ENSLD

Designing Cisco Enterprise Networks (ENSLD) 2.0

40 horas | Enterprise Network | Cisco

Cisco Continuing Education Credits

40 CE Credits

INTRODUÇÃO

The Designing Cisco Enterprise Networks (ENSLD) v2.0 course provides CCNP-level network administrators with the knowledge and skills needed to design an enterprise network. This course is intended to be a deep dive into enterprise network design and an expansion of the topics covered in the Implementing and Operating Cisco Enterprise Network Core Technologies (ENCOR) v1.0 course.

The overall course goal is to provide a knowledge and understanding or design concepts in regard to the enterprise network with regards to the various protocols and media as per wired and wireless networks. The discussion within this course will also take in the campus network, SD-Access, VPN, QoS, IPv6, and programmability.

OBJETIVO DO CURSO

Upon completing this course, students will be able to meet these objectives:

•Design EIGRP internal routing for the enterprise network

•Design OSPF internal routing for the enterprise network

•Design IS-IS internal routing for the enterprise network

•Design a network based on customer requirements

•Design BGP routing for the enterprise network

•Describe the different types and uses of MP-BGP address families

•Describe BGP load sharing

•Design a BGP network based on customer requirements

•Decide where 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 an 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

•Examine Cisco SD-WAN—NAT and hybrid design considerations

•Design Cisco SD-WAN redundancy

•Explain the basic principles of QoS

•Design QoS for the WAN

•Design QoS for enterprise network based on customer requirements

•Explain the basic principles of multicast

•Exploring Multicast with PIM-SM

•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 YANG, NETCONF and RESTCONF

PÚBLICO-ALVO

This course is designed for technical professionals who need to know how to designing enterprise networks and architecture.

PRÉ-REQUISITOS

The knowledge and skills that students are expected to have before attending this course are:

•Understand network fundamentals

•Implement LANs

•Implement Internet connectivity

CONTEÚDO PROGRAMÁTICO

Course Introduction

• Overview
• Course Goal and Objectives
• Course Flow
• Your Training Curriculum
• Learner Introductions

Designing EIGRP Routing

• Design EIGRP internal routing for the enterprise network
• Describe Scalable EIGRP Designs and Fast Convergence
• Examine EIGRP Autonomous Systems and Layered Designs
• Describe Scalable EIGRP Hub-and-Spoke and Stub Designs
• Describe EIGRP Convergence Features

Designing OSPF Routing

• Design OSPF internal routing for the enterprise network
• OSPF Neighbor Adjacencies and LSAs
• Describe the impact of adjacent neighbors on OSPF scalability
• OSPF Scalabilitv Issues
• Identify factors that influence OSPF scalability
• Define Area and Domain Summarization
• Design OSPF area
• OSPF Full and Partial Mesh
• Explain OSPF full-mesh design challenges
• Describe how OSPF convergence can be improved

Design Case Study Activity: Designing Enterprise Connectivity

• Design a network based on customer requirements
• Design Challenge
• Choose the Routing Protocol
• Explore the Backbone Area Design
• Determine Spoke Area Design
• Determine Spoke Area Design: Special Case
• Implement OSPF Summarization
• Define the RIPv2-to-OSPF Migration Steps
• Route Redistribution
• Disable RIPv2 After Complete Migration
• Understand how to disable RIPv2 after a successful migration to OSPF.
• Define Future Growth

Designing IS-IS Routing

• Design IS-IS internal routing for the enterprise network
• Describe IS-IS Routing Protocol
• Examine IS-IS Adjacencies and Authentication
• Describe IS-IS and OSPF Similarities
• Explore IS-IS Routing Logic
• Describe IS-IS Operations
• Examine Integrated IS-IS for IPv6

Designing BGP Routing and Redundancy

• Design BGP routing for the enterprise network
• Identify IBGP Scalability Issues
• BGP Route Reflector Terminology
• Describe BGP Split-Horizon
• Route Reflector Loop Prevention Mechanisms
• BGP Confederation Loop Prevention Mechanisms
• Compare BGP Load Sharing Designs
• Describe the two ways of connecting networks to the Internet with BGP
• Examine Dual and Multihomed BGP Designs
• Describe load sharing when dual-homed to one ISP through a single local router

Exploring BGP Address Families and Attributes

• Describe the different types and uses of MP-BGP address families
• BGP Address Families and Attributes
• Describe the BGP address family model
• BGP Route Selection Preferences
• Identify the BGP route selection criteria for a best-path route selection
• Describe BGP Communities
• Design BGP communities

Examine a Case Study: Designing a Dual-Stack MP-BGP Environment

• Describe BGP named community lists

Examine a Case Study: Designing an Enterprise Network with BGP Internet Connectivity

• Design a BGP network based on customer requirements
• Design Challenge
• Determine the Routing Protocol
• Determine the Autonomous System Numbers
• Define the BGP Sessions
• Define the BGP Communities
• Define Routing Policy in North American Sites
• Define Routing Policy in European and Asian Sites
• Describe the Internet Segment
• Determine Main Headquarters Multihoming
• Determine Default Routing
• Example: Final Design

D**esigning an Enterprise Campus LAN**

• Decide where L2/L3 boundary will be in your Campus network and make design decisions
• Compare End-to-End and Local VLANs
• Describe design considerations of end-to-end and local VLAN designs
• Describe the Layer 3 Access Layer
• Describe 3-tier network design with Layer 3 access

Examine a Case Study: Describe design considerations with Layer 2 distribution interconnect

• Describe Cloud Deployment Models
• Describe three cloud deployment types

Designing Layer 2 Campus

• Describe layer 2 design considerations for Enterprise Campus networks
• Describe VLANs, Trunks, and VTP
• Understanding the Spanning Tree Protocol
• Understanding the Layer 2 Security Techniques
• Describe Cisco STP toolkit andd access list usage
• Understand MST, POE, and EnergyWise
• Describe Port Aggregation Considerations
• Describe HSRP and VRRP design considerations
• Describe Network Requirements of Applications

Design Case Study Activity: Designing an Enterprise Campus LAN

• Design a LAN network based on customer requirements
• Design Challenge

Designing Layer 3 Campus

• Describe layer 3 design considerations in an Enterprise Campus network
• Explain why building triangles instead of squares is best for optimal convergence
• Routing Convergence
• Describe case when routing information will need to converge after failure in equal-cost link Campus network
• Describe Routing Protocols and Summarization
• Describe Default Routes, Redistribution, and Filtering
• Examine Passive Interface, Routing Convergence, and Routing IPv4 and IPv6
• Describe Network Management Best Practices

Discovering the Cisco SD-Access Architecture

• Examine Cisco SD-Access fundamental concepts
• Cisco Software-Defined Access Overview
• Explain what is Cisco SD-Access
• Cisco Software-Defined Access Architecture
• Cisco SD-Access Node Roles
• Cisco Software-Defined Access Definition and Benefits
• Examine the Fabric Enabled Wireless LAN
• Role of Cisco SD-Access in Cisco DNA

Exploring Cisco SD-Access Fabric Design

• Describe Cisco SD-Access Fabric Design
• Describe SD-Access Fabric Constructs
• Explain the use of Virtual Networks in Cisco SD-Access
• Describe Design Requirements of Underlay Network
• Describe DHCP and Security Solutions for the Fabric Domain
• Describe Cisco SD-Access Wireless Fabric Constructs
• Describe sizing and platform scalability

Exploring Cisco SD-Access Site Design Strategy and Considerations

• Overview of the SD-Access site reference models
• Explain different SD-Access site reference models
• Cisco SD-Access Distributed Campus Considerations
• Describe SD-Access transit and the transit control plane node characteristics
• Migration to Cisco SD-Access
• Explain how to migrate to the SD-Access

Design Case Study Activity: Designing Cisco SD-Access in the Enterprise

- Designing Cisco SD-Access in the Enterprise
- Design Challenge

Discovering Service Provider-Managed VPNs

- Design service provider-managed VPNs
- WAN Connection Decision Points
- Describe WAN connection considerations
- Describe Layer 3 MPLS VPN
- Use Routing Protocols at the PE-CE
- Describe using EIGRP as the PE-CE routing protocol

Designing Enterprise-Managed VPNs

- Enterprise-Managed VPNs Overview
- Describe enterprise-managed VPNs
- Describe GRE, mGRE, and IPsec
- Describe GRE basics
- Describe Dynamic VTI, GET VPN, SSL VPN, and FlexVPN
- Describe IPsec with DVTI
- Describe DMVPN
- Describe EIGRP DMVPN and DMVPN Scaling
- Explain how EIGRP scales in a DMVPN

Designing WAN Resiliency

- WAN Design Overview
- Describe WAN remote site
- Describe Common MPLS WAN Design Models
- Describe Common Layer 2 WAN Design Models
- Describe Common VPN WAN Design Models
- Describe Cellular VPN Design Models
- Identify 3G and 4G VPN design models + 5G
- Remote Site Local Internet Connectivity
- Remote-Site LAN Design
- Describe remote-site LAN
- Explain some redundancy and connectivity use cases
- Describe Basic Traffic Engineering Techniques
- Describe basic traffic engineering techniques
- Describe Cloud Connectivity Options

Design Case Study Activity: Designing Resilient Enterprise WAN

- Design a resilient WAN network based on customer requirements
- Design Challenge
- Quiz the Customer
- Select WAN Links
- Determine the Need for an Overlay VPN
- Create a High-Level Design

Examining Cisco SD-WAN Architectures

- Describe SDN for the WAN
- Describe how the WAN is evolving with SDN

- Describe Cisco SD-WAN Components and Functions
- Describe the Orchestration Plane
- Describe the Management Plane
- Describe the Control Plane
- Describe the Data Plane
- Describe SD-WAN Analytics
- Describe the SD-WAN analytics platform
- Describe the Overlay Management Protocol
- Describe the Cisco SD-WAN OMP protocol
- Define OMP Network Terminology
- Describe Transport Locators
- Describe TLOCs
- Describe Fabric Operation
- Describe how the SD-WAN fabric operates

Examining Cisco SD-WAN Deployment Design Considerations

- Describe Controller Deployment Options
- Describe deployment models
- Describe Cisco SD-WAN Cloud Deployment
- Describe Cisco SD-WAN Managed Service Provider Deployment
- Describe Cisco SD-WAN On-Premises Deployment
- Describe how to use an enterprise CA in Cisco SD-WAN
- Describe Controller Placement and Challenges
- Describe Cloud Controller Connections
- Describe On-Premises Controller Connections
- Describe on-premises controller connections
- Describe MPLS and Internet Interconnection
- Describe Deployment Considerations
- Describe cloud-hosted deployment
- Describe On-Premises Deployment Considerations
- Describe on-premises deployment
- Describe vBond On-Premises Deployment
- Describe vBond and NAT traversal deployment options

Examining Cisco SD-WAN—NAT and Hybrid Design Considerations

- Describe Working with NAT
- Describe how NAT works with SD-WAN
- Describe NAT Traversal Combinations
- Describe Zero-Touch Provisioning
- Describe the vEdge ZTP process
- Describe Considerations for Hybrid Scenarios
- Describe the cEdge PnP process

Designing Cisco SD-WAN Routing and High Availability

- Design Cisco SD-WAN redundancy
- Describe Horizontal Solution Scale
- Describe SD-WAN Redundancy
- Describe vManage redundancy
- Describe Site Design
- Describe routed site design

• Describe Path Redundancy
• Describe bidirectional forwarding detection
• Compare an Underlay and an Overlay Network
• Describe SD-WAN Branch Connectivity
• Describe DIA
• Describe SD-WAN Privacy and Integrity
• Describe the SD-WAN security features
• Describe SD-WAN Secure Segmentation
• Describe SD-WAN Security Features
• Cisco SD-WAN Security Use Cases
• Explore Cisco SD-WAN security use cases

Design Case Study Activity: Designing Resilient Enterprise Cisco SD-WAN

• Designing Resilient Enterprise Cisco SD-WAN
• Design Challenge
• Quiz the Customer

Exploring QoS

• Explain the basic principles of QoS
• Describe and compare the IntServ and DiffServ QoS models
• Explain Classification and Marking Tools
• Provide an overview of classification and marking tools
• Policers and Shapers
• Describe and contrast the role and usage of policers and shapers
• Describe Queuing Tools
• Describe the concept of queuing
• Explain RFC 4594 QoS Recommendations
• Describe QoS Strategy Models
• Four-Class QoS Strategy
• Eight-Class QoS Strategy Example
• Describe Twelve-Class QoS Strategy

Designing LAN and WAN QoS

• Need for Campus QoS
• Identify the need for QoS in campus networks
• Describe the Classification, Marking, and Policing QoS Model
• Describe the recommended classification, marking, and policing model at the ingress
• Need for QoS in WAN and Branch
• Explain the need for WAN and branch QoS
• Need for QoS in IPsec VPN
• Describe the need for QoS in an IPsec VPN
• Describe DMVPN QoS Considerations
• Describe Cisco SD-WAN Forwarding
• Describe Cisco SD-WAN QoS Operation
• Describe the QoS operation of Cisco SD-WAN
• Describe vEdge Queuing

Design Case Study Activity: Designing QoS in an Enterprise Network

• Design QoS for en enterprise network based on customer requirements
• Design Challenge

• Describe Traffic Inspection
• Describe the QoS Model
• Describe Trust Boundaries
• Describe Queuing Mechanisms
• Describe Scavenger Traffic
• Describe MPLS DiffServ Tunneling
• Describe a QoS Design for an Enterprise Network

Introducing Multicast

• Explain the basic of multicast
• Explain How IP Multicast Works
• Explain Multicast Groups
• Describe Cisco SD-WAN Multicast Application Support
• Describe the Functions of a Multicast Network
• Describe Multicast Protocols
• Describe Multicast Forwarding and RPF Check
• Case Study: RPF Check Fails and Succeeds
• Explain Multicast Protocol Basics
• Provide an overview of multicast protocol basics

Exploring Multicast with PIM-SM

• Describe Multicast Distribution Trees Identification
• Describe Receiver Joins and Registering the Source
• Describe the step of a receiver joining the PIM-SM shared tree
• Describe PIM-SM SPT Switchover
• Describe Multicast Routing Table
• Describe Basic SSM Concepts
• Describe Bidirectional PIM
• Describe DF Election and Messages
• Case Study: DF Election
• Provide a DF election case study

Designing Rendezvous Point Distribution Solutions

• Rendezvous Point Discovery
• Describe RP discovery
• Case Study: Auto-RP Operation
• Provide an example of Auto-RP operation
• Auto-RP and BSR Flooding
• Describe the Auto-RP scope issue
• MSDP Protocol Overview
• Provide an overview of MSDP

Designing an IPv4 Address Plan

• IPv4 Address Planning Considerations
• Explain IPv4 address planning considerations
• Plan the IP Addressing Hierarchy
• Describe why it is important to create an IP addressing plan that is hierarchical
• Create an Addressing Plan
• Describe how to determine the size of subnets and correct VLAN assignments
• Case Study: Design an IPv4 Address Space
• Describe how to perform subnetting using VLSM

• Case Study: Resolve Overlapping Address Ranges
• Describe what will be the future needs as related to IPv4 addressing
• Allocating More IP Addresses
• Describe how would you solve a situation where /24 subnet runs out of available address space

Exploring IPv6

• Create an IPv6 addressing plan
• IPv6 Address Planning Considerations
• Describe the challenges and benefits that come with IPv6
• IPv6 for an Enterprise
• Describe how an Enterprise gets allocated an IPv6 address
• Describe IPv6 Address Allocation: Linked IPv4 Into IPv6
• Describe IPv6 Address Allocation: Per Location/Type
• Describe IPv6 Address Allocation: Per VLAN

Deploying IPv6

• Plan an IPv6 deployment in an existing enterprise IPv4 network
• Describe the IPv6 Phased Approach
• Identify IPv6 Services to Deploy
• Identify the IPv6 services to be deployed
• IPv4 and IPv6 Coexistence
• Explain the transition from IPv4 to IPv6
• Transition Mechanisms
• Describe NAT64 and DNS64
• Describe Manual Tunnels
• Describe Tunnel Brokers
• Describe 6rd tunneling and 6rd addresses
• Describe DS-Lite
• Describe LISP
• IPv6 Application Support
• IPv6-Related Security
• Describe the IPv6 transition-related security risks, threats, and challenges

Design Case Study Activity: Designing an Enterprise IPv6 Network

• Design an IPv6 addressing plan based on customer requirements
• Design Challenge
• Choose the IPv6 Address Space Type
• Connect Site 1
• Connect Site 2
• Choose a Deployment Model
• Determine Address Allocation
• Analyze Address Provisioning
• Analyze Communication Between Branches
• Migrate Applications
• Analyze Network Management
• Analyze the Migration of Services
• Describe an Enterprise IPv6 Network Design

Introducing Network APIs and Protocols

• Describe network APIs and protocols

• Describing the Evolution of Device Management and Programmability
• Describing Data Encoding Formats
• Describing JSON
• Describing XML
• Describing Data Models
• Describing the Model-Driven Programmability Stack
• Describing REST
• Describing NETCONF
• Describe NETCONF
• Describe RESTCONF
• Describing gRPC

Exploring YANG, NETCONF, RESTCONF, and Model-Driven Telemetry

• Describe YANG, NETCONF, and RESTCONF
• Define YANG, NETCONF, and RESTCONF
• Describe Yang Concepts
• Describe NETCONF Concepts
• Describe RESTCONF Concepts
• Compare NETCONF and RESTCONF
• Describe gRPC and gNMI
• Describe gRPC and gRPC protocol
• Define Model-Driven Telemetry
• Describe Stream Telemetry Data
• Explain Subscription
• Describe Model-Driven Telemetry
• Describe Dial-In and Dial-Out Model-Driven Telemetry