



Course Description

CTS2652 | CCNA 3: Advanced Routing and Switching | 4.00 credits

This is the third course of the four-course Cisco curriculum that will prepare the student for professional certification as a Cisco Certified Network Associate (CCNA). Students will learn how to create virtual local area networks (VLANs), configure inter VLAN routing, and implement wireless network access and VLAN security. Prerequisite: CTS1651.

Course Competencies:

Competency 1: The student will demonstrate an understanding of scaling networks by:

1. Describing the strategies used to systematically design highly functional networks
2. Identifying the layers and the features of the Cisco three-layer hierarchical network model
3. Explaining the goals of network design, including performance, reliability, scalability, redundancy, manageability and maintainability
4. Researching and designing a network to fulfill given requirements and specifying the necessary network devices

Competency 2: The student will demonstrate an understanding of local area network (LAN) redundancy by:

1. Explaining the importance of redundancy and the issues involved within a converged switched network
2. Describing the function and operation of Spanning Tree Protocol (STP) and how STP prevents broadcast storms caused by redundancy
3. Describing the different spanning tree varieties and their operations, including Per-VLAN Spanning Tree Plus (PVST+) and Rapid PVST+
4. Configuring and verifying the proper operation of PVST+ and Rapid PVST+ in a switched LAN environment
5. Troubleshooting and optimizing STP operations
6. Describing the concept and varieties of First Hop Redundancy Protocols (FHRP)
7. Configuring, verifying and troubleshooting FHRP protocols, including HSRP and GLBP

Competency 3: The student will demonstrate an understanding of Link Aggregation by:

1. Describing the purpose and advantages of link aggregation
2. Describing features and operation of EtherChannel technology
3. Configuring and verifying link aggregation on LAN devices
4. Troubleshooting and verifying link aggregation operations on switches

Competency 4: The student will demonstrate an understanding of wireless LAN concepts and operations by:

1. Explaining the advantages and disadvantages of using Wireless Local Area Networks (WLAN)
2. Explaining WLAN technology and the standards developed by IEEE, WI-FI Alliance, ITU, FCC and others
3. Describing the features and operation of a WLAN, including Service Set Identification (SSID), Basic Service Set (BSS), and Extended Service Set (ESS)
4. Describing client association, authentication, media access, and channel management in a WLAN
5. Configuring and verifying WLAN operations and functionality on wireless routers and clients
6. Describing WLAN security issues, and implementing security mechanisms and procedures to mitigate threats

Competency 5: The student will demonstrate an understanding of procedures to Single Area Open Shortest Path First (OSPF) routing concepts and operations by:

1. Describing the features and operation of the OSPF routing protocol
2. Configuring OSPF on routers with loopback interfaces and router-id, and advertising network routes, including static and default routes
3. Modifying OSPF interfaces for cost, bandwidth and DR/BDR election priority
4. Tuning OSPF configurations to improve network performance
5. Implementing OSPF authentication to ensure secure routing updates

6. Deifying and troubleshooting router operations in an OSPF network

Competency 6: The student will demonstrate an understanding of multi-Area OSPF concepts and operations by:

1. Explaining the purpose, design and function of multi-area OSPF
2. Describing the operation of multi-area OSPF, including LSA types, neighbor adjacencies, routing table entries and types of network routes
3. Configuring routers in a complex, multi-area OSPF network
4. Calculating and implementing route summarization in a multi-area OSPF network
5. Verifying, troubleshooting and optimizing router operations in multi-area OSPF network

Competency 7: The student will demonstrate an understanding of Enhanced Interior Gateway Routing Protocol (EIGRP) concepts and operations by:

1. Describing the function and operation of the EIGRP routing protocol with its Diffusing Update Algorithm (DUAL) features
2. Describing, examining and calculating the composite metric used by EIGRP
3. Configuring routers for EIGRP operation in IPv4 and IPv6 networks
4. Inspecting of EIGRP operations, including neighbor adjacencies, routing table entries, successors and feasible distance
5. Configuring route summarization and propagating static and default routes in an EIGRP network.
6. Configuring EIGRP authentication to ensure secure routing updates
7. Configuring advanced EIGRP features, including summary routes, auto- summarization, tuning EIGRP interface settings to improve network performance
8. Verifying and troubleshooting EIGRP router operations in a complex network

Competency 8: The student will demonstrate an understanding of Cisco IOS® software licensing and file management by:

1. Explaining the Cisco Internetwork Operating System (IOS) image file naming conventions, including platform, version and feature set
2. Calculating memory and storage requirements when upgrading an IOS system image
3. Explaining the licensing process for Cisco IOS software in a small- to medium-sized business network
4. Configuring a device to install an IOS software image with license
5. Configuring and operating a Trivial File Transfer Protocol (TFTP) file server for updates, backups and recovery
6. Performing IOS and system file transfers from Cisco devices to a TFTP server

Learning Outcomes:

- Use quantitative analytical skills to evaluate and process numerical data
- Formulate strategies to locate, evaluate, and apply information
- Use computer and emerging technologies effectively