IPv6 Fundamentals, Design, and Deployment (IP6FD)

Course Content

Course Description:

The IPv6 Fundamentals, Design, and Deployment (IP6FD) v3.0 course is an instructor-led course that is presented by Cisco Learning Partners to their end-user customers. This five day course aims at providing network engineers and technicians that are working in the enterprise sector with the knowledge and skills that are needed to study and configure Cisco IOS Software IPv6 features. The course also provides an overview of IPv6 technologies, covers IPv6 design and implementation, describes IPv6 operations, addressing, routing, services, transition, and deployment of IPv6 in enterprise as well as in service provider networks, and includes case studies useful for deployment scenarios.

Prerequisites:

CCNA, understanding of networking and routing, working knowledge of the Microsoft Windows operating system

Topics:

Module 1: Introduction to IPv6
Lesson 1: Explaining the Rationale for IPv6
- IP Address Allocation
- History of IPv4
- Next Generation of IP
- IPv4 Workarounds

Lesson 2: Evaluating IPv6 Features and Benefits
- Features and Benefits of IPv6
- IPv6 Addresses
- IPv6 Autoconfiguration and Aggregation
- Advanced IPv6 Features o Transition Strategies to IPv6

Lesson 3: Understanding Market Drivers
- Market Growth for IPv6
- Native IPv6 Content
- Drivers for Adoption

Module 2: IPv6 Operations
Lesson 1: Understanding the IPv6 Addressing Architecture
- IPv6 Addressing Architecture
- IPv6 Address Formats and Types
- IPv6 Address Uses o Required IPv6 Addresses

Lesson 2: Describing the IPv6 Header Format
- IPv6 Header Changes and Benefits
- IPv6 Header Fields
- IPv6 Extension Headers

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Hours: 35

Lesson 3: Enabling IPv6 on Hosts
- Enabling IPv6 on Hosts
- Enabling IPv6 on Windows
- Enabling IPv6 on Mac OS X
- Enabling IPv6 on Linux

Lesson 4: Enabling IPv6 on Cisco Routers
- Enabling IPv6 on Cisco Routers
- IPv6 Address Configuration
- Autoconfiguration

Lesson 5: Using ICMPv6 and Neighbor Discovery
- ICMPv6
- ICMP Errors o Echo
- IPv6 over Data Link Layers
- Neighbor Discovery
- Stateless Autoconfiguration
- Value of Autoconfiguration
- Renumbering
- Cisco IOS Neighbor Discovery Command Syntax
- Cisco IOS Network Prefix Renumbering Scenario
- ICMP MLD
- IPv6 Mobility

Lesson 6: Troubleshooting IPv6
- Cisco IOS IPv6 Configuration Example
- Cisco IOS show Commands
- Cisco IOS debug Commands
- Cisco IOS debug Command Example

Module 3: IPv6 Services
Lesson 1: IPv6 Mobility
- Introduction to IP Mobility
- Mobile IPv6
- Network Mobility Examples

Lesson 2: Describing DNS in an IPv6 Environment
- DNS Objects and Records
- DNS Tree Structure
- Dynamic DNS

Lesson 3: Understanding DHCPv6 Operations
- DHCPv6
- DHCPv6 Operation
- DHCPv6 Multicast Addresses
- DHCPv6 Prefix Delegation Process
- DHCPv6 Troubleshooting

Lesson 4: Understanding QoS Support in an IPv6 Environment
- IPv6 Header Fields Used for QoS
- IPv6 and the Flow Label Field
- IPv6 QoS Configuration

Lesson 5: Using Cisco IOS Software Features
- Cisco IOS Software Features
- Cisco IOS IPv6 Tools
- IPv6 Support for Cisco Discovery Protocol
- Cisco Express Forwarding IPv6
- IP Service Level Agreements

Module 4: IPv6-Enabled Routing Protocols
Lesson 1: Routing with RIPng
- Introducing RIPng for IPv6
- Examining RIPng Enhancements
- Configuring RIPng

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Lesson 2: Examining OSPFv3
- OSPFv3 Key Characteristics
- OSPFv3 Enhancements
- OSPFv3 Configuration
- OSPFv3 IPsec ESP Authentication and Encryption
- OSPFv3 Advanced Functionalities

Lesson 3: Examining Integrated IS-IS
- Integrated IS-IS Characteristics
- Changes Made to IS-IS to Support IPv6
- Single SPF Architecture
- Multitopology IS-IS for IPv6
- IS-IS IPv6 Configuration on Cisco Routers

Lesson 4: Examining EIGRP for IPv6
- EIGRP for IPv6
- Cisco IOS EIGRP for IPv6 Commands

Lesson 5: Understanding MP-BGP
- MP-BGP Support for IPv6
- IPv6 as Payload and Transport Mechanism in MP-BGP
- BGP Peering Over Link-Local Addresses
- BGP Prefix Filtering
- MP-BGP Configuration and Troubleshooting

Lesson 6: Configuring IPv6 Policy-Based Routing
- Policy-Based Routing
- Configure PBR

Lesson 7: Configuring FHRP for IPv6
- First-Hop Redundancy Protocols and Concepts
- HSRP for IPv6
- GLBP for IPv6

Lesson 8: Configuring Route Redistribution
- Route Redistribution
- PE-CE Redistribution for Service Providers

Module 5: IPv6 Multicast Services
Lesson 1: Implementing Multicast in an IPv6 Network
- IPv6 Multicast Addressing
- PIM for IPv6
- Rendezvous Points
- MP-BGP for the IPv6 Multicast Address Family
- How to Implement Multicasting in an IPv6 Network
- IPv6 Multicast Application Example

Lesson 2: Using IPv6 MLD
- Multicast Listener Discovery
- MLD Snooping and MLD Group Limits
- Multicast User Authentication and Group Range Support

Module 6: IPv6 Transition Mechanisms
Lesson 1: Implementing Dual-Stack
- Dual-Stack Applications
- Dual-Stack Node
- The Dual-Stack Approach

Lesson 2: Describing IPv6 Tunneling Mechanisms
- Overlay Tunnels
- Manually Configured Tunnels
- Automatic Tunnels

Module 7: IPv6 Security

Lesson 1: Configuring IPv6 ACLs

- IPv6 ACLs
- IPv6 ACL Configuration
- Reflexive and Time-Based ACLs
- Cisco IOS IPv6 Header Filtering
- Cisco IOS New ICMPv6 Types
- Editing of ACLs
- How to Configure ACLs in an IPv6 Environment

Lesson 2: Using IPsec, IKE, and VPNs

- IPsec, IKE, and VPNs Basics
- IPsec and IKE
- VPN Connections Using IPv6

Lesson 3: Discussing Security Issues in an IPv6 Transition Environment

- Dual-Stack Issues
- Tunnel Security Issues
- NAT-PT Security Issues
- ICMP Traffic Requirements

Lesson 4: Understanding IPv6 Security Practices

- Threats in IPv6 Networks
- Build Distributed Security Capability
- Hide Topology when Possible
- Secure the Local Link
- ICMPv6 at Edge—Manage ICMPv6 Traffic