

## COURSE OVERVIEW:

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This Cisco SD-WAN (Viptela) training is targeted to engineers and technical personnel involved in deploying, implementing, operating and optimizing Cisco SD-WAN solution (Viptela), both in enterprise and Service Provider environments, including advanced features for centralized AAR/Data policies, QoS, application performance routing, configuration templates, control policies and troubleshooting common and advanced operating issues. The Cisco SD-WAN course is lab-intensive, and objectives are accomplished mainly through hands on learning. Students taking this Cisco SD-Wan (Viptela) training course should be familiar with Wide Area Networks (WANs) in a variety of ways, which can be found below. Ideal candidates for this course include engineering and planning teams who evaluate WAN evolution, personnel involved in SD-WAN Design, Implementation and Operation, and others.

## COURSE OUTLINE:

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### Day - 1

#### Module 1: Cisco SD-WAN Introduction

- High-level Cisco SD-WAN Deployment models
- Application level SD-WAN solution
- Cisco SDWAN plan for HA and Scalability
- Cisco SD-WAN solution components: vManage NMS, vSmart Controller, vBond Orchestrator
- Edge Routers (cEdge & vEdge)
- Cloud Based Deployment vs On-Premises Deployment

#### Module 2: Zero Touch Provisioning

- Overview
- User Input Required for the ZTP Automatic Authentication Process
- Authentication between the vBond Orchestrator and WAN Edges
- Authentication between the Edge Routers and the vManage NMS
- Authentication between the vSmart Controller and the Edge Routers



## Module 3: 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
- Direct Internet Access
- Cisco SD-WAN In-built Security features: App Aware FW, Talos IPS, URL Filtering, Umbrella Integration & Advanced Malware Protection
- Dynamic Cloud Access: Cloud On-Ramp for SaaS and IaaS (AWS, Azure & GPC)

## Day - 2

### Module 4: Operations Best Practices

- Config: Test Configuration Changes Before Committing
- NAT: Secure Routers Acting as NATs
- Edge Routers: Connect to the Console Port
- vManage Operational Commands
- SD WAN Devices: Site ID Naming Conventions
- SD WAN Devices: Using the System IP Address
- vManage NMS: Disaster Recovery
  - Disaster Recovery - Cluster failover scenarios
  - vManage Disaster Recovery Checklist
  - How to configure Disaster Recovery

### Module 5: Application Monitoring (Including SD-AVC)

- vManage - Application Monitoring
  - o How to enable DPI on SD-WAN cEdge Routers
    - Monitoring Application traffic per device/site
    - How to enable SD-AVC on vManage and push to routers.
    - Configuring application log collection parameters.
- vAnalytics
  - o vAnalytics dashboard walk-through
    - vAnalytics Network Health
    - vAnalytics Network Availability



- vAnalytics Applications
- Ecosystem Partner Solutions

## Module 6: General Troubleshooting

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

## Module 7: Troubleshooting: Data Plane Issues

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

## Module 8: Troubleshooting: Routing Issues

- Troubleshooting NAT Issues for Control and Data connections
- BGP Information
- Multicast Information
- OMP Information
- OSPF Information
- PIM Information
- Symptom: Some or All Routes Missing from Edge Routing table



- Symptom: Data Traffic Using Suboptimal Path
- Symptom: Data Traffic Not Using All Transports

## Day - 3

### Module 9: Monitoring and Troubleshooting Application-Aware Routing

- Application Performance with Cloud-Express Service
- Tunnel Latency Statistics
- Tunnel Loss Statistics

### Module 10: Troubleshooting Policy Related Issues

- Checking configuration o For Localized Policies
  - For Centralized Policies
- How to check if FIA is enabled
- Confirming and troubleshooting TCAM Issues
- Enabling Various Policy Level Logs
  - FRM Logs
  - EPBR Logs
  - FNF Logs during config
  - Collecting Log Files
  - How to deal with too many logs

### Module 11: Network Operations

- Check Alarms and Events
- Check User Accounts and Permissions
- Deploy the SD WAN Overlay Network
- Determine the Status of Network Sites
- Control Connections
- Data Connections
- OMP Status
- Enabling Embedded Packet Captures and Packet Trace on Cisco cEdges



## Module 12: Security Certificate Troubleshooting

- Generate a Certificate Signing Request
- Issues when installing a certificate
- Using Cisco Signed Certificates vs 3rd Party Signed Certificates
- Upload the Edge Serial Number File

## Module 13: SD WAN Devices Maintenance

- Decommission a vEdge Cloud Router
- Determine the Status of a Network Device
- Migrate a Controller's Virtual Machine Using vMotion
- Remove an Edge Router's Serial Number from the vManage NMS
- Replace an Edge Router
- Restore the vManage NMS
- Set Up User Accounts to Access SD-WAN Devices
- Validate or Invalidate an Edge Router
- Software Versions Installed on a Device
- Troubleshooting platform crash issues

## Module 14: SD WAN 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 an Edge Router
- Remove Edge Router Components



## LAB OUTLINE

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- Lab 1: Deploy and configure the Cisco SD-WAN Fabric
  - Configure and Deploy Control-Plane Connectivity
  - Configure and Deploy an Overlay Network
  - Provision and Deploy vManage Templates
  - Provision and Deploy vManage Policies
- Lab 2: Operational Best Practices
- Lab 3: Installing SD-AVC and monitoring CFlowD & DPI
- Lab 4: Cisco SD-WAN Control Plan Troubleshooting
- Lab 5: Cisco SD-WAN Data Plane Troubleshooting
- Lab 6: Cisco SD-WAN Troubleshoot Routing Issues
  - Basic route troubleshooting on the SD-WAN XE Image
  - Debugs on the Cisco SD-WAN XE Image
- Lab 7: Troubleshooting Cisco SD-WAN Policies
- Lab 8: Configuring a vManage Disaster Recovery Backup
- Lab 9: Troubleshooting platform crash files
- Lab 10: Configuring Cisco SD-WAN Alarms, Alerts and Notifications