Current Technologies
Computer Learning Centers

6210 Central Ave, Portage, IN. 46368 Phone: 219.764.3800 Fax: 219.764.3805 Web: http://www.ctclc.com

Installing, Configuring, Monitoring and Troubleshooting Cisco (Viptela) SDWAN (ICSDWAN-CT)

In this 5 day hands-on course on Cisco (Viptela) SD-WAN, students will deploy and configure SD-WAN Controllers, vEdge Devices, and Cisco IOS-XE Devices. Students will create Multiple Device and CLI Templates that will allow Hundreds of devices to be deployed using only a few Centralized Templates. Students will create Security Policies to enable the Enterprise Firewall, IDS/IPS, URL Filtering, and Web Layer Security to protect and allow Enterprises to deploy Cloud applications as well as Direct Internet Access (DIA). Students will also create Local and Central Policies that enable a Centralized Policy control of WAN Routing and device QOS configuration and enforcement. Students will also learn how Cisco SD-WAN allows Enterprises to deploy an effective Cloud Solutions such as Amazon AWS, Microsoft Azure, and Google Cloud. Students will also learn how to Monitor and Troubleshoot the SD-WAN Solution.

Use this course towards your Cisco Continuing (CE) Education Credits (40)

Why Attend with Current Technologies CLC

- Our Instructors are the top 10% rated by Cisco
- Our Lab has a dedicated 1 Gig Fiber Connection for our Labs
- Our Labs run up to Date Code for all our courses

Objectives

- SD-WAN Overview
- Cisco SD-WAN Hardware
- Deploying the Overlay
- Configuring vManage
- Deploying using Templates
- Creating Policies
- Monitoring vManage
- vAnalytics
- Troubleshooting Tools for VManage

Course Duration

5 day

Course Price

$4,795.00 or 46 CLCs

Methods of Delivery

- Instructor Led
- Virtual ILT
- On-Site

Outline

Module 0: Introductions

Module 1: Cisco SD-WAN Viptela Platform Overview

- Describe what a Software-Defined Wide Area Network (SD-WAN) is
- Describe the secure extensible network
- Describe the function of the virtual IP fabric created in the SD-WAN solution
- What is SD-WAN?
- Cisco Cloud vs On-Premises vs Private Cloud Management
- Cisco IWAN vs Viptela SD-WAN vs Meraki
- IWAN Migration to SD-WAN
- SD-WAN Integration with Cisco
- Cisco SD-WAN Licensing
    - DNA Essentials
    - DNS Advantage
    - DNA Premier
- SD-WAN Smart Licensing

Module 2: Deploying Cisco SD-WAN Controllers

- On-Prem vs Cloud Deployment
- Deploying Controllers in the Cisco Cloud
- Deploying Controllers in the On-Premise
- vManage NMS
    - Deploy the vManage NMS
    - Configure the vManage NMS
    - Configure the vManage NMS Cluster
    - Configure Multitenant vManage NMS
    - Configure Certificate Settings
    - Generate vManage NMS Certificate
- vBond Orchestrator
    - Deploy vBond VM Instance
    - Configure the vBond Orchestrator
    - Add the vBond Orchestrator to the Overlay Network
    - NAT Traversal
    - Start the Enterprise ZTP Server
- Deploy the vSmart Controller
    - Deploying vSmart Controller on ESXi
    - Deploying vSmart Controller on KVM
    - Configure the vSmart Controller
    - Add the vSmart Controller to the Overlay Network
- Controller High Availability
- Controller Deployments Considerations
- Remotely Accessing Controllers.
- Cluster Management
- Multi-Tenant
- Resource Groups
- RBAC Enhancements
- Upgrading Deployments

Module 3: Cisco SD-WAN Allowed Lists and Certificates

- On-Prem vs Cloud Certificate Deployment
- Cisco PNP Portal
- Virtual Accounts / Smart Accounts
- Controller Certificates
- Cisco vs Digicert vs Symantec vs Enterprise
- Hardware Device Certificates
- Software Device Certificates
- Controller Allowed Lists
    - Sync with PNP Portal
    - One Touch Provisioning
- Device Allowed Lists
- Certificates
    - Export Device Data in CSV Format
    - Check the WAN Edge Router Certificate Status
    - Validate a WAN Edge Router
    - Stage a vEdge Router
    - Invalidate a WAN Edge Router
    - Send the Controller Serial Numbers to vBond Orchestrator
    - Install Signed Certificate
    - View the CSR
    - View the Certificate
    - Generate the CSR
    - Reset the RSA Key Pair
    - Invalidate a Device
    - View Log of Certificate Activities

Module 4: Cisco SD-WAN Platforms

- vEdge Appliances
    - vEdge 100 / 1000
    - ISR 4g / 6g
    - vEdge 2000
    - vEdge 5000
- vEdge Cloud
    - ESXI
    - KVM
    - AWS
    - Microsoft Azure
- Cisco IOS-XE Platforms
    - Cisco IR 1101 Series Routers
    - Cisco ISR 1100 Series Routers
    - Cisco ISR 4300 / 4400 Series Routers
    - Cisco ISR 4400 Series Routers
    - Cisco Catalyst 8200 / 8300 Routers
    - Cisco ASR 10XX Routers
    - Cisco Catalyst 8500 Routers
- Cisco CSR 1000V, C8000v Router
- Cisco 54xx Enterprise Network Compute System (ENCS)
- Cisco Cellular Gateway
- IOS-XE Controller Mode
- Converting from Autonomous mode to Controllers Mode

- Upgrading SDWAN Routers
- Software Installation and Upgrade
    - Software Version Compatibility
    - Add New Software Images to the Repository
    - Software Upgrades Best Practices
    - Activate a New Software Image
    - Redundant Software Images

Module 5: Cisco SD-WAN Fabric and OMP

- Virtual Fabric Overview
- Overlay Management Protocol
- Transport Locators (TLOCs)
    - TLOC Extension
    - TLOC Colors
- Detail Site IDs and System IP
- VPN/VRF Segmentation
- Multicast
- OMP Routes / vRoutes
- Service Route
- Fabric Connections
- Loss of Controllers Behaviors
- BFD and Fabric Optimization

Module 6: Cisco SD-WAN Security

- Solution Security
- Opening Firewall Ports
- Cloud vs On-Premise Security Options
- Secure Internet Gateway (SIG)
    - Cloud Firewall
    - DNS Layer Security
    - Secure Web Gateway
    - Cloud Access Security Broker
    - Interactive Threat Intel
- SD-WAN Security Options
    - Enterprise Firewall
    - IDS/IPS (Snort)
    - URL Filtering
    - ThreatGrid
    - TLS Decryption
    - Web Layer Security (Umbrella/Open DNS)
- Firewall Ports
- Control Plane Security
    - DTLS
    - TLS
- Data Plane Security
    - IPSEC
    - GRE
- Traffic Segmentation
    - VPN

    - Policies
- Service Chaining
    - Firewalls
    - IDS
- Cloud Security
    - Umbrella
    - Z-Scaler

Module 7: Quality of Service (QoS)

- Application Visibility and Recognition (NBAR / QoSMOS)
- Differentiated Services - Quality of Service
- SD-AVC
- Critical Applications SLA
- Application Aware Routing
- Path MTU Discovery
- TCP Optimization
- Data Redundancy Elimination (DRE)
- Forward Error Correction (FEC)
- Packet Duplication
- Bidirectional Forwarding Detection (BFD)
    - BFD Hello Timer and Multiplier
    - BFD Measurements
- WAN Edge Router Queuing
    - Marking
    - Remarking
    - Shaping
    - Policing

Module 8: Configuring vManage

- vManage New Interface
- Using the vManage Interface
- Using the vManage Dashboards
- vManage Configuration Interface
- vManage Monitoring Interface
- vManage Tools Interface
- vManage Maintenance Interface
- vManage Administration Interface
- Managing Users and Groups
- Configuring TACACS and RADIUS
    - Remove a Tenant
- Configuration
    - Devices
        - Change Configuration Modes
        - Upload WAN Edge Authorized Serial Number File
        - Generate Bootstrap Configuration for a WAN Edge Cloud Router
        - Export Device Data in CSV Format
        - View a Device's Running Configuration
        - View a Device's Configuration

        - Delete a WAN Edge Router
        - Copy a WAN Edge Router's Configuration
        - Decommission a WAN Edge Cloud Router
        - View Log of Template Activities
        - Add a vBond Orchestrator
        - Add a vSmart Controller
        - Edit Controller Details
        - Delete a Controller
        - Change Variable Values for a Device

Module 9: Creating and Applying SD-WAN Templates

- Device behavior before Binding to Template
- Template Behavior once a device is bound to a Template
- Feature Templates
    - Type of Feature Templates
- CLI vs Device Templates
- Create a Device Template from Feature Templates
- Create a Device Template from the CLI
- Create Feature Templates
    - System, AAA, OMP, Logging, BFD, Security, NTP, VPN, VPN Interface, Service VPNs, T1/E1, APP-QOE, Banner, SNMP, Routing, Local Policy, Probes, Security Policy
        - CLI Add on Feature Template
        - SIG Feature Template
- List the parameter types that are used in vManage Templates
- Explain the use of the Template Variable Spreadsheet
- Summarize the configuration elements of a device
- List the other feature templates that can be configured
    - Edit a Template
    - View a Template
    - Delete a Template
    - View Device Templates Attached to a Feature Template
    - View Devices Attached to a Device Template
    - Perform Parallel Template Operations
    - Attach Devices to a Device Template
    - Copy a Template
    - Edit a CLI Device Template
    - Export a Variables Spreadsheet in CSV Format for a Template
    - Change the Device Rollback Time and View Configuration Differences
        - Configuration Rollback
- Maintenance
    - Device Reboot
        - Software Upgrade
- Quality of Service (QoS)

Module 10: Creating and Applying SD-WAN Policies

- What are Policies and how do they apply to SD-WAN
- Local Policies vs Central Policies
- Policies

    - Policy Construction
        - Lists
        - Policy Definition
        - Policy Application
    - Configure Centralized Policy
    - Configure Localized Policy
    - View a Policy
    - Copy a Policy
    - Edit a Policy
    - Edit or Create a Policy Component
    - Delete a Policy
    - Activate a Policy on vSmart Controllers
- Centralized Policies (Control, Data, AppRoute, cflowd)
    - Central Policy Lists
    - Control Policy
        - Service Chaining
        - Traffic Engineering
        - Extranet VPNs
        - Service path affinity
        - Arbitrary VPN Topologies
        - Fabric Policies
    - Application Aware Routing Policy
        - Application SLA
            - Latency
            - Loss
            - Jitter
        - Path Determination
    - Data Policy to manipulate different traffic types
        - Shaping Policies
        - QoS Policies
        - Service Chaining
        - Traffic Engineering
        - Extranet VPNs
        - Service path affinity
        - NAT Policies
    - cFlowd Policy
        - Cflowd-template for configuring flow cache behavior and flow export
        - Data-policy for selection of traffic subject to flow data collection
    - Multi-VPN and multi-topology policy
    - Hub Mesh Policies
        - Create a VPN Membership Policy
        - Create an Application SLA Policy
- Localized Policies
    - Local Policy Lists
    - Local Control Policy
        - EIGRP/BGP/OSPF Routing Policies
    - Local Data Policy
        - Device Access Policy
        - Access Control List
        - QOS Maps
        - QOS SLA

        - Mirroring

Module 11: SD-WAN Cloud Adoption

- Cloud Overview
- OnRamp SAAS
    - View Application Performance
    - View Details about an Application
    - Manage OnRamp Applications
    - Manage OnRamp Client Sites
    - Manage OnRamp Gateways
    - Manage OnRamp DIA Sites
- Cloud OnRamp IAAS
    - Create a Cloud Instance
    - Display Host VPCs
    - Map Host VPCs to a Gateway VPC
    - Display Gateway VPCs
    - Add a Gateway VPC
    - Delete a Gateway VPC
- Cloud OnRamp Multicloud
    - Megaport / Equinix Integrations
    - GCP/ AWS /AZURE Integrations

Module 12: vAnalytics Overview

- vAnalytics Overview
- Applications
    - Display Bandwidth Utilization
    - Display vQoE Values
    - Display Deviations from Baseline Utilization
- Network Availability
    - Display Downtime by Site
    - Display Downtime by Time
- Network Health
    - Display Latency, Loss, and Jitter on Circuits
    - Display Application Performance by Carrier
- Top Flows
- vAnalytics Dashboard
    - Network Availability Pane
    - Applications Pane
        - Least Performing Applications
        - Applications Consuming Most Bandwidth
        - Anomalous Application Families
    - WAN Performance Pane
        - Carrier Performance
        - Tunnel Performance

Module 13: Monitoring & Troubleshooting the SD-WAN Solution

- Troubleshooting SDWAN Controllers
    - vBond

  - vManage
  - vSmart
- Troubleshooting Controller Connectivity
- Troubleshooting vEdges
  - Controller Connections
  - IPSEC Tunnels
- Troubleshooting cEdges
  - Controller Connections
  - IPSEC Tunnels
- Monitoring Network Resource
- Network
  - View List of Devices
  - Export Device Data in CSV Format
  - View Information about a Device
  - View Device Status Summary
  - View DPI Flows
  - View Cflowd Flows
  - View Interfaces
  - View TCP Optimization Information
  - View TLOC Loss, Latency, and Jitter Information
  - View Tunnel Connections
  - View Wi-Fi Configuration
    - View Client Details
    - View Client Usage
  - View Control Connections
  - View System Status
  - View Events
  - View ACL Logs
  - Troubleshoot a Device
    - Check Device Connectivity
    - Check Device Bringup
    - Ping a Device
      - Run a Traceroute
    - View Control Connections in Real Time
  - Check Traffic Health
    - View Tunnel Health
    - Check Application-Aware Routing Traffic
    - Simulate Flows
    - Check Device Syslog Files
  - View Real-Time Data
- ACL Log
  - Set ACL Log Filters
- Alarms
  - Set Alarm Filters
  - Export Alarm Data in CSV Format
  - View Alarm Details
  - Alarms Generated on vManage NMS
- Audit Log
  - Set Audit Log Filters
  - Export Audit Log Data in CSV Format
  - View Audit Log Details

  - View Changes to a Configuration Template
- Events
  - Set Event Filters
  - Export Event Data in CSV Format
  - View Device Details
- Geography
  - Set Map Filters
    - View Device Information
    - View Link Information
    - Configure Geographic Coordinates for a Device
- Using vManage to Troubleshoot the environment
- Operational Commands
  - Admin Tech Command
  - Interface Reset Command
- Rediscover Network
  - Rediscover the Network
  - Synchronize Device Data
- CLI Command to troubleshoot the environment
- SSH Terminal
  - Establish an SSH Session to a Device
- vManage, APIs and Programmability

LAB OUTLINE

Lab 1: Deploy the SD-WAN Controller

- Deploy the vManage Controllers
- Deploy the vBond Orchestrator
- Deploy the vSmart Controller
- Configure Certificate Settings

Lab 2: Deploy the vEdge, ISR 4K /C8000V Routers

- Deploy WAN Edges
- Configure the WAN Edge Routers
- Prepare vEdge Routers for ZTP

Lab 3: vManage Configuration

- Explore the Interface
- Add Controllers to the Whitelist
- Add vEdge whitelist
- BFD Tuning
- Create and Update Users
- Manage the Fabric

Lab 4-8: Creating Device Templates

- Create CLI Policy Template
- Create Feature Policy Template
- Create vSmart Device CLI Template

- Create DC1 vEdges Device Feature Template
- Attach DC1 Devices to Template
- Create DC2 IOS-XE CSRs Device Feature Template
- Attach DC2 Devices to Template
- Create BR1 vEdges Device CLI Template using TLOC Extensions
- Attach BR1 Devices to Template
- Create BR2 IOS-XE CSRs Device Feature Template using TLOC Extensions
- Attach BR2 Devices to Template
- Create BR3 IOS-XE ISR4K Device Feature Template
- Attach BR3 Devices to Template
- Configuration Rollback

Lab 9: Use APIs to Import Feature Templates

Lab 10: Upgrade SDWAN Environment

Lab 11-13: Perform ZTP on SDWAN Environment

Lab 14-17: SDWAN Policies

- List types of policies that can be implemented in the SD-WAN solution
- Describe how policies can be implemented that affect the control plane
- Describe what affect policies can have on data traffic forwarding
- Identify the various components of the vSmart policy architecture
- Describe how different policies are enabled in different devices
- Detail how policies are processed and applied
- Control Policy Lab
    - Configure a Vpn-membership-policy
    - Configure Site-list Selection Policies
    - Configure a Service Chaining Policy
    - Configure an Extranet VPN Policy
    - Configure a Service path affinity Policy
    - Configure Fabric Policies
    - Configure Security Zones
- Data Policy Lab
    - Configure Shaping Policies
    - Configure QoS Policies
    - Configure a Service Chaining
    - Configure an Extranet VPN Policy
    - Configure Service path affinity Policy
    - Configure a NAT Policies for DIA
    - Configure an OSPF BGP Routing Policy
- Application Aware Routing Policy Lab
    - SLA Classes
    - Path Selection using Application Policies
- Create a cFlowd Policy
- Create a Local Control Policy
    - Configure OSPF and BGP
- Create a Local Data Policy
    - Create ACL

    - Create Device Access Policy
    - Configure QOS
    - Configure OSPF Route Policy

Lab 18: Application Visibility

- Create a Centralized Policy for Application-Aware Routing
- Identify Application Groups (FTP/Office 365/Voice)
- Create Lists
    - Site Lists
    - Application Lists
    - Data Prefix Lists
    - VPN Lists
- Create a SLA Classes
- Create Traffic Rules
- Apply Policies to Sites and VPNs

Lab 19: Cloud On-RAMP

- Configure Cloud Onramp for SAAS

Lab 20: Monitoring / Troubleshooting

- Explore vManage Dashboard analytics
- Monitor Applications
- Monitor Loss, Latency, and Jitter
- Monitor Individual Device
    - Check system Status
    - Check Control Connections
    - Check OMP Status
    - Check BFD Status
    - Check Interfaces for Issues
- Use the CLI to view and troubleshooting debug Logs
- Troubleshoot BFD
- Troubleshoot OMP
- Use troubleshooting tools to diagnose issues
    - Use the Ping tool
    - Use the Traceroute tool
    - Use the App Route Visualization
    - Simulate traffic flows
    - Take a Packet
- Troubleshoot Application Routing