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

SPT Region

Base VID 22

SPVID = 45

SPVID = 66

SPVID = 71

SPVID = 41

SPVID = 44

SPVID = 22

CST

IST

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VLAN partitioning

Partitioning and Hierarchy

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Current 802.1aq
Control plane backwards compatibility

SIN = Ships in the night

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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**

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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