Tying YANG QoS Modules to Interfaces, Not to Bridge Ports

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Where are QoS controls in IEEE Std 802.1Q?

- In the bridge architecture, queues are associated with bridge ports.
- Depending on the implementation, the actual queuing structures may be in a central brain, tied to the bridge port, they may be on a line card, tied to a few ports, or they may on the individual ports. (Or they may be virtual, or distributed, or any anything else.)
- Originally, there was no difference; 1 bridge port = 1 physical port. The implementer simply had to ensure that the end result was equivalent to the simple model given in IEEE Std 802.1Q.

Where are QoS controls in IEEE Std 802.1Q?

- When Link Aggregation (IEEE Std 802.3ad, later IEEE Std 802.1AX) was introduced, it still didn't matter whether one put the queues in the center or in a physical port, because strict priority works just the same if the bridge port parameters are applied to individual physical ports' queues.

- The addition of Enhanced Transmission Selection (ETS, aka Weighted Fair Queuing) did not change this indifference; the bridge port parameters can be replicated to the physical ports, and everything works as expected.

Credit Based Shaper and Link Aggregation

- The Credit-Based Shaper introduced a problem, if one implements CBS in the physical ports of an aggregation.
  - When a bridge port's CBS is split among several CBSs on several physical ports, then bandwidth of each Stream has to be added to the particular CBS on the physical port through which it passes; each physical ports' CBS can require a different idle slope.
- So, if managing CBS using a centralized server (as defined in IEEE Std 802.1Qcc), the network controller needs to manage physical ports' CBS parameters, not bridge ports' CBS parameters.
- **This is not possible in IEEE P802.1Qcw D1.2.**

Other shapers

- The same considerations apply to Scheduled Traffic.
  - If a small periodic window is used for a critical Stream, it is wasteful to put that window on every port of an aggregation; only the physical port that carries the Stream needs the window.
- The same considerations apply to ATS.
  - Streams following the same path can share a queue, but if ATS is distributed over aggregated links, the sharing is altered.
- That is, a TSN network controller needs to manage physical ports for QoS, if that's where the shapers and queues are best modeled as residing for a particular implementation.

Non-bridge uses of QoS management

- End stations could certainly make good use of some or all of the QoS mechanisms defined in IEEE Std 802.1Q and its amendments.
  - Scheduled transmission.
  - Preemption control.
  - Priority Flow Control.
  - Credit Based Shaper.
- But, the YANG modules in P802.1Qcw D1.2 are tied to the bridge port, and bridge component, and an end station has no bridge port and no bridge component.

Proposal: Tie QoS controls to Interfaces

- If we tie the QoS controls to interfaces, instead of bridge components and bridge ports, we can handle both cases:
  - Link Aggregation in a bridge.
  - End stations.
- We lose nothing by making this change; the interface can still be a bridge port.
- We do **not** need to change things like priority mapping, VLAN controls, and such; these are bridge port functions, and make no sense being applied to anything else. (Even the traffic-class-table is an L2-priority-to-queue assignment that is a bridge port function.)

Other considerations

- In my opinion, we do not need to change the MIBs; others may disagree.
- The implementation decides to what interfaces the QOS controls are attached, and whether that is a bridge port, a physical port, or some internal point in the interface stack (e.g. a line card).
- This change needs to be applied to **IEEE P802.1Qcr**, as well.
- The justification for moving the control of input features such as timed gates to the interface module is less strong, but is still present, because IEEE Std 802.1AX Distributed Resilient Network Interconnect (DRNI) can vary the reception timing greatly on different links of an aggregation.
- It is also important to IEEE P802.1DC that this change be made.

ISSUES

- I'm not sure where the YANG modules are for setting Enhanced Transmission Selection and Credit Based Shaper parameters. They also needs to be changed. Can someone help?

Thank you