

CCNP Routing Course Content

CCNP ROUTE (300-101): -

Course Schedule

- o Unit 1: Preparation
- o How to Prepare for Cisco CCNP R&S
- o Unit 2: Routing Fundamentals
- o IPv4 Explained
- o IPv4 Header Fields

- o **Introduction to ARP**
- o DHCP Server
- o DHCP Relay
- o Introduction to TCP and UDP
- o TCP Header Fields
- o TCP Window Size Scaling
- o TCP Bandwidth Delay Product
- o ICMP Explained
- o How to configure static route on Cisco IOS Router
- o Unicast Flooding due to Asymmetric Routing

- o **Unit 3: EIGRP**
- o Unit 1: Introduction to EIGRP
- o Introduction to EIGRP
- o Basic EIGRP configuration
- o EIGRP over frame-relay
- o Unit 2: EIGRP Neighbor Adjacency
- o EIGRP Packets
- o EIGRP Neighbor Adjacency
- o EIGRP Neighbor and Topology Table

- o EIGRP Hold Time and Hello Packets
- o EIGRP Unequal Load Balancing
- o EIGRP Variance Command Example
- o EIGRP K Values
- o EIGRP K Values Configuration
- o EIGRP Static Neighbor
- o EIGRP Passive Interface
- o EIGRP Authentication
- o EIGRP Authentication per Neighbor
- o Troubleshooting EIGRP Neighbor Adjacency
- o EIGRP OTP (Over the Top)
- o EIGRP Graceful Shutdown

- o Unit 3: EIGRP Filtering**
- o EIGRP distribute-list filtering
- o EIGRP prefix-list filtering
- o EIGRP route-map filtering
- o Unit 4: EIGRP Advanced Features
- o EIGRP Stuck in Active
- o EIGRP DUAL FSM
- o EIGRP Stub
- o EIGRP Stub Leak Map
- o EIGRP Default Network
- o EIGRP Router ID
- o EIGRP Summarization
- o EIGRP Summary Leak Map
- o EIGRP Auto-summary
- o EIGRP Named Mode
- o EIGRP Add Path Support
- o EIGRP Loop-Free Alternate (LFA) Fast Reroute (FRR)
- o EIGRP Wide Metrics

- o EIGRP IP Bandwidth-percent
- o EIGRP TTL=2 explained
- o Troubleshooting EIGRP Route Advertisement
- o EIGRP External Route Path Selection

o Unit 4: OSPF

o Unit 1: Introduction to OSPF

- o Introduction to OSPF
- o Basic OSPF Configuration
- o OSPF Multi Area Configuration
- o OSPF Reference Bandwidth
- o OSPF Plain Text Authentication
- o OSPF MD5 Authentication
- o OSPF SHA-HMAC Authentication

- o OSPF TTL Security Check

- o OSPF Default Route

o Unit 2: OSPF Neighbor Adjacency

- o OSPF LSA Types
- o OSPF LSAs and LSDB Flooding
- o OSPF Hello and Dead Interval
- o OSPF Router ID
- o OSPF Packets and Neighbor Discovery
- o OSPF DR/BDR Election
- o OSPF Passive Interface
- o Troubleshooting OSPF Neighbor Adjacency

o Unit 3: OSPF Network Types

- o OSPF Non-Broadcast Network Type
- o OSPF Broadcast Network Type
- o OSPF Point-to-Multipoint Network Type

- o OSPF Point-to-Multipoint Non-Broadcast Network Type
- o OSPF Point-to-Point Network Type
- o OSPF Next Hop with Network Types
- o Unit 4: OSPF Stub Areas**
- o Introduction to OSPF Stub Areas
- o How to configure OSPF Stub Area
- o How to configure OSPF Totally Stub
- o How to configure OSPF NSSA (Not So Stubby) Area
- o How to configure OSPF Totally NSSA (Not So Stubby) Area
- o OSPF NSSA P-bit explained
- o Unit 5: Advanced OSPF Topics**
- o OSPF Summarization
- o OSPF Distribute-List Filtering
- o OSPF LSA Type 3 Filtering
- o OSPF LSA Type 5 Filtering
- o OSPF Virtual Link
- o OSPF Virtual Link Authentication
- o OSPF Path Selection Explained

- o How to read the OSPF Database**
- o OSPFv3 for IPv4
- o Troubleshooting OSPF Route Advertisement
- o OSPF SPF Scheduling and Throttling
- o OSPF LSA Throttling
- o OSPF Incremental SPF
- o OSPF Prefix Suppression
- o OSPF Stub Router
- o OSPF Graceful Shutdown
- o OSPF Graceful Restart
- o OSPF Loop-Free Alternate (LFA) Fast Reroute (FRR)
- o OSPF Remote Loop-Free Alternate (LFA) Fast Reroute (FRR)

o **Unit 5: Redistribution**

- o Introduction to Redistribution
- o Redistribution between RIP and EIGRP
- o Redistribution between OSPF and RIP
- o Redistribution Route Tagging
- o Troubleshooting Metric Redistribution
- o Troubleshooting AD Redistribution

o **Unit 6: Route Selection**

- o Administrative Distance
- o CEF (Cisco Express Forwarding)
- o Cisco Offset-List Command
- o PBR (Policy Based Routing)
- o IP SLA (IP Service Level Agreement)
- o IP SLA with static routes
- o IP SLA with policy based routing

o **Unit 7: BGP (Border Gateway Protocol)**

o **Unit 1: Introduction to BGP**

o **Introduction to BGP**

- o Single/Dual (multi) homed connections
- o eBGP (external BGP)
- o eBGP Multi-Hop
- o iBGP (internal BGP)
- o How to read the BGP Table
- o How to advertise networks in BGP
- o iBGP Next Hop Self
- o BGP Auto-summary

o **Unit 2: BGP Neighbor Adjacency**

- o BGP Neighbor Adjacency States

- o BGP Messages
- o Troubleshooting BGP Neighbor Adjacency
- o Troubleshooting BGP Route Advertisement
- o Unit 3: BGP Attributes**
- o BGP Attributes and Path Selection
- o BGP Weight Attribute
- o BGP Local Preference
- o BGP AS Path Prepending
- o BGP Origin Code
- o BGP MED (metric) Attribute
- o Unit 4: BGP Communities**
- o BGP Communities
- o BGP Community No Advertise
- o BGP Community No Export
- o BGP Community Local AS
- o Unit 5: BGP Filtering**
- o BGP Regular Expressions
- o BGP Transit AS
- o BGP IPv6 route filtering
- o BGP AS Path Filter
- o BGP Extended Access-List Filtering
- o Unit 6: Advanced BGP Features**
- o BGP Peer Groups
- o BGP Route Reflector
- o BGP Confederations
- o BGP Synchronization
- o BGP Backdoor Routes
- o MP-BGP (multi-protocol BGP)
- o BGP Private and Public AS Numbers
- o BGP Remove Private AS Numbers
- o BGP 4-byte AS numbers

- o BGP Soft Reconfiguration
- o BGP Route Refresh Capability
- o BGP Allow AS in
- o BGP AS Override
- o BGP Aggregate AS-SET
- o BGP Multipath eBGP and iBGP
- o Unit 6: BGP Convergence**
- o BGP Next Hop Tracking
- o BGP Additional Paths
- o BGP PIC (Prefix Independent Convergence)

- o Unit 8: IPv6**
- o Introduction to IPv6
- o Shortening IPv6 Addresses
- o How to find the IPv6 prefix
- o IPv6 Address Types
- o IPv6 Address Assignment Example
- o IPv6 EUI-64 explained
- o IPv6 Summarization Example
- o IPv6 Solicited Node Multicast Address
- o IPv6 Neighbor Discovery Protocol
- o IPv6 Stateless Autoconfiguration
- o How to configure DHCPv6 Server
- o How to configure IPv6 Static Routing
- o How to configure IPv6 RIPNG

- o How to configure IPv6 EIGRP
- o How to configure IPv6 OSPF
- o OSPFv3 Default Route
- o OSPFv3 authentication
- o IPv6 Redistribution between RIPNG and OSPFv3

- o IPv6 Access-List
- o BGP IPv6 Route Filtering on Cisco IOS
- o IPv6 Tunnelling over IPv4
- o IPv6 Automatic 6to4 Tunnelling
- o IPv6 NAT64 Static
- o Unit 9: Remote Site Connectivity**
- o DHCP Client
- o Introduction to NAT and PAT
- o How to configure Static NAT
- o How to configure Dynamic NAT
- o How to configure PAT
- o PPP (Point to Point Protocol)
- o PPPoE Server and Client
- o MTU Troubleshooting
- o GRE Tunnelling
- o GRE Tunnelling Recursive Routing Error
- o IPsec (Internet Protocol Security)
- o Encrypted GRE Tunnel with IPSEC
- o VRF Lite
- o EVN (Easy Virtual Network)
- o Introduction to MPLS
- o MPLS Labels and Devices
- o MPLS LDP (Label Distribution Protocol)
- o MPLS Layer 3 VPN Explained
- o Introduction to DMVPN (Dynamic Multipoint VPN)

- o Unit 10: Router Security and Management**
- o Introduction to CDP (Cisco Discovery Protocol)
- o Link Layer Discovery Protocol (LLDP)
- o Router Security Policy
- o Standard Access-List

- o Extended Access-List
- o Time-Based Access-List
- o Infrastructure Access-List
- o uRPF
- o AAA 802.1X Authentication
- o Introduction to SNMP
- o SNMPv2
- o SNMPv3
- o Syslog
- o NTP (Network Time Protocol)
- o Cisco NetFlow

CCNP Switching Course Content

o Unit 1: Preparation

- o How to Prepare for Cisco CCNP R&S
- o How to build a CCNP SWITCH lab

o Unit 2: Campus Network Design

- o Introduction to Campus Network Design

o Unit 3: VLANs and Trunking

- o Introduction to VLANs (Virtual LAN)
- o How to configure VLANs
- o Static MAC Address Table Entry
- o 802.1Q Encapsulation
- o How to configure a trunk between switches
- o DTP (Dynamic Trunking Protocol) Negotiation
- o How to change the Native VLAN
- o VTP (VLAN Trunking Protocol)

- o VTP Version 3
- o Protected Port
- o Private VLANs (PVLAN)

o Unit 4: Spanning-Tree

- o Introduction to Spanning-Tree
- o Spanning-Tree Cost Calculation
- o PVST (Per VLAN Spanning Tree)
- o Spanning-Tree Port States
- o Spanning-Tree TCN (Topology Change Notification)
- o Spanning-Tree Portfast
- o Spanning-Tree UplinkFast
- o Spanning-Tree Backbone Fast
- o Rapid Spanning-Tree (RSTP)
- o Rapid Spanning-Tree Configuration
- o MST (Multiple Spanning-Tree)

o Unit 5: Spanning-Tree Toolkit

- o Spanning-Tree BPDUGuard
- o Spanning-Tree BPDUFILTER
- o Spanning-Tree RootGuard
- o Spanning-Tree LoopGuard and UDLD
- o FlexLinks

o Unit 6: Etherchannel

- o Introduction to Etherchannel
- o Layer 3 Etherchannel

o Unit 7: Switch Virtualization

- o Introduction to Switch Virtualization
- o Stackwise

- o VSS (Virtual Switching System)

- o Unit 8: Inter-VLAN Routing**

- o Routing between VLANs
- o CEF (Cisco Express Forwarding)
- o Unicast Flooding due to Asymmetric Routing

- o Unit 9: Gateway Redundancy**

- o Introduction to Gateway Redundancy
- o Hot Standby Routing Protocol
- o Virtual Router Redundancy Protocol
- o Gateway Load Balancing Protocol
- o IP SLA (Service-Level Agreement) on Cisco IOS
- o Reliable Static Routing with IP SLA

- o Unit 10: Switch Security**

- o Port Security
- o AAA and 802.1X Authentication
- o AAA Authentication on Cisco Switch
- o VLAN Access-List (VACL)
- o Storm-Control
- o VLAN Hopping
- o DHCP Snooping
- o ARP Poisoning
- o DAI (Dynamic ARP Inspection)

- o Unit 11: Network Management**

- o How to configure DHCP Server on Cisco IOS
- o Cisco IOS DHCP Relay Agent
- o SPAN / RSPAN
- o SDM Templates

- o Cisco IOS Syslog Messages
- o Introduction to SNMP
- o How to configure SNMPv2 on Cisco IOS Router
- o How to configure SNMPv3 on Cisco IOS Router
- o Introduction to Cisco NetFlow
- o Cisco Network Time Protocol (NTP)
- o Bidirectional Forwarding Detection (BFD)