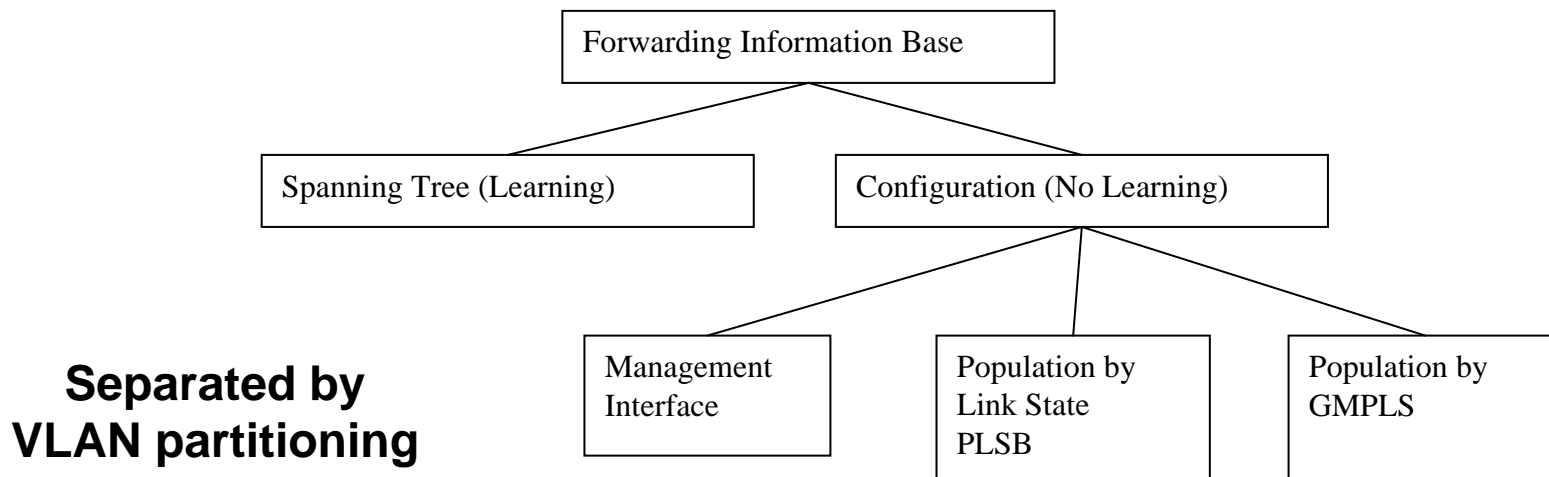# Provider Link State Bridging

Don Fedyk

Nortel Networks

Modifying Ethernet Control Planes

Ethernet control planes populate the Forwarding Information base. Many deployments of Ethernet do not use the control plane and instead use configuration. To add another control plane we look like we are using the configured option to other traditional control planes.

```
                    ┌──────────────────────────────┐
                    │  Forwarding Information Base  │
                    └──────────────────────────────┘
                       /                      \
       ┌──────────────────────────┐   ┌──────────────────────────────┐
       │ Spanning Tree (Learning) │   │ Configuration (No Learning)  │
       └──────────────────────────┘   └──────────────────────────────┘
                                        /         |          \
```

**Separated by
VLAN partitioning**

| Management Interface | Population by Link State PLSB | Population by GMPLS |

2

Provider Link State Bridging (PLSB)

- PLSB is the application of a link state protocol specifically IS-IS for the setup and control of PBB and PBT paths for CL-PS services.

- The link state protocol exchanges topology information and then allows parallel independent deterministic computation of forwarding.

- Unique aspects of PBB and PBB-TE allow us to overcome problems and issues encountered in the past and in other technologies

Service Instance Identifier

- Separation of the Service Instance from the from the VLAN concept.
  - VLAN concept was overloaded with services aspects in Provider Bridges
  - I-SID is the value.
- Service Instances are sets of ports that belong to the same service.
- VLAN Topologies may encompass many service instances
  - VLAN Topologies can be identified by multiple VLAN IDs
    - Typically one at any one time but translation is possible

4

PLSB Forwarding Nuances

- Unicast Traffic is identified by I-SID membership and is mapped to the corresponding destination by choosing the appropriate B-DA.

- Multicast Traffic is identified by I-SID membership and is mapped to the corresponding rooted multicast sub-tree.

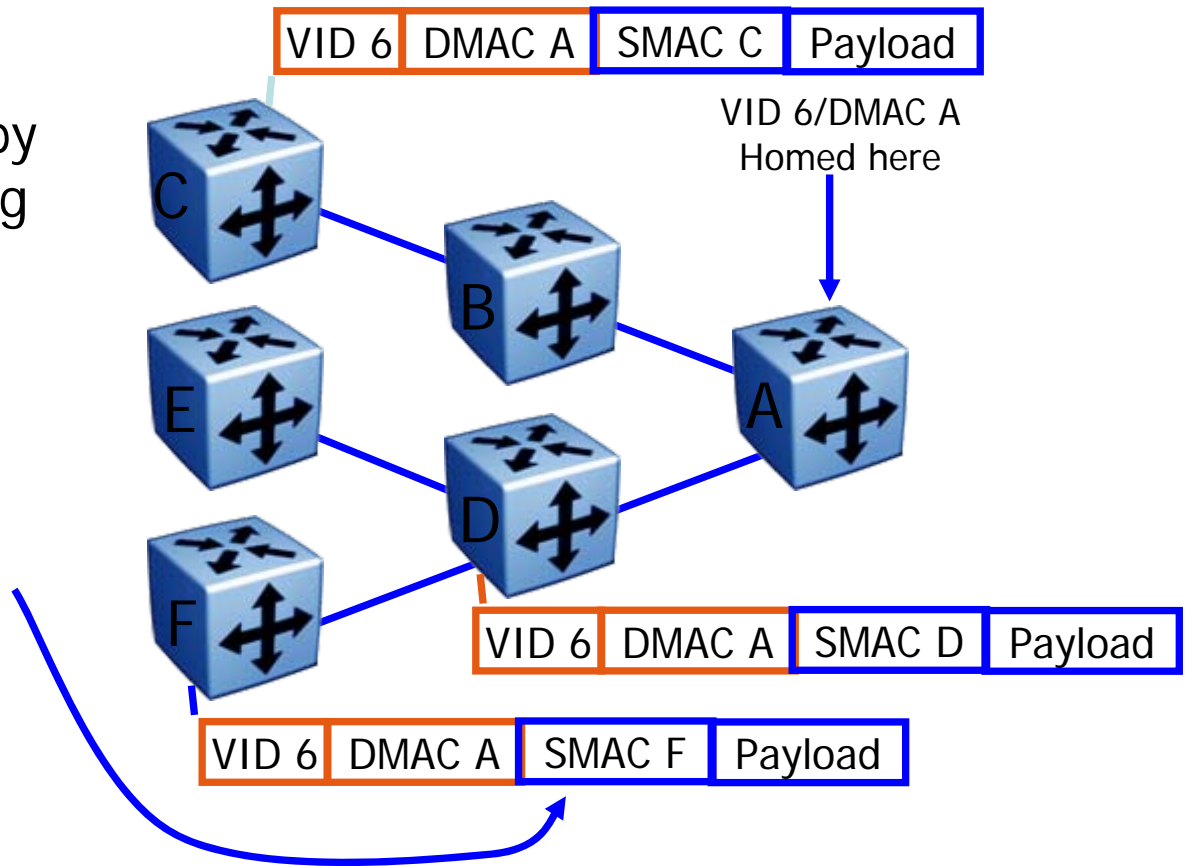- There is no V-LAN Filtering of Multicast.

Payload
C-VID
S-VID
SA
DA
I-SID
B-VID
B-SA
B-DA
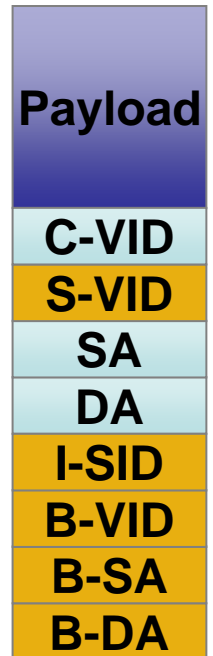
PLSB Operates only on DA + VLAN based on I-SID Membership

Shared Forwarding and the PBB-TE Label

One PBT Label, a single VID+DMAC can be used by multiple sources, providing Order (n) Labels per network.

Additionally, packets can be examined at destination to determine the source.

| VID 6 | DMAC A | SMAC C | Payload |

VID 6/DMAC A Homed here

C

B

E

A

D

F

| VID 6 | DMAC A | SMAC D | Payload |

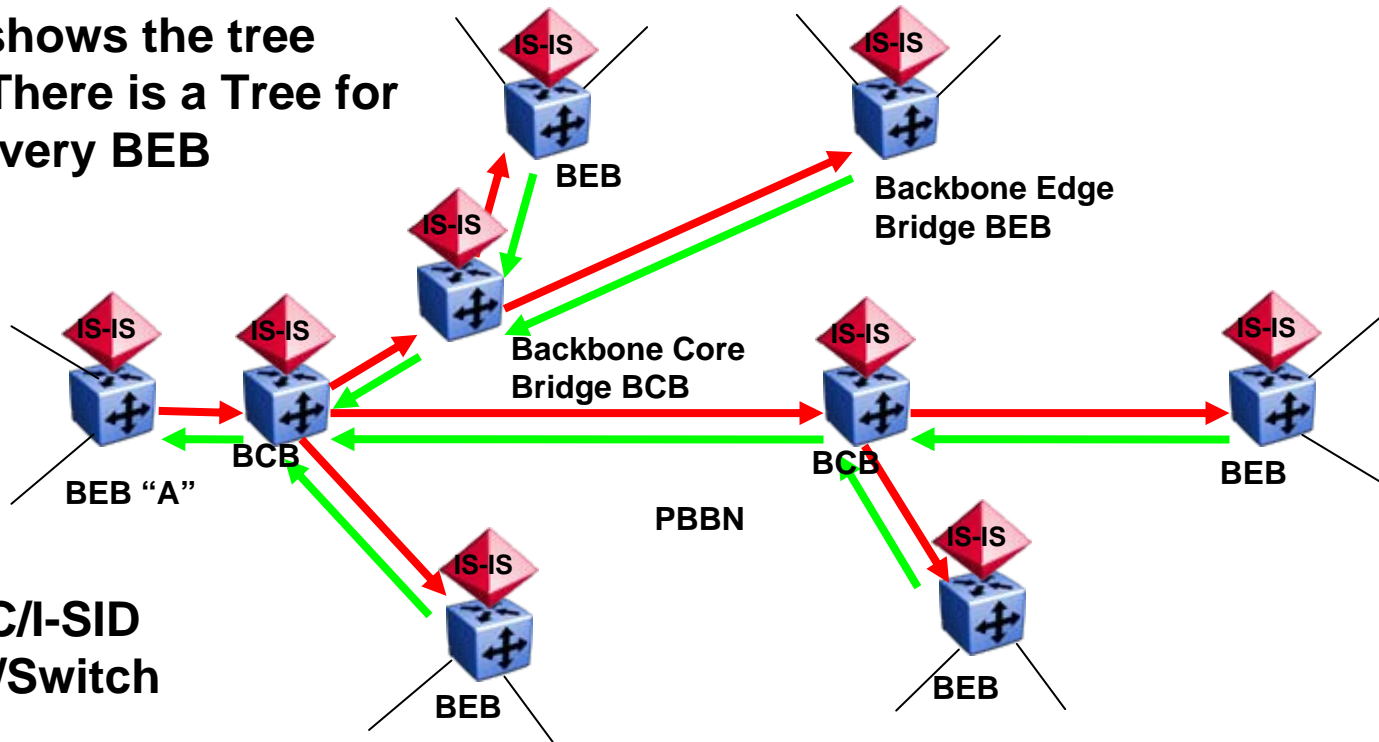| VID 6 | DMAC A | SMAC F | Payload |

PLSB

- PLSB combines the multicast/unicast capable per switch shortest path spanning tree, with PBT paths segments to allow full multicast and unicast data from all Backbone Bridges Backbone bridges in an IS-IS domain.
- This allows:
  - Any to any communications via unicast or multicast Per B-VLAN:
    - Only one Multicast address per I-SID
    - Only one Unicast address per switch
   - Support of PBB Data Plane capabilities

PLSB Visually

This shows the tree for "A" . There is a Tree for every BEB

1 MMAC/I-SID
1 UMAC/Switch

IS-IS

BEB

IS-IS

Backbone Edge
Bridge BEB

IS-IS

IS-IS

IS-IS

Backbone Core
Bridge BCB

IS-IS

IS-IS

BEB "A"

BCB

BCB

BEB

PBBN

IS-IS

IS-IS

BEB

BEB

Create Shortest Path tree from every switch. Also simultaneously Create a congruent PBT point to point path

PLSB Zoom In

BEB B

BEB C

BEB A
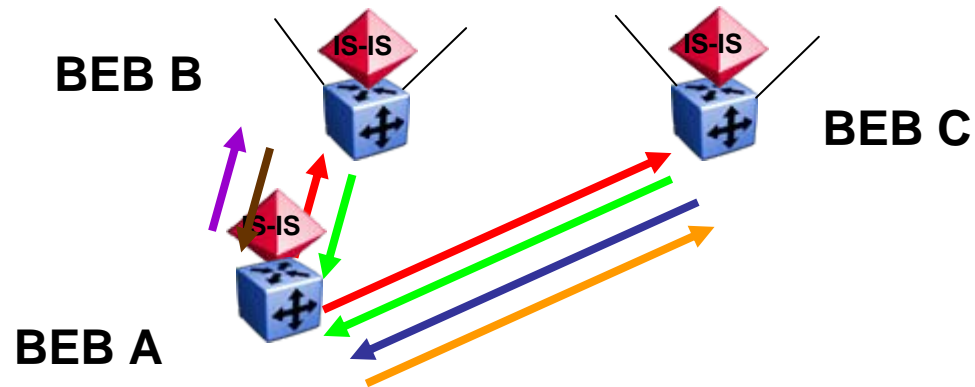
Type	DA	RPFC	I-SID	A'sView	B's View
Unicast A to B	UDA-B	UDA-A	All	Yes	Yes
Unicast B to A	UDA-A	UDA-B	All	Yes	Yes
Multicast Shortest path Rooted at A	MDA-A	UDA-A	Per I-SID	Yes	
Multicast Short Path Tree Rooted at B	MDA-B	UDA-B	Per I-SID		Yes

There are 4+ paths between nodes (1 bidirectional Unicast) (2 directional multicast/I-SID) 3 forwarding entries relevant to any I-SID destination