-to-1 mapping.

2.4. Default DRB handling

In the previous RAN2 meeting, it was agreed that if UE has the first UL packet for transmission before the mapping association is configured to the UE by RRC or reflective mapping, the UE shall map the UL packet in the default bearer, which means that the number of QoS flow(s) over default bearer is dynamically changed and out of the control of gNB. So the default DRB shall be configured to always include QFI in SDAP header at least in UL.

Proposal 4: The default DRB shall be configured to always include QFI in SDAP header at least in UL.

3. Conclusion

This paper discusses the QoS flow mapping and QFI issue for both uplink and downlink, and we have the following proposals:

Proposal 1: UE should be aware of DL QFI only in the cases of either activation of NAS reflective QoS or activation of AS reflective mapping and gNB should always be aware of UL QFI.

Proposal 2: Two methods will be supported to be aware of QFI in UL and DL: indicated implicitly by 1-to-1 mapping configuration between QoS flow and DRB or carried explicitly by SDAP header.

Proposal 3: Whether SDAP header includes QFI field or not is explicitly configured by network and even in 1-to-1 mapping case the QFI field may be also present to avoid complexity caused by reconfiguration between 1-to-1 and m-to-1 mapping.

Proposal 4: The default DRB shall be configured to always include QFI in SDAP header at least in UL.

4. References

[1] RAN2#97bis, Chairman's report.