

PBB-TE Control Plane Efforts

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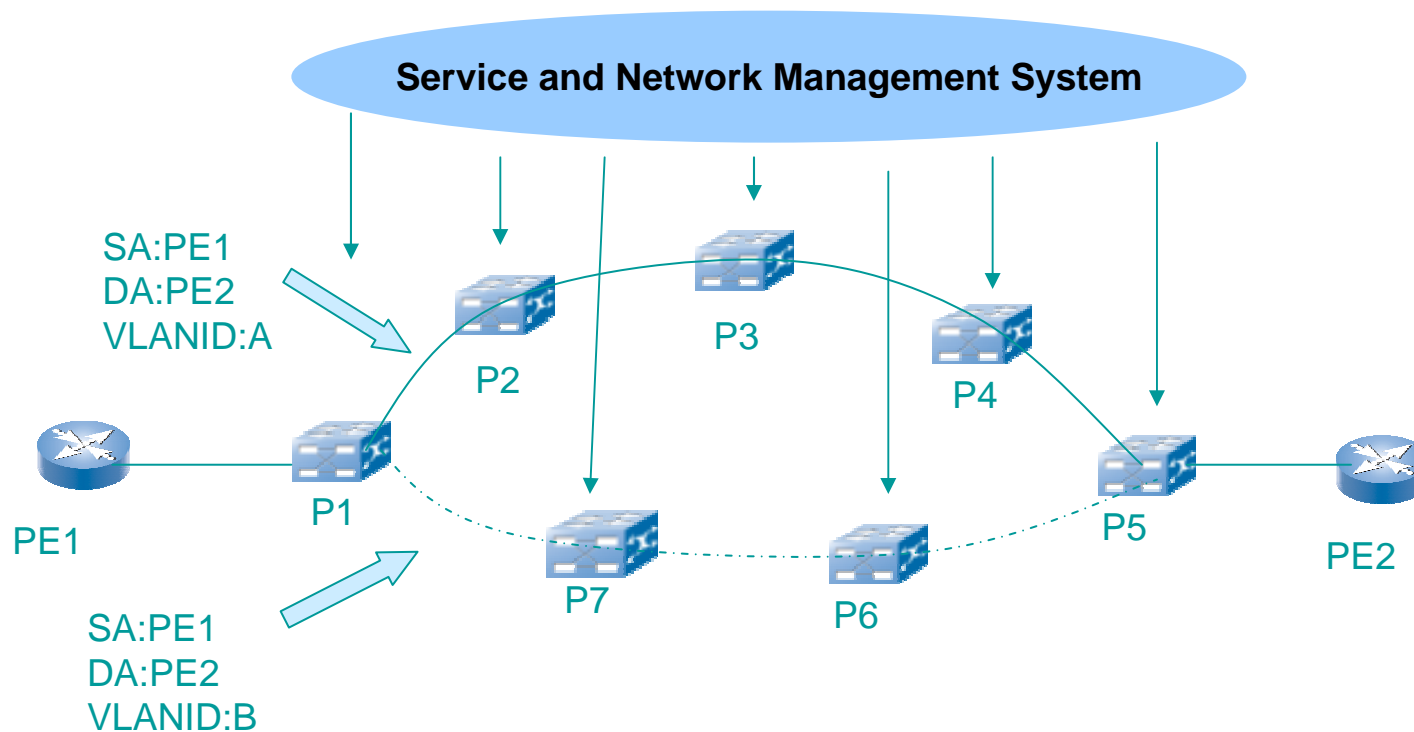
Lyndon Ong
Himanshu Shah
Ciena
Dan Zheng
ZTE



OIF

OPTICAL
INTERNETWORKING
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PBB-TE Functional Model



- Packet forwarding based on MAC and VID
- Switching is provisioned rather than learned
- No spanning tree topology control

PBB-TE and Control Plane

◆ PBB-TE

- Why ASON/GMPLS control

- RSVP-TE signaling is well suited to provisioning of paths
- Routing and Signaling concepts well established
- Scalable implementation compared to central management
- Possible without adding major cost to the switch
 - Switch forwarding remains unchanged

IETF CCAMP History

- ◆ Initial discussions
 - BOF in November 05
 - Liaisons with IEEE 802.1 to clarify data plane
 - Agreement to create CCAMP work item
 - Now incorporated in charter
 - “GMPLS source-controlled and explicitly-routed Ethernet networks “
 - Date for conclusion not currently specified
- ◆ Initial submissions
 - WG draft on Ethernet traffic parameters (OIF-related)
 - Non-WG draft on Ethernet label formats (OIF-related)
 - Soon-to-be-WG draft-gmpls-ethernet-arch-00.txt
 - Non-WG draft-fedyk-gmpls-ethernet-pbb-te-02.txt
 - focuses on impacts on GMPLS signaling

Previous work with OIF

- ◆ MEF Traffic Parameters
 - Extend TSpec format for MEF services
 - Distinguish between forwarding types
- ◆ Ethernet Label Formats
 - Support VLAN ID-based Labels
 - Support control of large numbers of label values
- ◆ Further extensions considered by CCAMP
 - Handling of Ethernet control signals
 - e.g., PAUSE

GMPLS Ethernet Architecture draft

- ◆ Currently individual draft
 - likely to be elevated to WG draft soon
- ◆ Identifies new Ethernet models, including 082.1ah, 802.1Qay, G.8011 and MEF.6.
- ◆ Defines framework for GMPLS Ethernet Label Switching (GELS)
 - Eth-LSP – Ethernet service path controlled by GMPLS
 - Label may be VID, DMAC, or other
 - Congruent bidirectional paths required for management
 - GMPLS addressing model unchanged, but may need non-IP addressing support
 - GMPLS routing and signaling can be applied
 - LMP, 802.1AB and 802.1ag may be used in combination
 - Intention to support multiple domains

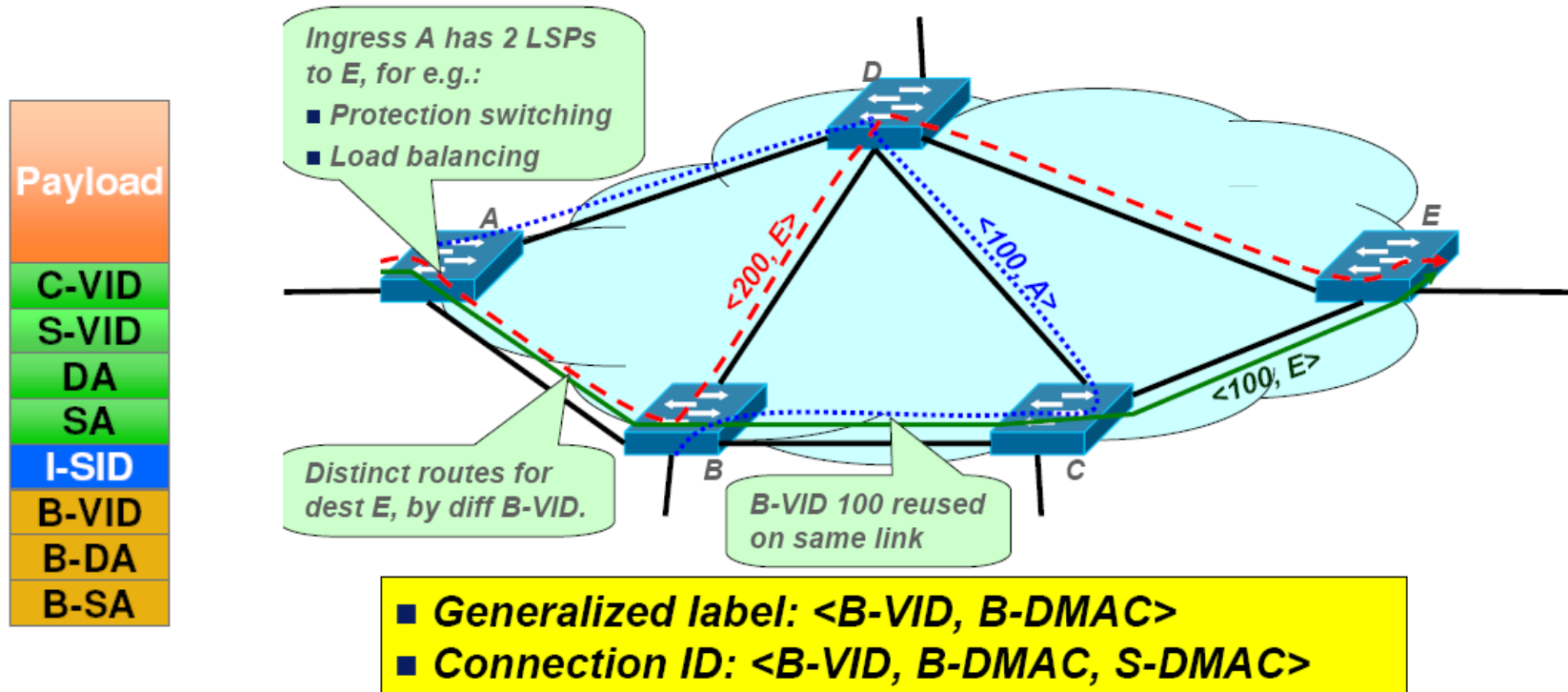
PBB-TE Control draft

- ◆ draft-fedyk-gmpls-ethernet-pbb-te-00.txt
 - participating companies include Nortel, Bell Canada, Ciena, Verizon, Ericsson and BT
 - NOT yet adopted as a Working Group draft
- ◆ Scope
 - Focus on 802.1Qay forwarding
 - Separation from Spanning Tree Control
 - Controls Ethernet Switched Path (ESP)
 - identified by {ESP-MAC DA & SA, ESP-VID}
 - analogous to a GMPS LSP
 - includes both P2P and P2MP

PBB-TE Control draft

- ◆ Other aspects in progress
 - P2MP extensions
 - Recovery aspects
 - Error handling
- ◆ Otherwise most signaling carries over with no major changes

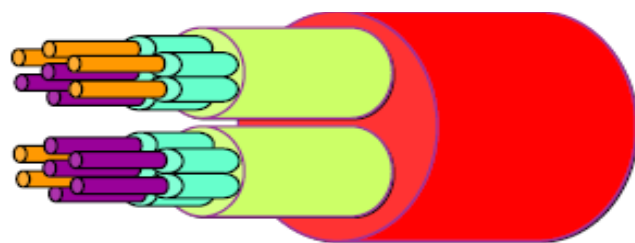
PBB-TE Label Switching



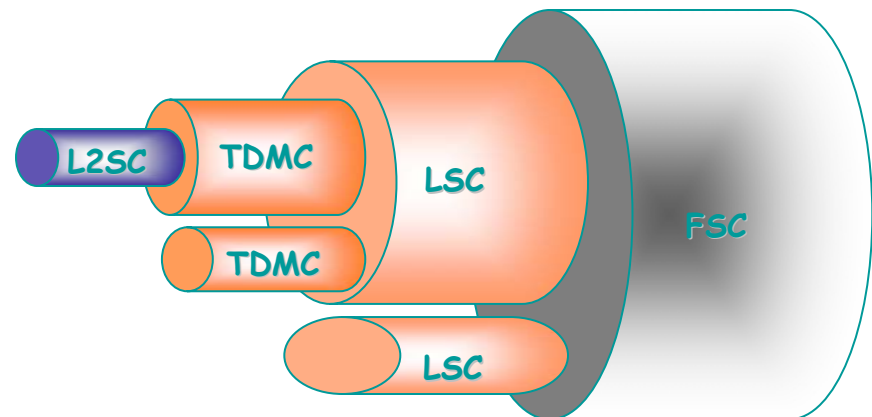
- TE Router ID assigned to bridge, Interface ID to port, Link ID to link
- VID/DA Label is used for end-end trail
 - Label is invariant within domain

Layered LSP

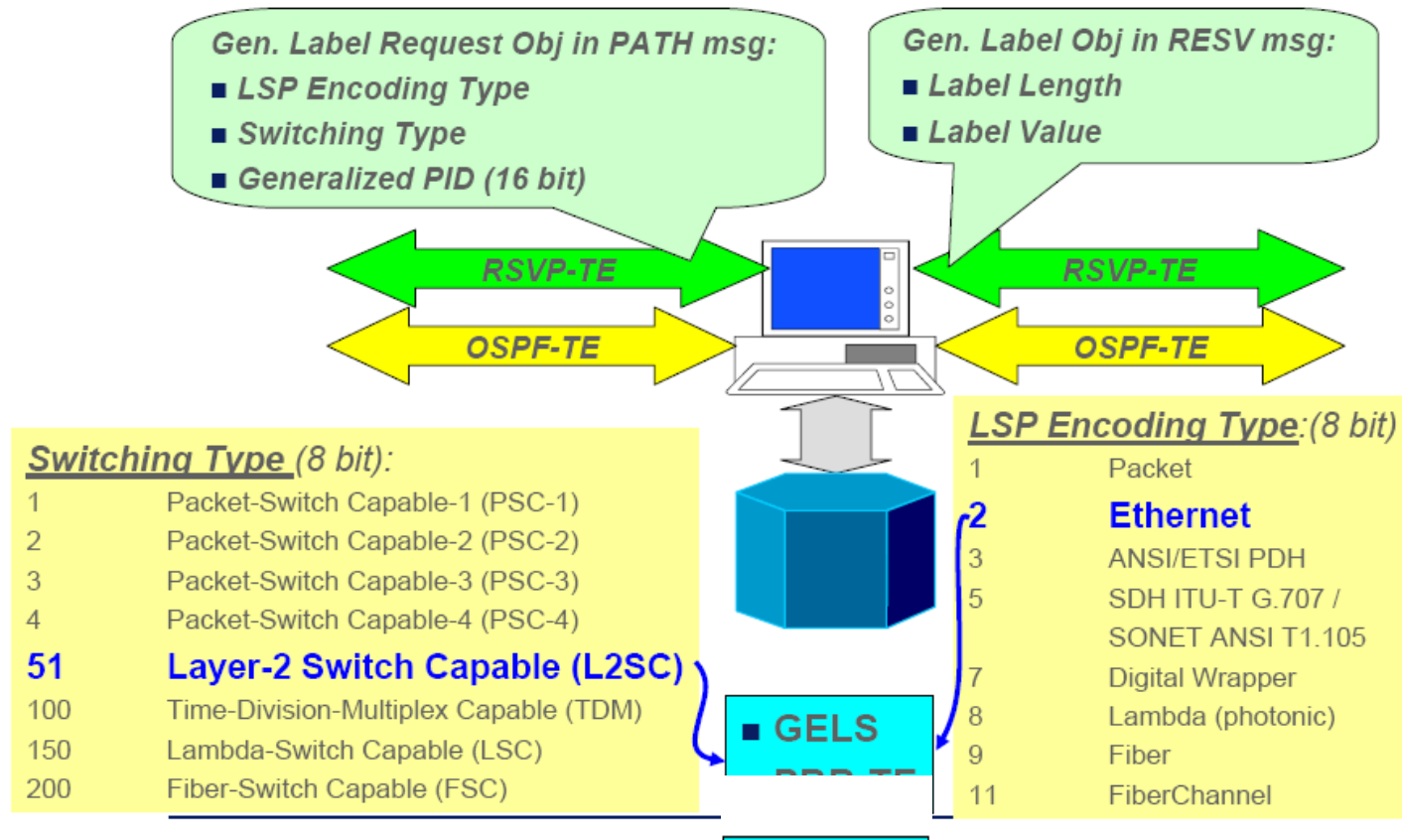
- ◆ Extend the MPLS to support more interfaces other than packet switch
 - Packet Switch Capable (PSC)—IP/MPLS
 - Layer-2 Switch Capable (L2SC) —Mac Switch
 - Time Division Multiplexing Capable (TDMC)—SDH/OTH
 - Lambda Switch Capable (LSC)—PXC
 - Fiber-Switch Capable (FSC)
- ◆ LSPs of different interfaces can be nested inside another



EVC or IP/MPLS I-SID or PW PBT Tunnel Eth or ODU

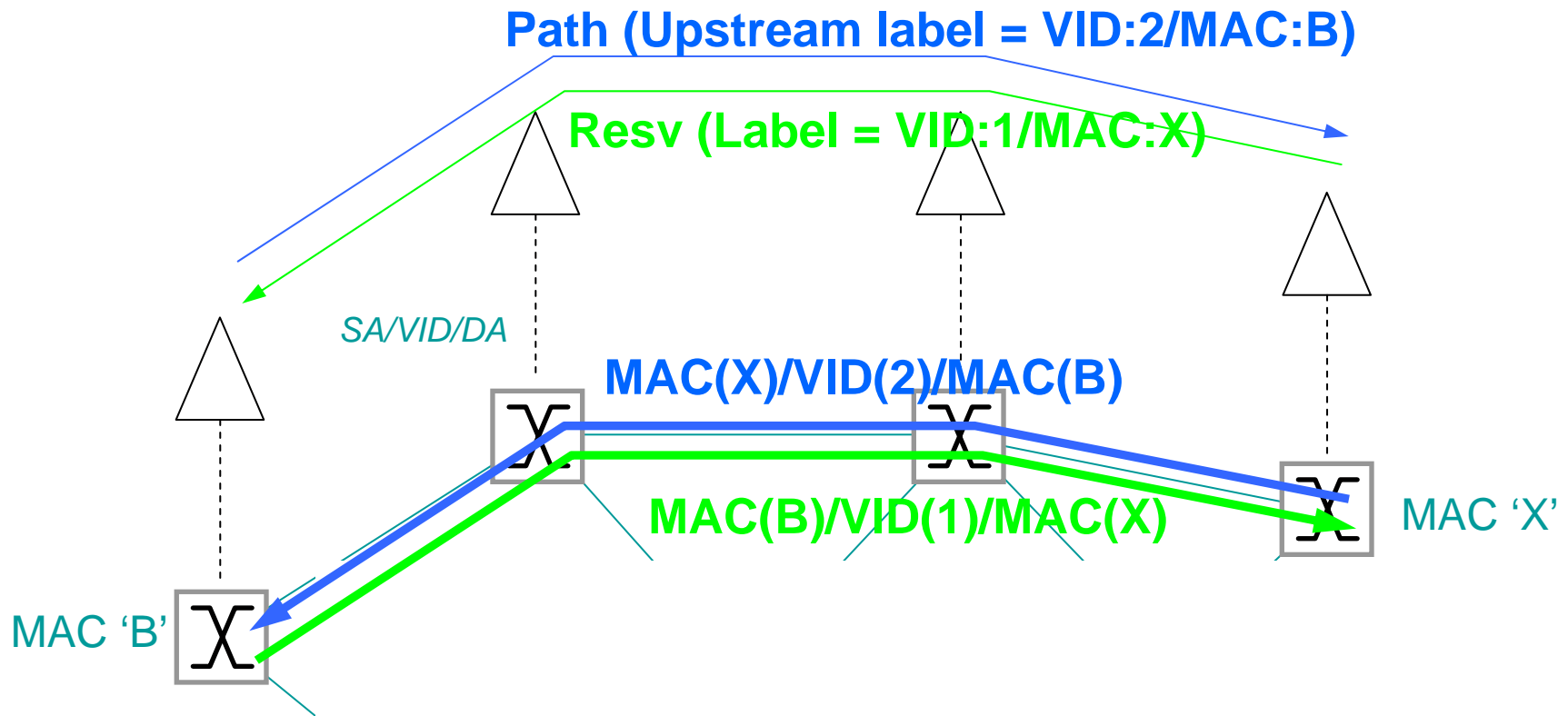


Label Distribution for PBB-TE



- ◆ RSVP_HOP object correlates label and port

Bi-direction LSP Establishment



- 'B' offers preferred label for 'X' in upstream label object
- 'X' replies with offer of preferred label
- 60 bit entries populated in the FIB
- Full 108 bit connection IDs constructed from both components

Some of the Technical Issues

- ◆ Uniform Service Classification agreement and meaningful to the service.
- ◆ Measurable end-end resource allocation
- ◆ Uniform Priority or compatible priority scheme
- ◆ Traffic Shaping or Traffic Guarantee
- ◆ Scalability and Granularity—Coarse, Fine or Ever Changing requirement
- ◆ Routing scale
- ◆ Layered or Flat
- ◆ Mobile traffic v.s Wire line traffic
 - Traffic Profile
 - QoS
 - Priority
 - Connectivity

Thank You