640-816: Interconnecting Cisco Networking Devices Part 2 v1.1

Course Introduction — 4m

Course Introduction

Chapter 01 - Small Network Implementation — 24m

Introducing the Review Lab
Cisco IOS User Interface Functions
Overview of Cisco IOS Configuration Modes
Cisco IOS CLI Hierarchy
Help Facilities of the Cisco IOS CLI
Command Review Discussion
Access to the Remote Labs
Summary
Chapter 01 Review

Chapter 02 - Medium-Sized Switched Network Construction — 3h 52m

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
Voice VLAN Essentials
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
Configuring VTP Server and Client
VTP Configuration and Verification Example
802.1Q Trunking Considerations
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
Optimizing Spanning Tree Performance
Interconnection Technologies
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 Transition
Demo - BPDU
Default Spanning-Tree Configuration
Describing PortFast
Configuring PortFast
Verifying PortFast
Per VLAN Spanning Tree Plus
PVST+ Extended Bridge ID
Spanning-Tree Operation Example
Spanning-Tree Path Cost
Spanning-Tree Recalculation
Demo - SwitchConfig
Rapid Spanning Tree Protocol
PVRST+ Configuration Guidelines
PVRST+ Commands
Verifying PVRST+
Configuring the Root and Secondary Bridges
Verifying the Root and Secondary Bridges: SwitchB
Summary
Routing Between VLANs
VLAN-to-VLAN Overview
Inter-VLAN Routing
Dividing a Physical Interface into Subinterfaces
Routing Between VLANs with 802.1Q Trunks
Verifying Inter-VLAN Routing
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
Troubleshooting Switches
Troubleshooting Port Connectivity
Troubleshooting VLANs and Trunks
Troubleshooting VTP
Troubleshooting Spanning Tree
Summary
Chapter 02 Review

Chapter 03 - Medium-Sized Routed Network Construction 2h 19m

Reviewing Routing Operations

Static vs. Dynamic Routes
Demo - Static Route
Dynamic Routing Protocol
Purpose of a Dynamic Routing Protocol
Autonomous Systems: Interior and Exterior Routing Protocols
Classes of Routing Protocols
Selecting the Best Route Using Metrics
Administrative Distance: Ranking Routes
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: Define 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
Link-State Routing Protocols Process
Hierarchical Routing
Link-State Routing Protocol Algorithms
Link-State Routing Benefits
Link-State Routing Drawbacks
Summary

Implementing VLSM

Subnetting Review
Subnetting Review Exercise
Variable-Length Subnet Mask
Working VLSM Example
Understanding Route Summarization
Classful Routing Essentials
Classless Routing Essentials
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 03 Review

Chapter 04 - Single-Area OSPF Implementation 1h 20m

Implementing OSPF

OSPF Essentials
OSPF Hierarchy Example
Neighbor Adjacencies: Hello Protocol
SPF Algorithm
Configuring Single-Area OSPF
OSPF Router ID
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 OSPF Authentication
Summary
Chapter 04 Review

Chapter 05 - EIGRP Implementation 1h 12m

Implementing EIGRP
EIGRP Features
EIGRP Tables
EIGRP Path Calculation (Router C)
EIGRP Configuration
Verifying the EIGRP Configuration
EIGRP and Discontiguous Networks Default Scenario Configuration
EIGRP and Discontiguous Networks with no auto-summary
EIGRP and Discontiguous Networks Default Scenario Configuration (Cont.)
Verifying the EIGRP Configuration (Cont.)
debug ip eigrp Command
EIGRP Metric
Examining the Metric Values
EIGRP Load Balancing
EIGRP Unequal-Cost Load Balancing
Variance Example
Demo - EIGRP
EIGRP MD5 Authentication
EIGRP MD5 Authentication Configuration Steps
EIGRP MD5 Authentication Configuration Example
Verifying MD5 Authentication
Troubleshooting EIGRP Authentication
Troubleshooting EIGRP Authentication Problem
Summary
Troubleshooting EIGRP
Components of Troubleshooting EIGRP
Troubleshooting EIGRP Neighbor Issues
Troubleshooting EIGRP Routing Tables
Summary
Chapter 05 Review

Chapter 06 - Access Control Lists 1h 48m

Introducing ACL Operation
Why Use ACLs?
ACL Applications: Filtering
ACL Applications: Classification
Outbound ACL Operation
List of Tests: Deny or Permit

Types of ACLs
Identifying ACLs
IP Access List Entry Sequence Numbering
ACL Configuration Guidelines
Dynamic ACLs (Lock and Key)
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
Applying Standard IPv4 ACLs to Interfaces
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
Editing Named IPv4 ACL Example
Commenting ACL Statements
ACL Recommended Practices
Demo - Named ACL
Monitoring ACL Statements
Verifying ACLs
Troubleshooting Common ACL Errors
Summary
Chapter 06 Review

Chapter 07 - Address Space Management 1h 17m

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
Dynamic Addresses Translation
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
Stateless Autoconfiguration
DHCPv6 (Stateful)
DHCPv6 Operation
Enabling IPv6 on Cisco Routers
IPv6 Address Configuration Example
IPv6 Routing Protocols
RIPng (RFC 2080)
Configuring and Verifying RIPng for IPv6
RIPng for IPv6 Configuration Example
Cisco IOS IPv6 Name Resolution
IPv4-to-IPv6 Transition
Cisco IOS Dual Stack
IPv6 Tunneling
Manually Configured IPv6 Tunnel
Summary
Chapter 07 Review

Chapter 08 - LAN Extension into a WAN 1h 40m

Introducing VPN Solutions
Remote Connection Options
What is VPN?
Site-to-Site VPNs
Remote-Access VPNs
Cisco Easy VPN
Cisco IOS IPsec SSL VPN (WebVPN)
VPN Components
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 08 Review
Course Closure

Total Duration: 13hrs 55m