

Cisco Certified Network Associate - CCNA (200-301)

Course Duration: 2 Months • Class Time: 1.5 Hrs

Before we begin the new CCNA official curriculum, we need a basic understanding of networking fundamentals and how AI fits into modern network operations. Therefore, we have included the following topics to provide a solid foundation before diving into the official 200-301 syllabus.

Building Blocks of Networking

Introduction to Network/Networking/Inter-Networking

Application of Network

Components of a Network

Types of Network

OSI Model and TCP/IP Suite

Introduction to IP Address

IPv4

IPv6

Subnetting the networks, CIDR, VLSM

Describe the supernetting concepts.

AI Foundations for Modern Networking

- Understand the role of agentic AI in network operations.
- Craft effective prompts for generative AI systems supporting network operations data classification, output format, persona, and instructions

200-301 Syllabus/Exam-Topic

Lesson 1: Network Infrastructure and Connectivity

- Diagnose interface and cable (copper and fiber) issues: **collisions, errors, mismatched duplex/speed, distance, signal levels, pinout, and cable types.**
- Understand the role and function of hypervisors, virtual machines, and containers.
- Troubleshoot IPv4 address configuration, assignment, and subnetting (public and private)
- 1.4 Troubleshoot IPv6 address configuration, assignment, and prefix sizing (unicast and modified EUI 64)

- Apply wireless principles
 - Band and channel selection
 - RF characteristics
 - Security protocols
 - Causes of interference
- Troubleshoot wired and wireless client connectivity, **IP configuration, network reachability, and wireless security parameters on Windows, macOS, and Linux.**
- Troubleshoot DHCPv4 client, server, and relay on IOS devices

Lesson 2: Switching and Network Access

- Configure network infrastructure connectivity: **switch-to-switch and switch-to-router**
 - Layer 2/Layer 3 physical interfaces
 - 802.1Q trunk interfaces
 - Layer 2/Layer 3 LACP port-channel/EtherChannel
 - Switch Virtual Interface (SVI)
- Configure Layer 2 switch port attributes for edge-host connectivity: **VLAN, PoE, port channel, and LACP.**
 - Desktop, printer, and IoT appliances
 - Wireless access points (standalone and controller-based)
 - Voice over IP phones
 - Virtualized hosts
 - Network appliances
- Validate network documentation accuracy using CDP and LLDP.
- Troubleshoot Layer 2/Layer 3 connectivity and device operations using show commands, ping, extended ping, trace route, and packet capture output
- Configure Rapid PVST+ (Rapid Per-VLAN Spanning Tree Protocol)
 - Root port, root bridge (primary/secondary), and other port roles
 - Port states and roles
 - PortFast
 - Root guard, loop guard, and BPDU guard

Hands-On Lab: Trunk and EtherChannel configuration, VLAN and PoE setup for edge devices, CDP/LLDP-based topology validation, and Spanning Tree convergence troubleshooting.

Lesson 3: IP Routing

- Interpret a routing table to identify the next hop for a packet: **protocol, prefix/mask, administrative distance, metric, default route**
- Troubleshoot IPv4 and IPv6 static routing
 - Default route
 - Network route
 - Host route
 - Floating static
- Configure single-area OSPFv2 (IPv4) and OSPFv3 (IPv6)
 - Neighbor adjacencies (excluding authentication)
 - Point-to-point
 - Broadcast (DR/BDR selection)
 - Router ID
- Interpret the operational status of First Hop Redundancy Protocols (HSRP and VRRP)

Hands-On Lab: Static and dynamic routing configuration across IPv4/IPv6, OSPF adjacency troubleshooting, and FHRP failover testing.

Lesson 4: Network Services and Security

- Configure local usernames and AAA client (TACACS+ and RADIUS) for device management.
- Manage device configuration and software files using secure file transfer (SFTP/SCP)
- Configure NAT/PAT on IOS XE routers
- Diagnose DNS record issues (A, AAAA, CNAME, MX, NS, PTR) affecting host, web application, and mail server access.
- Describe IPsec remote-access and site-to-site VPNs (protocols and transport modes)
- Configure IPv4 access control lists (standard, extended, numbered, and named ACLs)
- Configure Layer 2 security features
 - DHCP snooping
 - Dynamic ARP inspection
 - Storm control
 - RA guard
 - Port security

Hands-On Lab: AAA authentication setup, NAT/PAT configuration, DNS record troubleshooting, ACL deployment, and Layer 2 security hardening on live switches.

Lesson 5: AI, and Network Operations and Management

- Understand the role of agentic AI in network operations.
- Craft effective prompts for generative AI systems supporting network operations data classification, output format, persona, and instructions.
- Compare network management approaches (device-based, cloud-based, controller-based, automation-based, and infrastructure as code)
- Describe the function of SNMP in network operations.
- Use configuration management tools such as Ansible to execute commands.
- Interpret syslog message content, severity levels, and facilities.

Hands-On Lab: Generative AI prompt design for network troubleshooting scenarios, Ansible playbook execution for configuration management, and SNMP/syslog monitoring setup.