

Network Principles

10%

1.1 Identify Cisco Express Forwarding concepts

- 1.1.a FIB
- 1.1.b Adjacency table

1.2 Explain general network challenges

- 1.2.a Unicast
- 1.2.b Out-of-order packets
- 1.2.c Asymmetric routing

1.3 Describe IP operations

- 1.3.a ICMP Unreachable and Redirects
- 1.3.b IPv4 and IPv6 fragmentation
- 1.3.c TTL

1.4 Explain TCP operations

- 1.4.a IPv4 and IPv6 (P)MTU
- 1.4.b MSS
- 1.4.c Latency
- 1.4.d Windowing
- 1.4.e Bandwidth-delay product
- 1.4.f Global synchronization

1.5 Describe UDP operations

- 1.5.a Starvation
- 1.5.b Latency

1.6 Recognize proposed changes to the network

- 1.6.a Changes to routing protocol parameters
- 1.6.b Migrate parts of the network to IPv6
- 1.6.c Routing protocol migration

2.0 Layer 2 Technologies

10%

2.1 Configure and verify PPP

- 2.1.a Authentication (PAP, CHAP)
- 2.1.b PPPoE (client side only)

2.2 Explain Frame Relay

- 2.2.a Operations
- 2.2.b Point-to-point
- 2.2.c Multipoint

3.0 Layer 3 Technologies

40%

3.1 Identify, configure, and verify IPv4 addressing and subnetting

- 3.1.a Address types (Unicast, broadcast, multicast, and VLSM)
- 3.1.b ARP
- 3.1.c DHCP relay and server
- 3.1.d DHCP protocol operations

3.2 Identify IPv6 addressing and subnetting

- 3.2.a Unicast
- 3.2.b EUI-64
- 3.2.c ND, RS/RA
- 3.2.d Autoconfig (SLAAC)
- 3.2.e DHCP relay and server
- 3.2.f DHCP protocol operations

3.3 Configure and verify static routing

3.4 Configure and verify default routing

3.5 Evaluate routing protocol types

- 3.5.a Distance vector
- 3.5.b Link state
- 3.5.c Path vector

3.6 Describe administrative distance

3.7 Troubleshoot passive interfaces

3.8 Configure and verify VRF lite

- 3.9 Configure and verify filtering with any protocol
- 3.10 Configure and verify redistribution between any routing protocols or routing sources
- 3.11 Configure and verify manual and autosummarization with any routing protocol
- 3.12 Configure and verify policy-based routing
- 3.13 Identify suboptimal routing
- 3.14 Explain ROUTE maps
- 3.15 Configure and verify loop prevention mechanisms
 - 3.15.a Route tagging and filtering
 - 3.15.b Split-horizon
 - 3.15.c Route poisoning
- 3.16 Configure and verify RIPv2
- 3.17 Describe RIPv6
- 3.18 Describe EIGRP packet types
- 3.19 Configure and verify EIGRP neighbor relationship and authentication
- 3.20 Configure and verify EIGRP stubs
- 3.21 Configure and verify EIGRP load balancing
 - 3.21.a Equal cost
 - 3.21.b Unequal cost
- 3.22 Describe and optimize EIGRP metrics
- 3.23 Configure and verify EIGRP for IPv6
- 3.24 Describe OSPF packet types
- 3.25 Configure and verify OSPF neighbor relationship and authentication
- 3.26 Configure and verify network types, area types, and router types
 - 3.26.a Point-to-point, multipoint, broadcast, nonbroadcast
 - 3.26.b LSA types, area type: backbone, normal, transit, stub, NSSA, totally stub
 - 3.26.c Internal router, backbone router, ABR, ASBR
 - 3.26.d Virtual link
- 3.27 Configure and verify OSPF path preference
- 3.28 Configure and verify OSPF operations
- 3.29 Configure and verify OSPF for IPv6
- 3.30 Describe, configure, and verify BGP peer relationships and authentication
 - 3.30.a Peer group
 - 3.30.b Active, passive

- 3.30.c States and timers

3.31 Configure and verify eBGP (IPv4 and IPv6 address families)

- 3.31.a eBGP
- 3.31.b 4-byte AS number
- 3.31.c Private AS

3.32 Explain BGP attributes and best-path selection

4.0 VPN Technologies

10%

4.1 Configure and verify GRE

4.2 Describe DMVPN (single hub)

4.3 Describe Easy Virtual Networking (EVN)

5.0 Infrastructure Security

10%

5.1 Describe IOS AAA using local database

5.2 Describe device security using IOS AAA with TACACS+ and RADIUS

- 5.2.a AAA with TACACS+ and RADIUS
- 5.2.b Local privilege authorization fallback

5.3 Configure and verify device access control

- 5.3.a Lines (VTY, AUX, console)
- 5.3.b Management plane protection
- 5.3.c Password encryption

5.4 Configure and verify router security features

- 5.4.a IPv4 access control lists (standard, extended, time-based)
- 5.4.b IPv6 traffic filter
- 5.4.c Unicast reverse path forwarding

6.0 Infrastructure Services

20%

6.1 Configure and verify device management

- 6.1.a Console and VTY
- 6.1.b Telnet, HTTP, HTTPS, SSH, SCP
- 6.1.c (T)FTP

6.2 Configure and verify SNMP

- 6.2.a v2
- 6.2.b v3

6.3 Configure and verify logging

- 6.3.a Local logging, syslog, debugs, conditional debugs
- 6.3.b Timestamps

6.4 Configure and verify Network Time Protocol (NTP)

- 6.4.a NTP master, client, version 3, version 4
- 6.4.b NTP authentication

6.5 Configure and verify IPv4 and IPv6 DHCP

- 6.5.a DHCP client, IOS DHCP server, DHCP relay
- 6.5.b DHCP options (describe)

6.6 Configure and verify IPv4 Network Address Translation (NAT)

- 6.6.a Static NAT, dynamic NAT, PAT

6.7 Describe IPv6 NAT

- 6.7.a NAT64
- 6.7.b NPTv6

6.8 Describe SLA architecture

6.9 Configure and verify IP SLA

- 6.9.a ICMP

6.10 Configure and verify tracking objects

- 6.10.a Tracking objects
- 6.10.b Tracking different entities (for example, interfaces, IPSLA results)

6.11 Configure and verify Cisco NetFlow

- 6.11.a NetFlow v5, v9
- 6.11.b Local retrieval
- 6.11.c Export (configuration only)