



Inter-AS MPLS L3VPN Overview

Inter-AS MPLS L3VPN

» MPLS VPNs can span multiple providers

- Geographically diverse sites
- Redundancy requirements

Inter-AS MPLS L3VPN Considerations

» How much control does each SP want?

- How do SPs want to exchange routing information?
- Label exchange required?
 - LDP/TDP typically not feasible
 - RSVP would require $(n*(n-1)/2)$
 - BGP offers alternative

Inter-AS MPLS Designs

- » 3 designs per RFC 4364 – “BGP/MPLS IP Virtual Private Networks (VPNs)”
 - RFC 4364, Section 10 - Multi-AS Backbones
- » Option 1 / Option A
 - Back-to-Back VRF Exchange
- » Option 2 / Option B
 - VPNv4 EBGP Exchange ASBR to ASBR
- » Option 3 / Option C
 - Multihop VPNv4 EBGP Exchange

Inter-AS Option A

» Back-to-Back VRF Exchange

- SPs use one link per VRF needed
- SP1 treats SP2 like another customer site
- PE-CE routing (really PE-PE routing)
- No label exchange, IPv4 packets only

Inter-AS Option B

» VPNv4 EBGP Exchange ASBR to ASBR

- Connected SP PEs peer VPNv4 BGP
- VPNv4 exchanges labels
- LSP is end-to-end

Inter-AS Option C

» Multihop VPNv4 BGP Exchange

- Non-connected SP PEs or RRs peer VPNv4 BGP
- IPv4 BGP exchanges labels at SP edge
- Implies SPs must share internal routing information

Back-to-Back VRF Exchange Considerations

» Pros

- SPs do not need to exchange internal routing information
- SPs control own VRF import & export policies
 - Route distinguishers and route targets locally significant
- Simple configuration
 - Treated just like any other VPN site

» Cons

- Requires PE-PE protocol per VRF
- PE to PE routers must have all VRFs configured locally
 - Must maintain VPNv4 peerings with all internal PEs
 - Must maintain VRF routing tables

VPNv4 EBGP Exchange ASBR to ASBR Considerations

» Pros

- SPs do not need to exchange IGP routes
 - IPv4 BGP typically already running between border routers

» Cons

- PE to PE routers must have all VPNv4 information
 - Route-target filtering on edge by default
 - Must maintain VPNv4 peerings with all internal PEs/RRs
- VPNv4 RD & RT now have global significance

Multihop VPNv4 EBGW Exchange Considerations

» Considerations

- Local PE must have IGP route for remote PEs to...
 - Allow transport for VPNv4 session
 - Allow building of IGP transport label
- LSP is end to end
 - PE to PE routers exchange labels via IPv4 BGP
- Route reflection and next-hop processing

Multihop VPNv4 EBGW Exchange Considerations

» Pros

- VPNv4 information only exchanged between devices with that VRF
- VPN PE routers need not run BGP with anyone else
 - E.g. VPNv4 to RR peering already exists

» Cons

- SPs must exchange internal routing info
 - Internal addressing may not be routable
 - Possibly exposes core routers to Internet
- VPNv4 RD & RT now have global significance

Q&A