



## CCNA (Routing and Switching)

### 200-120 CCNA (CCNAX)

OR

### 100-101 ICND1

### 200-101 ICND2

#### Course Overview

CCNA R&S course teaches learners how to install, operate, configure, and verify a basic IPv4 and IPv6 network, including configuring a LAN switch, configuring an IP router, identifying basic security threats, understanding redundant topologies, troubleshooting common network issues, connecting to a WAN, configuring EIGRP and OSPF in both IPv4 and IPv6, understanding wide-area network technologies, and getting familiar with device management and Cisco licensing.

#### Contents

Operation of IP Data Networks

LAN Switching Technologies

IP Routing Technologies

IP Services

IP addressing (IPv4 / IPv6)

Network Device Security

Troubleshooting

WAN Technologies

#### Course Details

##### Operation of IP Data Networks

- Functions of Routers, Switches, Bridges and Hubs
- OSI and TCP/IP models
- Data flow between two hosts across a network

##### LAN Switching Technologies

- Identify basic switching concepts
  - Types of Switching
  - Collision / Broadcast Domains
  - CAM Table
- Configure and verify initial switch configuration
- Switch operation (ping, telnet and ssh)
- Identify enhanced switching technologies
  - RSTP / PVSTP
  - Ether channels
- Configure and verify VLANs / Trunking
  - DTP / Auto negotiation
- Configure and verify PVSTP operation
  - Root bridge election / STP Modes

##### IP Routing Technologies

- Describe basic routing concepts
  - C E F

##### IP addressing (IPv4 / IPv6)

- Private and public IP addresses for IPv4
- IPv6 addressing scheme
- IPv4 addressing scheme using VLSM and summarization
- IPv6 in conjunction with IPv4 such as (dual stack)
- Describe IPv6 addresses
  - Global unicast
  - Multicast
  - Link local
  - Unique local
  - eui 64
  - auto configuration

##### Network Device Security

- Configure and verify network device security
  - Enable secret vs enable
  - Disable telnet
  - SSH / VTYS
  - Physical security
  - Service password
- Configure and verify Switch Port Security
  - Sticky MAC / MAC address limitation
  - Static / dynamic

- Packet forwarding
  - Router lookup process
  - o Describe the boot process of Cisco IOS routers
  - o Configure and verify basic Router configuration
  - o Configure and verify interface (serial and Ethernet)
  - o Configure and verify Static & Default routing
  - o Manage Cisco IOS Files
    - Boot preferences / Cisco IOS image(s)
    - Licensing
  - o Differentiate methods of routing and routing protocols
    - Static vs. Dynamic
    - Link state vs. Distance Vector
    - Administrative distance
  - o Configure and verify OSPF (single area)
    - Benefit of single area
    - neighbor adjacencies
    - OSPF states, Multi area
    - Configure OSPF v2 & OSPF v3
    - Router ID, Passive interface, LSA types
  - o Configure and verify EIGRP (single AS)
    - Feasible Distance / Feasible Successors
    - Administrative distance
    - Feasibility condition
    - Metric composition
    - Router ID, Auto summary, Path selection
    - Load balancing (Equal & Unequal)
    - Passive interface
  - o InterVLAN routing (Router on a stick)
    - sub interfaces, encapsulation
  - o Configure SVI interfaces
- ## IP Services
- o Configure and verify DHCP (IOS Router)
    - Configuring router interfaces to use DHCP
    - DHCP options
    - Excluded addresses, Lease time
  - o ACL (Types, Features & Applications of ACLs)
    - Standard, Extended, Named & Numbered
    - Log option
  - o Configure and verify ACL
  - o Identify the basic operation of NAT
    - Purpose, Pool, Static, 1 to 1 & Overloading
    - Source addressing & One way NAT
  - o Configure and verify NAT
  - o Configure and verify NTP as a client
  - o Recognize High availability (FHRP, VRRP, HSRP & GLBP)
  - o Configure and verify Syslog.
  - o Describe SNMP v2 & v3

- Violation modes(Err disable/Shutdown)
  - Protect restrict
  - Err disable recovery
- ## Troubleshooting
- o Troubleshoot and Resolve VLAN problems
    - Identify that VLANs are configured
    - port membership correct
    - IP address configured
  - o Troubleshoot and Resolve trunking problems
    - trunk states
    - encapsulation
    - Allowed vlans
  - o Troubleshoot and Resolve STP
    - Root switch
    - Priority
    - Mode
    - Port states
  - o Troubleshoot and Resolve routing issues
    - Routing is enabled
    - Routing table is correct
    - Correct path selection
  - o Troubleshoot and Resolve OSPF problems
    - Neighbor advances
    - Hello and Dead timers
    - OSPF area
    - Interface MTU
    - Network types, Neighbor states
    - OSPF topology database
  - o Troubleshoot and Resolve EIGRP problems
    - Neighbor adjacencies
    - AS number
    - Load balancing
  - o Troubleshoot and Resolve interVLAN
    - Connectivity
    - Encapsulation
    - Subnet, Native VLAN
    - Port mode trunk status
  - o Troubleshoot and Resolve ACL issues
    - Statistics, Permitted networks, Direction
  - o Troubleshoot and Resolve WAN implementation issues
    - Serial interfaces, PPP, Frame relay
  - o Monitor NetFlow statistics
  - o Troubleshoot etherchannel problems
- ## WAN Technologies
- o Identify different WAN Technologies
    - Metro Ethernet, VSAT, Cellular 3G & 4G
    - ISDN, DSL, Frame relay, MPLS, VPN & Cable
  - o Configure and verify Frame Relay on Cisco routers