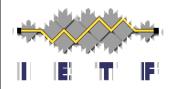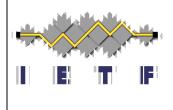# BGP-Based SPF
IETF 98, Chicago

Keyur Patel, Arrcus
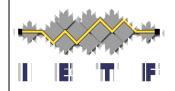Acee Lindem, Cisco
Shawn Zandi, Linkedin
Gunter Van de Velde, Nokia

Review of BGP SPF Protocol Specifics

- New BGP-LS SAFI
  - BGP-LS encodings utilized with minimal new BGP-LS attributes for Node and Link NLRI
  - Separate NLRI for each Link, Node, or Prefix – only changes are advertised.
  - Other BGP-LS encodings can be leverage (e.g., segment routing)
- Best-Path Simplified since most recent version of NLRI is re-advertised and used in SPF.
  - Enables changes to be advertised immediately
- With full topology view, other IGP advantages can be realized
  - Loop-Free Alternative (LFA) including Topology-Independent LFA with segment routing.
  - Micro-loop avoidance

Review of BGP SPF Advantages over RFC 4271

- Nodes have complete view of topology
  - Ideal when BGP is used as an underlay for other BGP address families
- Only network failures (e.g., link) need be advertised vis-à-vis all routes impacted by failure.
  - Faster convergence
  - Better scaling
- SPF lends itself better to optimal path selection in Route-Reflector (RR) and controller topologies.
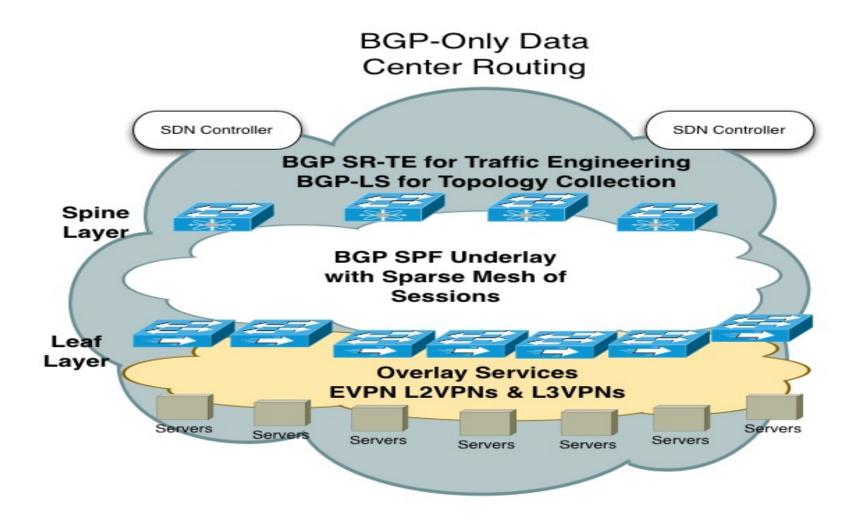
Operational Simplicity with Single DC Protocol

- BGP SPF for underlay in data center fabric
  - ➢ BGP-LS encodings used for link-state advertisement
  - ➢ Segment Routing SIDs can be advertised using existing SR encodings
- BGP EVPN for L2VPN and L3VPN Services
  - ➢ EVPN for Virtual VLANs (classic RFC 7432)
  - ➢ EVPN Type 5 Route for L3VPNs (draft)
  - ➢ EVPN Extended Community for VPWS (draft)
- BGP SR-TE for Traffic Engineering
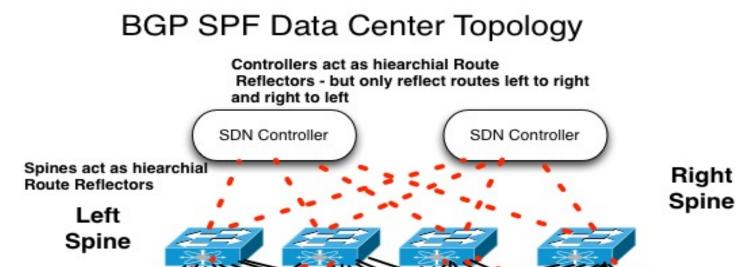 - ➢ BGP-LS NLRI can be leveraged for traffic engineering as well
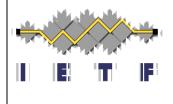
BGP-Only Data Center Routing

BGP-Only Data Center Routing

BGP SPF Data Center Peering Example

BGP SPF Data Center Topology

Controllers act as hiearchial Route Reflectors - but only reflect routes left to right and right to left

SDN Controller

SDN Controller

Spines act as hiearchial Route Reflectors

Left Spine

Right Spine

Leaf
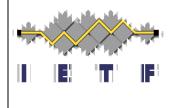
Each leaf has BGP Sessions with 2 Spines (shown in ▬ ▬)

Sparse BGP Peering

- Liveness detection for links done outside of BGP (i.e., based solely on link status or using BFD)
- Leaves peer with subset of spines (e.g., only 2 to offer redundancy)
  - Spines act as Route Reflector
  - Savings in sessions depends on the number of spines to which leaves are connected
- Spines peer with controllers
  - Controllers reflect between spines that peer with a unique set of leaves

SDN Controller Role

- Selective hierarchal route reflection between groups of spine nodes
- Provision Overlay Services
  - ➤ EVPN for L2 and L3 VPNs
- Use BGP-LS Based topology to provision traffic engineered routes
  - ➤ BGP SR-TE could be used for this provisioning

Next Steps

- Determine home for work
- Request WG Adoption