



CCIE Service Provider v4 Advanced Technologies Class Introduction

Instructor Introduction

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- CCIE Routing and Switching - 2002
- CCIE Service Provider - 2006
- CCIE Security - 2007
- CCDE - 2013
- CCIE Data Center - 2013



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Online Classroom Overview

» Adjusting your bandwidth

- HD button on bottom right of player adjusts stream

» Using the Q&A session

- All questions are submitted to me privately
- Questions relevant to everyone will be posted publicly

» Course Files

- Slides, diagrams, etc. posted in link above Q&A session

» Course is recorded

- Recordings will be available after post-processing

Course Timing

- » Start at 08:00 PDT (15:00 UTC) daily
- » ~ 15 minute breaks hourly
- » Class days will typically run about 5 hours
- » Course will likely run beyond 5 days
 - Depends on length of demos, questions, etc.
 - More info on specific topic schedule later

Today's Agenda

- » Advanced Technologies Class Overview
- » SPv4 Blueprint Changes
- » SPv4 Topology Specification
- » Technical Topics

What is the Advanced Technologies Class?

» Objective is to learn a structured approach for...

- Configuration
- Verification
- Troubleshooting

» Class is a mix of...

- Technology explanations
- Hands-on live examples
 - Not pre-scripted
 - Troubleshooting is half the fun 😊

Course Prerequisites

» Working knowledge of...

- IGP Routing
 - IPv4, IPv6, OSPFv2/v3, IS-IS, EIGRP, RIP
- BGP Routing
- Basic MPLS
 - LDP, L3VPN, etc.
- Multicast
 - Intra-AS IPv4 Multicast

» Previous IOS XR experience not required

Course Flow

- » Introduction
- » IOS XR Overview
- » Core IGP Routing
 - OSPFv2/v3 & IS-IS
- » Core MPLS
- » Core BGP

Course Flow (cont.)

- » Intra-AS MPLS L3VPN
- » Inter-AS MPLS L3VPN
- » Intra-AS MPLS L2VPN
- » Inter-AS MPLS L2VPN

Course Flow (cont.)

- » Multicast over MPLS VPN
- » MPLS Traffic Engineering
- » MPLS QoS
- » MPLS Security & Services

CCIE Service Provider v4 Blueprint

» Written exam blueprint

- <http://www.cisco.com/go/ccie> > Service Provider > Written Exam v4.0 Information

» Lab exam blueprint

- <http://www.cisco.com/go/ccie> > Service Provider > Lab Exam v4.0 Information

Six SPv4 Topic Domains

- » All topic domains cover both IPv4 and IPv6
- » SP Architecture and Evolution
 - Device roles (P, PE, CE), XR architecture, platform virtualization
- » Core Routing
 - OSPFv2/v3, IS-IS, BGP, MPLS, TE, Multicast, QoS
- » Service Provider-Based Services
 - MPLS L2VPN, MPLS L3VPN, Overlay VPNs, Internet Service

Six SPv4 Topic Domains (cont.)

» Access and Aggregation

- PE-CE Routing/QoS/Multicast

» High Availability and Fast Convergence

- FRR, LFA, BGP PIC, LDP Session Protection

» SP Security, SP Operation and Management

- CoPP, Control Plane Authentication & Filtering, NetFlow, SNMP

SPv3 to SPv4 Blueprint Changes

» Key topics removed

- Packet over SONET (PoS)
- Serial (T1/E1 & T3/E3)
- Frame Relay
- ATM

SPv3 to SPv4 Blueprint Changes

» Key topics added

- PBB MAC in MAC (802.1ah)
- Resilient Ethernet Protocol (REP)
- Multicast Label Distribution Protocol (mLDP)
- Point-to-Multipoint Traffic Engineering (P2MP TE)
- Unified MPLS (Seamless MPLS)
- Ethernet VPN (EVPN)
- Provider Backbone Bridging EVPN (PBB-EVPN)
- Locator/ID Separation Protocol (LISP)
- mGRE (DMVPN)
- IPv6 NAT44/NAT64/6RD
- MPLS OAM & Ethernet OAM

SPv4 Exam Format Changes

» Previous SPv3 format

- Single 8 hour configuration section
- Troubleshooting built into initial configs

» New SPv4 format

- Three separate modules
 - Troubleshooting
 - Diagnostic
 - Configuration

SPv4 Troubleshooting Module

» 2 – 2.5 hours

- 30 minutes may be deducted from configuration

» ~ 10 troubleshooting tickets

- 2 – 4 apiece
- Tickets are independent of each other
- Large topology separate from configuration

SPv4 Diagnostic Module

- » 1 hour fixed
- » ~ 3 tickets of ~ 4 questions apiece
 - Where is the problem occurring?
 - What is the cause of the problem?
 - What information do we need to correctly diagnose the problem?
- » Quickly sorting through the information is key for time management
 - Incident reports, show outputs, packet captures, etc.

SPv4 Configuration Module

» 4.5 – 5 hours

- 30 minutes may be assigned to Troubleshooting

» Similar to v3 exam format

- Large topology
- Lots of interdependencies
- Time management is key

Recommended Resources

» Recommended Books

- IP Routing on Cisco IOS, IOS XE, and IOS XR
- MPLS-Enabled Applications: Emerging Developments and New Technologies
- MPLS Configuration on Cisco IOS Software
- Interdomain Multicast Routing : Practical Juniper Networks and Cisco Systems Solutions

Recommended Resources

» Cisco Live Presentations

- BRKSPG-2904 - ASR-9000/IOS-XR Understanding forwarding, troubleshooting the system and XR operations
- BRKSPG-2724 - Network Function Virtualization (NFV) using IOS-XR
- BRKSPG-2051 - Evolution of Service Provider Edge Architectures
- BRKSPG-2202 - Deploying Carrier Ethernet Services on ASR 9000

Recommended Resources

» Cisco Live Presentations (cont.)

- BRKSPG-2209 - Designing Access Network With the ME3600X and ME3800X
- BRKSPG-2402 - Best Practices to Deploy High-Availability in Service Provider Edge and Aggregation Architectures
- BRKSPM-2008 - Unified MPLS Design and Deployment Case Study for Mobile Service Provider
- BRKIPM-3111 - Multipoint LDP
- BRKMPL-2333 - E-VPN & PBB-EVPN: the Next Generation of MPLS-based L2VPN

Recommended Resources

» Documentation

- www.cisco.com > Support > Configure
- Technology
 - FAQs
 - Standards
 - White Papers
 - Design Guides
 - Config Examples
- Products
 - Configuration Guides
 - Command Reference

INE's SPv4 Hardware Specification

» Previous INE SPv3 Spec

- 8 x IOS Routers w/ 12.2SRE
- 2 x IOS XR Routers w/ 3.9.1
- 2 x Catalyst ME Switches w/ 12.2SE

» INE's New SPv4 Spec

- 10 x CSR1000v Routers w/ 3.14S (15.5S)
- 4 x XRv Routers with w/ 5.2.0

Building INE's SPv4 Topology

» Virtual options

- VIRL
- GNS3
- VMware ESXi

» Physical options

- ASR 9000 w/ IOS XR 5.2
- ASR 1000 w/ IOS XE 3.13S (15.4(3)S)
- 7600 w/ 15.5(3)S
- ME 3600 w/ 15.5(3)S

Q&A