NETLOGIC TRAINING CENTER

Couse Outline

Cisco IPv6 Fundamentals, Designed and Deployment (version 3.0)

Course Content

The IPv6 Fundamentals, Design, and Deployment (IP6FD) v3.0 course is an instructor-led course presented by Cisco training partners to their end-user customers. This five-day course aims at enabling learners to study and configure Cisco IOS Software IP version 6 (IPv6) features. The course is a technology course covering IPv6 design and implementation topics. It provides an overview of IPv6 technologies, briefly covers history of IPv6, describes IPv6 operations, addressing, routing, services, transition, and deployment of IPv6 in enterprise networks. The course also includes case studies useful for deployment scenarios

Course Objectives

Upon completing this course, the student will be able to meet these objectives:

- Describe the factors that led to the development of IPv6, and the possible usages of this new IP structure
- Explore the structure of the IPv6 address format, how IPv6 interacts with link-layer technologies, and how IPv6 is supported in Cisco IOS software
- Describe the nature of changes to DNS and DHCP to support IPv6, and how networks can be renumbered using both services
- Understand the updates to IPv4 routing protocols needed to support IPv6 topologies
- Understand multicast concepts and IPv6 multicast specifics
- Describe IPv6 transition mechanisms and which methods will be most effective in your network
- Examine security issues, how security for IPv6 is different than for IPv4, and emerging practices for IPv6-enabled networks
- Describe the standards bodies that define IPv6 address allocation, as well as one of the leading IPv6 deployment issues, multihoming
- Describe the deployment strategies service providers are facing when deploying IPv6
- Explore case studies for enterprise, service provider, branch, and access networks

Course Prerequisite

The following lists the skills and knowledge that learners must possess to benefit fully from the course, including recommended Cisco learning offerings that learners should first complete

- Cisco CCNA® certification:
    - Interconnecting Cisco Network Devices 1 (ICND1)
    - Interconnecting Cisco Network Devices 2 (ICND2)
- Understanding of networking and routing (on Cisco CCNP® level, but no formal certification is required)
- Working knowledge of the Microsoft Windows operating system

Course Pre-Test

Not Required

Course Details

Day 1

Item	Subject	Details	Personal Lab and devices
1	Introduction IPv6	Rationale for IPv6 • IP Address Allocation • History of IPv4 • Next Generation of IP • IPv4 Workarounds Evaluating IPv6 Features and Benefits • Features and Benefits of IPv6 • IPv6 Addresses • IPv6 Autoconfiguration and Aggregation • Advanced IPv6 Features • Transition Strategies to IPv6 Market Drivers • Market Growth for IPv6 • Native IPv6 Content • Drivers for Adoption	
		BREAK	
2	IPv6 Operations	IPv6 Addressing Architecture • IPv6 Address Formats and Types • IPv6 Address Uses • Required IPv6 Addresses IPv6 Header Format • IPv6 Header Changes and Benefits • IPv6 Header Fields • IPv6 Extension Headers Enabling IPv6 on Hosts • Enabling IPv6 on Windows • Enabling IPv6 on Mac OS X • Enabling IPv6 on Linux Enabling IPv6 on Cisco Routers • IPv6 Address Configuration • Autoconfiguration Using ICMPv6 and Neighbor Discovery • ICMP Errors • 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 Troubleshooting IPv6 • Cisco IOS IPv6 Configuration Example • Cisco IOS show Commands • Cisco IOS debug Commands	

Item	Subject	Details	Personal Lab and devices
	Summary challenge advance lab for Introduction IPv6	Lab 1 (Enabling IPv6 on Hosts) • Configure IPv4 addressing and routing on a PC • Configure IPv6 addressing and routing on a router • Configure static IPv6 addressing and routing on a PC using Windows XP,Windows 7, and Linux Lab 2 (Using Neighbor Discovery) • Configure a router to send router advertisements • Renumber a local network	

Course Details

Day 2

Item	Subject	Details	Personal Lab and devices
3	IPv6 Services	IPv6 Mobility • Mobile IPv6 • Network Mobility Examples DNS in an IPv6 Environment • DNS Objects and Records • DNS Tree Structure • Dynamic DNS DHCPv6 Operations • DHCPv6 Multicast Addresses • DHCPv6 Prefix Delegation Process • DHCPv6 Troubleshooting QoS Support in an IPv6 Environment • IPv6 Header Fields Used for QoS • IPv6 and the Flow Label Field • IPv6 QoS Configuration Cisco IOS Software Features • Cisco IOS IPv6 Tools • IPv6 Support for Cisco Discovery Protocol • Cisco Express Forwarding IPv6 • IP Service Level Agreements	
		BREAK	
4	IPv6-Enabled Routing Protocols	Routing with RIPng • RIPng for IPv6 • RIPng Enhancements • Configuring RIPng Examining OSPFv3 • OSPFv3 Key Characteristics • OSPFv3 Enhancements • OSPFv3 Configuration • OSPFv3 IPsec ESP Authentication and Encryption • OSPFv3 Advanced Functionalities 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 EIGRP for IPv6 • Cisco IOS EIGRP for IPv6 Commands 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 Configuring IPv6 Policy-Based Routing (PBR) • PBR Basics • Configure PBR	

Item	Subject	Details	Personal Lab and devices
		Configuring First-Hop Redundancy Protocols (FHRPs) for IPv6 • FHRP Concepts • HSRP for IPv6 • GLBP for IPv6 Configuring Route Redistribution • Route Redistribution • PE-CE Redistribution for Service Providers	
	Summary challenge advance lab for IPv6 Service and IPv6 Routing	Lab 3 (Using Prefix Delegation) • Configure the prefix delegation server and client • Configure a non-prefix delegation DHCPv6 server Lab 4: Routing with OSPFv3 • Configure OSPFv3 • Summarize route announcements • Lab 5: Routing with IS-IS • Configure IS-IS for IPv6 routing • Configure IS-IS summarization for IPv6 routing • Add IPv4 IS-IS route exchange Lab 6: Routing with EIGRP • Configure EIGRP for IPv6 routing • Configure EIGRP for IPv6 summarization Lab 7: Routing with BGP and MP-BGP • Configure IBGP for IPv6 • Configure EBGP for IPv6 • Configure IPv6 prefix filtering in BGP	

Course Details

Day 3

Item	Subject	Details	Personal Lab and devices
5	IPv6 Multicast Services	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 Using IPv6 MLD • Multicast Listener Discovery (MLD) • MLD Snooping • Multicast User Authentication and Group Range Support	
		BREAK	
6	IPv6 Transition Mechanisms	Implementing Dual-Stack • Dual-Stack Applications • Dual-Stack Node • The Dual-Stack Approach IPv6 Tunneling Mechanisms • Overlay Tunnels • Manually Configured Tunnels • Automatic Tunnels	
	Summary challenge advance lab for IPv6 Multicast service and Transitions	Lab 8 : Multicast Routing • Configure multicast by using static RPs • Configure source-tree multicast • Configure embedded RPs Lab 9 : Implementing Tunnels for IPv6 • Configure a static IPv6-in-IPv4 tunnel • Implement host-only ISATAP to allow dual-stack hosts to exchange IPv6packets in IPv4 automatic tunnels • Implement ISATAP on a router • Integrate the ISATAP host and router implementations to allow the hosts to configure a global scope address • and to reach both ISATAP and non-ISATAP nodes •	

Course Details

Day 4

Item	Subject	Details	Personal Lab and devices
7	IPv6 Security	Configuring IPv6 ACLs • IPv6 ACLs • Reflexive and Time-Based ACLs • Cisco IOS IPv6 Header Filtering • Cisco IOS New ICMPv6 Types • Editing ACLs • Configuring ACLs in an IPv6 Environment IPsec, IKE, and VPNs • VPN Connections Using IPv6 Security Issues in an IPv6 Transition Environment • Dual-Stack Issues • Tunnel Security Issues • NAT-PT Security Issues • ICMP Traffic Requirements 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 • Develop Mobility Support Plan • Use Transition Mechanisms as Transport • Secure the Routing Plane • Deploy an Early-Warning System Cisco IOS Firewall for IPv6 • IPv6 Inspection on ISRs • Implement IPv6 Inspection on ISRs • Zone-Based Policy Firewall for IPv6 on ISRs • Configuring Zones and Zone Pairs • Configuring a Basic OSI Layer 3 to 4 Interzone Access Policy • Troubleshooting the Zone-Based Policy Firewall	
		BREAK	
8	Deploying IPv6	IPv6 Address Allocation • IPv6 Internet • IPv6 Address Allocation • Connecting to the IPv6 Internet IPv6 Multihoming • IPv6 Multihoming Aspects and Issues • IPv6 Multihoming Status IPv6 Enterprise Deployment Strategies • Enterprise Networks • Impacts of Network Services • WAN Networks • Dual Stack: Advantages and Disadvantages • Tunneling: Advantages and Disadvantages	

Item	Subject	Details	Personal Lab and devices
	Summary challenge advance lab for IPv6 Security and Deploying	Lab 10 : Configuring Advanced ACLs • Create and apply a standard ACL (matching on source and destination addresses only) • Create and apply an extended ACL (matching on addresses, ports, and other packet information) • Create and apply a reflexive ACL (matching on outgoing packets and creating dynamic inbound rules) • Create and apply an extended ACL (matching on IPv6 extension headers) • Create and apply an ACL to control inbound IPv6 access to a router Lab 11: Implementing IPsec and IKE • Secure communications between routers by using IPsec	

Course Details

Day 5

Item	Subject	Details	Personal Lab and devices
9	IPv6 and Service Providers	IPv6 Service Provider Deployment • Dual-Stack Deployment • IPv6-Only Deployment • Encapsulation • IPv6 Services • Key Service Provider Strategies • Service Layer Address Allocation • Encapsulation Support Support for IPv6 in MPLS • MPLS Operations • IPv6 over MPLS Deployment Scenarios • IPv6 Tunnels Configured on CE Routers • IPv6 over Layer 2 MPLS VPN • Cisco 6PE • How to Deploy Cisco 6PE on MPLS Networks 6VPE • Cisco 6VPE Basics • Configuring 6VPE IPv6 Broadband Access Services • IPv6 Rapid Deployment • Customer Link Encapsulations • FTTH Access Architecture • Cable Access Architecture • Wireless Access Architecture • DSL Access Architecture	
		BREAK	
10	IPv6 Case Studies	Planning and Implementing IPv6 in Enterprise Networks • Enterprise Network Definition • Implementing IPv6 in an Enterprise Campus Network • IPv6 in an Enterprise WAN Network Planning and Implementing IPv6 in Service Provider Networks • Service Provider Network Design • Native IPv6 Deployment in Service Provider Access Networks • Native IPv6 Deployment in the Service Provider Core Network • 6PE Deployment in the Service Provider Core Network Planning and Implementing IPv6 in Branch Networks • Branch Deployment Overview • Branch Deployment Profiles: Single-Tier Profile Implementation	

Item	Subject	Details	Personal Lab and devices
	Summary challenge advance lab for IPv6 Service Provider	Lab 12: Configuring Cisco IOS Firewall • Configure Cisco IOS Firewall to use stateful packet inspection for IPv6 • Configure Cisco IOS Firewall to use packet filtering for IPv6 Lab 13: Configuring 6PE and 6VPE • Configure IPv6 routing between PE and CE routers • Configure MP-IBGP to simultaneously run IPv6 with IPv4 • Determine how labels are assigned and propagated across the MPLS backbone • Analyze the Cisco 6PE forwarding plane • Configure 6VPE on PE routers	

Course Post-Test

Not Required

Course Materials

Not include in this class training (but you can requested from sale team)

Course Devices Training (Per 1 Person)

Cisco Router ISR 4321

Cisco Catalyst 2960

Cisco Catalyst 3605-CX