

Course ID

IPv6-IW

Course Duration

2-4 days

Related

Courses

Course Title

IPv6 Implementation Workshop

- IP Workshop: IPv4, IPv6, and Migration (IP-MW, 3-4 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 network design and architecture professionals with an average of 3-5 year experience who are migrating ISP access and backbone interconnection to IPv6.

Group Size

5-25

Prerequisites

Participants should have a solid understanding of IPv4 packet network architectures, operations and protocols. There is no coverage of IPv4 in this course. The only references to IPv4 are for purposes of comparison and understanding IPv6. To get the most from this course, participants should also have a working knowledge of WireShark.

**Course
in a Nutshell**

IPv6 is the NextGen protocol designed by the IETF to supplant IPv4, the version that has been in use for over two decades. 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.

The course provides an overview of RFC 3775, Mobility Support in IPv6, RFC 4283, Mobile Node Identifier Option for Mobile IPv6, RFC 4285, Authentication Protocol for Mobile IPv6, Dual Stack operation and supporting knowledge, and is customizable to include other topics that are relevant to your network's IPv6 migration.

Customize It!

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

If you do not possess prior knowledge of IPv4, the course can be expanded to cover the IPv4 basics upfront.

The course can be taught as an action learning workshop with the addition of a fourth day dedicated to the discussion of your particular implementation issues.

A two-day version of this course that covers the subject in less depth is also available.

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

Introduction: IP Networks in Transition

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

- 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 & 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)

- Mobility Support in IPv6
 - RFC 3775
 - Overview of MobileIPv6
 - RFC 4283 Mobile Node Identifier Option for Mobile IPv6 In Depth
 - Modifications to IPv6 Neighbor
 - Requirements for Types of IPv6 Nodes
 - Correspondent Node Operation
 - Home Agent Operation
 - Mobile Node Operation
 - Protocol Constants
 - Protocol Configuration Variables
 - IANA Considerations
 - New IPv6 Protocol, Message Types, and Destination Option
 - Mobile Node Identifier Option
 - MN-NAI Mobility Option
 - Processing Considerations
 - Security Considerations
 - General Considerations
 - MN-NAI Considerations

- Security Considerations for Mobile IPv6
 - Mobile IPv6 Security
 - RFC 4285 Authentication Protocol for Mobile IPv6
 - RFC 4285 MIP Authentication for IPv6
 - Overview
 - Terminology

Operational Flow
Mobility Message Authentication Option
MN-HA Mobility Message Authentication Option
Mobility Message Replay Protection Option
Dual Stack Operation

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)

IPv6 Market and Skill Sets

Hiring vs Training
Contracting
IPv6 ISP Advantage

Review and Conclusion

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 apply it to your job.
- The course can be optionally taught as a two-day tutorial (without the hands-on work) or four-day action learning program that includes a discussion of your implementation issues on the fourth day.
- 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.

Revised

June 6, 2011f