

Course Agenda

CCIE® Enterprise Infrastructure 1.1 Certification

**Qualifying Exam - Implementing Cisco Enterprise Network Core Technologies
v1.1 (ENCOR 350-401) Course Outline**

Module 1: Network Infrastructure

1.1 Layer 2 Technologies (Theory)

- **Ethernet Switching**
 - VLANs, trunking, EtherChannel's
 - Spanning Tree Protocol (STP), RSTP, MSTP
- **Switch Security**
 - Port security, DHCP snooping, Dynamic ARP Inspection
- **Multilayer Switching**
 - CEF, routing between VLANs, Layer 3 interfaces

1.2 Layer 2 Technologies (Labs)

- **VLAN Configuration**
 - Creating and managing VLANs, trunk ports
- **STP Configuration**
 - Configuring STP, RSTP, MSTP, implementing STP security features (BPDU Guard, Root Guard)
- **EtherChannel Configuration**

- Setting up EtherChannel (LACP, PAgP, and manual)

1.3 Layer 3 Technologies (Theory)

- **Routing Protocols**
 - EIGRP: operation, configuration, optimization
 - OSPF: types, areas, configuration, tuning
 - BGP: attributes, policies, configuration, scaling
- **IPv6**
 - Addressing, routing protocols, transition mechanisms
- **Multicast**
 - PIM-SM, PIM-SSM, IGMP, multicast scoping and RPF

1.4 Layer 3 Technologies (Labs)

- **OSPF Configuration**
 - Single area and multi-area OSPF, authentication, optimization
- **EIGRP Configuration**
 - Basic EIGRP setup, tuning, authentication
- **BGP Configuration**
 - Basic setup, attributes, path selection, route reflectors, confederations

1.5 Network Services (Theory)

- **Quality of Service (QoS)**
 - Classification, marking, queuing, congestion management

- **NAT**
 - Types of NAT, PAT, NAT64
- **DHCP, DNS, and NTP**
 - Configuration, troubleshooting

1.6 Network Services (Labs)

- **QoS Configuration**
 - Classification, marking, queuing mechanisms (LLQ, CBWFQ), traffic shaping, policing
- **NAT Configuration**
 - Static NAT, Dynamic NAT, PAT, NAT64
- **DHCP and DNS Configuration**
 - Setting up and troubleshooting DHCP and DNS services

Module 2: Software-Defined Infrastructure

2.1 SDN Concepts (Theory)

- **SDN Architecture**
 - Controllers, protocols
- **Cisco SDN Solutions**
 - Cisco ACI, DNA Center

2.2 SDN Concepts (Labs)

- **Cisco ACI Configuration**
 - Basic setup, creating and managing tenants, VRFs, and bridge domains

- **Cisco DNA Center Configuration**
 - Basic setup, device onboarding, network policies, automation

2.3 Network Programmability (Theory)

- **APIs and Protocols**
 - REST, NETCONF, YANG
- **Automation Tools**
 - Ansible, Python scripting

2.4 Network Programmability (Labs)

- **REST API Usage**
 - Performing CRUD operations using Postman
- **Python Scripting**
 - Writing and running basic scripts for network automation
- **Ansible Configuration**
 - Writing playbooks for automating network tasks

Module 3: Transport Technologies and Solutions

3.1 MPLS (Theory)

- **MPLS Basics**
 - Architecture, labels, LDP
- **MPLS Layer 3 VPNs**
 - VRFs, PE-CE routing, inter-AS MPLS VPNs

3.2 MPLS (Labs)

- **MPLS Configuration**
 - Enabling MPLS, configuring MPLS L3 VPNs

3.3 Segment Routing (Theory)

- **Segment Routing Concepts**
 - SRGB, SRLB, SR-TE
- **Implementation**
 - Configuring segment routing, policies, path computation

3.4 Segment Routing (Labs)

- **Segment Routing Configuration**
 - Setting up and verifying segment routing

3.5 DMVPN and GETVPN (Theory)

- **DMVPN**
 - Phases, NHRP, mGRE
- **GETVPN**
 - Architecture, key servers, group members

3.6 DMVPN and GETVPN (Labs)

- **DMVPN Configuration**
 - Setting up and verifying DMVPN phases
- **GETVPN Configuration**

- Setting up and verifying GETVPN

Module 4: Infrastructure Security and Services

4.1 Security Infrastructure (Theory)

- **Access Control**
 - AAA, TACACS+, RADIUS
- **Device Security**
 - Control plane, management plane, data plane security
- **Network Security**
 - Firewalls, IPSec, VPNs

4.2 Security Infrastructure (Labs)

- **AAA Configuration**
 - Setting up AAA with RADIUS and TACACS+
- **IPsec VPN Configuration**
 - Configuring and verifying site-to-site and remote access IPsec VPNs
- **Firewalls**
 - Configuring basic firewall policies

4.3 Network Assurance (Theory)

- **Monitoring Tools**
 - SNMP, Syslog, NetFlow, SPAN
- **Troubleshooting Tools**
 - Ping, traceroute, debugs, packet captures

4.4 Network Assurance (Labs)

- **Monitoring Configuration**
 - Setting up SNMP traps, Syslog servers, and NetFlow
- **Troubleshooting**
 - Using tools to diagnose and resolve network issues

4.5 Network Automation and Assurance (Theory)

- **Cisco DNA Assurance**
 - Monitoring, analytics, assurance tools
- **Automation Practices**
 - CI/CD pipelines, Infrastructure as Code (IaC)

4.6 Network Automation and Assurance (Labs)

- **Cisco DNA Assurance Configuration**
 - Setting up and using DNA Assurance for network monitoring
- **Automation Scripts**
 - Writing and executing scripts for network automation

Module 5: Infrastructure Automation and Programmability

5.1 Automation Fundamentals (Theory)

- **Introduction to Automation**
 - Benefits, tools, frameworks
- **Scripting and Programming**

- Python, API consumption, creating scripts

5.2 Automation Fundamentals (Labs)

- **Python Scripting**
 - Writing and executing Python scripts for automation
- **Using APIs**
 - Configuring devices using REST APIs

5.3 Model-Driven Programmability (Theory)

- **YANG Models**
 - Basics, usage in network automation
- **NETCONF and RESTCONF**
 - Concepts, configuration, use cases

5.4 Model-Driven Programmability (Labs)

- **YANG Models and NETCONF**
 - Configuring devices using YANG models and NETCONF
- **RESTCONF**
 - Configuring devices using RESTCONF

5.5 Network Device Programmability (Theory)

- **Programmable Interfaces**
 - Cisco IOS XE, NX-OS programmability
- **Configuration Management**

- Ansible, Puppet, Chef

5.6 Network Device Programmability (Labs)

- **Programmable Interfaces Configuration**
 - Setting up programmable interfaces on Cisco devices
- **Ansible Configuration Management**
 - Writing and running Ansible playbooks for network device management

Module 6: Evolving Technologies

6.1 Cloud and Virtualization (Theory)

- **Cloud Services**
 - Types (IaaS, PaaS, SaaS), benefits, challenges
- **Network Virtualization**
 - VRF, GRE, VxLAN

6.2 Cloud and Virtualization (Labs)

- **Configuring VxLAN**
 - Setting up and verifying VxLAN

6.3 IoT (Theory)

- **IoT Fundamentals**
 - Concepts, protocols (MQTT, CoAP), security considerations

6.4 IoT (Labs)

- **Basic IoT Configuration**

- Setting up and verifying IoT devices and networks

6.5 SD-WAN (Theory)

- **SD-WAN Architecture**
 - Components, benefits, deployment models
- **Cisco SD-WAN Solutions**
 - vManage, vSmart, vBond, vEdge

6.6 SD-WAN (Labs)

- **Cisco SD-WAN Configuration**
 - Setting up and configuring vManage, vSmart, vBond, vEdge
- **SD-WAN Policies**
 - Creating and deploying SD-WAN policies

Module 7: Lab and Practical Exercises

7.1 Hands-On Labs

- **Layer 2 and Layer 3 Technologies**
 - VLANs, routing protocols, MPLS
- **SDN and Network Programmability**
 - Cisco ACI, Python scripting
- **Infrastructure Security and Services**
 - VPNs, firewalls, network monitoring

7.2 Practice Exams

- **Exam Preparation**
 - Sample questions, timed practice exams
- **Exam Strategies**
 - Time management, question analysis

Course Delivery Methods

- **Instructor-Led Training and Classroom Training**
 - In-depth explanations, interactive Q&A sessions
- **Hands-On Labs**
 - Practical exercises and simulations
- **Group Discussions**
 - Collaborative learning, peer interaction
- **Online Resources**
 - Access to e-learning platforms, video tutorials

Assessment and Evaluation

- **Quizzes and Tests**
 - Regular assessments to reinforce learning
- **Lab Exercises**
 - Practical tasks and real-world scenarios
- **Final Exam**
 - Comprehensive assessment covering all modules