

ADVANCED ROUTING AND MPLS FEATURES

TRN-WW-ADVRMPLS-01

Course Specifics

Duration:	5 days
Class capacity:	10 students
Location(s) for open enrollment:	San Antonio, TX, USA Hamilton, Scotland, UK Paris, France Lagos, Nigeria Clark, Philippines Mexico City, Mexico
Materials provided:	Student Handbook (e-Book)



Course Description

The Aviat Networks Advanced Routing & MPLS Features course is recommended for design, field and operations personnel who design, deploy, configure and operate IP networking equipment involving advanced routing protocols and IP/MPLS. This five day instructor-led course builds on foundational routing and networking knowledge and introduces BGP and ISIS protocols. This is followed by an in-depth overview of MPLS technology, including MPLS theory, concepts, services, architecture, configuration, design issues, operations, troubleshooting, LDP, VPN, QoS, Traffic Engineering (TE) and MPLS-TP.

The course content is enriched with hands-on labs (nearly 30% of the course duration) and case studies that offer students scenarios they will face in real deployments in their networks.

Courses are **conducted by AVIAT expert trainers** in a mentoring environment backed by their deep technology expertise and experience in implementation of microwave wireless and IP/MPLS networks.

The course is **conducted at Aviat Training locations or can be arranged at customer sites.**

Target Audience

This course is intended for engineers requiring an advanced knowledge of IP routing, MPLS and traffic engineering concepts within an IP/MPLS network.

Prerequisites

- Participants must have completed the Aviat Basic Networking and IP Routing course or have completed the pre-requisite exam to demonstrate knowledge of Basic Networking including VLANs, QoS, IP Routing and Routing Protocols.
- Each student must have a laptop with administrative rights to install and run IP networking simulation software.

Objectives

Upon successfully completing this course, participants will be able to:

- Understand core routing concepts involving advanced protocols such as OSPF, ISIS, and BGP.
- Learn MPLS concepts, terminology, objectives and applications.
- Develop a strong understanding of implementing MPLS-based applications using L2VPNs, L3VPNs.
- Identify the scenarios that will require MPLS-TP and Traffic Engineering features.
- Learn and study examples of MPLS, MPLS-TP and Traffic Engineering in mobile backhaul and private network solutions.

Course Outline

Routing within the Core

- Core Routing Protocols (OSPF, IS-IS, BGP)
- OSPF concept and configuration
- IS-IS concept and configuration
- BGP concept and configuration

MPLS Concepts

- Objectives of MPLS
- Applications of MPLS
- MPLS Architecture
- Variants of MPLS: MPLS-TE; GMPLS; MPLS-TP
- Functions of Ingress & Egress Label Edge Routers
- Forward Equivalence Class
- Functions of Label Switched Routers and Requirements of LSPs
- MPLS Labels and Label Stack
- Forwarding Labeled Packets

Label Distribution Protocol (LDP)

- LDP Protocol definition and advantages
- Static LSP versus Dynamic LSP
- LDP traffic and flow control
- IP routing process versus MPLS LDP process
- LDP messaging
- Building and LDP routing tables set up
- Label distribution; Downstream unsolicited mode
- Label distribution; On demand mode
- Label retention mode
- LDP convergence
- Penultimate Hop Popping
- Targeted label distribution mode

MPLS Traffic Engineering Overview

- Introducing Traffic Engineering Concepts
- Understanding MPLS TE Components
- Configuring MPLS Traffic Engineering

MPLS Virtual Private Network Technology

- Introducing Virtual Private Networks
- Introducing MPLS VPN Architecture
- Introducing the MPLS VPN Routing Model
- Forwarding MPLS VPN Packets

MPLS-Based Applications - L2 VPNs

- L2 VPN Overview, VPWS and VPLS
- WPWS Point to Point Solutions
- VWWS Frame Forwarding
- Pseudowire Architecture
- L2TPV3
- ATOM
- Pseudowire Discovery and Signaling
- Label Mapping Message TLVs
- The Control Word
- MPLS QoS
- Ethernet over MPLS (EoMPLS)
- EoMPLS Port mode and VLAN Mode

- EoMPLS Configuration
- MPLS VPLS (L2 Multipoint-to-Multipoint service)
- VPLS Architecture
- VPLS Configuration

MPLS-Based Applications - IP VPNs (L3 VPNs)

- CE-PE Interfaces
- How packets are associated with VRFs
- Label stacking aiding VPN support
- Use of BGP within L3 VPNs
- Forwarding packets across the MPLS network
- Route Distinguisher
- Route Target: Import and Export targets
- Route distribution in MPLS L3 VPN
- Route and Label advertisement
- Independence from VPN addressing
- CE-PE Routing Protocols

MPLS L3 VPN Implementation

- Using MPLS VPN Mechanisms
- Configuring VRF Tables
- Configuring an MP-BGP Session between PE Routers
- Configuring Small-Scale Routing Protocols between PE and CE Routers
- Monitoring MPLS VPN Operations
- Configuring OSPF as the Routing Protocol between PE and CE Routers
- Configuring BGP as the Routing Protocol between PE and CE Routers
- Troubleshooting MPLS VPNs

MPLS-TP

- Concepts, benefits of MPLS-TP
- Requirements of MPLS-TP
- Layered concept
- Data Plane, Control Plane
- Protection and Recovery
- QoS
- For the optional Control Plane (GMPLS, RSVP-TE)
- Support for Network Management

Required Equipment for Training Sessions at Customer Sites

RADIO	Not Applicable.
OTHER EQUIPMENT	Not Applicable.
CLASSROOM SET UP	<p>Sufficient in size to handle all participants, instructor, desks, chairs, classroom equipment. The room must have enough 110 AC (220) AC power and air conditioning to operate equipment, all students clients PC's and the server or radio as required.</p> <p>Classroom Equipment</p> <ul style="list-style-type: none">• Marker board, SVGA or Overhead projector and screen. <p>Desk and Chairs</p> <ul style="list-style-type: none">• Desks or workstations with enough room for each student to write have open books, client PC and / or, keyboard and monitor. <p>Internet Access</p> <ul style="list-style-type: none">• Internet access through the server or through client PC.

Pricing & Scheduling

Please contact your Aviat local sales team for a quote or email aviatcareeducate@aviatnet.com and request pricing for the following items:

TRN-WW-ADVRMPLS-01A	ADVANCED ROUTING AND MPLS FEATURES 5 DAY, AVIAT LOC INSTRUCTOR LED - OPEN ENROLLMENT - PER PERSON- WW
TRN-WW-ADVRMPLS-01B	ADVANCED ROUTING AND MPLS FEATURES 5 DAY, AVIAT LOCATION INSTRUCTOR LED - WW
TRN-WW-ADVRMPLS-01D	ADVANCED ROUTING AND MPLS FEATURES 5 DAY, CUSTOMER LOCATION INSTRUCTOR LED NORTH AMERICA, WITH EQUIPMENT