



**TODD LAMMLE**  
Advanced Network Training

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## **Cisco SD-WAN**

### **Course Objectives**

Upon completing this course, the learner will be able to meet these overall objectives:

- Describe how to deploy SD-WAN
- Configure SD-WAN environment
- Deploy Plug and Play / Zero-Touch Provisioning
- Implement SD-WAN Security
- Configure SD-WAN Policies
- Deploy, maintain and troubleshoot cEdge devices
- Operate SD-WAN Devices and software
- Troubleshoot SD-WAN environment

### **Course Outline**

Module 1: Cisco SD-WAN Introduction

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- High-level Cisco SD-WAN Deployment models
- Application level SD-WAN solution
- Cisco SDWAN high availability solution
- Cisco SD-WAN Scalability
- Cisco SD-WAN Solution Benefits

#### Module 2: Cisco SD-WAN Orchestration

- - Introduction
  - vManage NMS
  - vSmart Controller
  - vBond Orchestrator
  - Controller Resiliency Architecture

#### Module 3: Site Architecture and Deployment Models

- - Site Capabilities
  - vEdge Router
  - vEdge form factors

#### Module 4: Zero Touch Provisioning

- - Overview
  - User Input Required for the ZTP Automatic Authentication Process
  - Authentication between the vBond Orchestrator and a vEdge Router
  - Authentication between the vEdge Router and the vManage NMS
  - Authentication between the vSmart Controller and the vEdge Router

#### Module 5: Cisco SD-WAN Solution

- - Overlay Management Protocol (OMP)
  - Cisco SDWAN Circuit Aggregation Capabilities
  - Secure Connectivity in Cisco SD-WAN
  - Performance Tracking Mechanisms
  - Application Discovery
  - Dynamic Path Selection
  - Performance Based Routing
  - Dynamic Cloud Access

#### Module 6: Operations Best Practices

- - Config: Test Configuration Changes Before Committing
  - NAT: Secure Routers Acting as NATs
  - vEdge Routers: Connect to the Console Port
  - vEdge Routers: Use the Poweroff Command
  - Viptela Devices: Site ID Naming Conventions
  - Viptela Devices: Using the System IP Address
  - vManage NMS: Disaster Recovery

## Module 7: Application Monitoring

- - vManage
  - vAnalytics
  - Ecosystem Partner Solutions

## Module 8: Troubleshooting Methods

- - Remote Access
  - Console Access
  - LAN Interfaces
  - WAN Interfaces
  - Control Connections

## Module 9: General Troubleshooting

- - Check Application-Aware Routing Traffic
  - Collect Device Data To Send to Customer Support
  - Monitor Alarms and Events
  - Monitor TCP Optimization
  - Ping a Viptela Device
  - Run a Traceroute
  - Simulate Flows
  - Troubleshoot Cellular Interfaces
  - Troubleshoot Device Bringup
  - Troubleshoot WiFi Connections
  - Use Syslog Messages
  - Tunnel Health

## Module 10: Troubleshooting: Data Plane Issues

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- BFD Session Information
- Cflowd Information
- Data Policies
- DPI Information
- Symptom: Site Cannot Reach Applications in Datacenter
- Symptom: vManage Showing vEdge or Interface Down
- Symptom: Site-Wide Loss of Connectivity (Blackout)
- Symptom: Poor Application Performance (Brownout)
- Issue Severity Assessment

#### Module 11: Troubleshooting: Routing Issues

- - BGP Information
  - Multicast Information
  - OMP Information
  - OSPF Information
  - PIM Information
  - Symptom: Some or All Routes Missing from vEdge Routing table
  - Symptom: Data Traffic Using Suboptimal Path
  - Symptom: Data Traffic Not Using All Transports

#### Module 12: Application-Aware Routing

- - Application Performance with CloudExpress Service
  - Tunnel Latency Statistics
  - Tunnel Loss Statistics

#### Module 13: Interface Troubleshooting

- - Reset an Interface
  - All Interfaces
  - ARP Table Entries
  - Cellular Interface Information
  - DHCP Server and Interface Information
  - Interface MTU Information
  - Management Interfaces
  - VRRP Information
  - WAN Interfaces

#### Module 14: Network Operations

- - Check Alarms and Events
  - Check User Accounts and Permissions
  - Deploy the Viptela Overlay Network
  - Determine the Status of Network Sites
  - Control Connections
  - Data Connections
  - Network Performance with vAnalytics Platform
  - OMP Status

#### Module 15: Security Certificate Troubleshooting

- - Generate a Certificate
  - Upload the vEdge Serial Number File
  - Certificate
  - CSR

#### Module 16: Viptela Devices Maintenance

- - Decommission a vEdge Cloud Router
  - Determine the Status of a Network Device
  - Locate a Viptela Device
  - Migrate a Controller's Virtual Machine Using vMotion
  - Reboot a Device
  - Remove a vEdge Router's Serial Number from the vManage NMS
  - Replace a vEdge Router
  - Restore the vManage NMS
  - Set Up User Accounts to Access Viptela Devices
  - Validate or Invalidate a vEdge Router
  - Software Versions Installed on a Device
  - Status of a vBond Orchestrator
  - Status of a vEdge Router
  - Status of a vSmart Controller

#### Module 17: Viptela Device Operation and Troubleshooting

- - Determine Changes to a Configuration Template
  - Determine Why a Device Rejects a Template
  - Alarm Severity Levels
  - Hardware Alarms
  - Checking Alarms and Notifications

- LEDs
- Additional Information
- Restore a vEdge Router
- Remove vEdge Router Components

## Module 18: Working With Viptela Support

- - Case Priority Levels and Response Times
  - Information for Opening Cases
  - Viptela Customer Support Portal
  - Other Ways to Contact Support

## Lab Outline

- - Introduction to the Cisco SD-WAN
  - Add vEdge to vManage Inventory
  - Control-Plane Connectivity
  - Overlay Network
  - Zero-Touch Provisioning
  - vManage Templates
  - vManage Basic Policies
  - Application Aware Policies
  - Advanced Policies
  - Analytics
  - MultiTenant Mode and Tenants
  - Troubleshooting Methods
  - Troubleshooting Data Plane Issues
  - Troubleshooting Routing Issues
  - Best Practices