Shortest Path Bridging 802.1aq Discussion and Proposals

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Shortest Path Bridging
What is SPB Trying to do?

- Enable mesh Networking for ALL SPB capable bridges
  - Bridged symmetric minimum shortest path tree
- Possibly use link state (IS-IS) for SPB capable bridges
- Interwork with STP, RSTP and MSTP bridges
- Allow Multicast with VID multicast, and Multicast MAC
  - Optimal multicast ? No specific reference but is allowed in principle via MMRP.

Shortest path bridging 802.1aq Where are we?

- We have a document
- Deals with a complex subject
- Basic structure defined.
- Devil is in the details

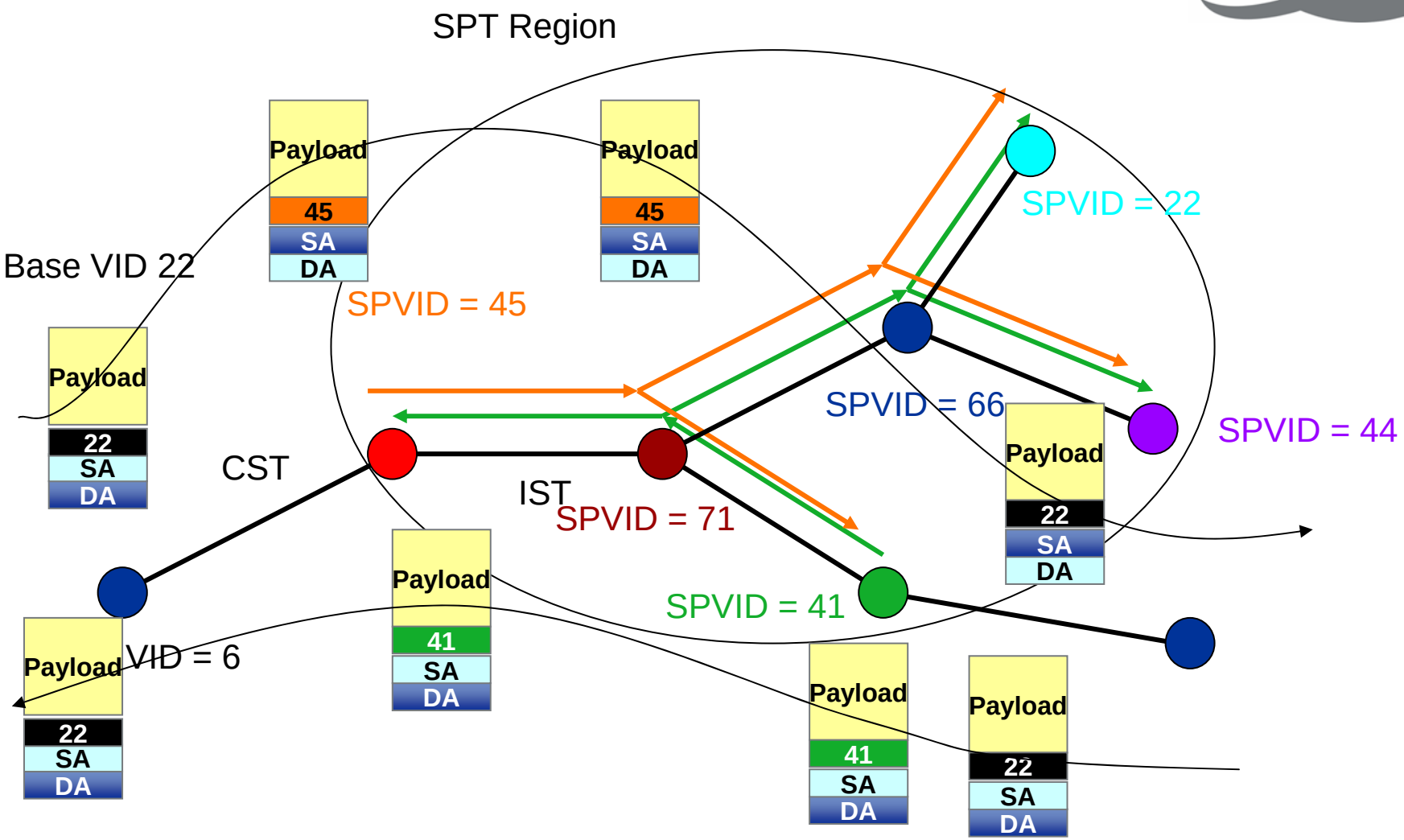
Important Concepts for Shortest Path Bridging

- Active Topology
- VLAN Partitioning
  - VID usage
- Link state topology
  - New objects
  - SPT computation
  - Mesh Networking
- Backwards compatibility
  - Control Plane, Data Plane
- Loop Mitigation

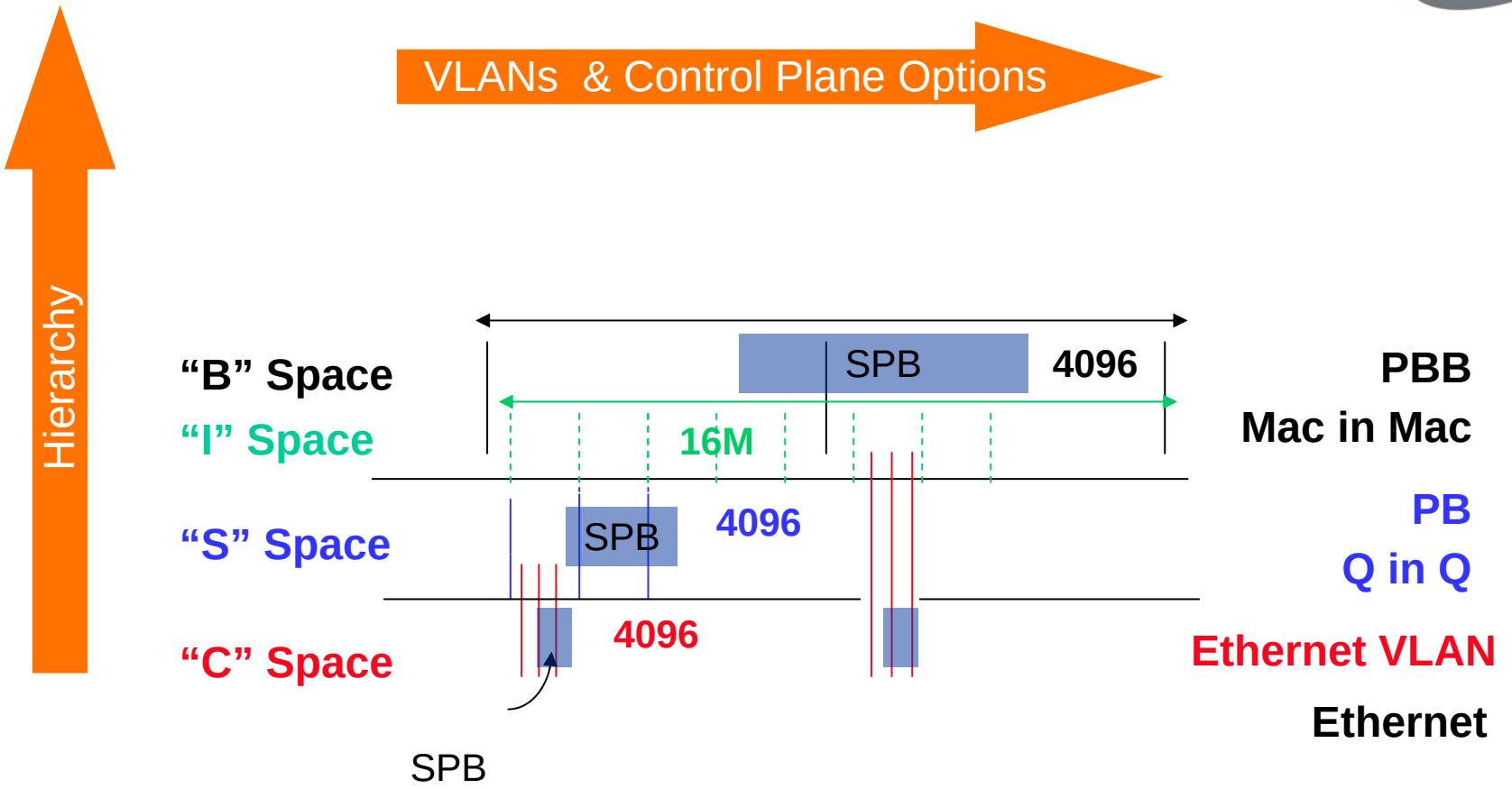
SPB Definitions

- Base VID a VID for transmitting Packets off a shortest path VLAN outside the region of a shortest path VLAN may be a VID for a MSTP tree.
- Primary VID: VID of attachment to a SPT
- SPT Primary set Set of VIDs One for every node of the SPT region.
- Alternate Set for equal cost trees. This doubles the number of VIDs.
- SPVID - Shortest Path VID

Shortest Path Bridging Concepts

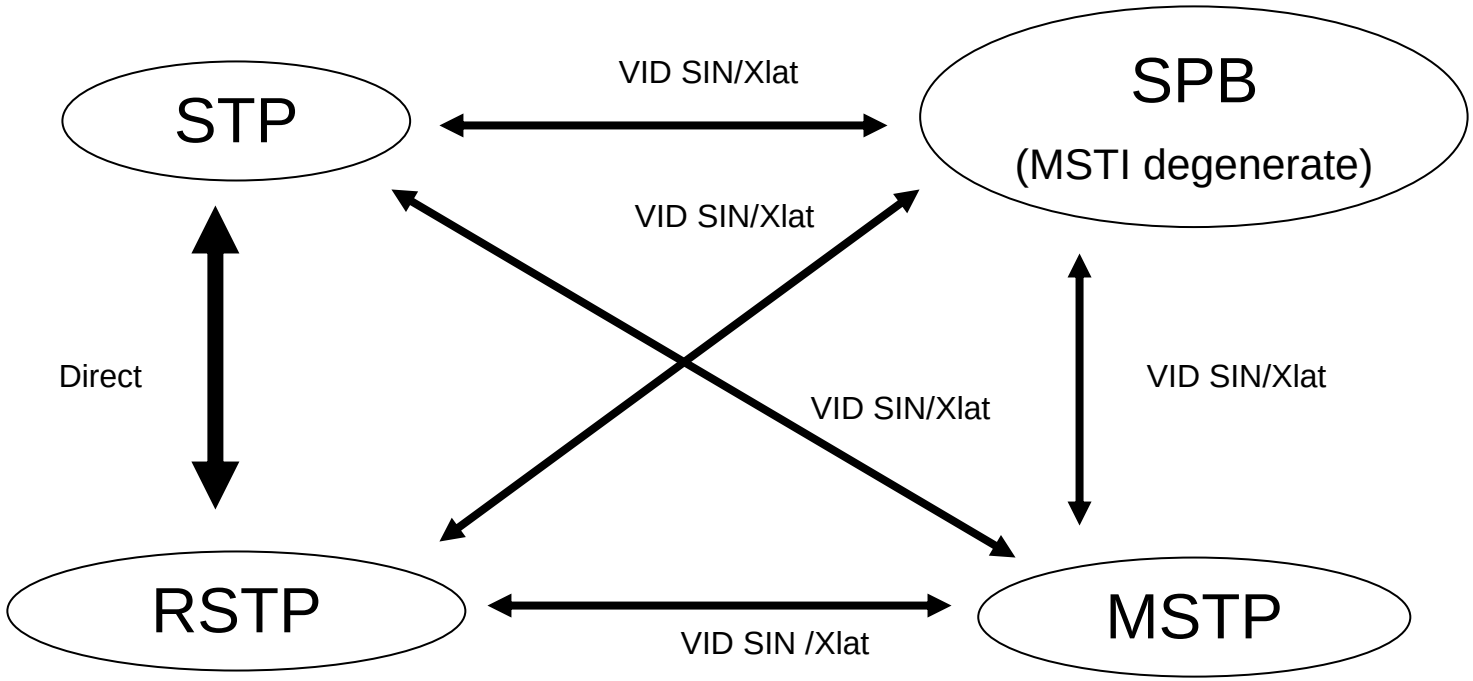


VLAN partitioning



Partitioning and Hierarchy

Current 802.1aq
Control plane backwards compatibility



SIN = Ships in the night

Current 802.1aq
SPB Active Topology Options

a) Use of an MSTP derived protocol, with the addition of cut-bit vectors to perform distance vector based tree calculation, as specified in clause <13.tbd>.

b) Use of IS-IS with additional information elements and procedures (27.27).

c) Use of the LSTP (Link State Tree Protocol) specified in clause 28.

Recommend only specify option b!

Why IS-IS?

- The protocol is built to handle MAC addresses
- Small set of new objects for SPVID distribution
- Single Domain Model = SPT Region
- All other options are much more work or cover new ground and at best will achieve IS-IS parity.

Loop Mitigation

- Port Blocking
  - Discards packets while converging until handshake
- Reverse Path Forwarding Check
  - Discards packet while FIB is inconsistent (less than blocking)
  - Protects topology all the time
    - Multicast with handshake & Unicast no handshake
- TTL
  - Same as Reverse Path Forwarding for 1 hop loops.
  - Buffers packet in greater than 1 hop loops (may create congestion)
  - May deliver more packets but some may be out of order
  - New capability to 802.1

Recommend add RPFC

Reverse path forwarding check

- Involves similar functions to learning must look at some combination of the VID/DA/SA
- In a SPB context this is a check based on the receiving port that the incoming SPVID is the correct SPVID for the incoming shortest Path Tree for this port.
  - If yes normal learning and forwarding
  - If no drop the frame

Recommendations for going forward

- Focus on IS-IS for SPBB
  - Work on clarifying the existing document with only this option
- Introduce RPFC for loop mitigation