802.1ah Provider Backbone Bridges support for DSLAM

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Background

- Customers of metro Ethernet services are mostly business users.
- Broadband access is not necessarily for business applications.
  - E.g., POS system of chain store
  - xDSL-based access is widely used.
- xDSLs are multiplexed by DSLAM then connected to backbone.
  - Ethernet frame is used for DSLAM-backbone connection now.
- DSLAM-based access network could be modeled as 802.1ad network which supports point-to-point connectivity.
  - However, S-VID identify a subscriber line, not a customer.
  - Therefore, relationship between I-SID in the backbone and S-VID in a DSLAM-based access network is 1:N.
- So, 802.1ah Provider Backbone Bridges support for DSLAM needs some considerations.
DSLAM support model

Current 802.1ah Model
1:1 I-SID:S-VID relationship

A service instance is identified by I-SID

802.1ah Provider Backbone Bridged Network

I-SID

S-VID

DSLAM Model
1:N I-SID:S-VIDs relationship

A service instance is identified by I-SID

802.1ah Provider Backbone Bridged Network

I-SID

S-VIDs

A subscriber line is identified by S-VID

802.1ad Provider Bridged Network

I-SID

S-VIDs

DSLAM-based Access Network

A service instance is identified by S-VID

802.1ad-based Access Network

DSLAM
I-SID -> S-VID translation issue

- Relationship between I-SID and S-VID is 1:N
  - S-VID identify a subscriber line for a customer
  - A customer may use multiple subscriber lines
  - Therefore, an I-SID may relate to multiple S-VIDs
- How to translate from I-SID to S-VID for egress frames?
Option 1: flooding

- I-comp translates from I-SID in I-tagged frame to all related S-VIDs, then generates S-tagged frames for all related S-VIDs.
- It works, but inefficient......
Option 2: MAC address based translation

- I-comp has a \{I-SID, MAC DA\} <-> S-VID translation table
  - Entries are manually configured
- For egress frames, I-comp translates from \{I-SID, MAC DA\} in I-tagged frame to S-VID for S-tagged frame
- Manual configuration is much burden for customers and providers
Option 3: upper layer protocol based translation

- Upper layer protocol information could be used for S-VID translation
- Most of applications use IP, thus an end station has an IP address
- I-comp has a \{I-SID, IP DA\} <-> S-VID translation table
  - Entries are manually configured
- For egress frames, I-comp translates from \{I-SID, IP DA\} in I-tagged frame to S-VID for S-tagged frame
- Not much different from option 2
Option 4: learning

- I-comp has a \{I-SID, MAC DA\} <-> S-VID translation table
  - Relationship between I-SID and S-VID is manually configured
  - Relationship between S-VID and MAC DA is learned from ingress frames
- For egress frames, I-comp translates from \{I-SID, MAC DA\} in I-tagged frame to S-VID for S-tagged frame
- If MAC DA is not learned, egress frame is flooded as option 1
- May be good scheme, but learning may be expensive
802.1ah Provider Backbone Bridges should support 1:N I-SID/S-VID translation capability for DSLAM support
- DSLAM is a real application for PBB
- It may be optional functionality

4 options are proposed to enable DSLAM support
- Flooding
- MAC address based translation
- Upper layer protocol based translation
- Learning

One option should be standardized or it is implementation choice?
- 802.1ag CFM correctly works in these environments?