

CCNA Routing & Switching 200-120 Syllabus

1. Networking Fundamentals

a. The TCP/IP and OSI Networking Models

- i. *TCP/IP and OSI Networking Model*
- ii. *Overview of*
 1. *Application Layer*
 2. *Presentation Layer*
 3. *Session Layer*
 4. *Transport layer*
 5. *Network Layer*
 6. *Data-Link Layer*
 7. *Physical Layer*

b. Fundamentals of LANs

- i. *Overview of LANs*
 1. *Typical SOHO LANs*
 2. *Typical Enterprise LANs*
 3. *The Variety of Ethernet Physical Layer Standards (Cables and Connectors Categories)*
 4. *Ethernet addressing and Functions (Ethernet Types & MAC/LLC)*
- ii. *Network Layer Functions and Addressing (IPv4 Addressing & Routing)*
 1. *Class A, B, and C IP Networks*
 2. *The Actual Class A, B, and C IP Networks*
 3. *IP Subnetting*
- iii. *Network Layer Protocols and Features (ARP, RARP, OSPF, EIGRP, ICMP, Ping, Traceroute ...)*

c. Fundamentals of TCP/IP Transport, Applications

- i. *TCP/IP Layer 4 Protocols: TCP and UDP*
 1. *Transmission Control Protocol (TCP)*
 2. *Multiplexing Using TCP Port Numbers*
 3. *Popular TCP/IP Applications*
 4. *Connection Establishment and Termination*
 5. *User Datagram Protocol*
- ii. *TCP/IP Applications (Http, SSL, DNS, DHCP, Telnet, SSH.....)*

2. Installing and Operating Cisco LAN Switches & Routers

a. Cisco Devices Boot Sequence

b. Accessing the Cisco Catalyst 2960 Switch CLI

- i. *Cisco Catalyst Switches and the 2960 Switch*

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- ii. *Switch Status from LEDs*
- iii. *Accessing the Cisco IOS CLI*
 - 1. *Cabling the Console Connection*
 - 2. *Configuring the Terminal Emulator for the Console*
 - 3. *Accessing the CLI with Telnet and SSH*
- iv. *User and Enable (Privileged) Modes*
- v. *CLI Help Features*
- vi. *The debug and show Commands*
- vii. *Configuring Cisco IOS Software*
 - 1. *Configuration Sub-modes and Contexts*
 - 2. *Storing Switch Configuration Files*
 - 3. *Copying and Erasing Configuration Files*
 - 4. *Initial Configuration (Setup Mode)*
 - 5. *IOS Version and Other Reload Facts*
 - 6. *Basic Configurations for CLI Access*
 - a. *Securing the Switch CLI*
 - b. *Securing Access with Simple Passwords*
 - c. *Securing Access with Local Usernames and Passwords*
 - d. *Securing Access with External Authentication Servers*
 - e. *Configuring Secure Shell (SSH)*
 - 7. *Encrypting and Hiding Passwords*
 - a. *Encrypting Passwords with the service password Command*
 - b. *Hiding the Enable Password*
 - c. *Hiding the Passwords for Local Usernames*
 - 8. *Console and vty Settings*
 - a. *Banners*
 - b. *History Buffer Commands*
 - c. *The logging synchronous and exec-timeout Commands*

3. LAN Switching

a. Implementing Ethernet Virtual LANs

- i. *Creating Multiswitch VLANs Using Trunking*
 - 1. *VLAN Tagging Concepts*
 - 2. *The 802.1Q and ISL VLAN Trunking Protocols*
- ii. *VTP Configuration and Verification*
- iii. *DTP (Dynamic Trunking Protocol)*
- iv. *CDP (Cisco Discovery Protocol)*

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b. Etherchannel

c. Spanning Tree Protocol

- i. Spanning Tree Protocol (IEEE 802.1d)*
- ii. Per-vlan Spanning Tree (PVST)*

4. IPv4 Routing

a. IPv4 Routing Process Reference

b. Configuring Connected Routes

- i. Connected Routes and the ip address Command*
- ii. Routing Between Subnets on VLANs*
- iii. Configuring Routing to VLANs using 802.1Q on Routers (Router-on-a-stick)*
- iv. Secondary IP Addressing*

c. Creating Redundant First-Hop Routers

- i. FHRP Concepts*
 - 1. The Need for Redundancy in Networks*
 - 2. The Need for a First Hop Redundancy Protocol*
 - a. The Three Solutions for First-Hop Redundancy*
 - 3. HSRP Concepts*
 - a. HSRP Failover*
 - b. HSRP Load Balancing*
- ii. GLBP Concepts*

d. Static Routes

- i. Static Route Configuration*
- ii. Floating Static Route*
- iii. Static Default Routes*

e. Routing Protocol Concepts and Configuration

- i. Comparing Dynamic Routing Protocol Features*
- ii. Routing Protocol Functions*
- iii. Interior and Exterior Routing Protocols*
- iv. Comparing IGPs*
 - 1. IGP Routing Protocol Algorithms*
 - 2. Metrics*
 - 3. Other IGP Comparisons*
- v. Administrative Distance*
- vi. Understanding the OSPF Link-State Routing Protocol*
 - 1. Building the LSDB and Creating IP Routes*
 - a. Topology Information and LSAs*

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1. *The Physical Components of a Leased Line*
2. *Leased Lines and the T-Carrier System*
3. *The Role of the CSU/DSU*
4. *Building a WAN Link in a Lab*
- ii. *Layer 2 Leased Lines with HDLC*
- iii. *Leased-Line WANs with PPP*
- iv. *PPP Concepts*
 1. *PPP Framing*
 2. *PPP Control Protocols*
 3. *PPP Authentication*
- v. *Understanding Frame Relay Concepts*
- vi. *Frame Relay Overview*
 1. *Virtual Circuits*
 2. *LMI and Encapsulation Types*
 3. *Frame Relay Encapsulation and Framing*
- vii. *Frame Relay Addressing*
 1. *Frame Relay Local Addressing*
 2. *Frame Forwarding with One DLCI Field*

b. Identifying Other Types of WANs

- i. *Private WANs to Connect Enterprises*
 1. *Leased Lines*
 2. *Frame Relay*
 3. *Ethernet WANs*
 4. *MPLS*
 5. *VSAT*
- ii. *Public WANs and Internet Access*
 1. *Internet Access (WAN) Links*
 2. *Dial Access with Modems and ISDN*
 3. *Digital Subscriber Line*
 4. *Cable Internet*
 5. *Mobile Phone Access with 3G/4G*
 6. *PPP over Ethernet*

9. IP Version 6

a. Introduction to IPv6

- i. *The Historical Reasons for IPv6*
- ii. *The IPv6 Protocols*
- iii. *IPv6 Routing*

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- iv. IPv6 Routing Protocols*
- v. IPv6 Addressing Formats and Conventions*
- vi. Global Unicast Addressing, Routing, and Subnetting*
- vii. IPv6 Protocols and Addressing*

10. Virtual Private Networks (VPN)

a. VPN Fundamentals

- i. IPsec VPNs*
- ii. SSL VPNs*
- iii. GRE Tunnels*
 - 1. GRE Tunnel Concepts*
 - 2. Routing over GRE Tunnels*
 - 3. GRE Tunnels over the Unsecured Network*