CCNP Enterprise

Introduction

Software and networking become more and more interconnected every day. Technology advances are enabling new applications and businesses that connect everything—people, devices, machines, and applications. And with intent-based networking, organizations can take advantage of automation to scale and secure their networking infrastructure. To capitalize on these opportunities, today's networking professionals need a broader range of skills and a deeper focus in strategic technology areas. The CCNP Enterprise certification program gives you exactly that breadth and depth.

CCNP Enterprise certification will help you prove your skills in the ever-changing landscape of enterprise network technologies. The certification covers core technologies and an enterprise focus area of your choice. You choose where you want to focus. You choose where to take your career.

Required exam

350-401 ENCOR: Implementing and Operating Cisco Enterprise Network Core Technologies

The Implementing and Operating Cisco Enterprise Network Core Technologies (ENCOR) v1.1 course gives you the knowledge and skills needed to configure, troubleshoot, and manage enterprise wired and wireless networks. You'll also learn to implement security principles, implement automation and programmability within an enterprise network, and how to overlay network design by using SD-Access and SD-WAN solutions.

This course helps you prepare to take the 350-401 Implementing Cisco® Enterprise Network Core Technologies (ENCOR) exam, which is part of four new certifications:

- CCNP® Enterprise
- CCIE® Enterprise Infrastructure
- CCIE Enterprise Wireless
- Cisco Certified Specialist – Enterprise Core

Duration

5 Days

Course Objectives

After taking 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 Ternary Content Addressable Memory (TCAM) and Content Addressable Memory (CAM), along with process switching, fast switching, and Cisco Express Forwarding concepts
- Troubleshoot Layer 2 connectivity using VLANs and trunking
- Implementation of redundant switched networks using Spanning Tree Protocol
- Troubleshooting link aggregation using Etherchannel

- Describe the features, metrics, and path selection concepts of Enhanced Interior Gateway Routing Protocol (EIGRP)
- Implementation and optimization of Open Shortest Path First (OSPF)v2 and OSPFv3, including adjacencies, packet types, and areas, summarization, and route filtering for IPv4 and IPv6
- Implementing External Border Gateway Protocol (EBGP) interdomain routing, path selection, and single and dual-homed networking
- Implementing network redundancy using protocols including Hot Standby Routing Protocol (HSRP) and Virtual Router Redundancy Protocol (VRRP)
- Implementing internet connectivity within Enterprise using static and dynamic Network Address Translation (NAT)
- Describe the virtualization technology of servers, switches, and the various network devices and components
- Implementing overlay technologies such as Virtual Routing and Forwarding (VRF), Generic Routing Encapsulation (GRE), VPN, and Location Identifier Separation Protocol (LISP)
- Describe the components and concepts of wireless networking including Radio Frequency (RF) and antenna characteristics, and define the specific wireless standards
- Describe the various wireless deployment models available, include autonomous Access Point (AP) deployments and cloud-based designs within the centralized Cisco Wireless LAN Controller (WLC) architecture
- Describe wireless roaming and location services
- Describe how APs communicate with WLCs to obtain software, configurations, and centralized management
- Configure and verify Extensible Authentication Protocol (EAP), WebAuth, and Pre-Shared Key (PSK) wireless client authentication on a WLC
- Troubleshoot wireless client connectivity issues using various available tools
- Troubleshooting Enterprise networks using services such as Network Time Protocol (NTP), Simple Network Management Protocol (SNMP), Cisco Internetwork Operating System (Cisco IOS®) IP Service Level Agreements (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 Command-Line Interface (CLI) access, Role-Based Access Control (RBAC), Access Control List (ACL), and Secure Shell (SSH), and explore device hardening concepts to secure devices from less secure applications, such as Telnet and HTTP
- Implement scalable administration using Authentication, Authorization, and Accounting (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 DNA Center™ Assurance for Intent-Based Networking, for network visibility, proactive monitoring, and application experience
- Describe the components and features of the Cisco SD-Access solution, including the nodes, fabric control plane, and data plane, while illustrating the purpose and function of the Virtual Extensible LAN (VXLAN) gateways
- Define the components and features of Cisco SD-WAN solutions, including the orchestration plane, management plane, control plane, and data plane
- Describe the concepts, purpose, and features of multicast protocols, including Internet Group Management Protocol (IGMP) v2/v3, protocol-independent Multicast (PIM) dense mode/sparse mode, and rendezvous points
- Describe the concepts and features of Quality of Service (QoS), and describe the need within the enterprise network
- Explain basic Python components and conditionals with scriptwriting and analysis
- Describe network programmability protocols such as Network Configuration Protocol (NETCONF) and RESTCONF
- Describe APIs in Cisco DNA Center and vManage

Prerequisites

Knowledge and skills you should have before attending this course:

- Implementation of Enterprise LAN networks
- Basic understanding of Enterprise routing and wireless connectivity
- Basic understanding of Python scripting

Target Audience

- Mid-level network engineers
- Network administrators
- Network support technicians
- Help desk technicians

Course Outline

- Examining Cisco Enterprise Network Architecture
- Understanding Cisco Switching Paths
- Implementing Campus LAN Connectivity
- Building Redundant Switched Topology
- Implementing Layer 2 Port Aggregation
- Understanding EIGRP
- Implementing OSPF
- Optimizing OSPF
- Exploring EBGP
- Implementing Network Redundancy
- Implementing NAT
- Introducing Virtualization Protocols and Techniques
- Understanding Virtual Private Networks and Interfaces
- Understanding Wireless Principles
- Examining Wireless Deployment Options
- Understanding Wireless Roaming and Location Services
- Examining Wireless AP Operation
- Understanding Wireless Client Authentication
- Troubleshooting Wireless Client Connectivity
- Introducing Multicast Protocols
- Introducing QoS
- Implementing Network Services
- Using Network Analysis Tools
- Implementing Infrastructure Security
- Implementing Secure Access Control
- Understanding Enterprise Network Security Architecture
- Exploring Automation and Assurance Using Cisco DNA Center
- Examining the Cisco SD-Access Solution
- Understanding the Working Principles of the Cisco SD-WAN Solution
- Understanding the Basics of Python Programming
- Introducing Network Programmability Protocols
- Introducing APIs in Cisco DNA Center and vManage

Lab Outline

- Investigate the CAM
- Analyze Cisco Express Forwarding

- Troubleshoot VLAN and Trunk Issues
- Tuning Spanning Tree Protocol (STP) and Configuring Rapid Spanning Tree Protocol (RSTP)
- Configure Multiple Spanning Tree Protocol
- Troubleshoot EtherChannel
- Implement Multi-area OSPF
- Implement OSPF Tuning
- Apply OSPF Optimization
- Implement OSPFv3
- Configure and Verify Single-Homed EBGP
- Implementing Hot Standby Routing Protocol (HSRP)
- Configure Virtual Router Redundancy Protocol (VRRP)
- Implement NAT
- Configure and Verify Virtual Routing and Forwarding (VRF)
- Configure and Verify a Generic Routing Encapsulation (GRE) Tunnel
- Configure Static Virtual Tunnel Interface (VTI) Point-to-Point Tunnels
- Configure Wireless Client Authentication in a Centralized Deployment
- Troubleshoot Wireless Client Connectivity Issues
- Configure Syslog
- Configure and Verify Flexible NetFlow
- Configuring Cisco IOS Embedded Event Manager (EEM)
- Troubleshoot Connectivity and Analyze Traffic with Ping, Traceroute, and Debug
- Configure and Verify Cisco IP SLAs
- Configure Standard and Extended ACLs
- Configure Control Plane Policing
- Implement Local and Server-Based AAA
- Writing and Troubleshooting Python Scripts
- Explore JavaScript Object Notation (JSON) Objects and Scripts in Python
- Use NETCONF Via SSH
- Use RESTCONF with Cisco IOS XE Software

Concentration Exams (Choose One)

1. 300-435 ENAUTO: Automating and Programming Cisco Enterprise Solutions

Implementing Automation for Cisco Enterprise Solutions (ENAUI) v.1.2 teaches you how to implement Cisco Enterprise automated solutions, including programming concepts, orchestration, telemetry, and automation tools.

This course highlights the tools and the benefits of leveraging programmability and automation in the Cisco-powered Enterprise Campus and WAN. You will also examine platforms including IOS XE software for device-centric automation, Cisco DNA Center for the intent-based enterprise network, Cisco Software-Defined WAN, and Cisco Meraki. Their current ecosystem of APIs, software development toolkits, and relevant workflows are studied in detail together with open industry standards, tools, and APIs, such as Python, Ansible, Git, JSON/YAML, NETCONF/RESTCONF, and YANG.

Duration

3 Days

Course Objectives

This course is designed primarily for network and software engineers who are interested in learning about automation and programmability and hold the following job roles:

- Network engineer
- Systems engineer
- Wireless engineer
- Consulting systems engineer
- Technical solutions architect
- Network administrator
- Wireless design engineer
- Network manager
- Sales engineer
- Account manager

Prerequisites

Before taking this course, you should have the following knowledge and skills:

- Basic programming language concepts
- Basic understanding of virtualization
- Ability to use Linux and CLI tools, such as Secure Shell (SSH) and bash
- CCNP level core networking knowledge
- A foundational understanding of Cisco DNA, Meraki, and Cisco SD-WAN

Target Audience

This course is designed primarily for network and software engineers who are interested in learning about automation and programmability and hold the following job roles:

- Network engineer
- Systems engineer
- Wireless engineer
- Consulting systems engineer
- Technical solutions architect
- Network administrator
- Wireless design engineer
- Network manager
- Sales engineer
- Account manager

Course Outline

- Network Programmability Foundation
- Automating APIs and Protocols
- Managing Configuration with Python and Ansible
- Implementing On-Box Programmability and Automation with Cisco IOS XE Software
- Implementing Model-Driven Telemetry
- Day 0 Provisioning with Cisco IOS-XE Software
- Implementing Automation in Enterprise Networks
- Building Cisco DNA Center Automation with Python
- Automating Operations using Cisco DNA Center
- Introducing Cisco SD-WAN Programmability
- Building Cisco SD-WAN Automation with Python
- Building Cisco SD-WAN Automation with Ansible
- Automating Cisco Meraki
- Implementing Meraki Integration APIs

Lab Outline

- Automate Networks with Netmiko
- Use Postman for REST API Consumption
- Use Ansible to Configure and Verify Device Configuration
- Implement On-Box Programmability and Automation with Cisco IOS XE Software
- Use Python on Cisco IOS XE Software
- Implement Streaming Telemetry with Cisco IOS XE
- Explore Cisco DNA Center APIs
- Build Python Scripts to Interact with Cisco DNA Center Intent APIs
- Build Python Scripts with Cisco DNA Center Assurance APIs
- Troubleshoot End-to-End Connectivity and Health-Check the Network via the Cisco DNA Center API
- Perform Administrative Tasks Using the Cisco SD-WAN API
- Build, Manage, and Operate Cisco SD-WAN Programmatically
- Consume SD-WAN APIs Using the Uniform Resource Identifier (URI) Module
- Manage Policies with Ansible
- Build Reports Using Ansible-Cisco SD_WAN Role
- Implement Cisco Meraki API Automation
- Explore Cisco Meraki Integration APIs
- Explore Cisco Meraki Webhook Alerts

2. 300-430 ENWLSI: Implementing Cisco Enterprise Wireless Networks

The Implementing Cisco Enterprise Wireless Networks (ENWLSI) v1.1 course gives you the knowledge and skills needed to create a secure wireless network infrastructure and troubleshoot any related issues. You'll learn how to implement and fortify a wireless network infrastructure using Cisco Identity Service Engine (ISE), Cisco Prime Infrastructure (PI), and Cisco Connect Mobile Experience to monitor and troubleshoot network issues.

This course provides hands-on labs to reinforce concepts including deploying Cisco Prime Infrastructure Release 3.5, Cisco Catalyst® 9800 Wireless Controller Release, Cisco IOS XE Gibraltar 16.10, Cisco Digital Network Architecture (Cisco DNA) Center Release 1.2.8, Cisco Connected Mobile Experiences (CMX) Release 10.5, Cisco Mobility Services Engine (MSE) Release 8.0 features, and Cisco ISE Release 2.4.

This course also helps you prepare to take the 300-430 Implementing Cisco Enterprise Wireless Networks (ENWLSI) exam, which is part of the new CCNP® Enterprise certification and the Cisco Certified Specialist - Enterprise Wireless Implementation certification.

Duration

5 Days

Course Objectives

After taking this course, you should be able to:

- Implement network settings to provide a secure wireless network infrastructure
- Implement a secure wireless client and troubleshoot wireless client connectivity issues
- Implement and troubleshoot QoS in wireless networks
- Implement and troubleshoot advanced capabilities in wireless network services

Prerequisites

Before taking this course, you should have:

- General knowledge of networks and wireless networks
- Routing and switching knowledge

Target Audience

- Network designers
- Sales engineers
- Wireless network engineers

Course Outline

- Securing and Troubleshooting the Wireless Network Infrastructure
- Implementing and Troubleshooting Secure Client Connectivity
- Implementing and Troubleshooting Quality of Service (QoS) in Wireless Networks
- Implementing and Troubleshooting Advanced Wireless Network Services

Lab Outline

- Lab Familiarization (Base Learning Lab)
- Configure Secure Management Access for Cisco Wireless LAN Controllers (WLCs) and Access Points (APs)
- Add Network Devices and External Resources to Cisco Prime Infrastructure
- Customize Cisco Prime Infrastructure for Network Monitoring
- Capture a Successful AP Authentication
- Implement Authentication, Authorization, and Accounting (AAA) Services for Central Mode WLANs
- Implement AAA Services for FlexConnect Mode Wireless LANs (WLANs)
- Configure Guest Services in the Wireless Network
- Configure Bring Your Own Device (BYOD) in the Wireless Network
- Capture Successful Client Authentications
- Configure QoS in the Wireless Network for Voice and Video Services
- Configure Cisco Application Visibility and Control (AVC) in the Wireless Network
- Configure multicast DNS (mDNS) in the Wireless Network
- Capture Successful QoS Traffic Marking in the Wireless Network
- Configure, Detect, and Locate Services on the Cisco CMX

3. 300-425 ENWLSD: Designing Cisco Enterprise Wireless Networks

The Designing Cisco Enterprise Wireless Networks (ENWLSD) v1.1 course gives you the knowledge you need to design Cisco® wireless networks. The course covers design specifics from scenario design concepts through the installation phase and into post-deployment validation.

This course, including the self-paced material, helps prepare you to take the exam, Designing Cisco Enterprise Wireless Networks (300-425 ENWLSD), which leads to the new CCNP® Enterprise and Cisco Certified Specialist – Enterprise Wireless Design certifications.

Duration

5 Days

Course Objectives

After taking this course, you should be able to:

- Describe and implement a Cisco-recommended structured design methodology
- Describe and implement industry standards, amendments, certifications, and Requests For Comments (RFCs)
- Describe and implement Cisco enhanced wireless features
- Describe and implement the wireless design process
- Describe and implement specific vertical designs
- Describe and implement site survey processes
- Describe and implement network validation processes

Prerequisites

- General knowledge of networks
- General knowledge of wireless networks
- Routing and switching knowledge

Target Audience

- Consulting systems engineer
- Network administrator
- Network engineer
- Network manager
- Sales engineer
- Systems engineer
- Technical solutions architect
- Wireless design engineer
- Wireless engineer

Course Outline

- **Describing and Implementing a Structured Wireless Design Methodology**
    - Importance of Planning Wireless Design with a Structured Methodology
    - Cisco Structured Design Model
    - Cisco Design Guides and Cisco Validated Designs for Wireless Networks
    - Role of the Project Manager When Designing Wireless Networks
- **Describing and Implementing Industry Protocols and Standards**
    - Wireless Standards Bodies
    - Institute of Electrical and Electronics Engineers (IEEE) 802.11 Standard and Amendments
    - Wi-Fi Alliance (WFA) Certifications
    - Relevant Internet Engineering Task Force (IETF) Wireless RFCs
    - Practice Activity
- **Describing and Implementing Cisco Enhanced Wireless Features**
    - Hardware and Software Choices for a Wireless Network Design
    - Cisco Infrastructure Settings for Wireless Network Design
    - Cisco Enhanced Wireless Features
- **Examining Cisco Mobility and Roaming**

    - Mobility and Intercontroller Mobility in a Wireless Network
    - Optimize Client Roaming in a Wireless Network
    - Cisco Workgroup Bridge (WGB) and WGB Roaming in a Wireless Network
- **Describing and Implementing the Wireless Design Process**
    - Overview of Wireless Design Process
    - Meet with the Customer to Discuss the Wireless Network Design
    - Customer Information Gathering for a Wireless Network Design
    - Design the Wireless Network
    - Deployment of the Wireless Network
    - Validation and Final Adjustments of the Wireless Network
    - Wireless Network Design Project Documents and Deliverables
- **Describing and Implementing Specific Vertical Designs**
    - Designs for Wireless Applications
    - Wireless Network Design Within the Campus
    - Extend Wireless Networks to the Branch Sites
- **Examining Special Considerations in Advanced Wireless Designs**
    - High-Density Designs in Wireless Networks
    - Introducing Location and Cisco Connected Mobile Experiences (CMX) Concepts
    - Design for Location
    - FastLocate and HyperLocation
    - Bridges and Mesh in a Wireless Network Design
    - Redundancy and High Availability in a Wireless Network
- **Describing and Implementing the Site Survey Processes**
    - Site Survey Types
    - Special Arrangements Needed for Site Surveys
    - Safety Aspects to be Considered During Site Surveys
    - Site Survey Tools in Cisco Prime Infrastructure
    - Third-Party Site Survey Software and Hardware Tools
- **Describing and Implementing Wireless Network Validation Processes**
    - Post-installation Wireless Network Validation
    - Making Post-installation Changes to a Wireless Network
    - Wireless Network Handoff to the Customer
    - Installation Report

Lab Outline

- Review Cisco Enhanced Wireless Features
- Design a Wireless Network
- Design a Wireless Network for a Specific Vertical
- Design a Wireless Network that Extends Beyond the Campus (ILT output)
- Use Cisco Prime Infrastructure as a Design Tool
- Create a Predictive Site Survey with Ekahau Pro
- Review a Live Site Survey Using Access Point on a Stick (APoS)
- Simulate a Post-installation Network Validation Survey

4. 300-420 ENSLD: Designing Cisco Enterprise Networks

The Designing Cisco Enterprise Networks (ENSLD) v1.0 course gives you the knowledge and skills you need to design an enterprise network. This course serves as a deep dive into enterprise network design and expands on the topics covered in the Implementing and Operating Cisco® Enterprise Network Core Technologies (ENCOR) v1.0 course.

This course also helps you prepare to take the exam, Designing Cisco Enterprise Networks (ENSLD), which is part of the CCNP® Enterprise and Cisco Certified Specialist - Enterprise Design certifications.

Duration

5 Days

Course Objectives

After taking this course, you should be able to:

- Design Enhanced Interior Gateway Routing Protocol (EIGRP) internal routing for the enterprise network
- Design Open Shortest Path First (OSPF) internal routing for the enterprise network
- Design Intermediate System to Intermediate System (IS-IS) internal routing for the enterprise network
- Design a network based on customer requirements
- Design Border Gateway Protocol (BGP) routing for the enterprise network
- Describe the different types and uses of Multiprotocol BGP (MP-BGP) address families
- Describe BGP load sharing
- Design a BGP network based on customer requirements
- Decide where the L2/L3 boundary will be in your Campus network and make design decisions
- Describe Layer 2 design considerations for Enterprise Campus networks
- Design a LAN network based on customer requirements
- Describe Layer 3 design considerations in an Enterprise Campus network
- Examine Cisco SD-Access fundamental concepts
- Describe Cisco SD-Access Fabric Design
- Design a Software-Defined Access (SD-Access) Campus Fabric based on customer requirements
- Design service provider-managed VPNs
- Design enterprise-managed VPNs
- Design a resilient WAN
- Design a resilient WAN network based on customer requirements
- Examine the Cisco SD-WAN architecture
- Describe Cisco SD-WAN deployment options
- Design Cisco SD-WAN redundancy
- Explain the basic principles of QoS
- Design Quality of Service (QoS) for the WAN
- Design QoS for enterprise network based on customer requirements
- Explain the basic principles of multicast
- Designing rendezvous point distribution solutions
- Describe high-level considerations when doing IP addressing design
- Create an IPv6 addressing plan
- Plan an IPv6 deployment in an existing enterprise IPv4 network
- Describe the challenges that you might encounter when transitioning to IPv6
- Design an IPv6 addressing plan based on customer requirements
- Describe Network APIs and protocols
- Describe Yet Another Next Generation (YANG), Network Configuration Protocol (NETCONF), and Representational State Transfer Configuration Protocol (RESTCONF)

Prerequisites

Before taking this course, you should have earned CCNA® certification or be familiar with:

- Basic network fundamentals and build simple LANs
- Basic IP addressing and subnets
- Routing and switching fundamentals
- Basic wireless networking concepts and terminology

Target Audience

- Network design engineers
- Network engineers
- System administrators

Course Outline

- Designing EIGRP Routing
- Designing OSPF Routing
- Designing IS-IS Routing
- Designing BGP Routing and Redundancy
- Understanding BGP Address Families
- Designing the Enterprise Campus LAN
- Designing the Layer 2 Campus
- Designing the Layer 3 Campus
- Discovering the Cisco SD-Access Architecture
- Exploring Cisco SD-Access Fabric Design
- Designing Service Provider-Managed VPNs
- Designing Enterprise-Managed VPNs
- Designing WAN Resiliency
- Examining Cisco SD-WAN Architectures
- Cisco SD-WAN Deployment Design Considerations
- Designing Cisco SD-WAN Routing and High Availability
- Understanding QoS
- Designing LAN and WAN QoS
- Exploring Multicast with protocol-independent Multicast-Sparse Mode
- Designing Rendezvous Point Distribution Solutions
- Designing an IPv4 Address Plan
- Exploring IPv6
- Deploying IPv6
- Introducing Network APIs and Protocols
- Exploring YANG, NETCONF, RESTCONF, and Model-Driven Telemetry

Lab Outline

- Designing Enterprise Connectivity
- Designing an Enterprise Network with BGP Internet Connectivity
- Designing an Enterprise Campus LAN
- Designing Resilient Enterprise WAN
- Designing QoS in an Enterprise Network
- Designing an Enterprise IPv6 Network

5. 300-415 ENSDWI: Implementing Cisco SD-WAN Solutions

The Implementing Cisco SD-WAN Solutions (ENSDWI) v2.0 course gives you training about how to design, deploy, configure, and manage your Cisco® Software-Defined WAN (SD-WAN) solution in a large-scale live network, including how to migrate from legacy WAN to SD-WAN. You will learn best practices for configuring routing protocols in the data center and the branch, as well as how to implement advanced control, data, and application-aware policies. The course also covers SD-WAN deployment and migration options, placement of controllers, how to deploy WAN Edge devices, and how to configure Direct Internet Access (DIA) breakout. The course looks at the different Cisco SD-WAN security options available, such as application-aware enterprise firewall, Intrusion Prevention System (IPS), URL filtering, Cisco Advanced Malware Protection (AMP), Secure Sockets Layer/Transport Layer Security (SSL/TLS) proxy, and Cisco Umbrella® Secure Internet Gateway (SIG).

This course helps you prepare to take the Implementing Cisco SD-WAN Solutions (300-415 ENSDWI) exam which is part of the CCNP® Enterprise certification.

Duration

5 Days

Course Objectives

After taking this course, you should be able to:

- Describe the Cisco SD-WAN solution and how modes of operation differ in traditional WAN versus SD-WAN
- Describe options for Cisco SD-WAN cloud and on-premises deployment
- Explain how to deploy WAN Edge devices
- Review the Zero-Touch Provisioning (ZTP) process and examine technical specifics for on-premises deployment
- Review the device configuration template and describe new features of device configuration templates
- Describe options for providing scalability, high availability, and redundancy
- Explain how dynamic routing protocols are deployed in an SD-WAN environment, on the service side and transport side
- Describe Cisco SD-WAN policy concepts, which includes how policies are defined, attached, distributed, and applied
- Define and implement advanced control policies, such as policies for custom topologies and service insertion
- Identify and implement advanced data policies, such as policies for traffic engineering and QoS
- Define and implement an Application-Aware Routing (AAR) policy
- Implement Direct Internet Access (DIA) and Cisco SD-WAN Cloud OnRamp options
- Describe Cisco SD-WAN security components and integration
- Describe how to design pure and hybrid Cisco SD-WAN solutions, as well as how to perform a migration to Cisco SD-WAN
- Describe Cisco SD-WAN Day-2 operations, such as monitoring, reporting, logging, troubleshooting, and upgrading
- Describe Cisco SD-WAN support for multicast

Prerequisites

- Knowledge of Software-Defined Networking (SDN) concepts as applied to large-scale live network deployments
- Strong understanding of enterprise WAN design
- Strong understanding of routing protocol operation, including both interior and exterior routing protocol operation
- Familiarity with Transport Layer Security (TLS) and IP Security (IPSec)

Target Audience

- System installers
- System integrators
- System administrators
- Network administrators
- Solutions designers

Course Outline

- Examining the Cisco SD-WAN Architecture
- Examining Cisco SD-WAN Deployment Options
- Deploying WAN Edge Devices
- Onboarding WAN Edge Devices with ZTP and PnP
- Using Device Configuration Templates
- Exploring Redundancy, High Availability, and Scalability
- Enabling Service-Side and Transport-Side Routing
- Understanding Cisco SD-WAN Policy Configuration Basics
- Defining Advanced Control Policies
- Implementing AAR
- Examining Direct Internet Access and Cloud Deployment Options
- Exploring Cisco SD-WAN Security
- Designing and Migrating to Cisco SD-WAN
- Performing Cisco SD-WAN Network Management and Troubleshooting
- Examining Cisco SD-WAN Multicast Support

Lab Outline

- Deploy Cisco SD-WAN Controllers
- Add a WAN Edge Router Using ZTP
- Deploy Cisco SD-WAN Device Using Configuration Templates
- Configure Cisco SD-WAN Controller Affinity
- Implement Service Side Routing Protocols
- Implement Transport Location (TLOC) Extensions
- Implement Control Policies
- Implement Data Policies
- Implement Application-Aware Routing
- Implement Branch and Regional Internet Breakouts
- Migrate Branch Sites
- Perform Cisco SD-WAN Software Upgrade

6. 300-410 ENARSI: Implementing Cisco Enterprise Advanced Routing and Services

The Implementing Cisco Enterprise Advanced Routing and Services (ENARSI) v1.0 gives you the knowledge you need to install, configure, operate, and troubleshoot an enterprise network. This course covers advanced routing and infrastructure technologies, expanding on the topics covered in the Implementing and Operating Cisco Enterprise Network Core Technologies (ENCOR) v1.0 course.

This course helps prepare you to take the exam, 300-410 Implementing Cisco® Enterprise Advanced Routing and Services (ENARSI), which leads to the new CCNP® Enterprise and Cisco Certified Specialist – Enterprise Advanced Infrastructure Implementation certifications.

Duration

5 Days

Course Objectives

After taking this course, you should be able to:

- Configure classic Enhanced Interior Gateway Routing Protocol (EIGRP) and named EIGRP for IPv4 and IPv6
- Optimize classic EIGRP and named EIGRP for IPv4 and IPv6
- Troubleshoot classic EIGRP and named EIGRP for IPv4 and IPv6
- Configure Open Shortest Path First (OSPF)v2 and OSPFv3 in IPv4 and IPv6 environments
- Optimize OSPFv2 and OSPFv3 behavior
- Troubleshoot OSPFv2 for IPv4 and OSPFv3 for IPv4 and IPv6
- Implement route redistribution using filtering mechanisms
- Troubleshoot redistribution
- Implement path control using Policy-Based Routing (PBR) and IP Service Level Agreement (SLA)
- Configure Multiprotocol-Border Gateway Protocol (MP-BGP) in IPv4 and IPv6 environments
- Optimize MP-BGP in IPv4 and IPv6 environments
- Troubleshoot MP-BGP for IPv4 and IPv6
- Describe the features of Multiprotocol Label Switching (MPLS)
- Describe the major architectural components of an MPLS VPN
- Identify the routing and packet forwarding functionalities for MPLS VPNs
- Explain how packets are forwarded in an MPLS VPN environment
- Implement Cisco Internetwork Operating System (IOS®) Dynamic Multipoint VPNs (DMVPNs)
- Implement Dynamic Host Configuration Protocol (DHCP)
- Describe the tools available to secure the IPV6 first hop
- Troubleshoot Cisco router security features
- Troubleshoot infrastructure security and services

Prerequisites

- General understanding of network fundamentals
- Basic knowledge of how to implement LANs
- General understanding of how to manage network devices
- General understanding of how to secure network devices
- Basic knowledge of network automation

Target Audience

- Enterprise network engineers
- System engineers
- System administrators
- Network administrators

Course Outline

- Implementing EIGRP
- Optimizing EIGRP
- Troubleshooting EIGRP
- Implementing OSPF
- Optimizing OSPF
- Troubleshooting OSPF
- Configuring Redistribution
- Troubleshooting Redistribution
- Implementing Path Control
- Implementing Internal Border Gateway Protocol (IBGP)
- Optimizing BGP
- Implementing MP-BGP
- Troubleshooting BGP
- Exploring MPLS

- Introducing MPLS L3 VPN Architecture
- Introducing MPLS L3 VPN Routing
- Configuring Virtual Routing and Forwarding (VRF)-Lite
- Implementing DMVPN
- Implementing DHCP
- Introducing IPv6 First Hop Security
- Securing Cisco Routers
- Troubleshooting Infrastructure Security and Services
- Troubleshooting with DNA Center Assurance

Lab Outline

- Configure EIGRP Using Classic Mode and Named Mode for IPv4 and IPv6
- Verify the EIGRP Topology Table
- Configure EIGRP Stub Routing, Summarization, and Default Routing
- Configure EIGRP Load Balancing and Authentication
- Troubleshoot EIGRP Issues
- Configure OSPFv3 for IPv4 and IPv6
- Verify the Link-State Database
- Configure OSPF Stub Areas and Summarization
- Configure OSPF Authentication
- Troubleshoot OSPF Issues
- Implement Routing Protocol Redistribution
- Manipulate Redistribution
- Manipulate Redistribution Using Route Maps
- Troubleshoot Redistribution Issues
- Implement PBR
- Configure IBGP and External Border Gateway Protocol (EBGP)
- Implement BGP Path Selection
- Configure BGP Advanced Features
- Configure BGP Route Reflectors
- Configure MP-BGP for IPv4 and IPv6
- Troubleshoot BGP Issues
- Configure Routing with VRF-Lite
- Implement Cisco IOS DMVPN
- Obtain IPv6 Addresses Dynamically
- Troubleshoot DHCPv4 and DHCPv6 Issues
- Troubleshoot IPv4 and IPv6 Access Control List (ACL) Issues
- Configure and Verify Unicast Reverse Path Forwarding (uRPF)
- Troubleshoot Network Management Protocol Issues: Lab 1
- Troubleshoot Network Management Protocol Issues: Lab 2