Segment Routing
Centralized Egress Peer Engineering

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Segment Routing

• Implementation available
  – IOS-XR 5.2.0

• Efficient Standardization
  – 15 drafts

• Significant industry support

• Many use cases

www.segment-routing.net
EPE use-case

- IETF
  - draft-filsfils-spring-segment-routing-central-epe-01
  - draft-previdi-idr-bgpls-segment-routing-epe-00

- ENOG presentation
  - www.enog.org/presentations/enog-7/263-EPE-ENO7.pptx
AS1’s best-path to M/8: B

C’s Node SID = 64
Objective: centralized egress peer engineering

• Per-Flow TE state only at the source node
  – Ingress router or directly at the source host
eBGP Peering Topology

Lo0: 3.3.3.3/32
ISIS SID: 64

Lo0: 1.0.5.2/32

Lo0: 1.0.2/32

eBGP single-hop

eBGP multi-hop
Automated BGP Peering SID allocation

BGP Peering SID’s in C’s MPLS Dataplane

PeerNode SID’s:
1012: pop and fwd to 1.0.1.2/32
1022: pop and fwd to 1.0.2.2/32
1052: pop and fwd to 1.0.5.2/32 (ecmp!)

PeerAdj SID’s:
1032: pop and fwd to 1.0.3.2/32
1042: pop and fwd to 1.0.4.2/32
BGP EPE Routes

• The controller learns the BGP Peering SID’s and the external topology of the egress border router via BGP-LS EPE routes
Controller – Decision

- Collects valid internet routes from peers
- Collect performance information across peers
  - EPE solution allows to target probes across probed peer
- Based on business policy and performance information, decides to engineer a flow via an explicit peer different than the best-path
- Outside the scope of the IETF drafts
• PCEP extension to instantiate at A an SR Traffic Engineering Tunnel
  – Tunnel1: push {64, 1042}
  – PBR Policy: any traffic to M/8, set next-hop = tunnel T1
• Other methods: BGP-3107 policy route, Netconf…
Conclusion
Centralized EPE SR use-case

- No assumption on the iBGP design with AS1 (nhop-self is fine)
- Integrated intra-domain and inter-domain TE
- EPE functionality only required at EPE egress border router and EPE controller
- Ability to deploy the same input policy across hosts connected to different routers
  - global property of the IGP prefix SID
- Per-flow TE state only at the source host or ingress border router
Thank you.
Intra and Peer TE

- PCEP extension to instantiate at A an SR Traffic Engineering Tunnel
  - Tunnel1: push \{72, 64, 1042\}
  - PBR Policy: any traffic to M/8, set next-hop = tunnel T1
- Other methods: BGP-3107 policy route, Netconf…