Traffic Engineering for 802.1 unicast/multicast networks

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Background

• Both AVB and Interworking have seen the need for
  – Bandwidth reservation
  – Engineered paths
• SPB not only learns topology and shares location of services, but shares link specific information
• SPB currently only controls default paths
• ISIS has existing mechanisms to distribute TE information
• Priority Flow Control and Congestion Notification are complementary, but orthogonal to path placement
“Concern”

We are unsure whether we have fully understood the requirements of the environment AVB is targeting:

• so we’ll replay our understanding of the headlines:
  – explicitly engineered p2p and p2mp trees,
  – with (restorable) backup
  – and a protection-switched (OAM-driven) mechanism to move between trees on an all-or-nothing basis (i.e. no requirement for protection-switched local repair, which will be handled by restoration)
  – lossless manual switchover between trees.
  – … what else ??

• How similar are these to Interworking?
Question

• What needs to be added to SPB/IS-IS?
Answer

- TE with SPB using underlying ISIS TLVs
- Protection switching mechanism to control flow to and from engineered paths
  - using the principle inherited from PBB-TE
- AVB specific information?
- Flow awareness?

Sub-TLV 3: Administrative Group (color, resource class)
Sub-TLV 9: Maximum Link Bandwidth
Sub-TLV 10: Maximum Reservable Link Bandwidth
Sub-TLV 11: Unreserved Bandwidth
Sub-TLV 29: SPB Link Metric
Potential new TLV?
SPB Protocol Modes

- SPB has two data plane modes; SPBv and SPBm
- Both use IS-IS as a base control plane to manage their own data planes
- ISIS learns and shares everything through its Link State DataBase (LSDB)
Existing TE in IS-IS

• SPB adjacency information is at the same level as the IS-IS TLV’s for TE
  – so what does this mean?
We can just reuse the IS-IS mechanisms to flood link occupancy information
How do we install path state?

We assume that engineered paths are computed by a management function. Then:

• Current IS-IS-TE uses a signalling protocol to seize resources and install path state, or
• At modest scale, we could just flood the path way-points in IS-IS using a new SPB TLV

But, what about simple bandwidth reservation with no alt path computation?
How do we do the protection switch?

• Actually, the switch-over is easy:
  – Swap VLAN Id at head-end to invoke a second forwarding plane.
  – all receivers accept off either VID

• How do we trigger the head-end to switch?
  – data plane OAM? – one CCM session per recipient
  – rely on local detection and IS-IS “link down”
What’s already available in IS-IS

• ISIS has per link TE awareness built in
  – SPB adjacencies use the same base TLV
  – Implementation chooses what to add in the adj messages

• Should we reuse what’s there or define new TLV?
Current ISIS-TE TLV

• The Extended IS Reachability TLV
  – Sub-TLV 3: Administrative Group (color, resource class)
  – Sub-TLV 6: IPv4 Interface Address (n/a)
  – Sub-TLV 8: IPv4 Neighbor Address (n/a)
  – Sub-TLV 9: Maximum Link Bandwidth
  – Sub-TLV 10: Maximum Reservable Link Bandwidth
  – Sub-TLV 11: Unreserved Bandwidth
  – Sub-TLV 18: Traffic Engineering Default Metric
    – Sub-TLV 29: SPB Link metric (24-bit unsigned number)

• The Extended IP Reachability TLV
  – Most likely not applicable