The role of IS-IS in a PCR system

Nigel Bragg

ciena.

From : Qca-farkas-
Proposal for 802.1Qca

Have a dedicated module/subclause for each item of PAR scope

Explicit path control
→ Explicit Route Object (ERO) specified by Path Computation Element (PCE) (combined with Constraint Based Routing (CBR))
→ ERO flooded and installed by IS-IS

Bandwidth and stream reservation
→ Performed by MSRP on top of topology controlled by IS-IS
→ Optimized by feeding Talker/Listener MSRPDUs into PCE(s)

Redundancy (protection or restoration)
→ Required new redundancy schemes provided by EROs
→ Automation may be provided under a new ECT-ALGORITHM

Distribution of control parameters for time synchronization
→ TLVs for the time synchronization parameters

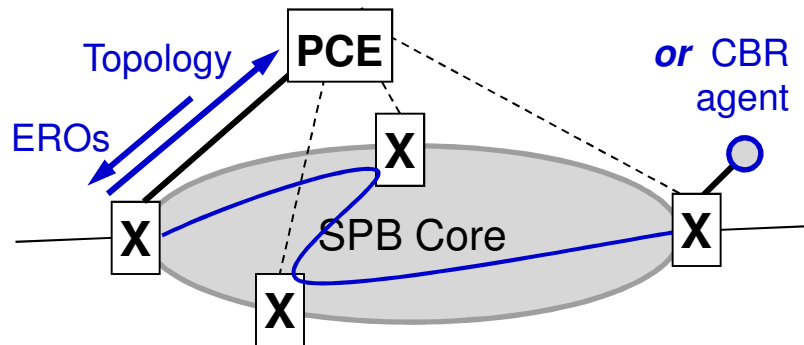Distribution of control parameters for time scheduling
→ TLVs for scheduling parameters

How will IS-IS-SPB cope with the added load ?

ciena.

Participation of IS-IS-SPB in off-SPT routes - scaling (1) ?

<u>Base assumption</u> – IS-IS distributes PCE-computed VLAN topology

Upon topology change, SPB already does an all-pairs-shortest-path calculation, in which the basic tree calculations are dominant :

→ interpretation of a "loose" ERO involves only **traversal** of tree structures,
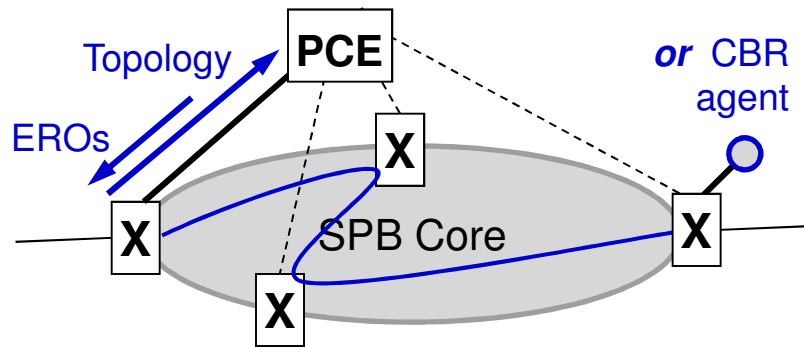→ thus a new ERO does not need to initiate SPF computation.

There is evidence from SPB computation that tree pruning for service instantiation is a "soft" function of the number of services :

→ for a mesh network with 200 nodes, **100** I-SIDs per node computes in **25** ms;
→ for a mesh network with 200 nodes, **500** I-SIDs per node computes in **50** ms;

ciena.

Participation of IS-IS-SPB in off-SPT routes
- **scaling** (2) **?**

Base assumption – **IS-IS distributes PCE-computed VLAN topology**

What about IS-IS topology database sync maintenance (LSP refresh) ?

→ assume that ~**50** EROs are originated at each bridge;

→ these are estimated to pack into **2** LSP fragments,

→ ~ twice the number needed by IS-IS for IP advertising internal IPs only.

Pick your limit for the size of a single IS-IS level – 500 to 1000 NEs ?

→ **Then why can a 250 bridge SPB network <u>not</u> be supported ?**

→ This corresponds to **12,500** –TE paths in the network **!**

→ **enough for service-specific routes in many networks.**

ciena.

Participation of IS-IS-SPB in off-SPT routes ?
- improvements (1) ?

Base assumption – IS-IS distributes PCE-computed VLAN topology,
→ **which is suited to aggregate trees with multiple services,**
→ **MSRP operates as now to reserve bandwidth.**

"Are we leaving money on the table ?"

1. **IS-IS-SPB could remove the limitations of VLAN numbers**
    → the ERO will be expressed as a list of Bridge IDs,
    → **and MSRP could follow routes analogous to SPBM's service-specific (I-SID) pruned trees** (using I-SIDs as context ?)

2. **The PCE could interact with MSRP to record bandwidth usage :**
    → **The central PCE already has a full knowledge of SPB topology,**
       – in order to compute maximally diverse optimised paths, etc.
         → assume the physical topology is uploaded from the bridge NEs,
    → **The PCE could also associate bandwidth with SRP requests :**
       → and keep track of link utilisation on a per admission basis
       → the PCE can also determine where SPB will place any routed SPT traffic (fault free and under selected faults), since SPB routing is deterministic.
    Improved visibility and control for operations

ciena.

Participation of IS-IS-SPB off-SPT routes ?
- improvements (2) ?

PCE + IS-IS alone could be sufficient for reactive, traffic-steering applications which do not require precision traffic admission control :
> → e.g. diversion of aggregate flows away from hot-spots.

A major performance-oriented innovation in SPB "as-is" is the elimination of signalling, and its replacement by in-place computation.

We could run SRP at the edge to allow end-stations to register Talker advertisements and Listener requests, or use "as-is" measurements,
> → and bind registrations across the core using IS-IS-SPB mechanisms

But then if the SPB core has a central PCE, with a full knowledge of SPB topology,
> → to compute maximally diverse optimised paths, etc.

this PCE could also track available bandwidth on a per link basis;
> → this element can also determine where SPB will place routed SPT traffic (fault free and under selected faults), because SPB routing is deterministic.

The PCE would allow "traffic aware" route selection, and then use IS-IS to flood an ERO to SPB Bridge NEs for path state installation.

ciena.

Allagash March 30th - backup

Name	Routers	Links	No ISIDs	100 ISIDs	500 ISIDs
Mesh50	50	125	0.70 ms	2.72 ms	7.36 ms
Mesh98	98	259	2.55 ms	8.72 ms	21.70 ms
Mesh200	200	550	10.84 ms	**24.84 ms**	**52.22 ms**
Mesh351	351	999	34.59 ms	**69.32 ms**	134.3 ms
Light50	50	125	0.75 ms	1.39 ms	2.84 ms
Light100	100	300	3.06 ms	4.04 ms	5.68 ms
Light200	200	700	13.88 ms	**17.25 ms**	22.83 ms
Light400	400	1600	62.44 ms	**88.23 ms**	128.0 ms
Light800	800	3600	285.9 ms	410.0 ms	591.6 ms
Rings49	49	56	0.44 ms	2.24 ms	7.16 ms
Rings100	100	110	1.47 ms	9.50 ms	30.18 ms
Rings196	196	210	5.80 ms	**28.71 ms**	86.11 ms
Rings400	400	420	24.43 ms	94.07 ms	N/A

7