

CCIE Data Center

Introduction

Technology advances are generating more data than ever before, by enabling new applications and businesses that connect everything—people, devices, machines, and applications. With intent-based networking, data center teams can take advantage of automation to scale and secure their infrastructure. CCIE Data Center certification can open your opportunities to help maximize that potential. Just ask hiring managers: 71% of them say that certifications increase their confidence in an applicant's abilities.

CCIE Data Center certification helps you position yourself as a technical leader in the ever-changing landscape of data center technologies. The certification covers core technology areas and validates your end-to-end lifecycle skills in complex data center technologies, from planning and design to operating and optimizing.

Exams and Recommended Training

1. 350-601 DCCOR: Implementing and Operating Cisco Data Center Core Technologies

The Implementing and Operating Cisco Data Center Core Technologies (DCCOR) v1.0 course helps you prepare for the Cisco® CCNP® Data Center and CCIE® Data Center certifications for advanced-level data center roles. In this course, you will master the skills and technologies you need to implement data center compute, LAN, and SAN infrastructure. You will also learn the essentials of automation and security in data centers. You will gain hands-on experience deploying, securing, operating, and maintaining Cisco data center infrastructure including Cisco MDS Switches and Cisco Nexus Switches; Cisco Unified Computing System™ (Cisco UCS®) B-Series Blade Servers, and Cisco UCS C-Series Rack Servers. This course also earns you 64 Continuing Education (CE) credits towards recertification.

Duration

5 Days

Course Objectives

- Implement routing and switching protocols in the Data Center environment
- Implement overlay networks in the data center
- Introduce high-level Cisco Application Centric Infrastructure (Cisco ACI™) concepts and Cisco Virtual Machine Manager (VMM) domain integration
- Describe Cisco Cloud Service and deployment models
- Implement Fibre Channel fabric
- Implement Fibre Channel over Ethernet (FCoE) unified fabric
- Implement security features in the data center
- Implement software management and infrastructure monitoring
- Implement Cisco UCS Fabric Interconnect and Server abstraction
- Implement SAN connectivity for Cisco Unified Computing System™ (Cisco UCS®)
- Describe Cisco HyperFlex™ infrastructure concepts and benefits
- Implement Cisco automation and scripting tools in the data center
- Evaluate automation and orchestration technologies

Prerequisites

To fully benefit from this course, you should have the following knowledge and skills:

- Familiarity with Ethernet and TCP/IP networking
- Familiarity with SANs
- Familiarity with Fibre Channel protocol
- Identify products in the Cisco Data Center Nexus and Cisco MDS families
- Understanding of Cisco Enterprise Data Center architecture
- Understanding of server system design and architecture
- Familiarity with hypervisor technologies (such as VMware)

Target Audience

- Network designers
- Network administrators
- Network engineers
- Systems engineers
- Datacenter engineers
- Consulting systems engineers
- Technical solutions architects
- Field engineers
- Cisco integrators and partners
- Server administrator
- Network manager

Course Outline

- Implementing Data Center Switching Protocols*
 - Spanning Tree Protocol
 - Port Channels Overview
 - Virtual Port Channels Overview
 - Implementing First-Hop Redundancy Protocols*
 - Hot Standby Router Protocol (HSRP) Overview
 - Virtual Router Redundancy Protocol (VRRP) Overview
 - First Hop Redundancy Protocol (FHRP) for IPv6
- Implementing Routing in Data Center*
 - Open Shortest Path First (OSPF) v2 and Open Shortest Path Protocol (OSPF) v3
 - Border Gateway Protocol
- Implementing Multicast in Data Center*
 - IP Multicast in Data Center Networks
 - Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD)
 - Multicast Distribution Trees and Routing Protocols
 - IP Multicast on Cisco Nexus Switches
- Implementing Data Center Overlay Protocols
 - Cisco Overlay Transport Virtualization
 - Virtual Extensible LAN
- Implementing Network Infrastructure Security*
 - User Accounts and Role-Based Access Control (RBAC)
 - Authentication, Authorization, and Accounting (AAA) and SSH on Cisco NX-OS
 - Keychain Authentication
 - First Hop Security
 - Media Access Control Security
 - Control Plane Policing
- Describing Cisco Application-Centric Infrastructure

- Cisco ACI Overview, Initialization, and Discovery
 - Cisco ACI Management
 - Cisco ACI Fabric Access Policies
- Describing Cisco ACI Building Blocks and VMM Domain Integration
 - Tenant-Based Components
 - Cisco ACI Endpoints and Endpoint Groups (EPG)
 - Controlling Traffic Flow with Contracts
 - Virtual Switches and Cisco ACI VMM Domains
 - VMM Domain EPG Association
 - Cisco ACI Integration with Hypervisor Solutions
- Describing Packet Flow in Data Center Network*
 - Data Center Traffic Flows
 - Packet Flow in Cisco Nexus Switches
 - Packet Flow in Cisco ACI Fabric
- Describing Cisco Cloud Service and Deployment Models
 - Cloud Architectures
 - Cloud Deployment Models
- Describing Data Center Network Infrastructure Management, Maintenance, and Operations*
 - Time Synchronization
 - Network Configuration Management
 - Software Updates
 - Network Infrastructure Monitoring
- Explaining Cisco Network Assurance Concepts*
 - Need for Network Assurance
 - Cisco Streaming Telemetry Overview
- Implementing Fibre Channel Fabric
 - Fibre Channel Basics
 - Virtual Storage Area Network (VSAN) Overview
 - SAN Port Channels Overview
 - Fibre Channel Domain Configuration Process
- Implementing Storage Infrastructure Services
 - Distributed Device Aliases
 - Zoning
 - N-Port Identifier Virtualization (NPIV) and N-Port Virtualization (NPV)
 - Fibre Channel over IP
 - Network Access Server (NAS) Concepts
 - Storage Area Network (SAN) Design Options
- Implementing FCoE Unified Fabric
 - Fibre Channel over Ethernet
 - Describing FCoE
 - FCoE Topology Options
 - FCoE Implementation
- Implementing Storage Infrastructure Security*
 - User Accounts and RBAC
 - Authentication, Authorization, and Accounting
 - Fibre Channel Port Security and Fabric Binding
- Describing Data Center Storage Infrastructure Maintenance and Operations*
 - Time Synchronization
 - Software Installation and Upgrade
 - Storage Infrastructure Monitoring
- Describing Cisco UCS Server Form Factors*
 - Cisco UCS B-Series Blade Servers
 - Cisco UCS C-Series Rack Servers
- Implementing Cisco Unified Computing Network Connectivity
 - Cisco UCS Fabric Interconnect
 - Cisco UCS B-Series Connectivity
 - Cisco UCS C-Series Integration
- Implementing Cisco Unified Computing Server Abstraction

- Identity Abstraction
 - Service Profile Templates
- Implementing Cisco Unified Computing SAN Connectivity
 - iSCSI Overview
 - Fibre Channel Overview
 - Implement FCoE
- Implementing Unified Computing Security
 - User Accounts and RBAC
 - Options for Authentication
 - Key Management
- Introducing Cisco HyperFlex Systems*
 - Hyperconverged and Integrated Systems Overview
 - Cisco HyperFlex Solution
 - Cisco HyperFlex Scalability and Robustness
- Describing Data Center Unified Computing Management, Maintenance, and Operations*
 - Compute Configuration Management
 - Software Updates
 - Infrastructure Monitoring
 - Cisco Intersight™
- Implementing Cisco Data Center Automation and Scripting Tools*
 - Cisco NX-OS Programmability
 - Scheduler Overview
 - Cisco Embedded Event Manager Overview
 - Bash Shell and Guest Shell for Cisco NX-OS
 - Cisco Nexus API
- Describing Cisco Integration with Automation and Orchestration Software Platforms
 - Cisco and Ansible Integration Overview
 - Cisco and Puppet Integration Overview
 - Python in Cisco NX-OS and Cisco UCS
- Describing Cisco Data Center Automation and Orchestration Technologies*
- Power On Auto Provisioning
 - Cisco Data Center Network Manager Overview
 - Cisco UCS Director Fundamentals
 - Cisco UCS PowerTool

Lab Outline

- Configure Overlay Transport Visualization (OTV)
- Configure Virtual Extensible LAN (VXLAN)
- Explore the Cisco ACI Fabric
- Implement Cisco ACI Access Policies and Out-of-Band Management
- Implement Cisco ACI Tenant Policies
- Integrate Cisco ACI with VMware
- Configure Fibre Channel
- Configure Device Aliases
- Configure Zoning
- Configure NPV
- Configure FCoE
- Provision Cisco UCS Fabric Interconnect Cluster
- Configure Server and Uplink Ports
- Configure VLANs
- Configure a Cisco UCS Server Profile Using Hardware Identities
- Configure Basic Identity Pools
- Configure a Cisco UCS Service Profile Using Pools
- Configure an Internet Small Computer Systems Interface (iSCSI) Service Profile
- Configure Cisco UCS Manager to Authenticate Users with Microsoft Active Directory
- Program a Cisco Nexus Switch with Python

2. CCIE Data Center (v3.0) Exam Topics (Practical Exam)

The Cisco CCIE Data Center (v3.0) Practical Exam is an eight-hour, a hands-on exam that requires a candidate to plan, design, deploy, operate, and optimize complex Data Center networks.

Candidates are expected to program and automate the network within their exam, as per the exam topics below.

The following topics are general guidelines for the content likely to be included in the exam. Your knowledge, skills, and abilities on these topics will be tested throughout the entire network lifecycle unless explicitly specified otherwise within this document.

The exam is closed book and no outside reference materials are allowed.

Duration

8 Hours

Prerequisites

There are no formal prerequisites for CCIE Data Center, but you should have a good understanding of the exam topics before taking the exam.

CCIE candidates are recommended to have five to seven years of experience with designing, deploying, operating, and optimizing data center technologies and solutions prior to taking the exam.

Course Outline

- **Data Center L2/L3 Connectivity (20%)**
 - 1.1 Layer 2 technologies
 - 1.1.a Link Aggregation
 - 1.1.a i vPC
 - 1.1.a ii PortChannel
 - 1.1.b Tagging/Trunking
 - 1.1.c Static Path binding
 - 1.1.d Spanning Tree Protocol
 - 1.1.d i PVST
 - 1.1.d ii MST
 - 1.2 Routing Protocols and features
 - 1.2.a OSPF (v2 and v3)
 - 1.2.a i Authentication
 - 1.2.a ii Adjacencies
 - 1.2.a iii Network types and Area Types
 - 1.2.a iv LSA Types
 - 1.2.a v Route Aggregation/Summarization
 - 1.2.a vi Route Redistribution
 - 1.2.b ISIS
 - 1.2.b i Adjacencies
 - 1.2.b.i.1. Single area, single topology
 - 1.2.b ii Network types, Levels and Router types
 - 1.2.b.ii.1. NSAP addressing
 - 1.2.b.ii.2. Point-to-point, broadcast
 - 1.2.c BGP
 - 1.2.c i Path Selection

- 1.2.c ii External and Internal Peering
 - 1.2.c iii Route reflectors and Route Server
 - 1.2.c iv Peer Templates
 - 1.2.c v Multi-Hop EBGP
 - 1.2.c vi Route Aggregation/Summarization
 - 1.2.c vii Route Redistribution
 - 1.2.d BFD
 - 1.2.e FHRP
- 1.3 Multicast protocols
 - 1.3.a PIM
 - 1.3.a i Sparse Mode
 - 1.3.a ii BiDir
 - 1.3.a iii Static RP, BSR, AutoRP, PhantomRP
 - 1.3.a iv IPv4 PIM Anycast
 - 1.3.a v IPv4 Anycast RP using MSDP
 - 1.3.b IGMP
 - 1.3.b i IGMPv2, IGMPv3
 - 1.3.b ii IGMP Snooping
 - 1.3.b iii IGMP Querier
- **Data Center Fabric Infrastructure (15%)**
 - 2.1 Physical fabric components
 - 2.1.a Fabric Discovery
 - 2.1.b Controllers/Network Managers
 - 2.1.c Switches
 - 2.2 Fabric policies
 - 2.2.a Access Policies
 - 2.2.b Multi-Tenancy
 - 2.2.c Monitoring Policies
 - 2.3 Tenant Policies
 - 2.3.a Application profiles and EPGs
 - 2.3.b Networking
 - 2.3.c Security
 - 2.4 Fabric Monitoring
 - 2.4.a Faults
 - 2.4.b Events
 - 2.4.c Health indicators
 - 2.4.d Audit Logs
 - 2.5 Virtual Networking
 - 2.5.a vSphere VDS
- **Data Center Fabric Connectivity (15%)**
 - 3.1 VRF lite
 - 3.2 L3Out
 - 3.2.a OSPF
 - 3.2.a i Authentication
 - 3.2.a ii Adjacencies
 - 3.2.a iii Network types and Area Types
 - 3.2.a iv Route Redistribution
 - 3.2.b BGP
 - 3.2.b i AS manipulation
 - 3.2.b ii External and Internal Peering
 - 3.2.b iii Route reflectors
 - 3.2.b iv Route Redistribution
 - 3.2.c Transit Routing
 - 3.3 Inter Fabric connectivity

- 3.3.a Multi-Pod
- 3.3.b Multi-Site
- 3.3.c Virtual POD
- 3.3.d remote Leaf
- 3.4 Overlays
 - 3.4.a VXLAN EVPN

- **Data Center Compute (15%)**

- 4.1 Compute Resources
 - 4.1.a UCSM Policies, Profiles, and Templates
 - 4.1.b Hyperflex
- 4.2 Compute Connectivity
 - 4.2.a SAN/LAN uplinks
 - 4.2.b Rack server integration
 - 4.2.c Port Modes

- **Data Center Storage Protocols and Features (10%)**

- 5.1 FC and FCoE
 - 5.1.a Zoning
 - 5.1.b NPV/NPIV
 - 5.1.c Trunking
 - 5.1.d Port-channel
 - 5.1.e Load Balancing
- 5.2 iSCSI
 - 5.2.a Authentication
 - 5.2.b Multipathing
- 5.3 RoCE v2 over IP Networks

- **Data Center Security and Network Services (10%)**

- 6.1 Security features
 - 6.1.a ACL's
 - 6.1.b First Hop Security
 - 6.1.c Port security
 - 6.1.d Private VLANs
 - 6.1.e Contracts
- 6.2 RBAC
 - 6.2.a Radius
 - 6.2.b TACACS+
 - 6.2.c LDAP
 - 6.2.d AAA
- 6.3 Network Services Insertion and Redirection
 - 6.3.a Policy Based Routing
 - 6.3.b Policy-Based Redirection
 - 6.3.c Inter VRF communication
 - 6.3.d Route Targets
 - 6.3.e Prefix Lists
- 6.4 Services
 - 6.4.a Flow/Telemetry Export
 - 6.4.b SPAN
 - 6.4.c SNMP
 - 6.4.d Syslog
 - 6.4.e DHCP
 - 6.4.f NTP/PTP
- 6.5 Traffic management
 - 6.5.a Queueing

- 6.5.b Policing
- 6.5.c Classification/Marking
- 6.5.d Scheduling
- 6.5.e CoPP

- **Data Center Automation and Orchestration (15%)**

- 7.1 Datacenter tasks using scripts (Python and Ansible)
 - 7.1.a Create, Read, Update, Delete using RESTful APIs
 - 7.1.b Deploy and modify configurations
 - 7.1.c Statistics, Data Collection
- 7.2 Data Center Automation and Orchestration using tools
 - 7.2.a DCNM
 - 7.2.b UCSD
 - 7.2.b i Tasks
 - 7.2.b ii Workflows
 - 7.2.b iii Catalog
 - 7.2.c Intersight
 - 7.2.d CloudCenter Suite
 - 7.2.d i Applications
 - 7.2.d ii Deployments
 - 7.2.d iii Action Orchest