802.1ad Provider & Provider Edge Bridges

Provider Bridge

S-VLAN

PNP n n PNP
PNP n n PNP
PNP n n PNP

Provider Edge Bridge

S-VLAN

1 CNP PEP
1 CNP PEP
1 CNP PEP
1 n C-VLAN

CEP

C-tagged srvc i/f

Customer Systems

C-tagged srvc i/f

S-tagged srvc i/f

port based srvc i/f

1 n bundling/multiplexing n client entities into 1 server entity
1 single instance/entities port
n n instance/entities port

PB & PBB models / 2006-10-10
802.1ad Provider & Provider Edge Bridges
S-VLAN MEP & MIP function locations

Provider Bridge

Provider Edge Bridge

Customer Systems

S-VLAN instance end point with S-VLAN MEP function
S-VLAN instance interm. point with S-VLAN MIP function
S-VLAN instance interm. point with S-VLAN-MIP & S-VLAN-MEP functions

1 bundling/multiplexing n client entities into 1 server entity
1 single instance/entities port
n n instance/entities port
I-SI and B(S)-VLAN MEP & MIP function locations

Provider Bridge & Backbone Core Bridge

B(S)-VLAN

Backbone Edge Bridge

B(S)-VLAN Comp. 1

I-SI Comp. 1

I-tagger

Backbone-MAC Service Boundary

Customer Systems

Srvc Instance interm. point with SI-MIP & SI-MEP functions

1n bundling/multiplexing n client entities into 1 server entity

1 single instance/entities port

n n instance/entities port

Service Instance end point with SI-MEP function(s)

B(S)-VLAN Instance end point with B(S)-VLAN MEP function

Srvc Instance interm. point with SI-MIP function

B(S)-VLAN instance interm. point with B(S)-VLAN MIP function

Port based srvc i/f

S-tagged srvc i/f

C-tagged srvc i/f

l-tagged srvc i/f

to/from peer PBBN BEB

PBBN BEB

PB & PBB models / 2006-10-10
(H)VPLS combines MPLS PW (i.e. service instance) and Tunnel layers with an Ethernet Service Instance layer

To scale HVPLS the Ethernet Service Instance layer should be the PBB Service Instance layer

PBB and MPLS Backbone Edge Bridges have same architecture

- main difference are
  - B-VLAN component is replaced by MPLS Tunnel component
  - I-SID and PCP/DE are replaced by MPLS PW label and EXP ➔ I.e. I-SI component translates in its VIP* port its Relay VID into PW label (instead into I-SID)
  - B-VID and PCP/DE are replaced by MPLS Tunnel label and EXP
Hybrid 802.1ah/MPLS Backbone Edge Bridge & MPLS Backbone Core Switch

MPLS Backbone Core Switch

MPLS Tunnel

MPLS Tunnel

I-SI Comp.

S-tagged srvc i/f

C-tagged srvc i/f

I-tagged srvc i/f

S-tagged srvc i/f

C-tagged srvc i/f

I-tagged srvc i/f

Backbone-MAC Service Boundary

Backbone-MAC Provider

Backbone-MAC Client

Customer Systems

MPLS Backbone Edge Bridge

S-tagged

C-tagged

I-tagged

N/C

to/from peer PBBN BEB

N/C

to/from peer PBBN BEB

bundling/multiplexing n client entities into 1 server entity

single instance/entities port

n instance/entities port

PB & PBB models / 2006-10-10
Hybrid 802.1ah/MPLS Backbone Edge Bridge & MPLS Backbone Core Switch

MPLS Backbone Core Switch

MPLS Tunnel

Backbone-MAC Service Boundary

Customer Systems

MPLS Backbone Edge Bridge

I-SI Comp.

S-tagged srvc i/f

C-tagged srvc i/f

I-tagged srvc i/f

B(S)-tagged i/f

VIP

to/from peer PBBN BEB

N/C

Service Instance end point with SI-MEP function(s)

Tunnel instance end point with Tunnel MEP function

Tunnel instance interm. point with Tunnel MIP function

Srvc Instance interm. point with SI-MIP function

PB & PBB models / 2006-10-10
PBB provides B-MAC Services

- Ethernet/PB Network
  - PBB Network
  - MAC Service Boundary

- PBB Network
  - B-MAC Service Boundary
  - B-MAC Service Boundary
Customer Instance ↔ Service Instance (PBB S-VLAN) Component

- Proposed new “PBB S-VLAN Component” maps “Customer Instances” onto “Service Instances”
- PBB Service Instances provide B-MAC Service to customer
- PBB S-VLAN Component’s PEPs include B-MAC SAPs and “ISS SAP into B-MAC SAP mapping”
  - ISS SAP ↔ B-MAC SAP mapping process to be defined in new clause 6.x (refer to slide 11)

- 802.1ad’s Relay VID (RVID) should be used as generic ISS SAP identifier
  - associated with both B-VLAN (trunk) instances and I-Service instances
  - VID translation function converts bridge-internal RVID into externally observable C-VID, S-VID, B-VID, I-SID, or other technology label format
Each ISS SAP instance is identified by means of a Relay VID (RVID, 6.7/802.1ad).
New clause 6.x/ 802.1ah

Alternative A: 6.1/802.1D

Alternative B: 2.3/802.3
Resources

Following slides present considerations on resources in the bridge

- fabric unit
- interface port unit

and illustrate on which resources

- customer instances
- service instances
- trunk instances and
- physical link instances

start/end
Resources

Functional model of PEB, PB, BEB, BCB must be mapped onto Resource model, consisting of

- Fabric Units
- Interface Port Units

Fabric unit supports

- Bridge Relay Entity
  - Typical Relay Port bandwidths: 1G, 2.5G, 10G, 40G (and in the future: 100G)

Interface Port unit may support

- Physical Media (PHY)
- Multiplexing/Demultiplexing ((DE)MUX)
- MEP and MIP functions (OAM)
- Mapping/Demapping ((DE)MAP) including bundling

Two types of equipment (ignoring service definition relays)

- Single Relay: PEB, PB, BCB, I-BEB, B-BEB
- Dual Relay: IB-BEB
Resources
Single Relay equipment

PB & PBB models / 2006-10-10
Resources
Dual Relay equipment

bundling of one or more Customer Instances into one or more Service Instances

termination of one or more Service Instances

Service Instance grooming & switching/bridging

multiplexing of one or more Service Instances into one or more Trunk Instances

termination of one or more Trunk Instances

Trunk Instance grooming & switching/bridging

multiplexing of one or more Trunk Instances into one or more PHY Instances

termination of one or more PHY Instances

PB & PBB models / 2006-10-10
Relay Resources

Two Relay types in 802.1
- 4k relay (≤ 4094 instances)
- 16M relay (≤ 16,777,214 instances)

4k Relay (802.1Q, .1ad, .1ah)
- 12-bit Relay VID (R_{12}VID)
- 0 ≤ R_{12}VID ≤ 4094

16M Relay (802.1ah)
- 24-bit Relay VID (R_{24}VID)
- 0 ≤ R_{24}VID ≤ 16,777,215

Relay Ports
- Contain one or more Instance Ports
- Instance Port identified by RVID
Interface Port Resources

to be added
Relay VID Translation

- **Relay VID (RVID)**
  - bridge internal instance identifier

- **External presentation as**
  - C-VID
  - S-VID/B-VID
  - I-SID
  - PW label (PW)
  - Time slot (TS)
  - ...

- **RVID translation function**
  - C-VID = RVID, RVID = C-VID
  - S-VID = f[RVID], RVID = f⁻¹[S-VID]
  - I-SID = f[RVID], RVID = f⁻¹[I-SID]
  - PW = f[RVID], RVID = f⁻¹[PW]
  - TS = f[RVID], RVID = f⁻¹[TS]
EISS SAP represents a set of “client-ISS SAPs”
- each client-ISS SAP is identified by its VID (to be replaced by RVID)

It seems that when deploying RVID in 802.1ah, current EISS SAP definitions can be maintained without extensions
IEEE 802.1Q-2005
EISS SAP represents set of client ISS SAPs

- EISS SAP may support between 1 and 4094 Client-ISS SAPs
IEEE 802.1ad-2005
EISS SAP represents set of client ISS SAPs

- EISS SAP may support between 1 and 4094 Client-ISS SAPs

Note: ISS SAP (6.4/802.1Q) should get drop_eligibility
**p802.1ah**

**EISS SAP represents set of client ISS SAPs**

- **Trunk Instances:** EISS SAP may support between 1 and 4094 Client-ISS SAPs
- **Service Instances:** EISS SAP may support between 1 and 16777214 Client-ISS SAPs

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**Note:** ISS SAP (6.4/802.1Q) should get drop_eligibility