

CCIE Collaboration

Introduction

New collaboration solutions deliver opportunities to connect in ways we never did before, and with intent-based networking, organizations can take advantage of automation to scale and secure their collaboration solutions. With CCIE Collaboration certification, your opportunities to help maximize that potential are boundless. Just ask hiring managers: 71% of them say that certifications increase their confidence in an applicant's abilities.

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

Exams and Recommended Training

1. 350-801 CLCOR: Implementing and Operating Cisco Collaboration Core Technologies

The Implementing and Operating Cisco Collaboration Core Technologies (CLCOR) v1.0 course helps you prepare for advanced-level roles focused on the implementation and operation of Cisco collaboration solutions. You will gain the knowledge and skills needed to implement and deploy core collaboration and networking technologies, including infrastructure and design, protocols, codecs, and endpoints, Cisco Internetwork Operating System (IOS®) XE gateway and media resources, call control, Quality of Service (QoS), and additional Cisco collaboration applications. This course earns you 64 Continuing Education (CE) credits towards recertification.

Duration

5 Days

Course Objectives

- Describe the Cisco Collaboration solutions architecture
- Compare the IP Phone signaling protocols of Session Initiation Protocol (SIP), H323, Media Gateway Control Protocol (MGCP), and Skinny Client Control Protocol (SCCP)
- Integrate and troubleshoot Cisco Unified Communications Manager with LDAP for user synchronization and user authentication
- Implement Cisco Unified Communications Manager provisioning features
- Describe the different codecs and how they are used to transform analog voice into digital streams
- Describe a dial plan, and explain call routing in Cisco Unified Communications Manager
- Implement Public Switched Telephone Network (PSTN) access using MGCP gateways
- Implement a Cisco gateway for PSTN access
- Configure calling privileges in Cisco Unified Communications Manager
- Implement toll fraud prevention
- Implement globalized call routing within a Cisco Unified Communications Manager cluster
- Implement and troubleshoot media resources in Cisco Unified Communications Manager
- Describe Cisco Instant Messaging and Presence, including call flows and protocols
- Describe and configure endpoints and commonly required features
- Configure and troubleshoot Cisco Unity Connection integration
- Configure and troubleshoot Cisco Unity Connection call handlers

- Describe how Mobile Remote Access (MRA) is used to allow endpoints to work from outside the company
- Analyze traffic patterns and quality issues in converged IP networks supporting voice, video, and data traffic
- Define QoS and its models
- Implement classification and marking
- Configure classification and marking options on Cisco Catalyst® switches

Prerequisites

- Working knowledge of fundamental terms of computer networking, including LANs, WANs, switching, and routing
- Basics of digital interfaces, Public Switched Telephone Networks (PSTNs), and Voice over IP (VoIP)
- Fundamental knowledge of converged voice and data networks and Cisco Unified Communications Manager deployment

Target Audience

- Students preparing to take the CCNP Collaboration certification
- Network administrators
- Network engineers
- Systems engineers

Course Outline

- Describing the Cisco Collaboration Solutions Architecture
- Exploring Call Signaling over IP Networks
- Integrating Cisco Unified Communications Manager LDAP
- Implementing Cisco Unified Communications Manager Provisioning Features
- Exploring Codecs
- Describing Dial Plans and Endpoint Addressing
- Implementing MGCP Gateways
- Implementing Voice Gateways
- Configuring Calling Privileges in Cisco Unified Communications Manager
- Implementing Toll Fraud Prevention
- Implementing Globalized Call Routing
- Implementing and Troubleshooting Media Resources in Cisco Unified Communications Manager
- Describing Cisco Instant Messaging and Presence
- Enabling Cisco Jabber®
- Configuring Cisco Unity Connection Integration
- Configuring Cisco Unity Connection Call Handlers
- Describing Collaboration Edge Architecture
- Analyzing Quality Issues in Converged Networks
- Defining QoS and QoS Models
- Implementing Classification and Marking
- Configuring Classification and Marking on Cisco Catalyst Switches

Lab Outline

- Using Certificates
- Configure IP Network Protocols
- Configure and Troubleshoot Collaboration Endpoints
- Troubleshoot Calling Issues

- Configure and Troubleshoot LDAP Integration in Cisco Unified Communications Manager
- Deploy an IP Phone Through Auto and Manual Registration
- Configure Self-Provisioning
- Configure Batch Provisioning
- Explore the Cisco VoIP Bandwidth Calculator
- Configure Regions and Locations
- Implement Endpoint Addressing and Call Routing
- Implement PSTN Calling Using MGCP Gateways
- Configure and Troubleshoot Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI)
- Examine Cisco IOS Gateway Inbound and Outbound Dial-Peer Functions
- Implement and Troubleshoot Digit Manipulation on a Cisco IOS Gateway
- Configure Calling Privileges
- Implement Toll Fraud Prevention on Cisco Unified Communications Manager
- Implement Globalized Call Routing
- Deploy an On-Premise Cisco Jabber Client for Windows
- Configure the Integration Between Unity Connection and Cisco UCM
- Manage Unity Connection Users
- EAI: Configure QOS

2. CCIE Collaboration v3.0 Exam Topics (Practical Exam)

The Cisco CCIE Collaboration (v3.0) Practical Exam is an eight-hour, a hands-on exam that requires a candidate to plan, design, implement, operate, and optimize complex enterprise collaboration solutions.

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

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.

Duration

8 Hours

Prerequisites

There are no formal prerequisites for CCIE Collaboration, but you should have a thorough 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 collaboration technologies and solutions prior to taking the exam.

Course Outline

1. Protocols and APIs (10%)

- 1.1 IP collaboration signaling protocols
 - 1.1.a SIP
 - 1.1.b MGCP
- 1.2 Media Negotiation
 - 1.2.a SDP Offer/Answer model
 - 1.2.b SDP Early offer, delayed offer, early media
 - 1.2.c SDP Payload type interworking

- 1.3 Media Path Optimization
 - 1.3.a Interactive Connectivity Establishment (ICE)
 - 1.3.b TURN and STUN
- 1.4 SIP headers
 - 1.4.a Identity headers (Name, number, URI, Privacy)
 - 1.4.b Route headers
 - 1.4.c Diversion headers
 - 1.4.d CallID, SessionID, and CiscoGUID
- 1.5 Media protocols
 - 1.5.a RTP/RTCP, SRTP/SRTCP
 - 1.5.b Binary Floor Control Protocol (BFCP)
 - 1.5.c ActiveControl (iX)
- 1.6 DTMF relay
 - 1.6.a In-band vs out-of-band
 - 1.6.b RFC 2833
 - 1.6.c Key Pad Markup Language (KPML)
 - 1.6.d Unsolicited NOTIFY
 - 1.6.e Interworking
- 1.7 Messaging protocols
 - 1.7.a XMPP
 - 1.7.b SIP/SIMPLE
- 1.8 Collaboration APIs
 - 1.8.a Unified CM Administrative XML (AXL) API
 - 1.8.b Webex REST API
 - 1.8.c Cisco Meeting Server
 - 1.8.d Unified CM User Data Service API
 - 1.8.e Java Telephony Application Programming Interface (JTAPI)

2. Infrastructure and Quality of Services (10%)

- 2.1 Network services
 - 2.1.a DHCP
 - 2.1.b NTP
 - 2.1.c DNS
 - 2.1.d CDP/LLDP
- 2.2 Troubleshoot layer 2 and layer 3 network connectivity issues
- 2.3 Quality of Service for Collaboration applications and endpoints on LAN/WAN/WLAN (Cisco IOS-XE and AireOS)
 - 2.3.a Identification
 - 2.3.b Classification and marking
 - 2.3.c Queuing and scheduling
 - 2.3.d Congestion management
- 2.4 Troubleshoot voice and video quality issues
 - 2.4.a Media stream packet loss, jitter, and latency
 - 2.4.b Endpoint media quality metrics
 - 2.4.c One-way or no-way media
- 2.5 Call Admission Control
 - 2.5.a CUBE
 - 2.5.b UCM
 - 2.5.c Cisco Expressway Series
- 2.6 Certificate management
 - 2.6.a CUBE
 - 2.6.b UCM and IM&P
 - 2.6.c Cisco Expressway Series
 - 2.6.d Cisco Meeting Server

3. Call Control and Dial plan (20%)

- 3.1 Global dial plans
 - 3.1.a Localization and globalization
 - 3.1.b Numbering schemes
 - 3.1.c Dialing habits
 - 3.1.d Interdigit timeouts
 - 3.1.e Calling privileges
 - 3.1.f Number presentation
- 3.2 Fundamental dial plan features on Unified CM
 - 3.2.a Partitions and calling search spaces
 - 3.2.b Translation and transformation patterns
 - 3.2.c Urgent priority
 - 3.2.d Path selection
- 3.3 Advanced dial plan features on Unified CM
 - 3.3.a Global dial plan replication
 - 3.3.b Local route groups
 - 3.3.c Emergency Location Groups
- 3.4 URI and domain-based routing
- 3.5 Unified CM telephony features
 - 3.5.a Call Pickup
 - 3.5.b Barge/privacy
 - 3.5.c Native call queuing
 - 3.5.d Busy Lamp Field (BLF)
- 3.6 Audio and video codec selection
- 3.7 SIP trunking
 - 3.7.a SIP profiles
 - 3.7.b SIP trunk security profiles
 - 3.7.c Resiliency
 - 3.7.d Mid-call signaling
 - 3.7.e Session refresh
- 3.8 Securing SIP trunks on UCM
- 3.9 UDS in a multi-cluster environment
 - 3.9.a Service discovery
 - 3.9.b ILS
 - 3.9.c User search
 - 3.9.d LDAP proxy
- 3.10 Unified CM database replication
- 3.11 Dial plans on CUBE
 - 3.11.a Inbound and outbound dial-peers
 - 3.11.b Voice translation rules and profiles
 - 3.11.c Dial-peer provisioning policy
 - 3.11.d Destination server groups
 - 3.11.e Destination dial-peer groups
 - 3.11.f E.164 pattern maps
 - 3.11.g URI-based dialing
 - 3.11.h VRF-aware call routing
- 3.12 SIP-SRST and E-SRST
- 3.13 Dial plans on Expressway Series
 - 3.13.a Transforms
 - 3.13.b Search rules
 - 3.13.c Zones

4. Endpoints and User Management (10%)

- 4.1 Hardware and software endpoint registration in a multi-cluster environment
 - 4.1.a On-premise (local or proxy TFTP)
 - 4.1.b Mobile and Remote Access (Service Discovery)

- 4.1.c Cloud
- 4.2 Mixed mode and Security By Default (SBD) on Unified CM
 - 4.2.a Certificate Trust List (CTL) and Identity Trust List (ITL)
 - 4.2.b Token-less
 - 4.2.c Trust Verification Service (TVS)
- 4.3 Securing endpoints
- 4.4 Collaboration endpoints and infrastructure using IPv6
- 4.5 Endpoint features
 - 4.5.a Directory integration and search
 - 4.5.b Product specific configuration
 - 4.5.c Multistream
- 4.6 User authentication and authorization
 - 4.6.a Directory synchronization On-premise
 - 4.6.b Directory synchronization Cloud
 - 4.6.c Single-Sign-On (SSO)
 - 4.6.d OAuth
- 4.7 Self-provisioning

5. Edge Services (20%)

- 5.1 ISDN PRI gateways
- 5.2 SIP trunks using CUBE
- 5.3 SIP normalization and SDP normalization
 - 5.3.a Normalization and transparency scripts (Lua)
 - 5.3.b Cisco IOS-XE SIP profiles
- 5.4 Securing SIP trunks on CUBE
 - 5.4.a SRTP to RTP interworking
 - 5.4.b SRTP pass-through
 - 5.4.c SRTP to SRTP interworking
- 5.5 Stateful box-to-box redundancy on CUBE (Cisco IOS-XE)
- 5.6 Network and application level security on Cisco IOS-XE
 - 5.6.a IP Trust List
 - 5.6.b Call spike protection
 - 5.6.c Media policing
 - 5.6.d Call thresholds
 - 5.6.e RTP port ranges
 - 5.6.f Telephony denial of service attacks
- 5.7 Firewall traversal in a Collaboration solution
 - 5.7.a Port numbers and transport
 - 5.7.b NAT
 - 5.7.c Web proxy servers
 - 5.7.d Deep Packet Inspection considerations
- 5.8 Expressway Series traversal communications
 - 5.8.a Traversal zones
 - 5.8.b SSH tunnels
 - 5.8.c Encryption interworking
- 5.9 Mobile and Remote Access (MRA)
- 5.10 Network and application level security on Expressway Series
 - 5.10.a Toll fraud prevention (CPL)
 - 5.10.b Zone authentication
 - 5.10.c Automated intrusion protection
 - 5.10.d Mutual TLS
- 5.11 Webex Edge and Webex Hybrid Services
 - 5.11.a Extending cloud services using on premise resources
 - 5.11.b Cloud service management
- 5.12 Third-party interoperability and federation
 - 5.12.a Voice and video calling
 - 5.12.b IM&P

6. Media Resources and Meetings (15%)

- 6.1 Media resources
 - 6.1.a Transcoding and transrating
 - 6.1.b MTP
 - 6.1.c Music on hold (unicast and multicast)
- 6.2 Rendezvous conferencing
 - 6.2.a Unified CM Conference Now
 - 6.2.b Cisco Meeting Server Spaces
- 6.3 Ad-hoc conferencing
 - 6.3.a Cisco IOS-XE conferencing
 - 6.3.b Cisco Meeting Server
- 6.4 Scheduled meetings
 - 6.4.a On-premise
 - 6.4.b Cloud
- 6.5 CallBridge and WebBridge on Cisco Meeting Server
 - 6.5.a Internal user access
 - 6.5.b External user access
- 6.6 High availability on Cisco Meeting Server
- 6.7 Secure conferencing on Cisco Meeting Server

7. Collaboration Applications and Services (15%)

- 7.1 On premise IM&P servers and clients
- 7.2 Presence
 - 7.2.a Busy Lamp Field (BLF)
 - 7.2.b Soft client
- 7.3 IM&P server integration with external database for Persistent Chat and Group Chat
- 7.4 Cisco Unity Connection voicemail integration
- 7.5 Cisco Unity Connection voicemail features
 - 7.5.a Call and directory handlers
 - 7.5.b Voicemail access from soft clients
 - 7.5.c Video greetings and messaging
- 7.6 Cisco Unity Connection voicemail dial plan
 - 7.6.a Partitions and search spaces
 - 7.6.b Routing rules
- 7.7 Mobility features
 - 7.7.a Mobile Connect (Single Number Reach)
 - 7.7.b Device Mobility
 - 7.7.c Mobile Identity
 - 7.7.d Extend and Connect
 - 7.7.e Extension Mobility
- 7.8 Extension Mobility Cross Cluster (EMCC)
 - 7.8.a Emergency dialing considerations
 - 7.8.b Certificate exchange
- 7.9 Audio and video call recording architectures
 - 7.9.a SIP-based Media Recording (SIPREC)
 - 7.9.b Network-Based Recording
 - 7.9.c Built-in bridge
 - 7.9.d CUBE Media Proxy
 - 7.9.e Cisco Meeting Server
- 7.10 Secure call recording
- 7.11 Cisco Unified Contact Center Express (UCCX)
 - 7.11.a Integration
 - 7.11.b Scripting
- 7.12 Contact Center agent desktop (Finesse)