CCNP Enterprise: Advanced Routing and Services (ENARSI) - Scope and Sequence

Last Updated April 20, 2020

Target Audience

The Cisco Networking Academy® CCNP Enterprise curriculum is designed for participants who are seeking professional-level jobs in the ICT industry, or hope to fulfill prerequisites to pursue other CCNP or CCIE certifications. The entire curriculum is appropriate for learners at many education levels and types of institutions, including career and technical schools, secondary schools, universities, colleges and community centers.

Prerequisites

While there are no stated prerequisites for this offering, progression through this course is increased when learners have the following skills:

- High school reading level
- CCNA or equivalent knowledge and skills

CCNP Enterprise v8 Curriculum Description

In this curriculum, Cisco Networking Academy™ participants learn, apply, and practice CCNP Enterprise knowledge and skills through a series of in-depth hands-on experiences that reinforce their learning. The CCNP Enterprise v8 curriculum is presented in two courses that provide integrated and comprehensive coverage of professional-level networking technologies. Upon completion of each course, learners will be prepared to take the certification exam associated with that course. The two course are as follows:

- **CCNP Enterprise: Core Networking (CCNP ENCOR v8)** - aligns to the Cisco Press *CCNP and CCIE Enterprise Core ENCOR 350-401 Official Cert Guide* and the Implementing Cisco Enterprise Network Core Technologies (ENCOR 350-401) certification exam. The ENCOR course includes implementation of core enterprise network technologies including dual stack (IPv4 and IPv6) architecture, virtualization, infrastructure, network assurance, security, and automation.

- **CCNP Enterprise: Advanced Routing (CCNP ENARSI v8)** - aligns to the Cisco Press *CCNP Enterprise Advanced Routing ENARSI 300-410 Official Cert Guide* and the Implementing Cisco Enterprise Advanced Routing and Services (ENARSI 300-410) certification exam. ENARSI includes implementation and troubleshooting of advanced routing technologies and services including Layer 3 VPN services, infrastructure security, and infrastructure services.

  These two courses and the corresponding certification exams align to the overall CCNP Enterprise certification. Both of these courses provide learners extensive opportunities for hands-on practical experience and career skills development.

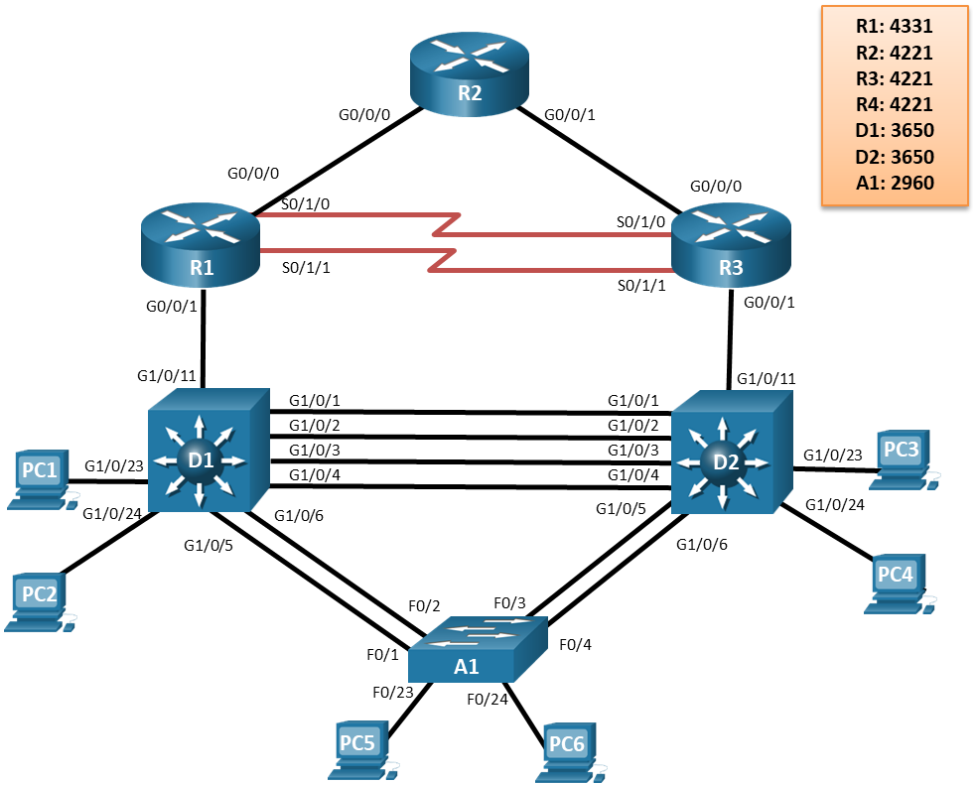
The CCNP Enterprise v8 curriculum includes the following features:

- Primary source of content for the learner is the Cisco Press Official Cert Guides.
- Assessments and practice activities are focused on specific certification competencies to increase retention.
- Embedded assessments provide immediate feedback to support the evaluation of knowledge and acquired skills.
- Hands-on labs help students develop critical thinking and complex problem-solving skills.
- Cisco Packet Tracer simulation-based learning activities are added as **optional** instructor resources to support review of CCNA skills.
- Video demonstrations give insight into complex workflows and processes and provides exposure to advance networking tools and operations.

Lab Equipment Requirements

Detailed equipment information, including descriptions and part numbers is available in the CCNP Enterprise Equipment List, which is located on the Cisco NetAcad Equipment Information site (https://www.netacad.com/portal/resources/equipment-information). The labs in the CCNP Enterprise curriculum use the following topology and equipment:

CCNP Enterprise Baseline Physical Topology (for both ENCOR and ENARSI)



Baseline Equipment Bundle:

- 3x Cisco 4221 with SEC license (2 with NIM-2T)
- 2x Cisco Catalyst 3650 Switches (WS-C3650-24TS-E)
- 1x Cisco Catalyst 2960+ Switch (WS-C2960+24TC-L)
- Ethernet cables as shown in the topology
- 2x CAB-SS-V35MT= (10' DTE Serial Cable)
- 2x CAB-SS-V35FC= (10' DCE Serial Cable)
- PCs - minimum system requirements
    - CPU: Intel Pentium 4, 2.53 GHz or equivalent •
    - Operating Systems, such as Microsoft Windows, Linux, and Mac OS•
    - RAM: 4 GB
    - Storage: 500 MB of free disk space
    - Display resolution: 1024 x 768
    - Language fonts supporting Unicode encoding (if viewing in languages other than English)
    - Latest video card drivers and operating system updates
- Internet connection for lab and study PCs

Software:

- Cisco IOS versions:
    - Routers: Version IOS-XE 16.9.4 or higher, universal feature set.
    - Layer 3 Switches: Version IOS-XE 16.9.4 or higher, ipservices feature set.
    - Layer 2 Switches: Version IOS 15.2.7 or higher, lanbaseK9 feature set
- Packet Tracer v7.3 (optional for CCNA skills review activities)

- Open-source server software for various services and protocols, such as HTTP, DHCP, FTP, TFTP, etc.
- Terminal emulation and SSH client software, such as Tera Term and PuTTy for lab PCs.
- Oracle VirtualBox, most recent version.
- Wireshark version: latest stable version
- Terminal emulation software for the installed PC operating system

CCNP Enterprise: Advanced Routing and Services (CCNP ENARSI v8) Outline

Listed below are the current set of chapters and their associated competencies outlined for this course. Each chapter aligns one-to-one to a chapter in the Cisco Press *CCNP Enterprise Advanced Routing ENARSI 300-410 Official Cert Guide*. The size of the chapter will depend on the depth of knowledge and skill needed to master the competencies in the associated chapter.

No.	Chapter Title	Topic	Objective
1	IPv4/IPv6 Addressing and Routing Review		Implement DHCPv4 to operate across multiple LANs
		IPv4	Troubleshoot a DHCP configuration for IPv4 in a switched network.
		IPv6	Troubleshoot a DHCP configuration for IPv6 in a switched network.
		Packet Forwarding	Troubleshoot the packet forwarding process.
		Troubleshoot IP addressing and host configuration.	Troubleshoot common problems with IP addressing and host configurations.
		Troubleshoot static routes.	Troubleshoot common static and defaut route configuration issues.
2	EIGRP		Explain how advanced EIGRP features affect network performance.
		EIGRP Fundamentals	Explain how EIGRP forms neighbor relationships.
		EIGRP Configuration	Configure EIGRP manual summarization.
		EIGRP Metrics	Explain how WAN considerations affect network performance.
3	Advanced EIGRP		Explain how advanced EIGRP features affect network performance.
		EIGRP Failure Detection	Explain how EIGRP forms neighbor relationships.
		EIGRP Route Summarization	Configure EIGRP manual summarization.
		WAN Considerations	Explain how WAN considerations affect network performance.
		Route Manipulation	Explain how route manipulation affects network performance.
4	Troubleshooting EIGRP for IPv4		Troubleshooting EIGRP for IPv4

No.	Chapter Title	Topic	Objective
		Troubleshoot IPv4 Neighbor Adjacencies	Troubleshoot neighbor adjacency issues in an EIGRP network. (307)
		Troubleshooting IPv4 Routes	Troubleshoot missing route entries in an EIGRP routing table. (309)
		Troubleshooting Miscellaneous EIGRP for IPv4 Issues	Troubleshoot miscellaneous IPv4 EIGRP issues.
5	EIGRPv6		Troubleshoot EIGRPv6 issues.
		EIGRPv6 Fundamentals	Explain the features and characteristics of EIGRPv6.
		Troubleshooting EIGRPv6 Neighbor Issues	Troubleshoot EIGRPv6 neighbor issues.
		Troubleshooting EIGRPv6 Routes	Troubleshoot EIGRPv6 route issues.
		Troubleshooting Named EIGRP	Troubleshoot named EIGRP.
6	OSPF		Explain how OSPF operates.
		OSPF Fundamentals	Explain the features and characteristics of the OSPF routing protocol.
		OSPF Configuration	Configure multiarea OSPFv2 in a routed network.
		OSPF in BMA Networks	Explain how OSPF works in BMA networks.
		OSPF Network Types	Compare OSPF network types.
		OSPF Failure Detection	Explain how the OSPF hello and dead timer intervals affect communications.
		OSPF Authentication	Configure OSPF authentication to ensure secure routing updates.
7	Advanced OSPF		Implement multiarea OSPF for IPv4 to enable internetwork communications.
		LSAs	Explain how multiarea OSPFv2 uses link-state advertisements.
		OSPF Stubby Areas	Explain the function of stubby areas in OSPF.
		OSPF Path Selection	Explain how OSPF selects the best path.

No.	Chapter Title	Topic	Objective
		OSPF Route Summarization	Configure summarization between OSPF areas.
		Discontiguaus Networks and Virtual Links	Explain how to connect discontiguous areas in OSPFv2.
8	Troubleshooting OSPFv2		Troubleshoot connectivity issues in OSPFv2.
		Troubleshooting OSPFv2 Neighbor Adjacencies	Troubleshoot OSPFv2 neighbor adjacencies.
		Troubleshooting OSPFv2 Routes	Troubleshoot OSPFv2 routes.
		Troubleshooting OSPFv2 Issues	Troubleshoot miscellaneous OSPFv2 issues
9	OSPFv3		Implement multiarea OSPFv3.
		OSPFv3 Fundamentals	Compare the characteristics and operation of OSPFv2 to OSPFv3.
		OSPFv3 Configuration	Configure multiarea OSPFv3.
		OSPF LSA Flooding Scope	Compare the impact of OSPFv2 and OSPFv3 LSAs.
10	Troubleshooting OSPFv3		Troubleshoot issues with OSPFv3 implementation.
		Troubleshooting OSPFv3 for IPv6	Explain the use of the commands used to troubleshoot OSPFv3 issues.
		Troubleshooting OSPF v3 Address Families	Troubleshoot OSPFv3 address family issues.
11	BGP		Configure BGP.
		BGP Fundamentals	Describe basic BGP features.
		BGP Confiuration	Configure BGP to establish neighbor sessions.
		BGP Session Types	Compare BGP session types.
		Multiprotocol BGP for IPv6	Configure multiprotocol BGP for IPv6.
12	Advanced BGP		Configure BGP with advanced features.
		Route Summarization	Configure summarization in BGP to improve performance.

No.	Chapter Title	Topic	Objective
		BGP Route Filtering	Explain how BGP uses route filtering and manipulation to improve performance.
		BGP Communities	Explain the function and purpose of BGP communities.
		BGP Prefixes and Scalability	Explain how to control the size of the BGP table.
13	BGP Path Selection		Explain the processes used by BGP for path selection.
		BGP Path Selection	Explain the processes used by BGP for path selection.
		BGP Attributes	Explain how BGP attributes affect path selection.
		BGP Equal Cost Multipath	Explain how equal cost multipathing provides load balancing for BGP.
14	Troubleshooting BGP		Troubleshoot BGP issues.
		Troubleshooting BGP Neighbor Adjacencies	Troubleshoot issues with BGP neighbor adjacencies.
		Troubleshooting BGP Routes	Troubleshoot BGP routes.
		Troubleshooting BGP Path Selection	Troublshoot issues with BGP path selection.
		Troubleshooting BGP	Troubleshoot miscellaneous BGP issues.
15	Route Maps and Conditional Forwarding		Troubleshoot Route Maps and Conditional forwarding issues.
		Conditional Matching	Configure ACLs and prefix lists.
		Route Maps	Explain the purpose of route maps.
		Conditional Forwarding of Packets	Configure Policy-based Routing (PBR).
		Conditional Forwarding Trouble Tickets	Troubleshoot conditional forwarding issues.
16	Route Redistribution		Configure route redistribution between routing protocols.
		Redistribution Overview	Explain route redistribution.

No.	Chapter Title	Topic	Objective
		Protocol Specific Redistribution Configuration	Configure route redistribution between routing protocols.
17	Troubleshooting Redistribution		Troubleshoot IPv4 and IPv6 route redistribution.
		Troubleshooting Advanced Redistribution	Troubleshoot advanced redistribution issues.
		Troubleshooting IPv4 and IPv6 Redistribution	Troubleshoot IPv4 and IPv6 route redistribution.
		Redistribution Trouble Tickets	Troubleshoot miscellaneous route redistribution issues.
18	VRF, MPLS, and MPLS Layer 3 VPNs		Explain the impact of VFR and MPLS on routing decisions.
		Implementing and Verifying VRF-Lite	Implement VRF-Lite.
		MPLS Operations	Explain how MPLS forwards packets.
		MPLS Layer 3 VPNs	Explain how MPLS Layer 3 VPNs provide peer-to-peer connectivity across a shared network.
19	DMVPN Tunnels		Implement DMVPN tunnels.
		GRE Tunnels	Explain the purpose and function of GRE tunnels.
		Next Hop Resolution Protocol (NHRP)	Describe the features and purpose of NHRP.
		DMVPN	Explain how DMVPN benefits network administrators.
		DMVPN Configuration and Operation	Implement DMVPN.
		Problems with Overlay Networks	Explain how to avoid common issues with overlay networks.
		Resilient DMVPN Networks	Explain how DMVPN mechanisms detect failure to provide a resilient network.
		IPv6 DMVPN Configuration	Implement IPv6 DMVPN.
20	Securing DMVPN Tunnels		Configure IPsec DMVPN with Pre-Shared Authentication.

No.	Chapter Title	Topic	Objective
		Elements of Secure Transport	Explain the requirements of secure communications including integrity, authentication, and confidentiality.
		IPsec Fundamentals	Explain how the IPsec framework is used to secure network traffic.
		IPsec Tunnel Protection	Configure IPsec DMVPN with Pre-Shared Authentication.
21	Troubleshooting ACLs and Prefix Lists		Troubleshoot ACLs and Prefix Lists.
		Troubleshooting IPv4 ACLs	Troubleshoot complex ACL implementations.
		Troubleshooting IPv6 ACLs	Troubleshoot IPv6 ACLs.
		Troubleshooting Prefix Lists	Troubleshoot Prefix Lists
		ACL and Prefix List Trouble Tickets	Troubleshoot miscellaneous ACL and prefix list issues.
22	Infrastructure Security		Troubleshoot security threats to a network.
		Cisco AAA Troubleshooting	Troubleshoot Cisco IOS AAA.
		Troubleshooting Unicast Reverse Path Forwarding (uRPF)	Troubleshoot Unicast Reverse Path Forwarding (uRPF)
		Troubleshooting Control Plane Policing (CoPP)	Troubleshooting Control Plane Policing (CoPP)
		IPv6 First-Hop Security	Describe IPv6 First-Hop Security features.
23	Device Management and Management Tools Troubleshooting		Troubleshoot Device Management and Management Tools.
		Device Management Troubleshooting	Troubleshoot Device Management Access
		Troubleshooting Tools	Troubleshoot Device Management Tools