

1. Basic Initialization

- 1.1. Load the provided initial configs, which contain basic IPv4 & IPv6 addressing per the diagram. Once complete, ensure that all devices can ping their directly connected neighbors with both IPv4 & IPv6.

2. Core Routing

- 2.1. Configure OSPFv2 and OSPFv3 on all transit links that connect R2, R3, XR2, & XR3. Advertise their IPv4 and IPv6 Loopback0 interfaces into OSPFv2 and OSPFv3 respectively. Once complete you should have full IPv4 and IPv6 connectivity between these devices.
- 2.2. Configure IS-IS Level 2 on all transit links that connect R1, R2, XR1, & XR2. Advertise their IPv4 and IPv6 Loopback0 interfaces into IS-IS respectively. Once complete you should have full IPv4 and IPv6 connectivity between these devices.
- 2.3. Do not advertise unnecessary LSAs in the OSPF or IS-IS domains.
- 2.4. Configure redistribution where necessary to allow for IPv4 & IPv6 reachability between R1, R2, R3, XR1, XR2, & XR3. Ensure that a single link or node failure does not break connectivity between the OSPF and IS-IS domains.
- 2.5. Configure MPLS on all links on all routers in the core. Advertise the minimum number of labels necessary to form a full mesh of LDP tunnels between the 6 core routers. Protect against an IGP process failure causing a black hole on any link in the MPLS core. In the event of a link failure, MPLS information should be cached for 5 minutes on the core devices.
- 2.6. Core routers are in BGP AS 123, R9 is in BGP AS 9, and XR4 is in AS 24. Configure R2 and XR2 to peer BGP with all routers in the core using AS 123. R9 and XR4 should peer VPNv4 & VPNv6 BGP. XR3 and XR4 should peer IPv4 Unicast BGP. XR4 should peer VPNv4 & VPNv6 BGP with R2 and XR2.

3. MPLS L3VPN

- 3.1. CE router R8 is in BGP AS 8. R8 should peer BGP with its MPLS L3VPN providers AS 9 and AS 123. Advertise R8's IPv4 and IPv6 Loopback0 addresses to the MPLS providers.
- 3.2. CE router R10 is in EIGRP AS 10. R10 should peer EIGRP with its MPLS L3VPN provider R2. Advertise R10's IPv4 and IPv6 Loopback0 addresses to the MPLS providers.
- 3.3. R4, R5, and R6 are in Customer Site 1. R7 is in Customer Site 2. Configure OSPF area 1 in Customer Site 1 and to its MPLS L3VPN provider. Configure OSPF area 2 in Customer Site 2 and to its MPLS L3VPN provider.
- 3.4. Establish IPv4 and IPv6 connectivity between R8 and R10. R8 should prefer to route to R9 for both IPv4 and IPv6 traffic.
- 3.5. Establish IPv4 and IPv6 connectivity between Customer Site 1 and Customer Site 2. Traffic between R6 and R7 should be load balanced between all available PE-CE connections.

4. MPLS TE

- 4.1. Configure an MPLS TE tunnel so that R5's traffic sent to the MPLS service provider is routed from R1 to XR1 to XR2 to XR2, and then load balanced between R3 and XR3.

5. MPLS L2VPN

- 5.1. Configure new IPv4 addresses 192.168.0.4/24 on R4's layer 2 link to R7, and address 192.168.0.8/24 on R8's layer 2 link to R5. R5 and R7 should peer L2VPN BGP to establish direct layer 3 connectivity between these addresses on R4 and R8.

6. Multicast

- 6.1. Configure R7 to listen for the multicast group 227.7.7.7. R6 should be able to ping this address and get a response from R7.