# *Advanced Junos Service Provider Routing* (AJSPR)

## Course Level
*Advanced Junos Service Provider Routing* (AJSPR) is an advanced-level course.

## Intended Audience
This course benefits individuals responsible for implementing, monitoring, and troubleshooting Layer 3 components of a service provider's network.

## Prerequisites
Students should have intermediate-level networking knowledge and an understanding of the Open Systems Interconnection (OSI) model and the TCP/IP protocol suite. Students should also attend the *Introduction to the Junos Operating System* (IJOS) and *Junos Intermediate Routing* (JIR) courses prior to attending this class.

## Objectives
After successfully completing this course, you should be able to:

- Describe the various OSPF link-state advertisement (LSA) types.
- Explain the flooding of LSAs in an OSPF network.
- Describe the shortest-path-first (SPF) algorithm.
- Explain OSPF link metrics.
- Describe the various OSPF authentication methods.
- Explain the key differences between OSPFv2 and OSPFv3.
- Describe OSPF area types and operations.
- Configure various OSPF area types.
- Summarize and restrict routes.
- Configure OSPF multi-area adjacencies.
- Configure OSPF virtual links.
- Explain OSPF external reachability.
- List useful commands that are used to troubleshoot and verify OSPF.
- Isolate different OSPF issues.
- Explain the concepts and operation of IS-IS.
- Describe various IS-IS link-state protocol data unit (LSP) types.
- List IS-IS adjacency rules and troubleshoot common adjacency issues.
- Configure and monitor IS-IS.
- Display and interpret the link-state database (LSDB).
- Perform advanced IS-IS configuration options.
- Implement IS-IS routing policy.
- Explain the default operation in multilevel IS-IS.
- Describe address summarization methods used in IS-IS.
- Configure and monitor a multilevel IS-IS network.
- List useful commands to troubleshoot and verify IS-IS problems.
- Troubleshoot and isolate different IS-IS issues.
- Describe basic BGP operation.
- List common BGP attributes.
- Explain the route selection process for BGP.
- Describe how to alter the route selection process.
- Configure some advanced options for BGP peers.
- Explain how policies function in BGP.

- Describe BGP attributes and explain how these attributes can be used to manipulate traffic.
- Show how Regex can be used in policies to manipulate AS-path.
- Describe the BGP attributes Origin, MED and communities in detail and explain the operation of those attributes.
- Manipulate these BGP attributes using routing policy.
- Describe the operation of BGP route reflection.
- Configure a route reflector.
- Describe the virtual route reflector.
- Describe the operation of optimal route reflection.
- Describe the operation of a BGP confederation.
- Configure confederations.
- Describe peering relationships in a confederation.
- Describe DDoS attacks.
- Describe DDoS mitigation techniques.
- Describe FlowSpec operations.
- Configure and monitor FlowSpec.
- Review common BGP troubleshooting procedures.
- List common BGP troubleshooting commands.
- Identify issues with BGP peering.
- Isolate problems on routing policy structure and configuration.
- Identify common commands for troubleshooting routing policy.
- Explain the causes for route instability.
- Describe the effect of damping on BGP routing.
- Explain the default behavior of damping on links.
- Control damping using routing policy.
- View damped routes using command-line interface (CLI) commands.

## Course Contents

*Day 1*
**Chapter 1: Course Introduction**
**Chapter 2: OSPF**
- OSPFv2 Review
- Link-State Advertisements
- Protocol Operations
- OSPF Authentication
- Lab: Configuring OSPF

**Chapter 3: OSPF Areas**
- Review of OSPF Areas
- Stub Area Operation
- Stub Area Configuration
- NSSA Operation
- NSSA Configuration
- Route Summarization
- Lab: Advanced OSPF

**Chapter 4: Advanced OSPF Options**
- OSPF Multi-Area Adjacencies
- External Reachability
- Virtual Links
- Lab: Advanced OSPF Options

*Day 2*

**Chapter 5: Troubleshooting OSPF**
- Troubleshooting OSPF Adjacency Issues
- Troubleshooting LSDB Consistency Issues
- Troubleshooting OSPF Routing Issues
- Case Study— Adjacency Issues
- Lab: Troubleshooting OSPF

**Chapter 6: IS-IS**
- Overview of IS-IS
- IS-IS PDUs
- Neighbors and Adjacencies
- Configuring and Monitoring IS-IS
- Lab: IS-IS Configuration and Monitoring

**Chapter 7: Advanced IS-IS Operations**
- IS-IS Operations
- IS-IS Configuration Options
- IS-IS Routing Policy
- Lab: Advanced IS-IS Configuration Options and Routing Policy

*Day 3*

**Chapter 8: Multilevel IS-IS Networks**
- Level 1 and Level 2 Operations
- Multilevel Configuration
- Lab: Configuring a Multilevel IS-IS Network

**Chapter 9: Troubleshooting IS-IS**
- IS-IS Troubleshooting Overview
- Case Study
- Lab: Troubleshooting IS-IS

**Chapter 10: BGP**
- Review of BGP
- BGP Operations
- BGP Path Selection and Options
- Configuration Options
- Lab: Configuring BGP

*Day 4*

**Chapter 11: BGP Attributes and Policy—Part 1**
- BGP Policy Overview
- BGP Attributes Overview
- Local Preference
- AS Path
- Lab: BGP Attributes—Part 1

**Chapter 12: BGP Attributes and Policy—Part 2**
- Origin
- Multi-Exit Discriminator
- Communities
- Lab: BGP Attributes—Part 2

**Chapter 13: Route Reflection and Confederations**
- Route Reflection Operation
- Configuration and Routing Knowledge
- BGP Confederations
- Lab: Scaling BGP

*Day 5*

**Chapter 14: BGP FlowSpec**
- DDoS Overview

- DDoS Mitigation Techniques
- FlowSpec Overview
- Configuring and Monitoring FlowSpec
- Lab: BGP FlowSpec

**Chapter 15: Troubleshooting BGP**

- BGP Troubleshooting
- Case Study: Neighborship Issues
- Lab: Troubleshooting BGP

**Chapter 16: Troubleshooting Policy**

- Routing Policy Overview
- Policy Structure
- Using Regular Expressions
- Useful Commands
- Case Studies
- Lab: Troubleshooting Routing Policy

**Appendix A: BGP Route Damping**

- Route Flap and Damping Overview
- Route Damping Parameters
- Configuring and Monitoring Route Damping
- Lab: BGP Route Damping

**Please note the highlighted topics will be covered theoretically only. No hands-on possible.**