

# Implementing IPv6 (4 days)

How to plan and implement IPv6 in a multi-vendor, commercial environment

## Relevant Platforms:

- Cisco IOS
- Linux (all distributions)
- Unix
  - AIX
  - HP-UX
  - Solaris
- FreeBSD
- Windows
  - Windows 2000
  - Windows XP
  - Windows Server 2003
  - Windows Vista
  - Windows 7
  - Windows Server 2008 R2

## You will learn how to

- Plan and manage the migration of your network to IPv6
- Implement new networking software and devices to support IPv6
- Implement IPv6 auto-configuration and manage IPv6 addresses
- Configure IPv6 migration techniques on different platforms.
- Configure dual-stacks, 6to4, ISATAP and Teredo.
- Configure IPv6 on different platforms.
- Configure IPv6 enabled network services (e.g. DNS, DHCP and OSPFv3).
- IPv6 enable networking applications (e.g. Apache, ping, FTP and e-mail).

## Course Benefits

IPv6 is the result of many years of research and activity by the international Internet community. IPv6 provides increased addressing space, improved routing, better security and support for new applications.

The implementation of IPv6 is inevitable and will impact on all companies that maintain, implement or use IP networks.

In this course, you will learn how to obtain and implement IPv6 protocols within your organisation on Unix, Linux, Windows, Cisco routers and other networked devices. This course provides extensive hands-on sessions and in-depth technical analysis.

## Who Should Attend

This course is ideal for network administrators, network support personnel, network designers, networking consultants, IT managers and directors.

A good knowledge of general networking concepts is assumed. Experience of IPv4 is recommended.

## Course Contents

### The Need for IPv6

- History of IP
- The problems with IPv4
- The IPv4 header format
- Address space & functionality
- IPv4 Security and QoS

### The Features of IPv6

- IPv6 datagram header
- IPv6 addresses
- IPv6 address representation
- Multicast, unicast & anycast in IPv6
- IPv6 link-local addresses
- The IPv6 datagram format
- IPv6 extension headers
- ICMPv6

- IPv6 multicast group management

### Auto-configuration of IPv6

- Stateless & stateful
- Neighbour discovery in IPv6
- IPv6 router discovery
- DHCPv6
- Stateless DHCPv6
- IPv6 Router renumbering

### Internetworking IPv6

- IPv6 routing
- IPv6 routing tables
- MTU path discovery in IPv6
- IPv6 Neighbour reachability
- IPv6 Fragmentation

### IPv6 Dynamic Routing

- ICMPv6 redirects
- RIPng
- OSPFv3
- IS-IS and IPv6
- EIGRPv6
- BGP4 & IPv6
- IPv6 Multicast Routing
- IPv6 PIM
- BGMP and IPv6

### Interfacing IPv6 to the Lower Layers

- Data-link and physical layer
- Point to point and IPv6
- IPv6 over PPP
- NBMA networks and IPv6
- IPv6 over ATM
- IEEE802 and IPv6
- IPv6 in 3GPP and IMS
- MPLS and IPv6
- 6PE and 6VPN

### The Transport Layer and IPv6

- Operation of TCP and UDP
- Ports and sockets
- Changes to TCP for IPv6
- Changes to UDP for IPv6

### IPv6 Transition Mechanisms I

- Overview of IPv6 transition mechanisms
- IPv6 dual stacks
- IPv4 compatibility addresses
- 6over4
- 6to4
- Automatic and configured tunnelling
- ISATAP
- Teredo & DSTM
- IPv6 Tunnel brokers
- Tunnel setup protocol

### IPv6 Transition Mechanisms II

- Protocol translators
- SIIT
- TRT
- Application layer gateways
- NAT-PT & NAT-PT
- IPv6 SOCKS
- BIS and BIA
- Transition mechanisms and DNS

### IPv6 Security (IPSec)

- Cryptographic techniques
- IPv6 and IPSec
- IPv6 AH & ESP Headers
- Transport and tunnel modes
- Security associations
- ISAKMP & IKE

### Mobile IPv6

- Limitations of link layer mobility
- Mobile IPv4 vs Mobile IPv6

- Mobile IPv6 Home agents
- Binding updates & binding cache
- Mobile IPv6 in operation
- Mobile IPv6 Security
- NEMO

### IPv6 and Quality of Service

- Traffic class in IPv6
- The IPv6 Flow label
- Differential services (DiffServ)
- Integrated services (IntServ)
- Traffic flows in IPv6
- RSVP and IPv6 QoS

### DNS and IPv6

- Changes to DNS for IPv6
- IPv6 AAAA resource records
- PTR records and IPv6
- Reverse lookups in IPv6
- ip6.arpa. & ip6.int.
- IPv6 in BIND and MS DNS servers

### IPv6 Application Changes

- Basic Internet commands
- IPv6 ping, telnet and FTP
- Mail systems and IPv6
- IPv6 enabled web-servers

### The IPv6 Programming Interface

- IPv6 Programming Basics
- Socket Library Changes for IPv6
- IPv6 Code Migration Tools
- Sockets & Winsock APIs
- Perl, Java, C# support for IPv6

### Network Management and IPv6

- SNMP & IPv6
- The extended MIB for IPv6
- IPv6 Protocol Analysers
- Troubleshooting IPv6

### Migrating to IPv6

- What when and how to migrate to IPv6
- The current status of IPv6
- Operating systems and IPv6
- Business applications and IPv6

### Hands-on IPv6 Practicals

During the course there are many opportunities for hands-on work. Each module has detailed exercises or demonstrations associated with it. Practicals can be run on varied platforms including Linux, Windows and Cisco IOS.

Hands-on IPv6 practical exercises include:

- Upgrading and configuring IPv6
- Capturing and decoding IPv6 datagrams
- Network monitoring of IPv6
- Basic IPv6 configuration
- IPv6 router configuration
- Assigning IPv6 addresses
- Configuring IPv6 auto-configuration
- Configuring IPv6 dynamic routing
- Security configuration using IPv6 IPSec
- Configuring IPv6 transition mechanisms
- Configuring 6to4, ISATAP, Teredo, NAT-PT etc.
- Configuring and testing Mobile IPv6
- Examining QoS and IPv6
- Upgrading and configuring IPv6 DNS servers
- Configuring IPv6 applications and services

### The IPv6 Trainers

Trainers are practising IPv6 consultants with extensive experience of IPv6. Further information can be found at [www.erion.co.uk](http://www.erion.co.uk).