Implementing and Operating Cisco Enterprise Network Core Technologies

Duration: 5 Days Course Code: ENCOR Version: 1.4

Overview:

The Implementing and Operating Cisco Enterprise Network Core Technologies course gives you the knowledge and skills needed to configure, troubleshoot, and manage enterprise wired and wireless networks. Learn how to implement security principles within an enterprise network and how to overlay network design by using solutions such as SD-Access and SD-WAN. The automation and programmability of Enterprise networks is also incorporated in this course.
This course will help you:
Configure, troubleshoot, and manage enterprise wired and wireless networks
Implement security principles within an enterprise network
Earn 64 CE credits toward recertification

Please note that this course is a combination of Instructor-Led and Self-Paced Study - 5 days in the classroom and approx. 3 days of self study. The self-study content will be provided as part of the digital courseware that you receive at the beginning of the course and should be part of your preparation for the exam. Additional lab access will be provided at the end of the class, this will be valid for 60 hours or 90 days whichever is the shorter. It will be possible to complete all but 7 of the labs after the class.

Target Audience:

Network engineers involved in the installation, support and troubleshooting of enterprise networks.

Objectives:

- **After completing this course you should be able to:**
- Illustrate the hierarchical network design model and architecture using the access, distribution, and core layers.
- Compare and contrast the various hardware and software switching mechanisms and operation, while defining the TCAM and CAM, along with process switching, fast switching, and Cisco Express Forwarding concepts.
- Troubleshoot layer 2 connectivity using VLANs, trunking.
- Implementation of redundant switched networks using spanning tree protocol.
- Troubleshooting link aggregation using Etherchannel.
- Describe the features, metrics, and path selection concepts of EIGRP.
- Implementation and optimization of OSPFv2 and OSPFv3, including adjacencies, packet types, and areas, summarization and route filtering for IPv4 and IPv6.
- Implementing EBGP interdomain routing, path selection and single and dual-homed networking.
- Implementing network redundancy using protocols like HSRP and VRRP.
- Implementing internet connectivity within Enterprise using static and dynamic NAT.
- Describe the virtualization technology of servers, switches, and
- Describe how APs communicate with WLCs to obtain software, configurations, and centralized management.
- Configure and verify EAP, WebAuth, and PSK wireless client authentication on a WLC.
- Troubleshoot wireless client connectivity issues using various tools available.
- Troubleshooting Enterprise networks using services like NTP, SNMP, Cisco IOS IP SLAs, NetFlow and Cisco IOS Embedded Event Manager.
- Explain the use of available network analysis and troubleshooting tools, which include show and debug commands, as well as best practices in troubleshooting.
- Configure secure administrative access for Cisco IOS devices using the CLI access, RBAC, ACL, and SSH, and explore device hardening concepts to secure devices from less secure applications, such as Telnet and HTTP.
- Implement scalable administration using AAA and the local database, while exploring the features and benefits.
- Describe the enterprise network security architecture, including the purpose and function of VPNs, content security, logging, endpoint security, personal firewalls, and other security features.
- Explain the purpose, function, features, and workflow of Cisco Catalyst Center Assurance for Intent Based Networking, for network visibility, proactive monitoring, and application experience.
- Describe the components and features of the Cisco SD-Access

the various network devices and components.

- Implementing overlay technologies like VRF, GRE, VPN and LISP.
- Describe the components and concepts of wireless networking including RF, antenna characteristics, and define the specific wireless standards.
- Describe the various wireless deployment models available, include autonomous AP deployments and cloud-based designs within the centralized Cisco WLC architecture.
- Describe wireless roaming and location services.

solution, including the nodes, fabric control plane, and data plane, while illustrating the purpose and function of the VXLAN gateways.

- Define the components and features of Cisco SD-WAN solution, including the orchestration plane, management plane, control plane, and data plane.
- Describe the concepts, purpose, and features of multicast protocols, including IGMP v2/v3, PIM dense mode/sparse mode, and rendezvous points.
- Describe the concepts and features of QoS and describe the need within the enterprise network.
- Explain basic Python components and conditionals with script writing and analysis.
- Describe network programmability protocols like NETCONF, RESTCONF.
- Describe APIs in Cisco Catalyst Center and Cisco Catalyst SD-WAN Manager.

Prerequisites:

Attendees should meet the following prerequisites:

- Implementation of Enterprise LAN networks
- Basic understanding of Enterprise routing and wireless connectivity
- Basic understanding of Python scripting
- CCNA - Implementing and Administering Cisco Solutions
- PRNE - Programming for Network Engineers

Testing and Certification

Recommended as preparation for the following exams:

- **350-401** - Implementing Cisco Enterprise Network Core Technologies Exam

Follow-on-Courses:

- ENSLD - Designing Cisco Enterprise Networks
- ENWLSD - Designing Cisco Enterprise Wireless Networks
- ENARSI - Implementing Cisco Enterprise Advanced Routing and Services
- ENWLSI - Implementing Cisco Enterprise Wireless Networks
- ENSDWI - Implementing Cisco SD-WAN Solutions

Content:

Examining Cisco Enterprise Network Architecture

- Cisco Enterprise Architecture Model
- Campus LAN Design Fundamentals
- Traditional Multilayer Campus Layer Design
- Campus Distribution Layer Design
- Fabric and Cloud Enterprise Design

Exploring Cisco Switching Paths

- Layer 2 Switch Operation
- Control Plane and Data Plane
- Cisco Switching Mechanisms
- Cisco Express Forwarding Overview

Implementing Campus LAN Connectivity

- Creating a VLAN
- IEEE 802.1Q
- Inter-VLAN Routing

Building Redundant Switched Topology

- STP Overview
- STP Operation
- STP Types and Features
- Introducing MST
- PortFast and BPDU Guard
- Enhance STP with Root Guard

Implementing Layer 2 Port Aggregation

- Need for EtherChannel
- EtherChannel Mode Interactions
- Layer 2 EtherChannel Configuration Guidelines
- EtherChannel Load-Balancing Options
- Troubleshoot EtherChannel Issues
- Describe Policy-Based Routing

Implementing OSPF

- Describe OSPF
- OSPF Process
- OSPF Neighbour Adjacencies
- Building a Link-State Database
- OSPF LSA Types
- Compare Single-Area and Multi-Area OSPF
- OSPF Area Structure
- OSPF Network Types

Optimizing OSPF

- OSPF Cost
- OSPF Route Summarization
- OSPF Route Filtering Tools
- Compare OSPFv2 and OSPFv3

Explaining EIGRP

- EIGRP Features
- EIGRP Reliable Transport

Introducing Virtualisation Protocols and Techniques

- Server Virtualisation
- Need for Network Virtualisation
- Path Isolation Overview
- Introducing VRF
- Introducing Generic Routing Encapsulation

Exploring Virtual Private Networks and Interfaces

- Site-to-Site VPN Technologies
- IPSec VPN Overview
- IPSec: Internet Key Exchange
- IPsec Modes
- IPsec VPN Types
- Cisco IOS VTI

Examining Wireless Deployment Options

- Wireless Deployment Overview
- Describe Autonomous AP Deployment
- Describe Centralized Cisco WLC Deployment
- Describe FlexConnect Deployment
- Describe the Cloud-Managed Meraki Solution
- Cisco Catalyst 9800 Series Controller Deployment Options
- Describe Cisco Mobility Express

Examining Wireless AP Operation

- Universal AP Priming
- Explore the Controller Discovery Process
- Describe AP Failover
- Explain High Availability
- Explore AP Modes

Implementing Wireless Client Authentication

- Authentication Methods
- Pre-Shared Key (PSK) Authentication
- 802.1X User Authentication Overview
- PKI and 802.1X Certificate Based Authentication
- Introduction to EAP
- EAP-Transport Layer Security (EAP-TLS)
- Protected Extensible Authentication Protocol
- EAP-Flexible Authentication via Secure Tunneling
- Guest Access with Web Auth
- Describe EAPOL
- Initialize Centralized Cisco WLC
- Getting Familiar with Cisco WLC GUI

Troubleshooting Wireless Client Connectivity

- Wireless Troubleshooting Tools Overview
- Spectrum Analysis

Implementing Secure Access Control

- Securing Device Access
- AAA Framework Overview
- Benefits of AAA Usage
- Authentication Options
- RADIUS and TACACS+
- Enabling AAA and Configuring a Local User for Fallback
- Configuring RADIUS for Console and VTY Access
- Configuring TACACS+ for Console and VTY Access
- Configure Authorization and Accounting

Discovering the Basics of Python Programming

- Describe Python Concepts
- String Data Types
- Numbers Data Types
- Boolean Data Types
- Script Writing and Execution
- Analyzing the Code

Introducing Network Programmability Protocols

- Configuration Management
- Evolution of Device Management and Programmability
- Data Encoding Formats
- Understanding JSON
- Model Driven Programmability Stack
- Introduction to YANG
- Types of YANG Models
- Understanding NETCONF
- Explain NETCONF and YANG
- Understanding REST
- Understanding RESTCONF

Explaining Wireless Principles (Self-Study)

- Explain RF Principles
- Describe Watts and Decibels
- Describe Antenna Charactistics
- Describe IEEE Wireless Standards
- Identify Wireless Component Roles
- Client Density

Exploring Wireless Roaming and Location Services (Self-Study)

- Wireless Roaming Overview
- Mobility Groups and Domains
- Wireless Roaming Types
- Describe Location Services

Exploring Enterprise Network Security Architecture (Self-Study)

- Explore Threatscape
- Cisco Intrusion Prevention Systems

- Establishing EIGRP Neighbour Adjacency
- EIGRP Metrics
- EIGRP Path Selection
- Explore EIGRP Load Balancing and Sharing
- EIGRP for IPv6
- Compare EIGRP and OSPF Routing Protocols
- Configure EIGRP

Exploring EBGP

- Interdomain Routing with BGP
- BGP Operations
- Types of BGP Neighbour Relationships
- BGP Path Selection
- BGP Path Attributes

Implementing Network Redundancy

- Need for Default Gateway Redundancy
- Define FHRP
- HSRP Advanced Features
- Cisco Switch High Availability Features

Implementing NAT

- Define NAT
- NAT Address Types
- Explore NAT Implementations
- NAT Virtual Interface
- Wi-Fi Scanning
- Packet Analysis
- Cisco AireOS GUI and CLI Tools
- Cisco Wireless Config Analyzer Express
- Common Wireless Client Connectivity Issues Overview
- Client to AP Connectivity
- WLAN Configuration
- Infrastructure Configuration

Implementing Network Services

- Understanding NTP
- Describe PTP
- Logging Services
- Understanding SNMP
- Introducing NetFlow
- Understanding Cisco IOS EEM

Introducing Multicast Protocols

- Multicast Overview
- Internet Group Management Protocol
- Multicast Distribution Trees
- IP Multicasting Routing
- Rendezvous Point

Introducing QoS (Self-study)

- Understand the Impact of User Applications on the Network
- Need for Quality of Service (QoS)
- Describe QoS Mechanisms
- Define and Interpret a QoS Policy

Using Network Analysis Tools

- Troubleshooting Concepts
- Network Troubleshooting Procedures: Overview
- Network Troubleshooting Procedures: Case Study
- Basic Hardware Diagnostics
- Filtered Show Commands
- Cisco IOS IP SLAs
- SPAN Overview
- Remote SPAN (RSPAN)
- Encapsulated Remote Switched Port Analyzer(ERSAPN)
- Cisco Packet Capture Tools Overview

Implementing Infrastructure Security

- Types of ACL
- Configure Numbered Access Lists
- Use ACLs to Filter Network Traffic
- Apply ACLs to Interfaces
- Configured Named Access Lists
- Control Plane Overview
- Control Plane Policing
- Virtual Private Networks
- Content Security
- Logging
- Endpoint Security
- Personal Firewalls
- Antivirus and Antispyware
- Centralized Endpoint Policy Enforcement
- Cisco AMP for Endpoints
- Firewall Concepts
- TrustSec
- MACsec
- Identity Management
- 802.1X for Wired and Wireless Endpoint Authentication
- MAC Authentication Bypass
- Web Authentication

Exploring Cisco Catalyst Center - Network Automation and Management (Self-study)

- Cisco Catalyst Center Solution Overview
- Cisco Catalyst Center - Functional Areas Overview
- Cisco Catalyst Center - NetOps Overview
- Cisco Catalyst Center - SecOps Overview
- Cisco Catalyst Cetner - AIOps Overview
- Cisco Catalyst Center - DevOps Overview
- Cisco Catalyst Center Inventory Overview
- Cisco Catalyst Center Configuration Management Overview
- Onboarding Network Devices Using Cisco Catalyst Center
- Cisco Catalyst Center SWIM
- Cisco Catalyst Center (Assurance) AIOps Key Features and Use Cases
- Cisco Catalyst Center (Assurance) AIOps Implementation Workflow

Examining the Cisco SD-Access Solution (Self-study)

- Need for Cisco SD-Access
- Cisco SD Access Overview
- Cisco SD-Access Fabric Components
- Cisco SD-Access Fabric Control Plane Based on LISP
- Cisco SD-Access Fabric Control Plane Based on VXLAN
- Cisco SD-Access Fabric Control Plane Based on Cisco TrustSec
- Role of Cisco ISE and Cisco DNA Centre in SD-Access
- Cisco SD-Access Wireless Architecture
- Traditional Campus Interoperating with Cisco SD-Access

Exploring the Working Principles of the Cisco Catalyst SD-WAN Solution (Self-study)

- Need for Software Defined Networking for WAN
- Cisco SD-WAN Components and Functions
- Cisco SD-WAN Orchestration Plane
- Cisco SD-WAN Management Plane

- Cisco SD-WAN Control Plane
- Cisco SD-WAN Data Plane
- Cisco SD-WAN Programmatic APIs
- Cisco SD-WAN Analytics
- Cisco SD-WAN Terminology
- Cisco IOS XE and IOS XE SD-WAN Software
- Flexible Controller Deployment Options

Introducing APIs in Cisco Catalyst Center and Cisco SD-WAN Manager (Self-study)

- Application Programming Interfaces
- REST API Response Codes and Results
- REST API Security
- Cisco Catalyst Center APIs
- Cisco SD-WAN REST API Overview

Labs

- Discovery Lab 1: Investigate the CAM
- Discovery Lab 2: Analyse Cisco Express Forwarding
- Discovery Lab 3: Troubleshoot VLAN and Trunk Issues
- Discovery Lab 4: Tune STP and Configure RSTP
- Discovery Lab 5: Configure Multiple STP
- Discovery Lab 6: Troubleshoot EtherChannel
- Discovery Lab 7: Implementing Multiarea OSPF
- Discovery Lab 8: Implement OSPF Tuning
- Discovery Lab 9: Apply OSPF Optimization
- Discovery Lab 10: Implement OSPFv3
- Discovery Lab 11: Configure and Verify Single-Homed EBGP
- Discovery Lab 12: Implement HSRP
- Discovery Lab 13: Configure VRRP
- Discovery Lab 14: Implement NAT
- Discovery Lab 15: Configure and Verify VRF
- Discovery Lab 16: Configure and Verify a GRE Tunnel
- Discovery Lab 17: Configure Static VTI Point-to-Point Tunnels
- Discovery Lab 18: Configure Wireless Client Authentication in a Centralized Deployment
- Discovery Lab 20: Configure Syslog
- Discovery Lab 21: Configure and Verify Flexible NetFlow
- Discovery Lab 22: Configuring Cisco IOS EEM
- Discovery Lab 23: Troubleshoot Connectivity and Analyse Traffic with Ping, Traceroute and Debug
- Discovery Lab 24: Configure and Verify Cisco IP SLA's
- Discovery Lab 25: Configure Standard and Extended ACLs
- Discovery Lab 26: Configure Control Plane Policing
- Discovery Lab 27: Implement Local and Server-Based AAA

- Discovery Lab 28: Write and Troubleshoot Python Scripts
- Discovery Lab 29: Explore JSON Objects and Scripts in Python
- Discovery Lab 30: Use NETCONF via SSH
- Discovery Lab 31: Use RESTCONF with Cisco IOS XE Software

Additional Information:

For this course you will receive two sets of login credentials - One for the 5 day -ILTclass and another for the extended 90-Day access. For the 5 day ILT class you will have all of the labs listed within the course.

Further Information:

For More information, or to book your course, please call us on 00 20 (0) 2 2269 1982 or 16142

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