Requirements for Queuing control YANG models

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Introduction

- There is a Deterministic Networking Working Group in IETF.
- TSN and DetNet both require that the **low-level data plane packet selection algorithms** be **aligned** with the **high-level stream reservations**.
- We have a well-developed (-ing) set of packet selection algorithms in TSN, but they are immersed in IEEE Std 802.1Q.
- **YANG/MIB modules separable from the rest of IEEE 802.1Q could make the 802.1Q queuing algorithms useable by DetNet**, without requiring normative references to the queuing techniques, themselves.

Introduction

- On the other hand, IETF already has a set of good queuing algorithms and a rich framework for describing them, e.g. RFC3670. We need to integrate with that, and the YANG model(s) built upon it.
- In a more general model, there are other shapers and other functions to be considered:
  - Rate meters, yellow/green/red markers
  - IEEE 802.1Qci flow identification and queue selection
  - Other shapers: IEEE 802.1Qau, RFC2212.

Requirements

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Requirements

1. The queuing control YANG/MIB modules must augment interfaces, not bridge ports.
   - Of course, they can augment the same interface that the bridge port augments.
   - Bridges using Link Aggregation may choose to attach the queuing controls to the aggregation, or to the physical links.
2. The ability of IEEE 802.1Q to predict and control the interactions among different packet selection algorithms on the same port must be maintained.
   - We must have an understandable model for those interactions.

Requirements

3. Hierarchical queuing must be supported.
   - Hierarchical queues are a reasonable way to represent and control both of the current proposals for IEEE P802.1Qcr.
4. Expanded methods for assignment of packets to traffic classes must be supported.
   - We have already allowed stream_handle to select the queue.
   - We must support DSCP, 802.1CB-type stream identification, MPLS priority, and perhaps others.

Queuing model

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Queuing model

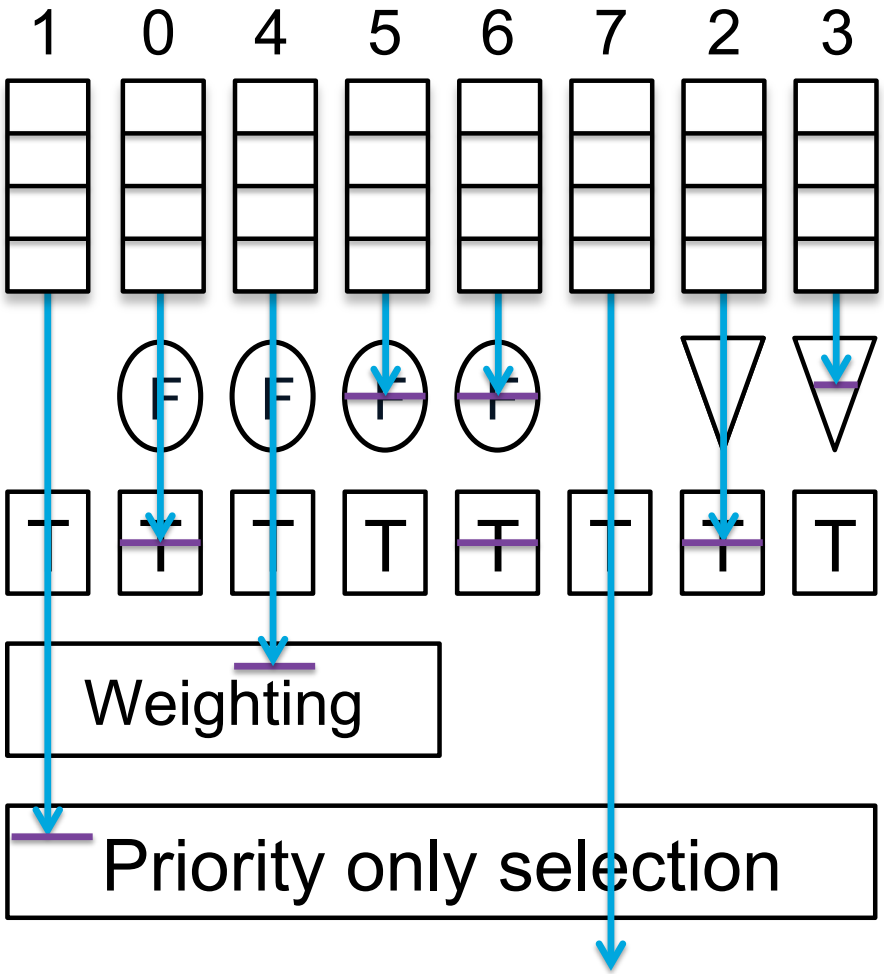
- RFC3670, “Information Model for Describing Network Device QoS Datapath Mechanisms” has a pretty good queuing model that can be extended to cover our stuff.
  - This model is as well thought-out as ours.
  - TSN can be accomplished using their queuing techniques, also.
- CVB, Priority Flow Control, and time gates would be additional shapers.
- Some shapers (PFC certainly, and perhaps time gates) would be applicable only to the layer of queues nearest the port.

Queuing model

- In the model, a certain number of queues, each optionally drained through a shaper, form a unit. The queues vie through a resolution mechanism to present their “not empty” signals. The unit presents a single “not empty” signal towards the port.
- This unit can feed either a queue of another unit, or its “not empty” signal can feed, along with other units, another resolution mechanism.
- Ultimately, one “not empty” signal reaches the port, and when the port has an opportunity to transmit, the queue supplying that “not empty” signal is selected for transmission.

IEEE model: one unit

(from bv-nfinn-queue-interactions-0315-v2.pdf)



- Selector (L2 priority)
- Queues in unit
- PFC and CBS shapers
- Time gates
- WFQ
- Strict priority

Only one “not empty” signal gets through to trigger packet selection.

Issues

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Issues

- The real issue is whether, and if so, how, to integrate the IETF queuing model and the IEEE 802.1 queuing model.
  - Although the terminology is different, they appear to be very close in their overall structure.
  - If there has been significant work on YANG models to support the RFC3670 QoS model (I have not yet found it, but that does not mean that such work does not exist!), then it would probably be easier to add the IEEE 802.1 techniques to that system.

Thank you