Filling DetNet Needs

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”Completing” the TSN suite

- Several constituencies, especially the DetNet Working Group, need additional work to be done in TSN (whether they know it or not).
  - (That parenthetical phrase is not flippant – DetNet has been focused, as a group, on user needs and on data plane encapsulations, not about what is needed to actually implement zero congestion loss.)
- P802.1Qxa: Stream aggregation for bridges
- P802.1CB-REV (CBcv??): Additional DetNet encapsulations
- P802.1xc: Applying 802.1Q queuing methods to non-bridges
- P802.1Qxd: Stream Reservation Protocol v2

P802.1Qxa
Stream aggregation for bridges

WHAT

- Aggregate multiple streams into a wrapper stream, which can be treated as a single stream as it is forwarded
- Terminate (disaggregate) an aggregate stream into its constituent streams
- Define extra queuing at aggregation (and perhaps, disaggregation) points
  - To minimize latency, the constituent streams' packets must be distributed evenly.
- TBD whether to do adding/splitting streams to/from an aggregate

P802.1Qxa
Stream aggregation for bridges

WHY

- When a network is scaled above the sizes well-served by bridged networks, so that routing is necessary, the number of streams can easily exceed the capacities of any reasonable TSN implementation.
- Aggregating many streams into a single stream enables support for more streams using fewer resources.
- Practical brownfield deployment considerations argue for defining aggregation in both bridges and edge routers.

P802.1CB-REV (CBcv?)
Frame Replication and Elimination REV

WHAT

- Two encapsulations will likely be standardized by DetNet:
  - MPLS + something very much like a pseudowire, but not called that
  - IPv6 using existing flow ID and a new sequence number
- We may or may not need some tweaks to handle the fact that pseudowire implementations skip over sequence number value 0.

P802.1CB-REV (CBcv?)
Frame Replication and Elimination REV

WHY

- 802.1CB already supports non-IEEE 802 encapsulations (HSR and PRP) and has IPv4 and IPv6 stream recognition
- Bridges and/or end stations may well want to support the new DetNet encapsulations
- Bridges placed between routers must recognize streams

P802.1xc: (Profile? Standard?) Applying 802.1Q queueing to non-bridges

WHAT

- Document is aimed at the implementer of a router, firewall, or any other device, especially a packet forwarding device.
- It needs to highlight the relevant 802.1Q clauses, and help the non-bridge implementer understand them
  - The current YANG projects need to take this document into account
- Perhaps the YANG/MIB modules will be extensible to any number of classes of service (e.g., DiffServ has 64 classes)

P802.1xc: (Profile? Standard?) Applying 802.1Q queueing to non-bridges

WHY

- The TSN queuing methods, e.g. 802.1Qci + 802.1Qch CQF, are defined only for a bridge
- If DetNet has to explain how to use 802.1Qs, they will, inevitably, have to redefine them, which would be bad
- This document should be an easier task than refactoring 802.1Q

- See also new-finn-non-bridge-queuing-0917

P802.1XD
Stream Reservation Protocol v2

WHAT

- A new stream reservation protocol that runs over P802.1CS Link-local Registration Protocol
- Perhaps suitable for processing by routers, label switches, and L2 and L3 end stations
- P802.1XD or P802.1Qxd?? (If suitable for routers, .1XD)
- We must decide whether to keep separate protocols for L2 reservations and L3 reservations.

P802.1XD
Stream Reservation Protocol v2

WHY

- Of course, as presented by others, we need this for TSN
- DetNet is not yet looking at control plane protocols; we have a chance to move first

Summary

- P802.1Qxa: Stream aggregation for bridges
- P802.1CB-REV (CBcv??): Additional DetNet encapsulations
- P802.1xc: Applying 802.1Q queuing methods to non-bridges
- P802.1Qxd: Stream Reservation Protocol v2

With these additions, DetNet + TSN will form a complete suite of standards. DetNet will have additional work to do in the control plane, but these TSN standards should be very useful to them, as well.

Thank you