Implementing Cisco Service Provider Advanced Routing Solutions

Duration: 5 Days **Course Code: SPRI** **Version: 2.0**

Overview:

The **Implementing Cisco Service Provider Advanced Routing Solutions (SPRI) course** covers the theories and practices required to integrate advanced routing technologies into Service Provider Networks. This includes routing protocols, multicast routing, policy language, Multiprotocol Label Switching (MPLS), and segment routing.

This course is worth 37 Continuing Education (CE) Credits.

Target Audience:

Engineers who maintain and operate advanced Service Provider core networks.

Objectives:

- **After completing this course you should be able to:**
- Configure multiarea OSPF
- Configure OSPF special area types and optimization features
- Configure IS-IS multilevel networks and optimization features
- Configure BGP to influence outbound and inbound BGP route selection
- Implement BGP route reflectors and confederations
- Describe the main characteristics of routing protocol tools that are used in service provider environments
- Implement the Routing Policy Language
- Configure route redistribution
- Troubleshoot routing protocols in the service provider network
- Describe, implement, and troubleshoot MPLS in service provider network
- Describe and implement segment routing technology
- Introduce and implement segment routing IPv6
- Implement BGP security options
- Implement advanced features to improve convergence in BGP networks
- Implement Topology Independent Loop-Free Alternate (TI-LFA)
- Describe Cisco MPLS traffic engineering
- Describe how traffic engineering is used in segment routing networks
- Implement and configure advanced SR-TE features
- Implement IPv6 tunneling mechanisms
- Describe IP multicast concepts and technologies
- Implement and verifying the PM-SM protocol
- Implement enhanced PIM-SM features
- Implement MSDP in the interdomain environment
- Implement mechanisms for dynamic RP distribution

Prerequisites:

Attendees should meet the following prerequisites:

- Intermediate to advanced knowledge of Cisco Internetwork Operating System (Cisco IOS®) or IOS XE and Cisco IOS XR Software configuration
- Knowledge of IPv4 and IPv6 TCP/IP networking
- Intermediate knowledge of BGP, OSPF, and ISIS routing

Testing and Certification

Recommended as preparation for the following exams:

- **300-510 -** Implmenting Cisco Service Provider Advanced Routing Solutions (SPRI) exam

Passing the **300-510** SPRI exam earns you the Cisco Certified Specialist - Service Provider Advanced Routing Implementation certification, and satisfies the concentration exam requirement for the

protocols
- Understanding of MPLS technologies
- Understanding of multicast technologies
- Familiarity with segment routing
- CCNA - Implementing and Administering Cisco Solutions
- PRNE-CPLL - Programming for Network Engineers - CPLL
- SPCOR - Implementing and Operating Cisco Service Provider Network Core Technologies

CCNP Service Provider certification.

Content:

Configure OSPF Multiarea Networks

- Multiarea OSPF Overview
- Configure Multiarea OSPF
- OSPF Area and LSA Types
- Watch and Learn: Multiarea OSPF Overview
- OSPFv2 Path Selection
- Configure OPSFv2 Path Selection
- Configure OSPFv2 Cost
- OSPFv3 Overview
- Configure OSPFv3

Configure OSPF Special Area Types

- OSPF Stubby Area Types Overview
- Configure OSPF Stubby Area Types
- OSPF NSSA Area Types Overview
- Configure OSPF NSSA Area Types
- Watch and Learn: OSPF Stubby Area Types Overview

Configure OSPF Optimization Features

- OSPFv2 Summarization Overview
- Configure OSPFv2 Summarization
- OSPF Fast Convergence Overview
- Configure OSPF Timers
- Configure OSPF BFD
- Watch and Learn : OSPFv2 Summarization Overview

Configure IS-IS Multilevel Networks

- IS-IS Interlevel Routing Overview
- Configure IS-IS Interlevel Routing
- Configure IS-IS Route Leaking
- Configure IS-IS Prefix Suppression
- IS-IS Path Selection
- Configure IS-IS Metric
- IS-IS for IPv6 Overview
- Configure IS-IS for IPv6
- Watch and Learn IS-IS Interlevel Routing Overview

Configure IS-IS Optimization Features

- IS-IS Summarization Overview
- Configure IS-IS Summarization
- IS-IS Fast Convergence Overview
- Watch and Learn: IS-IS Fast Convergence Overview

Introducing Routing Protocols

- Routing Protocol Tools Overview
- Routing Protocols Filtering Examples and Objectives
- Autonomous System Path ACL
- Autonomous System Path Access List Overview
- Configure Autonomous System Path Access List
- Route Maps Overview

Troubleshooting Routing Protocols

- Methodologies Overview
- Tools Overview
- OSPF Adjacencies
- OSPF Routes
- IS-IS Adjacencies
- IS-IS Routes
- BGP Peers
- BGP Routes

Improving BGP Convergence and Implementing Advanced Operations

- BGP Route Flap Dampening Overview
- Implementing BGP Route Flap Dampening
- BGP Convergence Features Overview
- Improving BGP Convergence
- Path MTU Discovery Overview
- Input Queue Depth Overview
- Cisco Nonstop Forwarding and Routing Overview
- BGP Dynamic Neighbors Overview

Multiprotocol Label Switching

- Forwarding Structures Overview
- Label-Switching Path Overview
- Label Management in LDP
- Follow Packet Propagation Across an MPLS Domain
- Impact of IP Aggregation on LSPs
- Forwarding Operations
- Loop Detection Using the MPLS TTL Field
- Modify TTL Propagation
- Examine Convergence Process
- Examine Link Recovery Convergence Process

Cisco MPLS Traffic Engineering

- Packet Forwarding Overview
- RSVP Path Setup Overview
- Traffic Forwarding Overview
- Attributes
- Affinity Bits
- Path Setup, Computation and Optimization

Troubleshooting MPLS

- MPLS Troubleshooting Overview
- MPLS Troubleshooting Scenarios

Segment Routing

- Segment Routing Overview
- Segment Types
- Segment Routing Labels Overview
- Routing Protocol Extensions for Segment Routing

Advanced Segment Routing Traffic Engineering Features

- Performance Measurement Overview
- Configuring Performance Measurement
- Verifying Performance Measurement
- On-Demand Next Hop Overview
- Implementing ODN
- BGP SR-TE
- Flexible Algorithm Overview
- Implementing Flexible Algorithm

Securing BGP

- Service Provider Environment Threats
- BGP Threat Countermeasures
- BGP Route Limiting
- BGP Neighbor Authentication
- BGP TTL Security
- CoPP and LPTS
- Remote-Triggered Black-Hole Filtering
- BGP FlowSpec

Deploying IPv6 Tunnelling Mechanisms

- IPv6 Tunnelling Mechanisms
- GRE Tunnels
- 6in4 Tunnels
- 6to4 Automatic Tunnels
- NAT64 Overview
- MAP-T Overview
- Using layer 2 MPLS VPNs to Support IPv6
- Using Cisco 6VPE to Support IPv6

IP Multicast Concepts and Technologies

- Multicast Overview
- IP Multicast Addresses
- Multicast Distribution Tree
- Multicast Group Management Protocols
- ASM Versus SSM Comparison
- Intradomain and Interdomain Multicast Routing Protocols
- Multicast IP Layer 3 to Layer 2 Mapping
- IGMP and PIM Snooping
- Multipoint LDP Overview

Implementing PIM-SM Protocol

- PIM-SM Overview
- PIM-SM Packets and State
- PIM-SM Receiver Joining a Shared Tree
- PIM-SM Source Recognition
- PIM-SM SPT Switchover Process
- PIM-SM Shared Tree Pruning Overview
- Configuring and Verifying PIM-SM

Implementing PIM-SM Enhancements

- SSM Overview
- Configuring SSM
- Bidirectional PIM Overview
- Configuring Bidirectional PIM

- Configure Route Maps

Introducing Routing Policy Language

- Routing Policy Language Overview
- Routing Policy Language Syntax
- Describe and Configure RPL Attributes and Parameters
- RPL Attributes and Parameters Use Cases
- RPL Parameterization Overview
- Value Sets Overview
- Configure Autonomous System Path Sets
- Configure Community Sets
- Configure Prefix Sets
- Routing Policies Application Overview
- Routing Policies Troubleshooting
- Route Maps to Routing Policies Translation

Influencing Outbound BGP Route Selection

- BGP Weight Overview
- Configure BGP Weight
- BGP Local Preference Overview
- Modify BGP Local Preference
- Watch and Learn: BGP Local Preference

Influencing Inbound BGP Route Selection

- Autonomous System Path Prepending Overview
- Implement Autonomous System Path Prepending
- BGP Multi-Exit Discriminators Overview
- Implement BGP Multi-Exit Discriminators
- BGP Communities Overview
- Implement BGP Communities
- Multihomed Customer Connectivity to ISPs
- Configure Multihomed Customer Primary and Backup Scenario
- Configure Multihomed Customer Load Sharing Scenario

Scaling BGP in Service Provider Networks

- Scalable IBGP Solutions Overview
- BGP Split-Horizon Rule Overview
- BGP Route Reflectors Overview
- Implement BGP Route Reflectors
- BGP Confederations Overview
- Implement BGP Confederations

Implementing Route Redistribution

- Route Redistribution Overview
- Seed Metrics
- Implementation Considerations
- Implementation
- Administrative Distance Overview
- Modify Administrative Distance
- Prevent Routing Loops Redistribution
- Prefix and Adjacency Segment Identifiers
- LDP Interworking Concepts
- FIB Programming Overview
- Migration from LDP

Implementing Segment Routing

- Configure and Verify Segment Routing IS-IS
- Configure and Verify Segment Routing OSPF
- Configure and Verify Segment Routing BGP
- Mapping Server Overview
- Implement Mapping Server
- Implement Tree-SID

Segment Routing for IPv6

- SRv6 Overview
- Header Formats
- Node Roles
- Segment Formats
- Endpoint Behaviors
- Micro-Segments

Implementing Segment Routing for IPv6

- Configure and Verify SRv6 Extension
- Configure and Verify IS-IS for SRv6
- Configure and Verify BGP Service for SRv6
- Configure and Verify MP-BGP for SRv6

Segment Routing TI-LFA

- TI-LFA Overview
- P and Q Spaces Overview
- Zero-Segment Implementation
- Single-Segment Implementation
- Double-Segment Implementation
- TI-LFA for LDP Overview
- Verifying TI-LFA for LDP

Segment Routing Traffic Engineering

- Concepts and Components
- RSVP-TE Comparison
- Policy Overview
- Distributed and Centralized Policies
- Configuring Segment Routing Policy
- Traffic Steering Overview
- Implementing SR-TE Automate
- PCE-Based Paths Overview
- Implementing PCE and BGP-LS
- SRLG Overview
- Implementing SRLG

Implementing Interdomain IP Multicast

- Multicast Service Provider Requirements
- SSM Interdomain Overview
- Implementing MP-BGP Multicast
- Configuring PIM and IGMPv3
- ASM Interdomain
- MSDP Overview
- Implementing MSDP

Implementing MPLS

- MPLS Implementation Overview
- Configure Basic MPLS
- Configure MPLS MTU
- Modify IP TTL Propagation
- Customize LDP Configuration
- Control LDP Label Advertisement
- MPLS Verification
- Unified MPLS Overview
- Configure Unified MPLS

Implementing Distributed Rendezvous Point Solution in Multicast Network

- Static vs. Dynamic Discovery and RP Placement
- Auto-RP Overview
- Implementing Auto-RP
- Bootstrap Router Overview
- Configuring a Bootstrap Router
- Anycast RP Overview
- Configuring Anycast RP
- Understanding Phantom RP

Labs

- Discovery Lab 1: Implement OSPF Special Area Types (IPv4 and IPv6)
- Discovery Lab 2: Implement OSPF Route Summarization (IPv4 and IPv6)
- Discovery Lab 3: Implement Multiarea IS-IS
- Discovery Lab 4: Implement IS-IS Route Summarization
- Discovery Lab 5: Implement Outbound BGP Route Selection
- Discovery Lab 6: Implement Inbound BGP Route Selection
- Discovery Lab 7: Implement BGP Route Reflectors
- Discovery Lab 8: Implement Route Redistribution
- Discovery Lab 9: Troubleshoot Routing Protocols
- Discovery Lab 10: Configure and Verify IGP Segment Routing
- Discovery Lab 11: Configure and Verify SRv6
- Discovery Lab 12: Configure and Verify SR TI-LFA Using OSPF
- Discovery Lab 13: Configure and Verify SR TI-LFA Using IS-IS
- Discovery Lab 14: Configure and Verify

SR-TE Using OSPF
- Discovery Lab 15: Configure and Verify SR-TE Using IS-IS
- Discovery Lab 16: Configure and Verify ODN and Flexible Algorithm
- Discovery Lab 17: Implement BGP Security Options
- Discovery Lab 18: Implement Tunnels for IPv6
- Discovery Lab 19: Enable and Optimize PIM-SM
- Discovery Lab 20: Implement PIM-SM Enhancements
- Discovery Lab 21: Implement MPLS in the Service Provider Core
- Discovery Lab 22: Implement Rendezvous Point Distribution

Further Information:

For More information, or to book your course, please call us on 00 20 (0) 2 2269 1982 or 16142

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