

# CCNP SERVICE PROVIDER

## Cisco Service Provider Network Routing(642-883)

### 1.0 OSPFv2 and OSPFv3 Routing in Service Provider Environments

- 1.1 Describe multi-area OSPFv2 and OSPFv3 operations
- 1.2 Implement multi-area OSPFv2 and OSPFv3 on IOS-XR and IOS-XE
- 1.3 Implement different OSPF areas (stubby, totally stubby, NSSA) on IOS-XR and IOS-XE
- 1.4 Implement OSPF neighbor authentication on IOS-XR and IOS-XE
- 1.5 Troubleshoot OSPF IOS-XR and IOS-XE configuration errors

### 2.0 IS-IS, IPv4, and IPv6 in Service Provider Environments

- 2.1 Describe multi-area IS-IS operations
- 2.2 Implement multi-area IS-IS for IPv4 and IPv6 on IOS-XR and IOS-XE
- 2.3 Implement IS-IS neighbor authentication on IOS-XR and IOS-XE
- 2.4 Troubleshoot IS-IS IOS-XR and IOS-XE configuration errors

### 3.0 BGP Routing in Service Provider Environments

- 3.1 Describe the Internet routing hierarchy: Network Service Providers (NSP), Network Access Point (NAP), ISP Tiers (Tier 1, 2 and 3)
- 3.2 Describe connectivity between an enterprise network and an SP that requires the use of BGP
- 3.3 Describe connectivity between a SP and upstream SPs
- 3.4 Describe BGP transit AS operations
- 3.5 Implement EBGP and IBGP on IOS-XR and IOS-XE
- 3.6 Implement BGP neighbor authentication on IOS-XR and IOS-XE
- 3.7 Optimize BGP IOS-XR configurations using af-groups, session-groups, and neighbor-groups
- 3.8 Optimize BGP IOS-XE configurations using peer-groups
- 3.9 Influence BGP route selection by using various BGP attributes on IOS-XR and IOS-XE
- 3.10 Troubleshoot BGP IOS-XR and IOS-XE configuration errors

### 4.0 Route Manipulations in Service Provider Environments

- 4.1 Implement Routing Policy Language (RPL) to configure a desired routing policy on IOS-XR
- 4.2 Implement Route-Maps to configure a desired routing policy on IOS-XE
- 4.3 Implement route filterings using prefix-list, distribute-list, and as-path list on IOS-XE
- 4.4 Implement route redistributions on IOS-XR and IOS-XE

### 5.0 High Availability Routing Features

- 5.1 Implement NSF/NSR/Graceful Restart for OSPF on IOS-XR and IOS-XE
- 5.2 Implement NSF/NSR/Graceful Restart for IS-IS on IOS-XR and IOS-XE
- 5.3 Implement Bidirectional Forwarding Detection (BFD) for OSPF on IOS-XR and IOS-XE
- 5.4 Implement Bidirectional Forwarding Detection (BFD) for IS-IS on IOS-XR and IOS-XE

## Cisco Service Provider Advanced Network Routing(642-885)

### 1.0 BGP Routing Features in a Service Provider IP NGN Environment

- 1.1 Describe the BGP routing processes in IOS-XR
- 1.2 Configure the BGP timers on IOS-XR and IOS-XE
- 1.3 Describe the need for BGP confederations in BGP transit backbones
- 1.4 Design and implement BGP route reflectors to scale IBGP in BGP transit backbones on OS-XR and IOS-XE
- 1.5 Implement BGP in SP IP NGN IOS-XR and IOS-XE PE routers to support multi-homed BGP Customers
- 1.6 Implement Remote Triggered Blackhole Filtering (RTBF) on IOS-XR and IOS-XE
- 1.7 Implement BGP TTL security on IOS-XR and IOS-XE
- 1.8 Implement BGP maximum-prefix on IOS-XR and IOS-XE
- 1.9 Implement BGP route dampening on IOS-XR and IOS-XE
- 1.10 Troubleshoot BGP IOS-XR and IOS-XE configuration errors in service provider environments
- 1.11 Optimize BGP IOS-XR configurations using af-groups, session-groups, and neighbor-groups
- 1.12 Optimize BGP IOS-XE configurations using peer-groups

### 2.0 Multicast Routing in a Service Provider IP NGN Environment

- 2.1 Describe Multicast Concepts (multicast distribution trees, multicast routing protocols and IGMP operations)
- 2.2 Describe Any-source multicast (ASM) versus Source Specific Multicast (SSM)
- 2.3 Describe Intra Domain versus Inter Domain Multicast Routing
- 2.4 Describe the mapping of multicast IP addresses to MAC addresses
- 2.5 Describe and illustrate how RPF check can fail if the unicast and multicast topologies are non-congruent
- 2.6 Describe multiprotocol BGP functions in mroute distribution
- 2.7 Describe the principles and operations of PIM-SM
- 2.8 Describe multicast source discovery protocol (MSDP) operations
- 2.9 Describe methods used to secure multicast
- 2.10 Implement PIM-SM operations on IOS-XR and IOS-XE
- 2.11 Implement Auto-RP, PIMv2 BSR, Anycast RP on IOS-XR and IOS-XE
- 2.12 Implement Bi-Dir PIM operations in SP IP NGN environment on IOS-XR and IOS-XE
- 2.13 Implement SSM operations on IOS-XR and IOS-XE
- 2.14 Implement MSDP operations on IOS-XR and IOS-XE
- 2.15 Troubleshoot multicast routing IOS-XR and IOS-XE configurations errors in service provider environments

### 3.0 IPv6 in a Service Provider IP NGN Environment

- 3.1 Describe DNS and DHCP operation in IPv6
- 3.2 Describe the fields that are used in the IPv6 header to support QoS functions
- 3.3 Describe Cisco IOS/IOS-XE and IOS-XR IPv6 network management and troubleshooting tools like traceroute/ping
- 3.4 Describe dual-stack implementations
- 3.5 Describe IPv6 tunneling mechanisms
- 3.6 Configure IPv6 multicast routing
- 3.7 Configure static IPv6-in-IPv4 tunnels on IOS-XR and IOS-XE
- 3.8 Configure dynamic 6to4 tunnels on IOS-XR and IOS-XE

#### **4.0 High Availability Routing Features**

- 4.1 Implement NSF/NSR/Graceful Restart for BGP on IOS-XR and IOS-XE
- 4.2 Implement Bidirectional Forwarding Detection (BFD) for BGP on IOS-XR and IOS-XE
- 4.3 Implement high availability and optimization multicast routing features on IOS-XR and IOS-XE

