Agenda

• Spine-Leaf Use Cases
• Extension Basics
• TLV in Hello and/or CSF-LSP
• Link and Node Down (Pure Clos)
• Spine-Leaf Summary
Spine-Leaf Use Cases

- Spine-Leaf Setup popular in Data Center and Campus
- Normally leaf-to-leaf traffic goes through one of the spine nodes, for east-west
- Basically some ECMP load sharing from leaf to spine nodes
- Rich mesh of spine-leaf IGP topology generates LSP flooding issues, in particular in the events of link and node down
Extension Basics

Normal ISIS Operation

Full ISIS Database

Aggregation Layer

Only default routes to Spines

Access Layer

0/0 -> S1, S2

Spine-Leaf Extension
TLV in Hello/CSF-LSP

- L: Leaf mode bit; R: Default Route Gateway bit; B: Leaf-Leaf bit
- ‘Default Route metric’ is removed. Can use IS-IS Reverse Metric from Spine to Leaf nodes
- Optional Sub-TLVs: Leaf-Set, Info-Req, IPv4/6 Info-Advertise
Link/Node Down (CLOS)

- S1-S4 include Leaf-Set sub-TLV when sending Spine-Leaf TLV
- L4 picks S3 0/0, forward to L6 for p3
- S3-L6 link down
- S3 Leaf-Set lost L6 in sub-TLV
- L4 picks S4, sending “forward prefixes behind node L6” Info-Req sub-TLV
- S4 replies with “Prefixes are: p1, and p3 for L6” Info-Adv sub-TLV
- L4 adds more specific entries p1, p3 with nexthop to S4
- L4 picks S4 lookup p3, forward to L6 for p3
- L3 Node down. Nothing special to do
- S2 Node down. Nothing special to do

Spine-Leaf Extension
Spine-Leaf Summary

- Leaf (ToR) nodes have no topology of the network, SPF is not even needed
- Rich connectivity without IGP flooding issues
- If topology has interconnections among Spine nodes, or core layer connectivity, reroute is possible in events of link/node down
- For pure CLOS without core layer, or to guarantee DC data forwarding latency, ‘negative routing’ or ‘conversational learning’ can be utilized to learn specific prefixes
- Can be a ‘thin-layer’ of underlay in an overlay routing/forwarding Data Centers