1588 and the 802.1 Model

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(based on L2CP slides by Steve Haddock – MEF 42033)
802.1 Handling of 1588 frames

- **802.1 Bridges**
  - Decide whether to filter or forward an 1588 frame based on the Destination Address and VID.
  - Decide whether to peer an 1588 frame based on the protocol identifier (and, in some cases, the DA and/or VID).
  - These are orthogonal decision points.

- **PTP messages**
  - Does not require the original SA (identifying the clock) to be maintained
  - Optional features (e.g., acceptable master table) require this
Bridge Model with Higher Layers

End Station

Higher Layers

LSAPs

MAC

MSAPs

PhSAPs

SA: AC-DE-48-33-33-33

SA: AC-DE-48-22-22-22

SA: AC-DE-48-11-11-11

SA: AC-DE-48-00-00-00

Bridge

Higher Layers

LLC

MAC Relay

End Station

Higher Layers

LLC Sublayer

Data Link Layer

MAC Sublayer

Physical Layer

Media
Customer Bridge – PTP mode A

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MAC Relay

RSTP/MSTP/SPB

PTP

LLDP

IP/SNMP

C-VLAN Component

VLAN VLAN

Ingress PTP Message -- Peer
SA: AC-DE-48-00-00-00
DA: 01-80-C2-00-00-0E

Egress PTP Message
SA: AC-DE-48-22-22-22
DA: 01-80-C2-00-00-0E

Any frames received to AC-DE-48-00-00-00 on the left port will be relayed to the right port.
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MAC Sublayer

PhSAPs

MSAPs

LLC Sublayer

Higher Layers

Ingress PTP Message -- Peer
SA: AC-DE-48-00-00-00
DA: 01-80-C2-00-00-0E

Egress PTP Message
SA: AC-DE-48-22-22-22
DA: 01-80-C2-00-00-0E
Customer Bridge – PTP mode B

C-VLAN Component

IP/SNMP
LLDP
RSTP/MSTP/SPB
PTP
MAC Relay

Higher Layers

LSAPs
LLC Sublayer
MSAPs

MAC Sublayer

PhSAPs

Media

Ingress PTP Message -- Peer
SA: AC-DE-48-00-00-00
DA: 01-80-C2-00-00-0E

Learning
AC-DE-48-00-00-00 is on right port
...replaced by:
AC-DE-48-00-00-00 is on left port
Any frames received to this address on the left port will be discarded

Egress PTP Message
SA: AC-DE-48-00-00-00
DA: 01-80-C2-00-00-0E
Possible solutions

1. Disable learning
   - PTP mode B will work with existing bridges only if learning is off
   - This requires the link and ports to be configured as point-to-point

2. Disable learning for reserved multicast DA
   - PTP mode B will work with bridges if learning is off for these PTP messages, or generally reserved multicast DA
   - Many vendors already support this, define this as an option in 802.1Q

3. Add a tag shim for correctionField
   - Use PTP mode B
   - Create a new tag with Ethertype in 802.1Q that is inserted before the PTP message and contains only the correctionField

4. Add a tag shim for PTP
   - Use PTP mode B.
   - Define the PTP Ethertype as a tag in 802.1Q

5. Move SA into PTP message
   - Use PTP mode A
   - Add a new TLV for the SA of the clock in 1588 or use clockIdentity for acceptable master clock

6. Abandon 1588 options
   - Use PTP mode A
   - Define an ITU-T alternative for acceptable master clock that does not depend on knowing the SA of the clock
Customer Bridge – PTP mode C

non-PTP aware Bridge

PTP aware Bridge behaviour for DA 01-1B-19-00-00-00 is identical to mode A

Ingress PTP Message -- Peer
SA: AC-DE-48-00-00-00
DA: 01-1B-19-00-00-00

Learning
AC-DE-48-00-00-00 is on right port
Any frames received to AC-DE-48-00-00-00 on the left port will be relayed to the right port

Egress PTP Message
SA: AC-DE-48-00-00-00
DA: 01-1B-19-00-00-00