



Curriculum Of CCNP

ROUTING

NETWORK PRINCIPLES

- Identify Cisco Express Forwarding concepts
 - ❖ FIB
 - ❖ Adjacency table
- Explain general network challenges
 - ❖ Unicast
 - ❖ Out-of-order packets
 - ❖ Asymmetric routing
- Describe IP operations
 - ❖ ICMP Unreachable and Redirects
 - ❖ IPv4 and IPv6 fragmentation
 - ❖ TTL
- Explain TCP operations
 - ❖ IPv4 and IPv6 (P)MTU
 - ❖ MSS
 - ❖ Latency
 - ❖ Windowing
 - ❖ Bandwidth-delay product
 - ❖ Global synchronization
- Describe UDP operations
 - ❖ Starvation
 - ❖ Latency
- Recognize proposed changes to the network
 - ❖ Changes to routing protocol parameters
 - ❖ Migrate parts of the network to Ipv6
 - ❖ Routing protocol migration

LAYER 2 TECHNOLOGIES

- Configure and verify PPP
 - ❖ Authentication (PAP, CHAP)
 - ❖ PPPoE (client side only)
- Explain Frame Relay
 - ❖ Operations
 - ❖ Point-to-point, Multipoint

LAYER 3 TECHNOLOGIES

- Identify, configure, and verify IPv4 addressing and subnetting



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LAYER 3 TECHNOLOGIES

- Identify, configure, and verify IPv4 addressing and subnetting
 - ❖ Address types (Unicast, broadcast, multicast, and VLSM)
 - ❖ ARP
 - ❖ DHCP relay and server
 - ❖ DHCP protocol operations
- Identify IPv6 addressing and subnetting
 - ❖ Unicast
 - ❖ EUI-64
 - ❖ ND, RS/RA
 - ❖ Autoconfig (SLAAC)
 - ❖ DHCP relay and server
 - ❖ DHCP protocol operations
- Configure and verify static routing
- Configure and verify default routing
- Evaluate routing protocol types
 - ❖ Distance vector
 - ❖ Link state
 - ❖ Path vector
- Describe administrative distance
- Configure and verify VRF lite
- Configure and verify filtering with any protocol
- Configure and verify redistribution Between any routing protocols or routing sources
- Configure and verify manual and auto summarization with any routing protocol
- Configure and verify policy-based routing
- Identify suboptimal routing
- Explain ROUTE maps
- Configure and verify loop prevention mechanisms
 - ❖ Route tagging and filtering
 - ❖ Split-horizon
 - ❖ Route poisoning
- Configure and verify RIPv2
- Describe RIPv2
- Describe EIGRP packet types
- Configure and verify EIGRP neighbor relationship and authentication
- Configure and verify EIGRP stubs
- Configure and verify EIGRP load balancing
 - ❖ Equal cost
 - ❖ Unequal cost



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- Describe and optimize EIGRP metrics
- Configure and verify EIGRP for Ipv6
- Describe OSPF packet types
- Configure and verify OSPF neighbor relationship and authentication
- Configure and verify network types, area types, and router types
 - ❖ Point-to-point, multipoint, broadcast, nonbroadcast
 - ❖ LSA types, area type: backbone, normal, transit, stub, NSSA, totally stub
 - ❖ Internal router, backbone router, ABR, ASBR
 - ❖ Virtual link
- Configure and verify OSPF path preference
- Configure and verify OSPF operations
- Configure and verify OSPF for Ipv6
- Describe, configure, and verify BGP peer relationships and authentication
 - ❖ Peer group
 - ❖ Active, passive
 - ❖ States and timers
- Configure and verify eBGP (IPv4 and IPv6 address families)
 - ❖ eBGP
 - ❖ 4-byte AS number, Private AS
- Explain BGP attributes and best- path selection

VPN TECHNOLOGIES

- Configure and verify GRE
- Describe DMVPN (single hub)
- Describe Easy Virtual Networking (EVN)

INFRASTRUCTURE SECURITY

- Describe IOS AAA using local database
- Describe device security using IOS AAA with TACACS+ and RADIUS
 - ❖ AAA with TACACS+ and RADIUS
 - ❖ Local privilege authorization fallback
- Configure and verify device access control
 - ❖ Lines (VTY, AUX, console)
 - ❖ Management plane protection
 - ❖ Password encryption
- Configure and verify router security features
 - ❖ IPv4 access control lists (standard, extended, time- based)
 - ❖ IPv6 traffic filter
 - ❖ Unicast reverse path forwarding



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INFRASTRUCTURE SERVICES

- Configure and verify device management
 - ❖ Console and VTY
 - ❖ Telnet, HTTP, HTTPS, SSH, SCP
 - ❖ (T)FTP
- Configure and verify SNMP
 - ❖ v2
 - ❖ v3
- Configure and verify logging
 - ❖ Local logging, syslog, debugs, conditional debugs
 - ❖ Timestamps
- Configure and verify Network Time Protocol (NTP)
 - ❖ NTP master, client, version 3, version 4
 - ❖ NTP authentication
- Configure and verify IPv4 and IPv6 DHCP
 - ❖ DHCP client, IOS DHCP server, DHCP relay
 - ❖ DHCP options (describe)
- Configure and verify IPv4 Network Address Translation (NAT)
- Static NAT, dynamic NAT, PAT
- Describe IPv6 NAT
 - ❖ NAT64
 - ❖ NPTv6
- Describe SLA architecture
- Configure and verify IP SLA
 - ❖ ICMP
- Configure and verify tracking objects
 - ❖ Tracking objects
 - ❖ Tracking different entities (for example, interfaces, IPSLA results)
- Configure and verify Cisco NetFlow
 - ❖ NetFlow v5, v9
 - ❖ Local retrieval
 - ❖ Export (configuration only)

SWITCHING

LAYER 2 TECHNOLOGIES

- Configure and verify switch administration
 - ❖ SDM templates
 - ❖ Managing MAC address table



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- Configure and verify Layer 2 protocols
 - ❖ CDP, LLDP
 - ❖ UDLD
- Configure and verify VLANs
 - ❖ Access ports
 - ❖ VLAN database
 - ❖ Normal, extended VLAN, voice VLAN
- Configure and verify trunking
 - ❖ VTPv1, VTPv2, VTPv3, VTP pruning
 - ❖ dot1Q
 - ❖ Native VLAN
 - ❖ Manual pruning
- Configure and verify EtherChannels
 - ❖ LACP, PAgP, manual
 - ❖ Layer 2, Layer 3
 - ❖ Load balancing
 - ❖ EtherChannel misconfiguration guard
- Configure and verify spanning tree
 - ❖ PVST+, RPVST+, MST
 - ❖ Switch priority, port priority, path cost, STP timers
 - ❖ PortFast, BPDUguard, BPDUfilter
 - ❖ Loopguard and Rootguard
- Configure and verify other LAN switching technologies
 - ❖ SPAN
 - ❖ RSPAN
- Describe chassis virtualization and aggregation technologies
 - ❖ Stackwise

INFRASTRUCTURE SECURITY

- Configure and verify switch security features
 - ❖ DHCP snooping
 - ❖ IP Source Guard
 - ❖ Dynamic ARP inspection
 - ❖ Port security
 - ❖ Private VLAN
 - ❖ Storm control
- Describe device security using Cisco IOS AAA with TACACS+ and RADIUS
 - ❖ AAA with TACACS+ and RADIUS
 - ❖ Local privilege authorization fallback



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INFRASTRUCTURE SERVICES

- Configure and verify first-hop redundancy protocols
 - ❖ HSRP
 - ❖ VRRP
 - ❖ GLBP