Advanced IPv6 Migration

Course Summary

Description

The advanced IPv6 class designed for students that already possess introduction skills and have a good foundation knowledge of IPv6. This hands-on course covers all you need to know about IPv6 migration and deployment strategies. You will gain an understanding of how deploy IPv6 using both stateless and stateful auto-configuration techniques. Configure Advanced OSPF, EIGRPv6, IS-IS and MP-BGP routing protocols. Configure a live MPLS 6PE network while tunneling IPv6 over an IPv4 network. Discuss different IPv6 security vulnerabilities and current security issues.

Objectives
At the end of this course, students will be able to:

- Understand DHCPv6 along with hands-on labs demonstrating deployment of DHCPv6 within a company's intranet.
- Understand interior routing protocol EIGRPv6, OSPFv3 and IS-ISv6 in a real world lab deployment.
- Understand exterior routing protocol BGP4+ and how it integrates with IPv4 along with its IPv6 deployment.
- Configure an 6PE, MPLS network to forward traffic over an IPv4 ISP
- Configure a multicast network to route IPv6 traffic using IPv6 MLD and PIM-SM
- Understand advanced deployment methods are covered using DS-LITE, NAT64, DNS64 and 6rd (Rapid Deployment).

Topics

- Advanced Addressing Methods
- IGRPv6
- Advanced OSPFv3
- DHCPv6
- IPv6 Multicast Routing
- Advanced BGP4+
- MPLS for IPv6

- IPv6 Security
- Advanced Reflexive ACLs
- IPv6 Mobility Deployment
- Advanced IS-IS
- HSRPv2 Deployment for IPv6
- Broadband ISP Deployment
- Advanced Deployment Methods

Audience

Networking professionals who are migrating from an IPv4 to IPv6-based network environment and require a thorough understanding of how to implement IPv6 Professionals requiring the knowledge to implement both interior and exterior protocols for IPv6 only and dual-stack methods of deploying IPv6 over an existing IPv4 backbone network using different tunneling and encapsulating technologies. MPLS and 6PE is discussed as a cost-effective way to migrate any ISP for supporting IPv6 over their MPLS backbone.

Prerequisites

Before taking this course, students should take ProTech's Introduction to IPv6 course.

Duration

Four days

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Course Outline

I. Advanced Addressing Methods
  A. Issues with prefixes longer than: :/64
  B. Prefix assignment of: :/128
  C. Static IPv6 assignment
  D. Anycast address deployment
  E. Loopback address assignment
  F. Sub-interfacing using IPv6
  G. Preferred global and temporary addressing
  H. Advanced subnetting

II. EIGRPv6
  A. EIGRPv6 Overview
  B. Unicast-Routing
  C. Neighbor Discovery
  D. Hello Message
  E. EIGRPv6 configuration example
  F. Routing table
  G. Authentication
  H. Summarization

III. Advanced OSPFv3
  A. OSPFv3 Overview
  B. LSA Types
  C. LSA 1-5
  D. New type 8
  E. New type 9
  F. Area Types
  G. Stub Area
  H. Totally Stubby
  I. Not-So-Stubby Area
  J. Dual ABR
  K. Setting Preferred Metric Cost
  L. IPSec Authentication
  M. Configuring IPSec authentication
  N. IPv6 Area Route Summarization

IV. DHCPv6
  A. DHCPv6 overview
  B. Configuring router flags
  C. Configuring XP for DHCPv6
  D. Configuring Windows 7 for DHCPv6
  E. Configuring Linux for DHCPv6
  F. 2008 (R2) DHCPv6 Server
  G. Router client DHCPv6 support
  H. DHCPv6 IP helper

V. IPv6 Multicast Routing
  A. Multicast Listener Query
  B. Multicast Listener Report
  C. Multicast Listener Done
  D. IPv6 PIM-DM
  E. IPv6 PIM-SM

VI. Advanced BGP4+
  A. Overview
  B. Neighbor Relationship
  C. IBGP Full-Meshing
  D. GRE Tunneling
  E. IPv6 Internal Routing
  F. MED Announcements
  G. Peer Group Configuration
  H. Route Redistribution
  I. Route Maps
  J. BGP Configuration Example

VII. MPLS for IPv6
  A. MPLS Overview
  B. RIB, FIB, LIB, LFIB
  C. MPLS Label Header
  D. MPLS Labeling
  E. MPLS Route Tagging
  F. VRF, Route Targets
  G. Route Distinguisher
  H. 6PE Overview
  I. IPv6 Route Distinguisher
  J. 6PE Traffic Flow
  K. IPv6 MPLS Configuration Example

VIII. IPv6 Security
  A. Security Overview
  B. Hacker Types
  C. Assessing your Threats
  D. CIA Triad
  E. 802.1x
  F. IPSec
  G. Distribute List
  H. ACL
  I. Hacker Threats for IPv6
  J. Neighbor Discovery
  K. DHCPv6
  L. Denial of Service
  M. Neighbor spoofing attack
  N. Neighbor poisoning
  O. ICMPv6 Attacks
  P. Anycast threat

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Course Outline (cont'd)

IX. **Advanced Reflexive ACLs**
   A. IPv6 ACL Overview
   B. Reflexive ACL
   C. Reflexive ACL Configuration Example

X. **IPv6 Mobility Deployment**
   A. Home Agent
   B. Home Address
   C. Care-of-Address
   D. Binding Agent
   E. Triangular Routing, Route Optimization
   F. Route Caching
   G. Roaming Mobility
   H. Home Agent Discovery
   I. HoTI, CoTI, HOT
   J. NEMO
   K. Mobile IPv6 Deployment Examples

XI. **Advanced IS-IS**
   A. IS-ISv6 Overview
   B. S-IS Areas
   C. L1, L2 Databases
   D. Summarization
   E. Configuration Examples
   F. NAT-PT
   G. 6PE
   H. 6VPE

XII. **HSRPv2 Deployment for IPv6**
   A. HSRP Overview
   B. HSRP Addressing
   C. HSRP Configuration
   D. Router Solicitation using HSRP
   E. Default Gateway Issue
   F. Link-Local Addressing
   G. Viewing Configuration Results
   H. HSRP Preempt Command

XIII. **Broadband ISP Deployment**
XIV. How Cable TV Works
XV. Cable Signaling
XVI. Cable Network Overview
XVII.   Cable Network Diagram
XVIII.   Bridge CM and CMTS
XIX. Bridge CM and CMTS Network Diagram
XX. Routed CMTS Network
XXI. DOCSIS Standards
XXII.   DOCSIS 1.0
XXIII.   DOCSIS 1.x
XXIV.   DOCSIS 2.0
XXV.   DOCSIS 3.0
XXVI.   IPv6 Deployment in a Broadband Network
XXVII.   IPv4 Address Depletion
XXVIII.   Broadband Equipment

XXIX. **Advanced Deployment Methods**
XXX.   IPv6 Tunneling Methods
XXXI.   NAT-PT
XXXII.   6to4 Manual
XXXIII.   6to4 Automatic
XXXIV.   ISATAP
XXXV.   Teredo
XXXVI.   Connecting to IPv6 network
XXXVII.   ISP Carrier Deployment
XXXVIII. Carrier Options
XXXIX.   NAT44
XL. NAT444
XLI. LSN, CGN and NAT464
XLII.   DS-Lite
XLIII.   NAT64
XLIV.   DNS64
XLV.   NAT64 and DNS64 Illustrated
XLVI.   Government Mandate
XLVII.   Carrier Deployment Methods
XLVIII.   CGv6, CRS-1 and CGSE

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Course Outline (cont'd)

Advanced IPv6 Labs

Lab 1: Initial Dual Stack Network Configuration
- Configure dual stacks on router
- Configure DNS for name and address resolution
- Configure host workstation for dual stack

Lab 2: EIGRPv6 Configuration
- Configure Cisco's EIGRPv6 routing protocol
- Deploy EIGRPv6 protocol
- Configure both summarization and password authentication

Lab 3: Configuring OSPFv3 Areas
- Advanced IPv6 Area Summarizations
- Creating Dual ABR Routers
- Configure Router Summarizations
- Configure Totally Stubby Areas

Lab 4: DHCPv6 Deployment
- Deploy DHCPv6 in a Windows 7 network
- Use Incognito server for DHCPv6
- Configure Cisco routers to forward DHCPv6 request

Lab 5: Multicasting Using IPv6
- Configure PIM-SM for IPv6 multicasting
- Send and receive multicast video over IPv6 network

Lab 6: Initial BGP4+ Configuration
- BGP4+ Deployment
- IBGP and EBGP Peering
- Test and verify proper BGP configuration
- Configure IPv6 Route Map
- Configure IPv6 Distribute List

Lab 7: BGP4+ Route Policy Configuration
- Configure a BGP route policy
- Test route policy for proper configuration

Lab 8: BGP Weight Values
- Configure weight values to control local BGP routing
- Test BGP weight value for proper configuration

Lab 9: Initial MPLS Configuration
- Configure an MPLS Dual-Stack Deployment
- Test proper MPLS tagging operation

Lab 10: MPLS 6PE Configuration
- Configure 6PE routers for MPLS tagging
- View and test MPLS "P" routers for proper tagging operation

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Lab 11: Configuring IPv6 IS-IS
- Configure IS-IS to route IPv6
- View both L1 and L2 route tables
- Verify proper operation using show commands

Lab 12: Configuring HSRP Protocol
- Configure and test HSRP protocol operation
- Work in pairs to test HSRP redundancy