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Cisco Certified Network Professional (CCNP) Routing and Switching certification validates the ability to plan, implement, verify and troubleshoot local and wide-area enterprise networks and work collaboratively with specialists on advanced security, voice, wireless and video solutions.

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CCNP Course Objectives

The CCNP routing and switching protocol knowledge from this certification will provide a lasting foundation as these skills are equally relevant in the physical networks of today and the virtualized network functions of tomorrow.

CCNP Route 300-101

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

Layer 2 Technologies
- Configure and verify PPP i.e. Authentication (PAP, CHAP), PPPoE (client side only)
- Explain Frame Relay i.e. Operations, Point-to-point, Multipoint

Layer 3 Technologies
- Identify, configure, and verify IPv4 addressing and subnetting i.e. Address types (Unicast, broadcast, multicast, and VLSM), ARP, DHCP relay and server, DHCP protocol operations
- Identify IPv6 addressing and subnetting i.e. Unicast,EUI-64, ND, RS/RA, Autoconfig (SLAAC), DHCP relay and server
- Configure and verify DHCP protocol operations
- Configure and verify static routing.
- Configure and verify default routing
- Evaluate routing protocol types i.e. Distance vector, Link state, Path vector
- Describe administrative distance
- Troubleshoot passive interfaces
- 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 autosummarization with any routing protocol
- Configure and verify policy-based routing
- Identify suboptimal routing
- Explain ROUTE maps
- Configure and verify loop prevention mechanisms i.e. Route tagging and filtering, Split-horizon, Route poisoning
- Configure and verify RIPv2
- Describe RIPng
- Describe EIGRP packet types
- Configure and verify EIGRP neighbor relationship and authentication
- Configure and verify EIGRP stubs
- Configure and verify EIGRP load balancing i.e. Equal cost, Unequal cost
- 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 i.e. 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 i.e. Peer group, Active, passive, States and timers
- Configure and verify eBGP (IPv4 and IPv6 address families) i.e. eBGP, 4-byte AS number, Private AS
- Configure and verify BGP attributes and best-path selection
- Configure and verify manual and autosummarization with any routing protocol
- Configure and verify policy-based routing
- Identify suboptimal routing
- Configure and verify device access control i.e. Lines (VTY, AUX, console), Management plane protection, Password encryption

CCNP Switch 300-115

Layer 2 Technologies
- Configure and verify switch administration i.e. SDM templates, Managing MAC address table, Troubleshoot Err-disable recovery
- Configure and verify Layer 2 protocols i.e. CDP, LLDP, UDLL
- Configure and verify VLANs i.e. Access ports, VLAN database, Normal, extended VLAN, voice VLAN
- Configure and verify trunking i.e. VTPv1, VTPv2, VTPv3, VTP pruning, dot1Q, Native VLAN, Manual pruning
- Configure and verify EtherChannels i.e. LACP, PAgP, manual, Layer 2, Layer 3, Load balancing, EtherChannel misconfiguration guard
- Configure and verify spanning tree i.e. PVST+, RPVST+, MST, Switch priority, port priority, path cost, STP timers, PortFast, BPDUguard, BPDUfilter, Loopguard and Rootguard
- Configure and verify other LAN switching technologies i.e SPAN, RSPAN
- Describe chassis virtualization and aggregation technologies i.e. Stackwise

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 i.e. AAA with TACACS+ and RADIUS, Local privilege authorization fallback
- Configure and verify device access control i.e. Lines (VTY, AUX, console), Management plane protection, Password encryption

Infrastructure Services
- Configure and verify device management i.e. Console and VTY, Telnet, HTTP, HTTPS, SSH, SCP, (T)FTP
- Configure and verify SNMP i.e. v2, v3
- Configure and verify logging i.e. Local logging, syslog, debugs, conditional debugs, Timestamps
- Configure and verify Network Time Protocol (NTP) i.e. NTP master, client, version 3, version 4, NTP authentication
- Configure and verify IPv4 and IPv6 DHCP i.e. DHCP client, IOS DHCP server, DHCP relay, DHCP options (describe)
- Configure and verify IPv4 Network Address Translation (NAT) i.e. Static NAT, dynamic NAT, PAT
- Describe IPv6 NAT i.e. NAT64 NPTv6
- Describe SLA architecture
- Configure and verify IPv6 SLA i.e. ICMP
- Configure and verify tracking objects i.e. Tracking objects, Tracking different entities (for example, interfaces, IPSLA results)
- Configure and verify Cisco NetFlow i.e. NetFlow v5, v9, Local retrieval, Export (configuration only)
Infrastructure Security
- Configure and verify switch security features i.e. 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 i.e. AAA with TACACS+ and RADIUS, Local privilege authorization fallback

Infrastructure Services
- Configure and verify first-hop redundancy protocols i.e. HSRP, VRRP, GLBP

CCNP TShoot 300-135

Network Principles
- Use Cisco IOS troubleshooting tools i.e. Debug, conditional debug, Ping and trace route with extended options
- Apply troubleshooting methodologies i.e. Diagnose the root cause of networking issues (analyze symptoms, identify and describe root cause), Design and implement valid solutions, Verify and monitor resolution

Layer 2 Technologies
- Troubleshoot switch administration i.e. SDM templates, Managing MAC address table, Troubleshoot En-disable recovery
- Troubleshoot Layer 2 protocols i.e. CDP, LLDP, UDLD
- Troubleshoot VLANs i.e. Access ports, VLAN database, Normal, extended VLAN, voice VLAN
- Troubleshoot trunking i.e. VTPv1, VTPv2, VTPv3, VTP pruning, dot1Q, Native VLAN, Manual pruning
- Troubleshoot EtherChannels i.e. LACP, PAgP, manual, Layer 2, Layer 3, Load balancing, EtherChannel misconfiguration guard
- Troubleshoot spanning tree i.e. PVST+, RPVST+, MST, Switch priority, port priority, path cost, STP timers, PortFast, BPDUguard, BPDUfilter, Loopguard, Rootguard
- Troubleshoot other LAN switching technologies i.e. SPAN, RSPAN
- Troubleshoot chassis virtualization and aggregation technologies i.e. Stackwise

Layer 3 Technologies
- Troubleshoot IPv4 addressing and subnetting i.e. Address types (Unicast, broadcast, multicast, and VLSM), ARP, DHCP relay and server, DHCP protocol operations
- Troubleshoot IPv6 addressing and subnetting i.e. Unicast, EUI-64, ND, RS/RA, Autoconfig (SLAAC), DHCP relay and server, DHCP protocol operations
- Troubleshoot static routing
- Troubleshoot default routing
- Troubleshoot administrative distance
- Troubleshoot passive interfaces
- Troubleshoot VRF lite
- Troubleshoot filtering with any protocol
- Troubleshoot between any routing protocols or routing sources
- Troubleshoot manual and autosummarization with any routing protocol
- Troubleshoot policy-based routing
- Troubleshoot suboptimal routing
- Troubleshoot loop prevention mechanisms i.e. Route tagging, filtering, Split-horizon, Route poisoning
- Troubleshoot RIPv2
- Troubleshoot EIGRP neighbor relationship and authentication
- Troubleshoot loop free path selection i.e. RD, FD, FC, successor, feasible successor, Troubleshoot EIGPR operations, Stuck in active
- Troubleshoot EIGRP stubs
- Troubleshoot EIGRP load balancing i.e. Equal cost, Unequal cost
- Troubleshoot EIGRP metrics
- Troubleshoot EIGRP for IPv6
- Troubleshoot OSPF neighbor relationship and authentication
- Troubleshoot network types, area types, and router types i.e. 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
- Troubleshoot OSPF path preference
- Troubleshoot OSPF operations
- Troubleshoot OSPF for IPv6
- Troubleshoot BGP peer relationships and authentication i.e. Peer group, Active, passive, States and timers
- Troubleshoot eBGP i.e. eBGP, 4-byte AS number, Private AS

VPN Technologies
- Troubleshoot GRE

Infrastructure Security
- Troubleshoot IOS AAA using local database i.e. Troubleshoot device access control, Lines (VTY, AUX, console), Management plane protection, Password encryption
- Troubleshoot router security features i.e. IPv4 access control lists (standard, extended, time-based), IPv6 traffic filter, Unicast reverse path forwarding

Infrastructure Services
- Troubleshoot device management i.e. Console and VTY, Telnet, HTTP, HTTPS, SSH, SCP, (T) FTP
- Troubleshoot SNMP i.e. v2, v3
- Troubleshoot logging i.e. Local logging, syslog, debugs, conditional debugs, Timestamps
- Troubleshoot Network Time Protocol (NTP) i.e. NTP master, client, version 3, version 4, NTP authentication
- Troubleshoot IPv4 and IPv6 DHCP i.e. DHCP client, IOS DHCP server, DHCP relay, DHCP options (describe)
- Troubleshoot IPv4 Network Address Translation (NAT) i.e. Static NAT, Dynamic NAT, PAT, Troubleshoot SLA architecture
- Troubleshoot tracking objects i.e. Tracking objects, Tracking different entities (for example, interfaces, IPSLA results)

Practical Approach
A real-time examples, will be given throughout the lectures, starting from design, analysis, implementation and maintenance of network.