Cisco Catalyst SDWAN

The Cisco Catalyst SDWAN course is designed to provide in-depth knowledge and hands-on experience in implementing and managing SD-WAN solutions using Cisco's cutting-edge Catalyst platform. This course covers all aspects of SD-WAN, including its architecture, deployment, routing protocols, security, and policy configurations. Participants will learn to optimize network performance, ensure reliability, and simplify operations across distributed environments. Whether you are a network engineer or an IT professional, this course prepares you for real-world SD-WAN deployments and troubleshooting.

Course Objectives

By the end of this course, participants will be able to:

1. Understand the fundamentals and architecture of Cisco SD-WAN.
2. Deploy and configure Cisco Catalyst SD-WAN controllers and devices (vManage, vBond, vSmart, vEdges, and cEdges).
3. Configure and troubleshoot SD-WAN policies, including centralized and localized policies.
4. Implement advanced SD-WAN features such as NAT, Direct Internet Access (DIA), and Application-Aware Routing (AAR).
5. Ensure high availability and security in SD-WAN networks using redundancy, TLS/DTLS encryption, and firewall policies.
6. Use tools like vManage to monitor, troubleshoot, and optimize SD-WAN performance.
7. Apply Zero Touch Provisioning (ZTP) for seamless WAN edge deployment.
8. Prepare for SD-WAN real-world deployments and Cisco certification exams.

Cisco Catalyst SDWAN Course Introduction

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Pre-requisites

To successfully participate in this course, attendees should have:

1. A solid understanding of networking fundamentals, including TCP/IP, routing, and switching concepts.
2. Basic knowledge of enterprise WAN and LAN technologies.
3. Familiarity with networking protocols such as OSPF, BGP, and IPSec.
4. Experience with Cisco devices and configuration through CLI and GUI.
5. Access to a laptop or workstation with a stable internet connection for online sessions and lab work.

Course Duration:

60 Hours, 30 Sessions

Course Outline

Module 1: Introduction to SD-WAN

1. Overview of SD-WAN
2. Advantages of SD-WAN
3. Challenges before SD-WAN
4. SD-WAN Underlay and Overlay concepts
5. Cost benefits of SD-WAN
6. Comparison of SD-WAN with traditional WAN

Module 2: SD-WAN Architecture

1. Overview of SD-WAN Controllers
2. vManage, vBond, and vSmart functionalities
3. WAN Edges: vEdges vs. cEdges
4. TLS/DTLS and OMP roles
5. Controller and WAN edge hosting options
6. Transport options: MPLS, Internet, Cellular

Module 3: SD-WAN Planes

1. Types of planes in SD-WAN
2. Management Plane (vManage)
3. Orchestrator Plane (vBond)
4. Control Plane (vSmart)
5. Data Plane (vEdge & cEdge)

6. Interaction between planes

Module 4: Certificate Authentication Components

1. Overview of Certificate Authentication (CA)
2. CA Server and RootCert
3. CSR and ID Certificates
4. Trust establishment in SD-WAN
5. Steps for certificate renewal
6. Impact of certificate failures

Module 5: VPN Types in SD-WAN

1. Management VPN (VPN 512)
2. Transport VPN (VPN 0)
3. Service VPN (VPN 1–511)
4. Advanced VPN ranges (513–65535)
5. VPN segmentation of traffic
6. Benefits of VPNs in SD-WAN

Module 6: SD-WAN Terminology

1. System-IP and Organization Name
2. Site-ID and Virtual Chassis Number
3. Serial and Token Numbers
4. Templates: Feature and Device
5. TLOC and vRoute concepts
6. Policies: Centralized and Localized

Module 7: Initial SD-WAN Configuration

1. SD-WAN lab setup overview
2. Configuring vManage
3. Transport connectivity setup
4. Configuring vBond
5. Initial configuration of vSmart
6. WAN Edge device registration

Module 8: Certificate Installation and Registration

1. RootCert installation in vManage
2. Generating CSR in vManage
3. ID-Cert installation in vManage
4. Registering vBond in vManage
5. Registering vSmart in vManage
6. Troubleshooting certificate installation

Module 9: Templates in SD-WAN

1. Purpose of SD-WAN templates
2. Feature templates: Overview
3. System Feature Template configuration
4. Device templates: Overview
5. Template hierarchy in SD-WAN
6. Editing templates for deployment

Module 10: Feature Templates for Branch vEdge

1. Configuring VPN 0 for transport

2. Configuring VPN 1 for services
3. Configuring VPN 512 for management
4. External routing with OSPF
5. Internal routing with OSPF
6. Common troubleshooting in branch configurations

Module 11: Device Templates in SD-WAN

1. Purpose of device templates
2. Configuring device templates for branch vEdge
3. Transport VPN template setup
4. Service VPN template setup
5. Applying templates to devices
6. Troubleshooting device templates

Module 12: SD-WAN Routing and OMP

1. Introduction to Overlay Management Protocol (OMP)
2. Role of OMP in SD-WAN architecture
3. Route advertisement and redistribution
4. TLOC and its components
5. ECMP traffic simulation
6. Troubleshooting OMP issues

Module 13: HQ vEdge Configuration

1. Configuring VPN 0 for HQ transport
2. Configuring VPN 1 for HQ services
3. Configuring VPN 512 for HQ management

4. External routing with BGP
5. Internal routing with OSPF
6. Troubleshooting HQ configurations

Module 14: cEdge Device Templates

1. Overview of cEdge devices
2. Configuring cEdge device templates
3. Adding VPNs to cEdge devices
4. External routing on cEdge
5. Internal routing on cEdge
6. Deploying and verifying cEdge templates

Module 15: SD-WAN Policy Components

1. Centralized vs. localized policies
2. Traffic policies overview
3. Application-aware routing (AAR)
4. Topology policies: Overview
5. TLOC preference policies
6. Route filtering policies

Module 16: Centralized Policy Configuration

1. Introduction to centralized policies
2. Configuring traffic policies
3. Protocol and port-based traffic rules
4. Application-based traffic rules
5. Creating topology policies

6. Hub-and-spoke topology implementation

Module 17: NAT and Direct Internet Access (DIA)

1. Introduction to NAT in SD-WAN
2. Local breakout for internet access
3. Configuring NAT for DIA
4. Testing local breakout configurations
5. Challenges in implementing NAT
6. Security considerations for NAT

Module 18: Service VPN Management

1. Adding multiple service VPNs
2. Configuring VPN interfaces for services
3. Routing between service VPNs
4. Testing service VPN connectivity
5. Route leakage between VPNs
6. Troubleshooting service VPN issues

Module 19: High Availability in SD-WAN

1. Importance of high availability (HA)
2. Configuring redundant vSmart controllers
3. HA setup for vBond orchestrators
4. WAN Edge device redundancy
5. Testing controller failover scenarios
6. Troubleshooting HA setups

Module 20: Advanced Topology Configurations

1. Overview of SD-WAN topologies
2. Implementing hub-and-spoke topology
3. Configuring TLOC preferences
4. Testing hub-and-spoke configurations
5. Verifying data flow in hub-and-spoke
6. Troubleshooting topology-related issues

Module 21: Route Management in SD-WAN

1. Basics of SD-WAN route management
2. Aggregated route configuration
3. Route preference and policy setup
4. Route filtering with centralized policies
5. Configuring ECMP routing
6. Troubleshooting route misconfigurations

Module 22: Advanced Topology Scenarios

1. Advanced hub-and-spoke implementation
2. TLOC modification in hub-and-spoke
3. Data traffic handling in complex topologies
4. Configuring additional topologies for testing
5. Verifying advanced topology configurations
6. Troubleshooting data flow in complex setups

Module 23: NAT Advanced Configurations

1. Understanding advanced NAT requirements

2. Configuring NAT for multiple VPNs
3. Setting up NAT rules for service VPNs
4. Managing NAT for internet breakout
5. Verifying and testing NAT traffic
6. Troubleshooting NAT-related issues

Module 24: SD-WAN Security Implementation

1. Introduction to SD-WAN security features
2. Role of TLS/DTLS in secure communication
3. Certificate management for SD-WAN devices
4. Implementing security policies in SD-WAN
5. Configuring firewalls and access controls
6. Troubleshooting security issues in SD-WAN

Module 25: Zero Touch Provisioning (ZTP)

1. What is Zero Touch Provisioning?
2. ZTP process for WAN edge devices
3. Prerequisites for ZTP implementation
4. Automating device registration via ZTP
5. Troubleshooting common ZTP failures
6. Best practices for successful ZTP deployment

Module 26: Controller Scalability and Resilience

1. Importance of controller scalability
2. Configuring vManage clusters
3. Adding redundant vBond orchestrators

4. Scaling vSmart controllers for larger networks
5. Verifying controller resilience during failover
6. Troubleshooting scalability and resilience issues

Module 27: Application Performance Optimization

1. Introduction to application-aware routing (AAR)
2. Traffic prioritization based on application type
3. Configuring bandwidth policies for applications
4. Verifying AAR policies in action
5. Troubleshooting application performance issues
6. Best practices for optimizing application traffic

Module 28: Monitoring and Troubleshooting SD-WAN

1. Tools for monitoring SD-WAN performance
2. Logging and event management in vManage
3. Verifying control and data connections
4. Troubleshooting WAN edge devices
5. Debugging OMP and TLOC connectivity issues
6. Best practices for systematic troubleshooting

Module 29: Lab Exercises and Practical Case Studies

1. Overview of lab objectives and setup
2. Testing branch configurations in lab
3. Simulating centralized policies
4. Advanced hub-and-spoke configuration exercises
5. Practical troubleshooting scenarios in lab

6. Peer review and discussion on case studies

Module 30: Final Assessment and Course Wrap-Up

1. Recap of key SD-WAN concepts and configurations
2. Final hands-on lab assessments
3. Advanced troubleshooting and resolution tasks
4. Real-world case studies of SD-WAN implementation
5. Certification exam preparation and guidance
6. Course feedback and next steps in learning