Cisco® Implementing Cisco® IP Routing v2.0 (ROUTE)

Course Overview
ROUTE v2.0, a five-day ILT course, includes major updates and follows an updated blueprint. (However, note that this course does not cover all items listed on the blueprint.) Some older topics have been removed or simplified, while several new IPv6 routing topics have been added. The course content has been adapted to Cisco IOS Software Release 15 and technically updated. Students will gain the knowledge and skills needed to plan, implement, and monitor a scalable routed network. Students will also learn how to redistribute routes, implement path control, and secure Cisco routers.

Who Should Attend
Learners who aim to be network professionals and who have knowledge that is obtained from Cisco CCNA courses.

Course Objectives

Course Outline
1 Basic Network and Routing Concepts
   Lesson 1: Differentiating Routing Protocols
   Enterprise Network Infrastructure
   Role of Dynamic Routing Protocols
   Choosing the Optimal Routing Protocol
   IGP vs. EGP
   Types of Routing Protocols
   Convergence
   Route Summarization
   Routing Protocol Scalability
   Lesson 2: Understanding Network Technologies
   Traffic Types
   IPv6 Address Types
   Network Types
   Nonbroadcast Multiple-Access Networks
   Routing over the Internet
   Lesson 3: Connecting Remote Locations with the Headquarters
   Connectivity Overview
   Routing Across MPLS VPNs
   Routing over a GRE Tunnel
   Dynamic Multipoint Virtual Private Network
   Multipoint GRE
   Next Hop Resolution Protocol
   IPsec
   Lesson 4: Implementing RIPng
   RIP Overview
   Investigating the RIPng Database
2 EIGRP Implementation

Lesson 1: Establishing EIGRP Neighbor Relationships
- EIGRP Features
- EIGRP Reliable Transport
- EIGRP Operation Overview
- Manipulating EIGRP Timers
- EIGRP Neighborship over Frame Relay
- Establishing EIGRP over Layer 3 MPLS VPN
- EIGRP Neighborship over Layer 2 MPLS VPN

Lesson 2: Building the EIGRP Topology Table
- Exchange of Routing Knowledge in EIGRP
- EIGRP Metric
- EIGRP Metric Calculation
- EIGRP Metric Calculation Example
- The Feasibility Condition
- EIGRP Path Calculation Example

Lesson 3: Optimizing EIGRP Behavior
- EIGRP Queries
- EIGRP Stub Routers
- Stuck in Active
- Reducing Query Scope by Using Summary Routes

Lesson 4: Configuring EIGRP for IPv6
- EIGRP for IPv6 Overview
- Verifying EIGRP for IPv6 Configuration

Lesson 5: Discovering Named EIGRP Configuration
- Introduction to Named EIGRP Configuration
- Named EIGRP Configuration Modes
- Example: Classic vs. Named EIGRP Configuration
3 OSPF Implementation

Lesson 1: Establishing OSPF Neighbor Relationships
OSPF Features
OSPF Operation Overview
Hierarchical Structure of OSPF
Design Limitations of OSPF
OSPF Message Types
OSPF Neighborship over Point-to-Point Links
OSPF Neighborship on Layer 3 MPLS VPN
OSPF Neighborship over Layer 2 MPLS VPN
OSPF Neighbor States
OSPF Network Types
Configuring Passive Interfaces
Lesson 2: Building the Link-State Database
OSPF LSA Types
Periodic OSPF Database Changes
Exchanging and Synchronizing LSDBs
Synchronizing LSDB on Multiaccess Networks
Running the SPF Algorithm
Calculating the Cost of Intra-Area Routes
Calculating the Cost of Interarea Routes
Selecting Intra-Area and Interarea Routes
Lesson 3: Optimizing OSPF Behavior
OSPF Route Summarization
Benefits of Route Summarization
Summarization on ABRs
Summarization on ASBRs
Two Ways of Directing Traffic to the Internet
Cost of the Default Route in a Stub Area
The default-information originate Command
Other Stubby Area Types
Lesson 4: Configuring OSPFv3
Configuring Advanced OSPFv3
OSPFv3 Caveats
4 Configuration of Redistribution
Lesson 1: Implementing Basic Routing Protocol Redistribution
The Need for Redistribution
Defining Route Redistribution
Redistributing Route Information
Default Metrics for Redistributed Routes
Calculating Costs for OSPF E1 and E2 Routes
Types of Redistribution
Mutual Redistribution
Lesson 2: Manipulating Redistribution Using Route Filtering
The Need for Redistribution Manipulation
Distribute Lists
Distribute Lists Usage
Prefix Lists
Prefix List Example
Introducing Route Maps
Route Map Applications
Route Map Operation
Configuring Route Maps
Route Maps Example
Changing Administrative Distance
Manipulating Redistribution Using Route Tagging
Caveats of Redistribution

5 Path Control Implementation
Lesson 1: Using Cisco Express Forwarding Switching
Control Plane and Data Plane
Cisco Switching Mechanisms
Process Switching and Fast Switching
Cisco Express Forwarding
Lesson 2: Implementing Path Control
Need for Path Control
PBR Features
PBR Benefits
Configuring PBR
Need for Dynamic Path Control
Cisco IOS IP SLA
Configuring IP SLA
Using IP SLA for Path Control

6 Enterprise Internet Connectivity
Lesson 1: Planning Enterprise Internet Connectivity
Enterprise Internet Connectivity Needs
Types of ISP Connectivity
Public IP Address Assignments
Provider-Independent IP Addressing
AS Numbers
Lesson 2: Establishing Single-Homed IPv4 Internet Connectivity
Configuring a Provider-Assigned IPv4 Address
Obtaining a Provider-Assigned IPv4 Address with DHCP
Need for NAT
NAT Overview
Configuring Static NAT
Configuring Dynamic NAT
Configuring PAT
Limitations of NAT
NAT Virtual Interface
Lesson 3: Establishing Single-Homed IPv6 Internet Connectivity
Obtaining Provider-Assigned IPv6 Addresses
Securing IPv6 Internet Connectivity
Lesson 4: Improving Resilience of Internet Connectivity
Drawbacks of a Single-Homed Internet Connectivity
Dual-Homed Internet Connectivity
Configuring Best Path for Dual-Homed Internet Connectivity
Multihomed Internet Connectivity
Multihoming Options
Lesson 5: Considering Advantages of Using BGP Routing Between Autonomous Systems
Path Vector Functionality
BGP Routing Policies
Characteristics of BGP
BGP Data Structures
BGP Message Types
When to Use BGP
Lesson 6: Implementing Basic BGP Operations
BGP Neighbor Relationships
EBGP Neighbor Relationships
IBGP Neighbor Relationships
Basic BGP Configuration Requirements
Configuring BGP Neighbors
Lesson 7: Using BGP Attributes and the Path Selection Process
BGP Path Selection
BGP Route Selection Process
Weight Attribute
Configuring the Default Weight for a Neighbor
Configuring Weight with Route Maps
MED Attribute
Setting MED with a Route Map
Lesson 8: Controlling BGP Routing Updates
Filtering of BGP Routing Updates
Using Prefix Lists to Filter BGP Updates
Implementing AS Path Access Lists
Using Route Maps to Manipulate BGP Updates
Route Map Use Case Example
Filtering Order
Clearing the BGP Session
BGP Peer Groups
Peer Group Configuration Scenario
Peer Group Configuration Example
Lesson 9: Implementing BGP for IPv6 Internet Connectivity
MP-BGP Support for IPv6
Exchanging IPv6 Routes over an IPv4 Session
Exchanging IPv6 Routes over an IPv6 Session
Comparing Single and Dual BGP Transport
IPv6 BGP Filtering Mechanisms
IPv6 Prefix List Filtering
IPv6 Path Selection with BGP Local Preference

7 Routers and Routing Protocol Hardening

Lesson 1: Securing Cisco Routers
Securing Cisco IOS Routers Checklist
Router Security Policy
Encrypted Passwords
Use SSH Instead of Telnet
Securing Access to the Infrastructure Using Router ACLs
Secure SNMP
Configuration Backups
Implement Logging
Disable Unused Services

Lesson 2: Describing Routing Protocol Authentication Options
The Purpose of Routing Protocol Authentication
Authentication Types
Plaintext Authentication Process
Hashing Authentication Process
Time-Based Key Chains
Authentication Options with Different Routing Protocols

Lesson 3: Configuring EIGRP Authentication
EIGRP Authentication Configuration Checklist
EIGRP for IPv6 Authentication Configuration
EIGRP for IPv6 Authentication Verification
Configuring Authentication in Named EIGRP

Lesson 4: Configuring OSPF Authentication
OSPF Authentication Configuration Checklist

Lesson 5: Configuring BGP Authentication
BGP Authentication Configuration Checklist
BGP Authentication Configuration
BGP Authentication Verification
BGP for IPv6 Authentication Configuration
BGP for IPv6 Authentication Verification