

Course ID

IPV6-MW

Course Duration

2-4 days

Related

Courses

Course Title

IP Workshop: IPv4, IPv6, and Migration

- IPv6 Implementation Workshop (IP-IW, 2-4 days)
- Everything over IP (EoIP): Data, Voice, Video, Signaling and Telemetry over IPv4/IPv6 Networks (EOIP, 5 days)
- Multimedia Applications: IMS, SIP, and VoIP (MULTIMEDIA, 2 days)
- IMS: The Technology, Applications, and Challenges (IMS, 2 days)
- SIP Protocol, Architecture, and Design (SIP, 1 day)
- VoIP: Protocols, Design, and Implementation (VOIP, 2-3 days)
- NextGen Networks (NGN) Explained: For All Audiences (N-NGN, a half day e-learning course)
- MPLS Backbone: For Technical Audiences (N-MPLS, a one-day e-learning course)
- MPLS: Technology, Engineering, Applications, and QoS (MPLS10, 2-4 days)
- MPLS: Emerging Applications (MPLSEA, 2-3 days)
- IPTV: For All Audiences (N-IPTV, a half day e-learning course)

Aimed At

This course is aimed at I/T and telecom professionals who require a hands-on workshop to help them with IPv6 migration preceded by an up-front review of key IPv4 concepts.

Group Size

5-25

Prerequisites

You should have some prior knowledge of or on-the-job experience with IPv4.

**Course
in a Nutshell**

IPv6 overcomes some of the limitations of IPv4, such as the limited address space, while introducing a number of enhancements in areas such as routing and network auto-configuration. IPv6 is expected to gradually replace IPv4, with the two coexisting for a number of years. With IPv4 networks now migrating to IPv6 worldwide, there is need for a strong hands-on workshop focusing on the IPv6 migration. This course was designed to address that need.

This course is a sweeping start-to-finish introduction to Internet Protocol including both IPv4 and IPv6. The standard outline has been structured to emphasize the migration strategy for a simplified, flat backbone. However, the course can be customized to your own network's architecture and can exclude or include topics to cater to issues of interest to you now and in the near future. The instruction will employ a powerful combination of lecture and discussion led by a leading IP expert, hands-on lab work that will help you acquire job-specific analysis and trouble-

shooting skills, and a workshop day at the end of the course devoted to a full day of detail-level planning for migration to IPv6.

Customize It! Let us know your reason for studying IPv6 so we can customize the course to your specific needs.

If you do possess prior knowledge of IPv4, the IPv4 material can be omitted, resulting in some time savings. The course can also be shortened by excluding the migration planning that is included in the fourth day.

The course is normally taught workshop-style with the participants using WireShark to engage in hand-on exercises. The course can be optionally taught as a tutorial that does not include the hands-on work.

Course Outline

Day 1

IP Networking & IPv4

Introduction

- Packet Network Concepts
- OSI Model
- IETF Model
- IP Networks in Transition

IP Networks In Depth

Layer 1: The Physical Layer

- Circuits (General Concepts)
- Electrical Circuits
- Optical Circuits
- WDM
- SONET/SDH

Layer 2: The Data Link Layer

- Local Area Networks
- Network Access
- MAN
- WAN

Layer 3: The Network Layer

- Internet Protocol (IP)
- Internet Control Message Protocol (ICMP)
- Open Shortest Path First (OSPF) Routing Protocol
- Address Resolution Protocols (ARPs)

Layer 4: The Transport Layer

- Transmission Control Protocol (TCP)
- User Datagram Protocol (UDP)

Layer 5: Application Layer

- Hypertext Markup Language (HTML)
 - Hypertext Transport Protocol (HTTP)
 - File Transfer Protocol (FTP)
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- Remote Login (TELNET)
- Simple Mail Transport Protocol (SMTP)
- Other
- DNS / BIND
- DHCP
- Applications
 - Browsers
 - File Transfer Programs
 - Remote Login / Secure Shell (SSH)
 - eMail
 - Other
- "Dual Stack" Operations

Day 2

- IPv6 Protocol In Depth
 - w/comparison to IPv4
 - Addressing
 - Address Space
 - Address Allocation
 - Address Lifetime
 - Address Mask
 - Address Prefix
 - Address Resolution Protocol (ARP)
 - Address Scope
 - Address Types
 - Private and Public Addresses
 - Unspecified Address
 - Communications trace
 - Domain Name System (DNS)
 - DNS Discovery
 - DNS Assignment
 - Dynamic Host Configuration Protocol (DHCP)
 - DHCP in a Mobile IP Environment
 - File Transfer Protocol (FTP)
 - Fragments/Fragmentation
 - Host Table
 - Interface
 - Internet Control Message Protocol (ICMP)
 - Internet Group Management Protocol (IGMP)
 - IP header
 - IP header options
 - IP header protocol byte
 - IP header Type of Service (TOS) byte
 - Mobility Header and RFC 4283 Overview
 - LAN connection
 - Layer 2 Tunnel Protocol (L2TP)
 - Loopback address
 - Maximum Transmission Unit (MTU)

- Network Address Translation (NAT)
- Network Table
- Node Info Query
- Packet Filtering
- Packet Forwarding
- Packet Tunneling
- PING
- Point-to-Point Protocol (PPP)
- Ports
- Port restrictions
- Protocol Table
- Quality of Service (QOS)
- Renumbering
- Routes and Routing
- Routing Information Protocol (RIP)
- Services Table
- Simple Network Management Protocol (SNMP)
- Sockets API
- Source Address Selection
- Starting and Stopping
- Telnet
- Trace Route
- Transport Layers
- Virtual Private Networking (VPN)

IPv6 Protocol Lab

View, dissect and analyze a variety of IPv6 call traces with a protocol analyzer and answer questions about normal and abnormal protocol operation with a variety of higher layer protocols and network services.

LAB Debrief: Group Discussion

Day 3

IPv4 to IPv6 Migration Overview

- Migration and Interoperability Concerns

- Security Issues

- Tunnels

- IPv4/IPv6 Embedded Addresses

- Default Configured Tunnel

- Dual Stack Operation

NAT-PT Emphasis

- NAT-PT (RFC 2765, RFC 2766)

- Protocol Translation

- Address Translation

IPSec Architectural and Capabilities Overview

- IETF IPSec Roadmap

- IPSec Implementation

AH

ESP

IPSec Modes

Transport Mode

Transport Mode with NAT Traversal

Tunnel Mode

Security Associations (SAs)

IPSec Processing

Fragmentation

Internet Control Message Protocol (ICMP)

IPv6 Routing

IS-IS (RFC 1195)

Overview of the Protocol

Subnetwork Independent Functions

Subnetwork Dependent Functions

Structure and Encoding of PDUs

Encoding of IP-Specific Fields in IS-IS PDUs

OSPF for IPv6 (OSPFv3) (RFC 2740)

Differences from OSPF for IPv4

Implementation

OSPF data

Architectural

Configurable

Authentication/Confidentiality for OSPFv3 (RFC 4552)

Day 4: Migration Planning Workshop

The fourth day will be devoted to detail-level planning for migration to IPv6. This session will be conducted as a “chalk talk”, with a client-designated engineer to capture the information and put it into a final document. A review of the planning document will be provided upon your request at no additional cost.

How You Will Learn

- A highly qualified instructor, with expertise in a range of IP-based technologies, will present this course in workshop format.
- Along with the lecture, we will use hands-on exercises conducted using WireShark to help you better understand the course content and acquire analysis and trouble-shooting skills.
- The last-day of the course will consist of detailed migration planning for your own network.
- You will receive a printed Participant Handbook which will help you remember and retain what you learned in class and apply it on your job.

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