Recap of PFC Headroom and Enhancements Project Proposal

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2021 History

Automatic configuration of PFC
Headroom in data centers was discussed
- Technical options were proposed
- 802.1Q changes were discussed

PFC and MACSec Interworking
Interpretation was requested and discussed
- Interoperability issues identified in data center interconnect use case

Motion to authorize development of PAR and CSD was tabled
- Need to consider MACsec protection of PFC frames
- Narrow down technical proposals

Jan   Feb   July

Individually contributed
PAR&CSD proposals were
discussed in Nendica

Continuous 'vet' in Nendica and
consensus was made
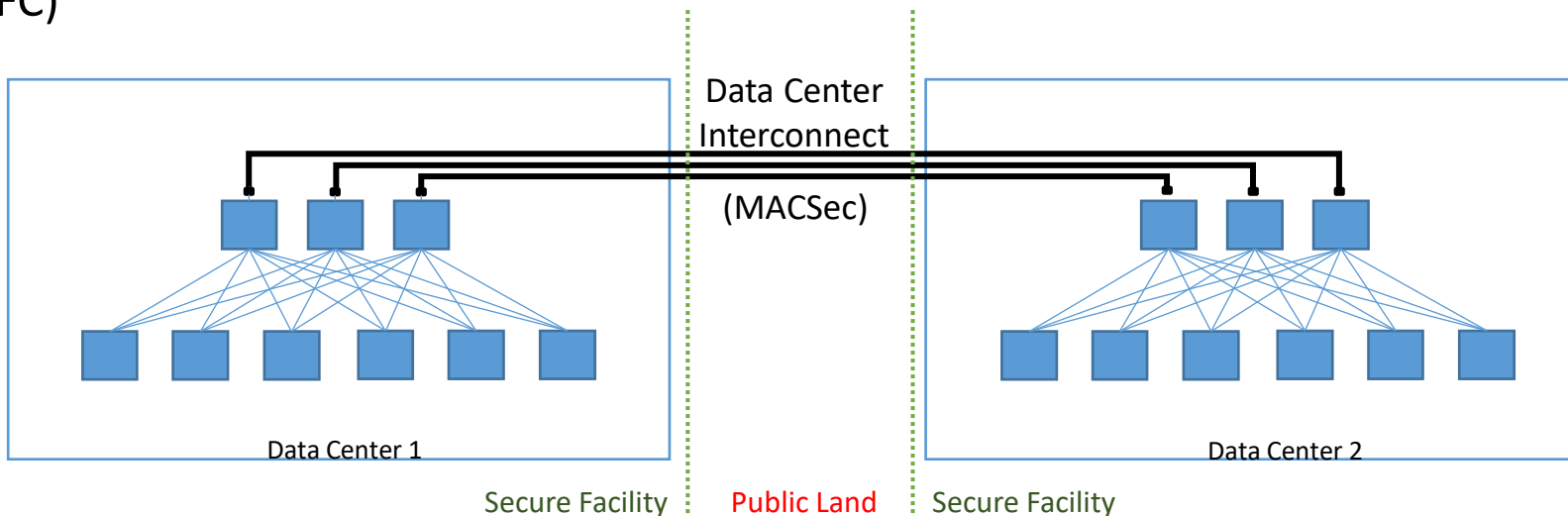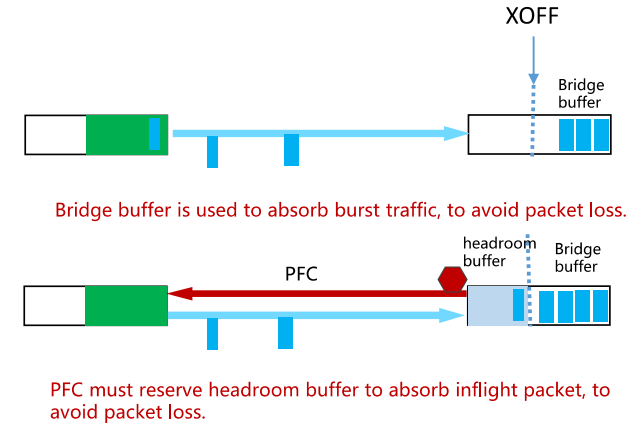- Technical alternatives have been explored with agreement

Nov   Sep

Lots of previous presentations.
- https://www.ieee802.org/1/files/public/docs2021/new-lv-adaptive-pfc-headroom-0121-v02.pdf - Adaptive PFC Headroom
- https://www.ieee802.org/1/files/public/docs2021/new-congdon-a-pfc-h-Q-changes-0521-v01.pdf - Consideration of Adaptive PFC Headroom in 802.1Q
- https://www.ieee802.org/1/files/public/docs2021/new-lv-adaptive-pfc-headroom-and-PTP-0602-v03.pdf - Adaptive PFC Headroom and PTP
- https://www.ieee802.org/1/files/public/docs2021/cz-finn-pfc-headroom-0629-v01.pdf - Determining Priority Flow Control Headroom
- https://www.ieee802.org/1/files/public/docs2021/new-lv-PFC-Headroom-Project-Proposal-0721-v01.pdf - PFC Headroom Measurement and Calculation Project Proposal
- https://mentor.ieee.org/802.1/dcn/21/1-21-0048-00-ICne-pfc-headroom-with-macsec.pdf - Incorporating MACSec into PFC Headroom Calculation
- https://mentor.ieee.org/802.1/dcn/21/1-21-0050-00-ICne-pfc-enhancements-project-proposal.pdf - PFC Enhancements Project Proposal
- https://mentor.ieee.org/802.1/dcn/21/1-21-0052-00-ICne-pfc-enhancements-next-steps.pdf - PFC Enhancements Project Proposal
- https://mentor.ieee.org/802.1/dcn/21/1-21-0064-00-ICne-pfc-headroom-project-par-csd-discussion.pdf - PFC Enhancements Project Plan
- https://mentor.ieee.org/802.1/dcn/21/1-21-0064-00-ICne-pfc-headroom-project-par-csd-discussion.pdf - PFC Enhancements Project individually contributed PAR&CSD

Motivation

- PFC is used to avoid packet loss in data centers. For PFC to function properly and without wasting memory, the amount of headroom buffer must be calculated. Deployment in large scale data center networks and long-distance interconnects is currently problematic because it requires manual configuration.

Bridge buffer is used to absorb burst traffic, to avoid packet loss.

PFC must reserve headroom buffer to absorb inflight packet, to avoid packet loss.

- There are customer requirements for the integrity and confidentiality protection of all frames transmitted between geographically distributed data centers. The current specification is inconsistent and incomplete regarding the operation PFC and MACSec together. (Note: it is a general issue for MAC control frame, not only PFC)

Data Center Interconnect

(MACSec)

Data Center 1

Data Center 2

Secure Facility   Public Land   Secure Facility

Project Proposal

- Use the existing PTP protocol and enhance the existing DCBX protocol to support automated PFC headroom calculation.
  - Reuse PTP protocol to measure link delay
  - Define separate mechanism (using LLDP) to convey peer node(far-end) internal processing delay.
  - Sum up link delay, peer node processing delay and near-end processing delay to calculate PFC headroom.

- Support the existing PFC MAC Control interface, and add an option to transmit PFC frames using the Internal Sublayer Service interface supported by MACsec
  - Define new PFC shim to enable protected PFC frames
  - Shim passes through existing MAC Control interface in 'control mode'
  - Shim configured to generate and consume PFC frames in 'data mode' if desired

Note: The shim layer proposal works for other MAC control frames
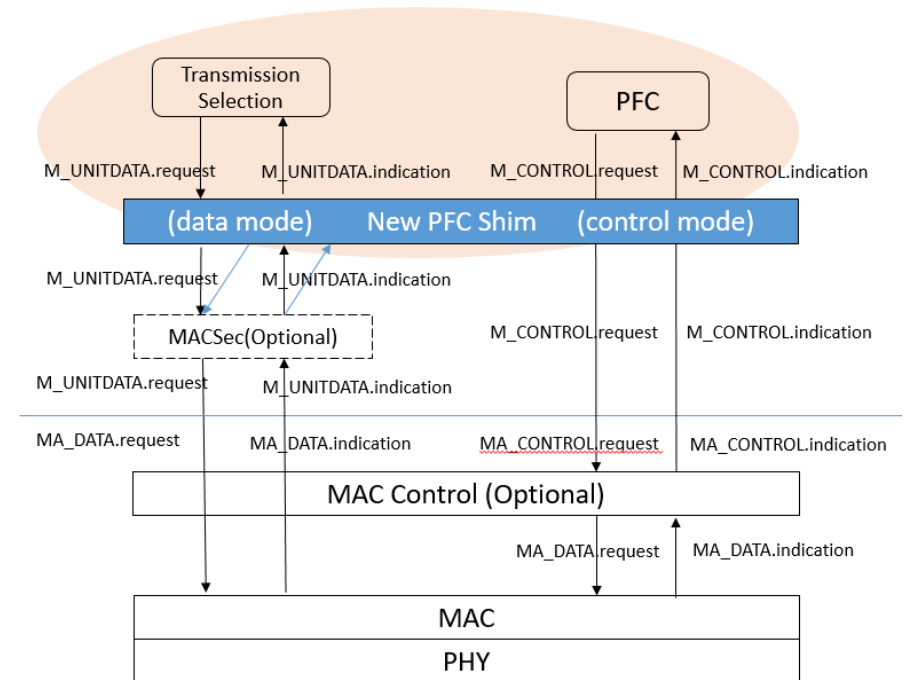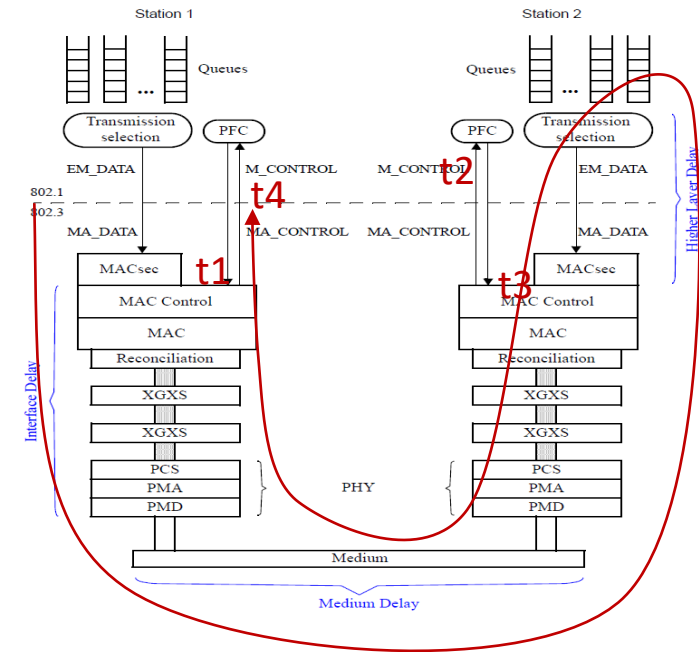
Proposed Next Step

- Motion to develop a PAR and CSD for pre circulation at the November plenary.

- Sample Motion Slide to follow:

Motion

- 802.1 authorizes the January 2022 Interim to generate PAR and CSD for pre-circulation to the EC for an amendment to IEEE Std 802.1Q to specify mechanisms for automatic PFC headroom configuration and PFC MACSec operation.

- Proposed: Lily Lv
- Second: Paul Congdon

- In the WG (y/n/a): <y>, <n>, <a>