802.1CB and Qci Layering

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Current MAC Relay

- Active Topology
- Ingress
- Frame Filtering
- Egress
- Flow Metering
- Queuing
- Transmission Selection
Per Stream Filtering and Policing P802.1Qci

MAC Relay

Per Stream Filtering and Policing (P802.1Qci)

Active Topology

Ingress

Frame Filtering

Egress

Flow Metering

Queuing

Transmission Selection
Layering Described in P802.1CB D1.1

MAC Relay

TSN Relay

Non TSN Relay (incl. passive Stream Layer)
802.1CB with 802.1Qci as shown in 802.1CB D1.1 C.3

TSN Relay

- SR function
- P802.1Qci

Stream

MAC Relay

- EISS
- ISS

Non TSN Relay (incl. passive Stream Layer)

- ISS
Issues with the current proposal

- The stream identification is needed for 802.1Qci but is defined in 802.1CB (Seamless Redundancy) so parts of Qci need to be in the MAC Relay

- 802.1CB defines that 802.1Qci is used outside the MAC Relay

- This seems to be not a very clean approach and is very confusing for the reader

- Does this mean that there is an additional separate implementation of Qci necessary for each port besides the Qci implementation in the MAC Relay?

- In the CB layering approach the Qci implementation is above the Non TSN Relay -> so the Qci implementation on this side only supports TSN streams?
Issues with the current proposal

• The main problem of the current approach of 802.1CB seems to be that it tries to define the “whole world of TSN” for all layers (incl. layer 2, 3, 4)

• For seamless redundancy this is not necessary

• Seamless redundancy requires a sequence number, currently this sequence number is encoded in a layer 2 tag
  → layer 2 is required for Seamless Redundancy as defined today
  → there is no reason to try to put layer > 2 related topics in CB (for seamless redundancy)
Proposal

• Get rid of the “Popeye arm” for seamless redundancy, it is not necessary

• All of the seamless redundancy related functions can be handled inside the MAC Relay

• The identification of streams can be based on layer 2 fields as it is done for AVB

• “But we want to tunnel/proxy layer >= 3”
  • Yes, but this is completely orthogonal to seamless redundancy
  • Proxying other traffic is a completely different topic
  • The “Popeye arm” can be used as a middlebox for TSN unaware end stations
Seamless Redundancy inside the MAC Relay

Per Stream Filtering and Policing (P802.1Qci)

Active Topology
- Ingress
- Frame Filtering
- Egress
- Flow Metering
- Seamless Redundancy
- Queuing
- Transmission Selection

MAC Relay
- EISS
- ISS
- EISS
- ISS
Seamless Redundancy with TSN Proxy Middlebox

MAC Relay
(incl. seamless redundancy)

ISS

ISS

TSN Relay

Stream

Stream

Non TSN Relay
(incl. passive Stream Layer)

ISS

ISS

ISS

ISS

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Seamless Redundancy with TSN Proxy Middlebox

- TSN Relay
  - Stream
  - Non TSN Relay (incl. passive Stream Layer)
    - ISS
  - MAC Relay (incl. seamless redundancy)
    - EISS
  - ISS
  - ISS
  - ISS
- TSN Relay
  - Stream
  - Non TSN Relay (incl. passive Stream Layer)
    - ISS
  - ISS
  - ISS
  - ISS

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IEEE 802.1 TSN TG
Bridged TSN Network with TSN Proxy Middleboxes

Non TSN end station with time-sensitive streams

TSN Proxy Middlebox

TSN end station

TSN Bridge
Network with TSN Proxy Middleboxes and Seamless Redundancy

- Non TSN end station with time-sensitive streams
- TSN end station
- TSN Proxy Middlebox
- TSN Bridge

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Thank You