IPv6 Foundations: Protocols, Services, and Migration

Course ID#: 1575-941-ZZ-W

Hours: 28

Course Content

Course Description:

Learn the essentials for integrating IPv6 into your existing IPv4 network. This powerful, hands-on course covers all you need to know about IPv6 technology and its implementation and deployment within your network environments. The IPv6 protocol offers 128-bit IP addresses compared to IPv4's 32-bit addresses and plays a growing role in security, VoIP, Quality of Service (QoS), and other networking technologies for medium to large enterprises.

In this course, you will gain a complete understanding of the differences between the IPv4 and IPv6 protocols, critical pre- and post-deployment installation techniques to ensure successful migration, and how to deploy mixed IPv4/IPv6 networks. Through detailed hands-on labs, you will configure IPv6-over-IPv4 tunnels and explore and understand the expanded roles of the IMCPv6 protocol vs. ICMP in IPv4.

You'll also learn about IP Security (IPSec), Access Control Lists, and DNS implementation within an IPv6 network, as well as IPv6 auto-configuration vs. stateful and stateless DHCPv6 configuration of IPv6-enabled devices. Finally, you will gain invaluable real-world experience as you configure and set up IPSec tunnels, explore DNS implementation, configure and analyze Access Control Lists, and configure routers with various IPv6 routing protocols in informative hands-on labs.

This course is geared towards students who have no prior knowledge of ISE and 802.1X. The ISE product is Cisco's flagship security product, intended to replace several major current products, including NAC Servers and Managers, NAC Profiler, Guest Server, Profiler, and the Cisco Secure Access Control Server (ACS).

In this course with enhanced hands-on labs, you will cover the Cisco Identity Services Engine (ISE) version 1.1.1, a next generation identity and access control policy platform that provides a single policy plane across the entire organization combining multiple services, including authentication, authorization, and accounting (AAA), posture, profiling, device on-boarding, and guest management. You will gain the knowledge and skills needed to enforce security posture compliance for wired and wireless endpoints and enhance infrastructure security using the Cisco ISE.

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You will learn how to perform a fundamental installation of ISE and how to configure identity-based networks using 802.1X for both wired and wireless clients, using a Windows 7 client. You will also learn to use many of the new features, including AnyConnect 3.1,
EAP-FAST, PEAP, BYOD, and EAP Chaining. You'll also see how the new Virtual Wireless Controller (vWLC) works to integrate with ISE along with advanced features within ISE.

Prerequisites:

- TCP/IP Networking

Topics:

Module 1: Introduction to IPv6

- IPv6 First Appears Simple
- Why IPv6
- New Technologies
- IPv4 Lifetime Extension
- Key Differences Between IPv4 and IPv6
- Free IPv6 Brokers and Support
- IPv4 Lifetime Extension
- What Happened to IPv5?
- Key Differences between IPv4 and IPv6
- DoD 2003 Mandate
- NIST Recommendations
- DoD IPv6 Standard Profiles
- IPv6 Forum
- MoonV6, NAv6TF, and JTIC
- IPv6 Ready Logo Program
- Five Internet Registries
- ARIN Requirements for Address Licensing
- ARIN Form/Template o ARIN Assignment
- 2012 Government Public-Facing Servers
- Current Issues with Public Servers
- IPv6 Reference Sheet

Module 2: IPv6 Addressing

- Binary Number Representation
- Decimal-to-Binary Conversion
- Hexadecimal
- IPv6 Addressing
- Possible IPv6 Addresses
- IPv6 Address Notation
- Compressing the IPv6 Address
- IPv6 Address Space
- IPv6 Address Prefix Subnetting
- Prefix Examples
- IPv6 Prefixes
- Unicast Addresses
- Link-Local Address
- Site-Local (deprecation)
- Unique Local Address (ULA)
- Global Unicast Address
- Global Address Flow Chart
- Auto-Configured Address States
- Tentative
- Preferred, Deprecated
- Valid and Invalid
- Address Timers
- IPv6 Address Timers
- Anycast Addresses
- Multicast Addresses
- Well-Known Multicast
- Mapping Layer 3 to Layer 2 Multicast
- Loopback and Unspecified Addresses
- 64-bit MAC Address Assignment
- IPv6 Prefixes and MAC Addresses

- Temporary IPv6 Address
- IPv6 Ping Command
- Unicast Addresses
- IPv6 Host, Nodes, Routers, and Interfaces

Module 3: IPv6 Header Information

- IPv4 Protocol Stack
- IPv6 Protocol Stack
- IPv6 Dual Stack
- IPv4 and IPv6 Type Codes
- IPv4 and IPv6 Header Comparison
- New Header Format
- Traffic Class Field
- IPv6 Header Length Includes
- IPv6 Extension Headers
- Hop-by-Hop
- Destinations Options Routing Header
- Mobility with IPv6
- Mobile Node Home Agent Support
- Fragment Header
- IPSec Authentication Header
- IPSec ESP Header
- Extension Header Order
- List of Next Header Values

Module 4: ICMPv6 Network Operation

- ICMPv6 Header
- ICMPv6 Message Types
- ICMPv6 Error Message Types
- ICMPv6 Informational Message Types
- ICMPv6 Ping Operation
- ICMPv6 Echo Request Message
- ICMPv6 Echo Reply Message
- Windows XP
- Windows Vista and 07
- Windows server 03' and 08'
- Windows 07 GUI Configuration
- Common Windows Commands
- Ipconfig Command
- Using Different Netsh Commands
- Windows Route Print Command
- Client Addresses
- ICMPv6 Neighbor Discoveries
- ICMPv6 Neighbor Discoveries Defined
- Neighbor Solicitation
- ICMPv6 Neighbor Discovery
- ICMPv6 Neighbor Solicitation Message
- Duplicate Address Detection
- Solicited-Node Multicast Address
- Duplicate Address Analyzed
- Neighbor Solicitation Message Process
- Host Neighbor Cache
- Host Neighbor Cache After Solicitation
- Neighbor Advertisement
- ICMPv6 Neighbor Advertisement Message
- Autoconfiguration Methods
- Router Solicitation
- ICMPv6 Router Solicitation Message
- Router Advertisement
- ICMPv6 Router Advertisement Message
- ICMPv6 Router Advertisement vs. DHCPv6
- Viewing a Router's Neighbor Cache Table
- SLAAC Flow Chart
- Viewing a Host Routing Table
- Viewing a Router's Neighbor Cache Table
- Configuring IPv6 on a Unix Workstation
- Unix Ifconfig Commands
- Common Unix Commands
- Configuring IPv6 on a MAC Workstation
- Operating Systems
- DHCPv6 Overview
- DHCPv4 and DHCPv6 Comparison
- DHCPv6 Relay Agent
- DHCPv6 08' Server Configuration
- ICMPv6 Redirect
- ICMPv6 Multicast Messages
- Fragmentation Service from the Source
- ICMPv6 MTU Path Discovery

- ICMPv6 Packet Too Big Error Message
- Windows Destination Cache Table
- Fragment Header o Fragment Offset Value

ICMPv6 Time Exceeded Destination Unreachable, etc.