

# Implementing IPv6

(4 days)



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

## Relevant Platforms:

- Cisco IOS
- Juniper JunOS
- Linux (all distributions)
- Unix (HP-UX, AIX, Solaris)
- FreeBSD
- Windows

## You will learn how to

- Migrate your network to IPv6
- Manage the differences between IPv4 and 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 transition techniques including; dual-stacks, 6to4, ISATAP and Teredo.
- Configure IPv6 on different platforms
- Configure IPv6 enabled network services (e.g. DNS, DHCPv6, OSPFv3 and BGP)
- 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, new features and support for transition from IPv4.

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 and related protocols within your organisation on Unix, Linux, Windows, Cisco, Juniper 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
- Reality Check: IPv6 vs IPv4

### The Features of IPv6 I

- IPv6 datagram format and header
- IPv6 extension headers
- Hop-by-hop and destination options
- Routing header, fragmentation header
- Mobility header and No next header
- IPv6 addresses
- IPv6 address representation
- Unicast Multicast & Anycast in IPv6
- Link local, site local and unique local addresses

### The Features of IPv6 II

- Summary of the new features of IPv6
- ICMPv6
- Path MTU discovery (PMTU)
- IPv6 multicast group management
- MLD and MLDv2

### Auto-configuration of IPv6 I

- Autoconfiguration methods
- Choosing the interface identifier
- Modified EUI-64
- CGA, HBA, Privacy and Temporary Addresses
- Neighbour discovery in IPv6 (NDP)
- IPv6 router discovery (RS and RA)
- IPv6 Router renumbering

### Auto-configuration of IPv6 II

- DHCPv6
- DHCPv6 Relay Agents
- DUIDs and IADs
- Stateless DHCPv6
- DHCPv6 prefix delegation (PD)

### Internetworking IPv6

- IPv6 routing and IPv6 routing tables
- IPv6 default routes

### IPv6 Dynamic Routing

- ICMPv6 redirects
- RIPng
- OSPFv3
- IS-IS and IPv6
- EIGRPv6
- BGP4 & IPv6
- IPv6 multicast dynamic routing
- IPv6 PIM

### Interfacing IPv6 to the Lower Layers

- The Data-link and the physical layer
- Point to point and IPv6
- IPv6 over PPP
- NBMA networks and IPv6
- IPv6 over ATM
- IEEE802 and IPv6
- IPv6 in 3G, 4G, LTE and IMS
- MPLS and IPv6
- 6PE and 6VPE
- RADIUS and IPv6

### The Transport Layer and IPv6

- Operation of TCP and UDP
- 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
- Automatic and configured tunnelling
- 6over4 and 6to4
- 6rd - IPv6 rapid deployment
- ISATAP
- Teredo
- Dual stack lite (DSLite)
- Dual stack transition mechanism
- IPv6 Tunnel brokers
- Tunnel setup protocol

### IPv6 Transition Mechanisms II

- Protocol translators
- SIIT
- Application layer gateways
- NAT64 and DNS64
- NAT-PT & NAPT-PT
- TRT
- 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

- 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
- Historic DNS support for IPv6
- IPv6 AAAA resource records
- PTR records and IPv6
- Reverse lookups in IPv6
- ip6.arpa. & ip6.int.

### 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 Practical Labs

Each module includes detailed exercises.

Hands-on IPv6 practical exercises include:

- Installing and configuring IPv6
- Capturing and decoding IPv6 datagrams
- Basic IPv6 operation
- IPv6 router configuration
- Assigning IPv6 addresses
- Configuring IPv6 auto-configuration
- Configuring and using DHCPv6
- IPv6 dynamic routing (OSPFv3 & BGP)
- Security configuration using IPv6 IPsec
- Configuring IPv6 transition mechanisms
- Configuring 6to4, ISATAP, Teredo, NAT64 etc.
- Configuring and testing Mobile IPv6
- Examining QoS and IPv6
- Network monitoring of 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).

Erion is the world's leading IPv6 training company.