

SDWOTS- Cisco SD-WAN Operations Troubleshooting and Best Practices



Days: 5

Prerequisites: Familiarity with WAN Networks.

Audience: The primary audience for this course is: The engineering and Planning team evaluating WAN evolution; personnel involved in SD-WAN Design, Implementation, and Operation; the Network Operations team with the SD-WAN solution; Cisco partners who sell and support SD-WAN solutions.

Description: Master Cisco SDWAN in these five focused days of training and turn your WAN into a fast, resilient, policy-driven fabric. This hands-on course takes you from Day 0 provisioning to Day N operations, showing you how to design, deploy, configure, operate, and troubleshoot Cisco SDWAN across any transport, including MPLS, Metro Ethernet, broadband, 5G, Satellite, and more. You'll build a full SDWAN environment, automate the device configurations, and implement multiple types of policies, including data plane, control plane, and application-aware routing policies. You will sharpen your troubleshooting and operations skills using best practices grounded in real enterprise scenarios. Through extensive labs based on the latest SD-WAN software versions, you'll gain practical experience in management, policy control, and end-to-end visibility, so you can confidently deploy, operate, optimize, and sustain a modern SDWAN at scale. The course qualifies for 40 Cisco Continuing Education Credits (CE).

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

- Identify the SD-WAN control components, their roles in the solution and the options to deploy them (cloud vs. on premise)
- Understand the Secure Enterprise Network (SEN) approach, explain the tunneling and security mechanism in control plane (DTLS tunnels) and data plane (IPSec tunnels) and the role of digital certificates and Certificate Authorities
- Plan and deploy the control components and verify their control connections
- Define the underlay and overlay domains, identify the role of Overlay Management Protocol (OMP) and list its features and attributes
- Deploy device configurations using multiple tools, including CLI, device templates and configuration groups
- Describe how to operate from Day-0 to Day-N at scale using Zero-Touch Provisioning (PnP/ZTP)
- Optimize performance with the policy framework: Build centralized/local control and data policies, apply Application-Aware Routing and QoE, leverage VPN membership and cFlowd telemetry for application-level outcomes
- Describe how SD-WAN supports enterprise initiatives and strategies to provide Direct Internet Access (DIA) and migrate to SaaS and IaaS solutions
- List the security mechanisms that can be deployed in SD-WAN Edge routers to protect the networks when using DIA and SaaS (including Firewall, IPS, URL filtering, DNS security and malware protection)
- Troubleshoot and sustain reliable operations: Deploy/maintain cEdge devices, monitor health via dashboards/alerts, and systematically isolate issues (OMP, TLOC, BFD, IPsec, policy) using proven workflows and runbooks

OUTLINE:

MODULE 1: CISCO SD-WAN INTRODUCTION

- 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

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MODULE 2: CISCO SD-WAN: CONTROL PLANE

- Deploying SD-WAN Control Plane
- SD-WAN Router Establishes Control Connection with vBond
- Devices and Controllers Identities
- Establishing the Control Plane
- Cisco SD-WAN Control Plane Overlay Management Protocol (OMP)
- Troubleshooting Control Connections

MODULE 3: CISCO SD-WAN: DATA PLANE

- Establishing the Data Plane

MODULE 4: TEMPLATES

MODULE 5: POLICY FRAMEWORK

- Control Policies
- Building, Applying, and Processing Centralized Control Policies
- Control, Data, Application Aware, VPN Membership, cFlowd, and Security Policies
- Central and Local Control Policy
- Central and Local Data Policy
- Application Aware Policy
- Creating a Centralized Policy
- VPN Membership Policies
- cFlowd Policy
- Security Policies
- Application Quality of Experience

MODULE 6: DATA PLANE TROUBLESHOOTING

- Troubleshooting BFD and Data Plane Tunnels
- BFD Troubleshooting
- Control Connections Related Issues
- Firewalls – Port Requirements
- NAT – Related Problems
- OMP
- Security Configuration
- ISP Problems with DSCP 48
- cEdge: In-depth Datapath Debugging

MODULE 7: TROUBLESHOOTING POLICIES

- Control Policy Failure Scenario No. 1
- Control Policy Failure Scenario No. 2
- Troubleshooting Data Policies and App-Route Policies
- Centralized Policies – Points of Failure
- Example 1: vManage Policy Deployment Failure
- Example 2: Policy Deployment on vSmart
- Example 3: Policy Deployment on vEdge
- Example 4: Policy Deployment on cEdge
- Tricky Problem

MODULE 8: MANAGEMENT AND OPERATIONS

- Customer Deployment
- Use Case: Retail
- Controller Deployment
- Seamless Migration
- Multi-Segment Overlay
- Hub and Spoke Topology
- Secure Internet Access
- Cloud onRamp for SaaS
- Cloud onRamp for IaaS
- Redundancy

MODULE 9: SD-WAN MULTI-TENANT

APPENDIX

- Troubleshooting Common Issues
- Interface Troubleshooting
- Troubleshoot vManage Common Issues
- Cisco SD-WAN Best Practices

LAB OUTLINE

- Lab 0: Access the Lab Devices
 - Task 1: Access the EnterOne Lab
- Lab 1: Onboard vSmart Controller
- Lab 2: Prepare a vEdge Router for Onboarding
- Lab 3: Prepare a cEdge Router for Onboarding

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- Lab 4: Add vEdge to vManage Inventory
- Lab 5: Configure and Deploy vEdge Router Control-Plane
- Lab 6: Configure and Deploy cEdge Router Control-Plane
- Lab 7: Decommission a cEdge from vManage Inventory
- Lab 8: Adding a cEdge to vManage Inventory
- Lab 9: Configure and Deploy an Overlay Network
- Lab 10: Exploring vManage GUI
- Lab 11: Provision and Deploy vManage Feature Templates
 - Task 1: Deploy Feature-Based Device Template
- Lab 12: Provision and Deploy vManage CLI Templates
- Lab 13: Provision and Deploy Policies (Part 1)
 - Task 1: Modify Controller Distribution Using a Control Policy
 - Task 2: Create a Hub and Spoke Control Policy
- Lab 14: Provision and Deploy Policies (Part 2)
 - Task 1: Create an Application Aware Routing Policy
 - Task 2: Create a Service Chain Policy
 - Task 3: Create Localized QOS Policies Using Feature Templates
- Lab 15: Verifying and Troubleshooting Data Plane Issues
 - Task 1: Verifying the Data Plane
 - Task 2: Verifying BFD Information
 - Task 3: Determining the Makeup of Network Traffic Using DPI
 - Task 4: Simulating Flows
- Lab 16: TLOC Extension
- Lab 17: Troubleshooting Methods and Tools
 - Task 1: Ping and Traceroute
 - Task 2: vManage Alarms and Events
 - Task 3: vShell
 - Task 4: Viewing System Log Files
- Task 5: Enabling and View Debug Output
- Lab 18: Using the REST API and Python Scripting
 - Task 1: Python Installation and Introduction
 - Task 2: Examine and Run a Sample Python Script and View the Output
- Lab 19: Deploy Multitenant vManage
 - Task 1: Deploy Multitenant vManage
 - Task 2: Install vManage Certificates
 - Task 3: Add vBond Controller and Install Certificates
 - Task 4: Add a Tenant in vManage
 - Task 5: Access vManage as a Tenant