Interconnecting Cisco Networking Devices Part 2

Course Number: ICND2
Length: 5 Day(s)

Certification Exam

This course will help you prepare for the following exam:

- **640-816:** ICND2

Course Overview

This course focuses on providing the skills and knowledge necessary to install, operate, and troubleshoot a small to medium-size branch office Enterprise network, including configuring several switches and routers, connecting to a WAN and implementing network security.

Prerequisites

Before taking this course, a candidate must have successfully completed Interconnecting Cisco Networking Devices Part 1.

Audience

This course is intended for those wanting to become Cisco Certified Entry Network Technicians.

Course Outline

- **Course Introduction**
- Course Introduction
- **Chapter 1 - Small Network Implementation**
- Introducing the Review Lab
- Cisco IOS User Interface Functions
- Overview of Cisco IOS Configuration Modes
- Help Facilities of the Cisco IOS CLI
- Commands Review Discussion
- Access to the Remote Labs
- Summary
- Chapter 1 Review
- **Chapter 2 - Medium-Sized Switched Network Construction**
- Implementing VLANs and Trunks
- Issues in a Poorly Designed Network
- VLAN Overview
- Designing VLANs for an Organization
- Guidelines for Applying IP Address Space

- Network Traffic Types
- Advantages of Voice VLANs
- VLAN Operation
- VLAN Membership Modes
- 802.1Q Trunking
- 802.1Q Frame
- Understanding Native VLANs
- VTP Features
- VTP Modes
- VTP Operation
- VTP Pruning
- Configuring VLANs and Trunks
- VTP Configuration Guidelines
- Creating a VTP Domain
- VTP Configuration and Verification Example
- 802.1Q Trunking Issues
- Configuring 802.1Q Trunking
- Verifying a Trunk
- VLAN Creation Guidelines
- Adding a VLAN
- Verifying a VLAN
- Assigning Switch Ports to a VLAN
- Verifying VLAN Membership
- Demo – VLAN
- Executing Adds, Moves, and Changes for VLANs
- Summary
- Improving Performance with Spanning Tree
- Interconnection Technologies
- Determining Equipment and Cabling Needs
- Advantages of EtherChannel
- Demo – Bridging
- Redundant Topology
- Broadcast Frames
- Broadcast Storms
- Multiple Frame Copies
- MAC Database Instability
- Demo – STP
- Loop Resolution with STP
- Spanning-Tree Operation
- STP Root Bridge Selection
- Spanning-Tree Port States
- Demo – BPDU
- Describing PortFast
- Configuring and Verifying PortFast
- Spanning-Tree Operation Example
- Spanning-Tree Path Cost

- Spanning-Tree Recalculation
- Per VLAN Spanning Tree Plus
- PVST+ Extended Bridge ID
- Demo – SwitchConfig
- Rapid Spanning Tree Protocol
- Default Spanning-Tree Configuration
- PVRST+ Configuration Guidelines
- PVRST+ Implementation Commands
- Verifying PVRST+
- Configuring the Root and Secondary Bridges
- Configuring the Root and Secondary Bridges: SwitchA
- Configuring the Root and Secondary Bridges: SwitchB
- Summary
- Routing Between VLANs
- VLAN-to-VLAN Overview
- Dividing a Physical Interface into Subinterfaces
- Routing Between VLANs with 802.1Q Trunks
- Summary
- Securing the Expanded Network
- Overview of Switch Security
- Recommended Practices: New Switch Equipment
- Recommended Practices: Switch Security
- Port Security
- 802.1X Port-Based Authentication
- Summary
- Troubleshooting Switched Networks
- Switches Troubleshooting
- Troubleshooting Port Connectivity
- Troubleshooting VLANs and Trunks
- Troubleshooting VTP
- Troubleshooting Spanning Tree
- Summary
- Chapter 2 Review
- **Chapter 3 - Medium-Sized Routed Network Construction**
- Reviewing Routing Operations
- Static vs. Dynamic Routes
- Demo - Static Route
- What Is a Dynamic Routing Protocol?
- Autonomous Systems: Interior and Exterior Routing Protocols
- Classes of Routing Protocols
- Selecting the Best Route Using Metrics
- Administrative Distance: Ranking Routing Sources
- Distance Vector Routing Protocols
- Sources of Information and Discovering Routes
- Maintaining Routing Information
- Demo - RIP Review

- Inconsistent Routing Entries: Counting to Infinity and Routing Loops
- Counting to Infinity
- Solution to Counting to Infinity: Defining a Maximum
- Routing Loops
- Solution to Routing Loops: Split Horizon
- Solution to Routing Loops: Route Poisoning and Poison Reverse
- Solution to Routing Loops: Hold-Down Timers
- Triggered Updates
- Eliminating Routing Loops
- Link-State Routing Protocols
- OSPF Hierarchical Routing
- Link-State Routing Protocol Algorithms
- Benefits and Drawbacks of Link-State Routing
- Summary
- Implementing VLSM
- Subnetting Review
- Possible Subnets and Hosts for a Class C Network
- Possible Subnets and Hosts for a Class B Network
- Possible Subnets and Hosts for a Class A Network
- Subnetting Review Exercise
- What Is a Variable-Length Subnet Mask?
- A Working VLSM Example
- Understanding Route Summarization
- Classful Routing Overview
- Classless Routing Overview
- Summarizing Within an Octet
- Summarizing Addresses in a VLSM-Designed Network
- Route Summarization Operation in Cisco Routers
- Demo – VLSM
- Summarizing Routes in a Discontiguous Network
- Summary
- Chapter 3 Review
- **Chapter 4 - Single-Area OSPF Implementation**
- Implementing OSPF
- OSPF Overview
- OSPF Hierarchy Example
- Neighbor Adjacencies: The Hello Packet
- SPF Algorithm
- Configuring Single - Area OSPF
- Configuring Loopback Interfaces
- Verifying the OSPF Configuration
- OSPF debug Commands
- Demo - OSPF
- Load Balancing with OSPF
- OSPF Authentication
- Configuring OSPF Plaintext Password Authentication

- Plaintext Password Authentication Configuration Example
- Verifying Plaintext Password Authentication
- Summary
- Troubleshooting OSPF
- Components of Troubleshooting OSPF
- Troubleshooting OSPF Neighbor Adjacencies
- Troubleshooting OSPF Routing Tables
- Troubleshooting Plaintext Password Authentication Problems
- Summary
- Chapter 4 Review
- **Chapter 5 - EIGRP Implementation**
- Implementing EIGRP
- EIGRP Features
- EIGRP Tables
- EIGRP Path Calculation (Router C)
- EIGRP Configuration
- EIGRP and Discontiguous Networks Default Scenario Configuration
- EIGRP and Discontiguous Networks with no auto-summary
- Verifying the EIGRP Configuration
- Debug ip eigrp Command
- EIGRP Metric
- EIGRP Load Balancing
- EIGRP Unequal - Cost Load Balancing
- Variance Example
- Demo – EIGRP
- EIGRP MD5 Authentication
- EIGRP MD5 Authentication Configuration Steps
- Configuring EIGRP MD5 Authentication
- Example EIGRP MD5 Authentication Configuration
- Verifying MD5 Authentication
- Summary
- Troubleshooting EIGRP
- Components of Troubleshooting EIGRP
- Troubleshooting EIGRP Neighbor Issues
- Troubleshooting EIGRP Routing Tables
- Troubleshooting EIGRP Authentication
- Troubleshooting EIGRP Authentication Problem
- Summary
- Chapter 5 Review
- **Chapter 6 - Access Control Lists**
- Introducing ACL Operation
- Why Use ACLs?
- ACL Applications: Filtering
- ACL Applications: Classification
- Outbound ACL Operation
- A List of Tests: Deny or Permit

- Types of ACLs
- How to Identify ACLs
- IP Access List Entry Sequence Numbering
- ACL Configuration Guidelines
- Dynamic ACLs
- Reflexive ACLs
- Time-Based ACLs
- Wildcard Bits: How to Check the Corresponding Address Bits
- Wildcard Bits to Match IP Subnets
- Wildcard Bit Mask Abbreviations
- Summary
- Configuring and Troubleshooting ACLs
- Testing Packets with Numbered Standard IPv4 ACLs
- Numbered Standard IPv4 ACL Configuration
- Numbered Standard IPv4 ACL Example 1
- Numbered Standard IPv4 ACL Example 2
- Numbered Standard IPv4 ACL Example 3
- Demo - Standard ACL
- Standard ACLs to Control vty Access
- Demo - Access Class
- Testing Packets with Numbered Extended IPv4 ACLs
- Numbered Extended IPv4 ACL Configuration
- Numbered Extended IPv4 ACL Example 1
- Numbered Extended IPv4 ACL Example 2
- Demo - Extended ACL
- Named IP ACL Configuration
- Named Standard IPv4 ACL Example
- Named Extended IPv4 ACL Example
- Commenting ACL Statements
- Demo - Named ACL
- Monitoring ACL Statements
- Verifying ACLs
- Troubleshooting Common ACL Errors
- Summary
- Chapter 6 Review
- **Chapter 7 - Address Space Management**
- Scaling the Network with NAT and PAT
- Network Address Translation
- Port Address Translation
- Translating Inside Source Addresses
- Configuring and Verifying Static Translation
- Enabling Static NAT Address Mapping Example
- Configuring and Verifying Dynamic Translation
- Dynamic Address Translation Example
- Overloading an Inside Global Address
- Configuring Overloading

- Overloading an Inside Global Address Example
- Clearing the NAT Translation Table
- Demo – NAT
- Translation Not Occurring: Translation Not Installed in the Table
- Displaying Information with show and debug Commands
- Translation Occurring: Installed Translation Entry Not Being Used
- Sample Problem: Cannot Ping Remote Host
- Solution: Corrected Configuration
- Summary
- Transitioning to IPv6
- IPv4 and IPv6
- Why Do We Need a Larger Address Space?
- IPv6 Advanced Features
- IPv6 Address Representation
- IPv6 Address Types
- IPv6 Unicast Addressing
- IPv6 Global Unicast (and Anycast) Addresses
- Link-Local Addresses
- Larger Address Space Enables Address Aggregation
- Assigning IPv6 Global Unicast Addresses
- IPv6 EUI-64 Interface Identifier
- Stateless Autoconfiguration
- DHCPv6 (Stateful)
- DHCPv6 Operation
- IPv6 Routing Protocols
- RIPng (RFC 2080)
- IPv4-to-IPv6 Transition
- Cisco IOS Dual Stack
- IPv6 Tunneling
- Manually Configured IPv6 Tunnel
- Enabling IPv6 on Cisco Routers
- IPv6 Address Configuration Example
- Cisco IOS IPv6 Name Resolution
- Configuring and Verifying RIPng for IPv6
- RIPng for IPv6 Configuration Example
- Summary
- Chapter 7 Review
- **Chapter 8 - LAN Extension into a WAN**
- Introducing VPN Solutions
- What Is a VPN?
- Benefits of VPN
- Site-to-Site VPNs
- Remote-Access VPNs
- Cisco Easy VPN
- Cisco IOS IPsec SSL VPN (WebVPN)
- VPN-Enabled Cisco IOS Routers

- Cisco ASA Adaptive Security Appliances
- VPN Clients
- What Is IPsec?
- IPsec Security Services
- Confidentiality (Encryption)
- Encryption Algorithms
- DH Key Exchange
- Data Integrity
- Authentication
- IPsec Security Protocols
- IPsec Framework
- Summary
- Establishing a Point-to-Point WAN Connection with PPP
- Typical WAN Encapsulation Protocols
- An Overview of PPP
- PPP Session Establishment
- PPP Authentication Protocols: PAP
- PPP Authentication Protocols: CHAP
- Configuring PPP and Authentication Overview
- Configuring PPP and Authentication
- PPP and CHAP Configuration Example
- Demo – CHAP
- Verifying the PPP Encapsulation Configuration
- Verifying PPP Authentication
- Verifying PPP Negotiation
- Summary
- Establishing a WAN Connection with Frame Relay
- Frame Relay Overview
- Frame Relay Terminology
- Selecting a Frame Relay Topology
- Resolving NBMA Reachability Issues
- Frame Relay Address Mapping
- Frame Relay Signaling
- Stages of Inverse ARP and LMI Operation
- Configuring Basic Frame Relay
- Configuring a Static Frame Relay Map
- Configuring Frame Relay Subinterfaces
- Configuring Frame Relay Point-to-Point Subinterfaces
- Configuring Frame Relay Multipoint Subinterfaces
- Verifying Frame Relay Operation
- Demo - Frame Relay
- Summary
- Troubleshooting Frame Relay WANs
- Components of Troubleshooting Frame Relay
- Troubleshooting a Frame Relay Link That Is Down
- Troubleshooting Frame Relay Remote Router Connectivity

- Troubleshooting Frame Relay End-to-End Connectivity
- Summary
- Chapter 8 Review
- Course Closure