



# CCNP V 6.0 Scope and Sequence

Last updated June 2, 2010

## Target Audience

The Cisco® CCNP curriculum is designed for Cisco Networking Academy® students seeking career oriented, enterprise-level networking skills. Target students include experienced networking professionals who are ready to advance their core routing, switching, and network troubleshooting skills and students with Cisco CCNA®-level knowledge who are enrolled in technology degree programs at institutions of higher education.

CCNP provides a next step for CCNA Discovery or CCNA Exploration students who want to build on their CCNA-level skill set to further a career in computer networking.

## Prerequisites

The CCNP curriculum consists of three courses: CCNP ROUTE: Implementing IP Routing, CCNP SWITCH: Implementing IP Switching, and CCNP TSHOOT: Maintaining and Troubleshooting IP Networks.

CCNP ROUTE and CCNP SWITCH have no required Networking Academy course prerequisites. Students should have basic PC and Internet navigation knowledge and skills as well as a solid foundation in CCNA-level networking concepts and skills. While there are no *required* course prerequisites, students are encouraged to complete the CCNA Discovery or CCNA Exploration curriculum to acquire the fundamental CCNA-level routing and switching skills needed for success in the CCNP courses.

CCNP ROUTE and CCNP SWITCH are both prerequisites for the CCNP TSHOOT course. They can be taken in any order.

## Target Certifications

The Cisco CCNP certification validates the ability of a network professional to install, configure, and troubleshoot converged local and wide area networks. The CCNP curriculum helps students prepare for the following exams leading to the CCNP certification:

| Course   | Exam             |
|--|------------------|
| CCNP ROUTE: Implementing IP Routing                      | ROUTE (642-902)  |
| CCNP SWITCH: Implementing IP Switching                   | SWITCH (642-813) |
| CCNP TSHOOT: Maintaining and Troubleshooting IP Networks | TSHOOT (642-832) |

## Curriculum Description

CCNP equips students with the knowledge and skills needed to plan, implement, secure, maintain, and troubleshoot converged enterprise networks. The CCNP curriculum was designed to reflect the job skills and responsibilities that are associated with professional-level job roles such as network engineer, systems engineer, network support engineer, network administrator, network consultant, and system integrator.

The curriculum was designed to be delivered by certified Networking Academy instructors, using a blend of lectures, lab activities, case studies, and assessments. Instead of being delivered online, each course uses a textbook developed and published by Cisco Press in close collaboration with Networking Academy. All course elements are tightly aligned with the textbooks.

All hands-on labs in the course can be completed on actual physical equipment or in conjunction with the NDG NETLAB solution.

**CCNP course features:**

- Designed for students with CCNA-level knowledge and skills
- Can be delivered as an independent curriculum or integrated into broader courses of study
- Offers a hands-on, career-oriented approach to learning networking that emphasizes practical experience
- Can be delivered in-person or in a blended distance learning (BDL) environment
- Includes activities that emphasize networking implementation

**Curriculum and Course Objectives**

CCNP helps students develop the skills needed to succeed in IT-related degree and diploma programs and prepare for the Cisco CCNP certification. It provides a theoretically rich, hands-on learning experience covering advanced routing, switching, and troubleshooting skills.

The goals of the CCNP curriculum are as follows:

- Provide an in-depth, theoretical overview of advanced routing and switching and troubleshooting
- Equip students with the knowledge and skills necessary to design and support complex enterprise networks
- Provide an experience-oriented course that employs industry-relevant instructional approaches to prepare students for professional-level jobs in the industry
- Enable students to gain significant hands-on interaction with IT equipment to prepare them for certification exams and career opportunities

Students who complete CCNP ROUTE will be able to perform the following tasks:

- Explain complex network requirements and design models for implementing advanced routing services in an enterprise network
- Implement EIGRP and OSPF in an enterprise network
- Exchange routing information between interior gateway protocols
- Implement various mechanisms for controlling routing updates and traffic
- Implement BGP to allow an enterprise network to connect to an ISP
- Describe a basic implementation for branch office and mobile worker connectivity
- Implement IPv6 in an enterprise network

Students who complete CCNP SWITCH will be able to perform the following tasks:

- Implement, monitor, and maintain switching in an enterprise campus network
- Implement appropriate spanning tree protocols in campus networks
- Implement VLANs in campus networks
- Configure and optimize high availability and redundancy on switches
- Describe and implement LAN security features
- Plan and prepare for advanced services in a campus infrastructure

Students who complete CCNP TSHOOT will be able to perform the following tasks:

- Monitor, maintain, and troubleshoot a complex network
- Plan and document the most common maintenance functions in complex enterprise networks
- Develop a troubleshooting process to identify and solve problems in complex enterprise networks
- Select tools that best support specific troubleshooting and maintenance processes in large, complex enterprise networks
- Practice maintenance procedures and fault resolution in switched and routed environments
- Troubleshoot IPv4 addressing services
- Troubleshoot IPv6 routing issues
- Troubleshoot network infrastructure services
- Troubleshoot network performance issues on routers and switches
- Troubleshoot network integration issues affecting wireless connectivity, VoIP, and video
- Practice maintenance procedures and fault resolution in a secure infrastructure

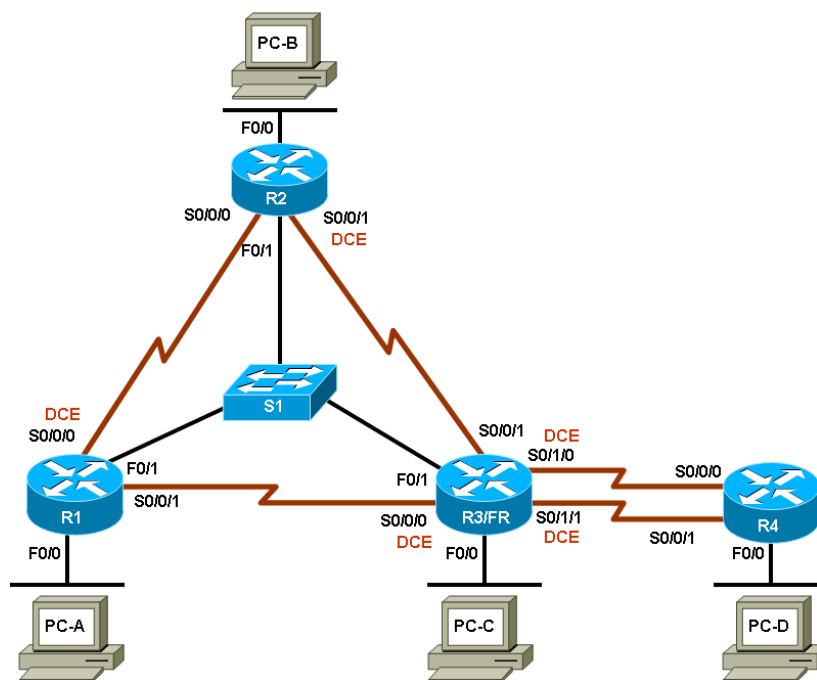
### Minimum System Requirements

#### General curriculum requirements:

- 1 Student PC per student
- Lab equipment as defined per course

#### CCNP ROUTE Lab Bundle Requirements

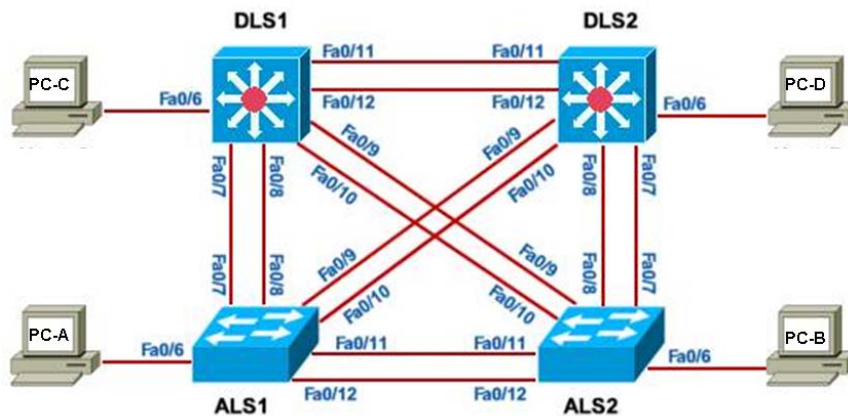
This course uses a lab bundle similar to that specified for the CCNP v5.0 Building Scalable Internetworks curriculum. The lab bundle consists of four Cisco Integrated Services Routers, one Catalyst switch, and four student PCs to represent network devices in a multisite, medium-sized business network. The equipment should be set up in the following configuration:



| Quantity | Description   | Part Number                                       |
|----------|---|---|
| 4        | Modular Router w/2xFE, 2 WAN slots, 32 FL/128 DR            | CISCO1841   |
| 4        | 128 to 192MB SODIMM DRAM factory upgrade for the Cisco 1841 | MEM1841-64D=                                      |
| 4        | 64MB Cisco 1800 Compact Flash Memory                        | MEM1800-64CF=                                     |
| 5        | 2-Port Async/Sync Serial WAN Interface Card or T1 Card      | HWIC-2A/S or HWIC-2T                              |
| 5        | V.35 Cable, DTE Male to Smart Serial, 10 Feet               | CAB-SS-V35MT=                                     |
| 5        | V.35 Cable, DCE Female to Smart Serial, 10 Feet             | CAB-SS-V35FC=                                     |
| 1        | Catalyst 2960 24 10/100 + 2 1000BT LAN Base Image           | WS-C2960-24TT-L                                   |
| 4        | (Optional) Rackmount Kit for the 1841                       | ACS-1841-RM-19=                                   |
| 3        | PCs acting as clients/servers                               | N/A   |
| 3        | Ethernet cables   |   |
| 4        | Ethernet cables (x-over)                                    |   |
| 4        | Cisco IOS® Release 12.4(20)T Advanced IP Services           | c1841-advipservicesk9-mz.124-24.T1.bin            |
| 4        | (Optional) Cisco CCP 1.3 or SDM 2.5                         | Cisco-config-pro-exp-k9-1_3-en.zip<br>SDM-V25.zip |

### CCNP SWITCH Lab Bundle Requirements

This course uses a lab bundle similar to that specified for the CCNP v5.0 Building Multilayer Switched Networks curriculum. This lab bundle consists of four Catalyst switches and four PCs to represent network devices in a multilayer switched campus LAN. The equipment should be set up in the following configuration:

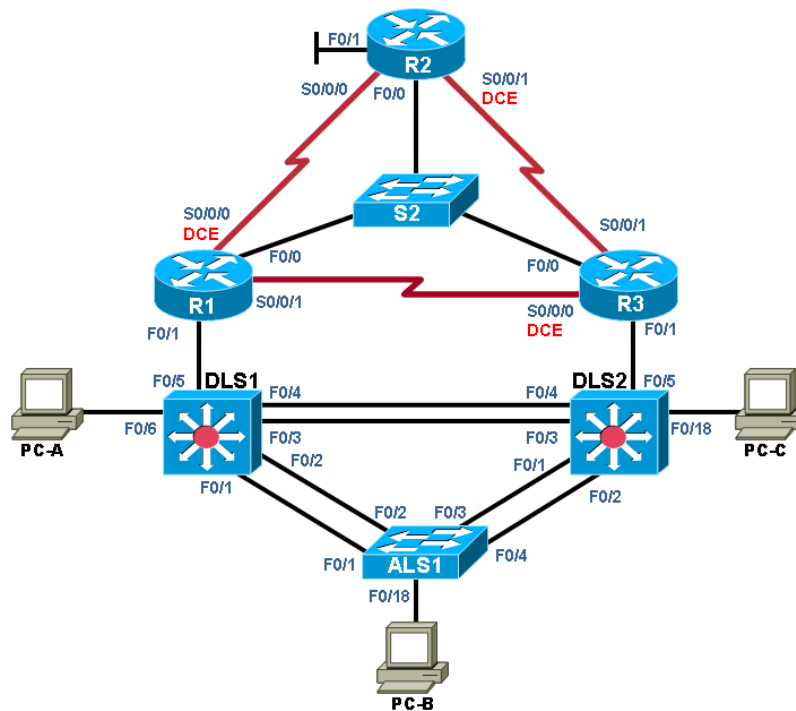


| Quantity | Description  | Part Number                            |
|----------|--|--|
| 2        | Cisco Catalyst 3560-24PS EMI –24 ports – EN fast EN – 10BaseT 100Base-TX + 2 x SFP (empty) | WS-C3560V2-24PS-E                      |
| 2        | Cisco Catalyst 2960-24TT – 24 ports – 10/100BTX +2x1000BaseT                               | WS-C2960-24TT-L                        |
| 4        | PCs acting as clients/servers  | N/A                                    |
| 4        | Ethernet cables  |  |
| 12       | Ethernet cables (x-over)   |  |
| 2        | Cisco IOS 12.2(46)SE Advanced IP Services (or better) for 3560s (K9-M image)               | c3560-advipservicesk9-mz.122-46.SE.bin |

|   |   |   |
|---|---|---|
| 2 | Cisco IOS 12.2(46)SE LAN base (or better) for 2960 (K9-M image) | c2960-lanbasek9-mz.122-46.SE.bin                  |
| 4 | Cisco CCP 1.3 or SDM 2.5 (Optional)                             | cisco-config-pro-exp-k9-1_3-en.zip<br>SDM-V25.zip |

### CCNP TSHOOT Lab Bundle Requirements

This course uses a modified combination of the topologies for the ROUTE and SWITCH courses. The NETLAB Multi-Purpose Academy Pod (MAP) can be used to satisfy most labs by replacing the two 2960 distribution layer switches in the topology with 3560 switches. The topology includes the 3560 switches DLS1 and DLS2. A switch has been added between R1, R2, and R3, as with the ROUTE course. This switch can be simulated through the NETLAB control switch using the cabling shown. One of the PCs can be attached to R2 Fa0/1 for labs that may require it. This can also be accommodated in NETLAB. The equipment should be set up in the following configuration:



| Quantity | Description  | Part Number                                       |
|----------|--|---|
| 3        | Cisco IOS Release 12.4(20)T Advanced IP Services                             | c1841-advipservicesk9-mz.124-24.T1.bin            |
| 2        | Cisco IOS 12.2(46)SE Advanced IP Services (or better) for 3560s (K9-M image) | c3560-advipservicesk9-mz.122-46.SE.bin            |
| 1        | Cisco IOS 12.2(46)SE LAN base (or better) for 2960 (K9-M image)              | c2960-lanbasek9-mz.122-46.SE.bin                  |
| 3        | (Optional) Cisco CCP 1.3 or SDM 2.5  | cisco-config-pro-exp-k9-1_3-en.zip<br>SDM-V25.zip |

## Suggested Software

The following software is also suggested for all three CCNP courses; however, Cisco cannot guarantee the availability of the listed software from the manufacturer

| Description  | Manufacturer                              |
|--|---|
| Firefox 2.0 and later versions, or Internet Explorer 6.0 and later versions  | Mozilla, Microsoft                        |
| Tera Term Pro version 2.3 software terminal emulator for Windows<br><a href="http://www.ayera.com/teraterm/">http://www.ayera.com/teraterm/</a>      | Ayera Technologies<br>Freeware            |
| PuTTY Terminal Emulator<br><a href="http://www.chiark.greenend.org.uk/~sgtatham/putty/">http://www.chiark.greenend.org.uk/~sgtatham/putty/</a>       | Freeware                                  |
| Kiwi Syslog Daemon<br><a href="http://www.kiwisyslog.com/kiwi-syslog-daemon-overview/">http://www.kiwisyslog.com/kiwi-syslog-daemon-overview/</a>    | Freeware                                  |
| TFTP32 includes DHCP, TFTP, SNTP and Syslog servers as well as a TFTP client<br><a href="http://tftp32.jounin.net/">http://tftp32.jounin.net/</a>    | Freeware                                  |
| Wireshark network protocol analyzer<br><a href="http://www.wireshark.org/">http://www.wireshark.org/</a>   | Freeware                                  |
| Cisco SDM requires Sun Java Runtime Environment (JRE)<br><a href="http://java.com/en/download/manual.jsp">http://java.com/en/download/manual.jsp</a> | Sun Microsystems, Inc.<br>(Free download) |

## Curriculum Outline

| Chapter | ROUTE:<br>Implementing IP Routing                                     | SWITCH:<br>Implementing IP Switching                              | TSHOOT:<br>Maintaining and Troubleshooting IP Networks                 |
|---------|---|---|--|
| 1       | Routing Services  | Analyzing the Cisco Enterprise Campus Architecture                | Planning Maintenance for Complex Networks                              |
| 2       | Configuring the Enhanced Interior Gateway Routing Protocol            | Implementing VLANs in Campus Networks                             | Troubleshooting Processes for Complex Enterprise Networks              |
| 3       | Configuring the Open Shortest Path First Protocol                     | Implementing Spanning Tree  | Using Maintenance and Troubleshooting Tools and Applications           |
| 4       | Manipulating Routing Updates  | Implementing InterVLAN Routing                                    | Maintaining and Troubleshooting Campus Switched Solutions              |
| 5       | Implementing Path Control   | Implementing High Availability and Redundancy in a Campus Network | Maintaining and Troubleshooting Routing Solutions                      |
| 6       | Implementing a Border Gateway Protocol Solution for ISP Connectivity  | Securing the Campus Infrastructure                                | Troubleshooting Addressing Services                                    |
| 7       | Implementing Routing Facilities for Branch Offices and Mobile Workers | Preparing the Campus Infrastructure for Advanced Services         | Troubleshooting Network Performance Issues                             |
| 8       | Implementing IPv6 in the Enterprise Network                           |   | Troubleshooting Converged Networks                                     |
| 9       |   |   | Maintaining and Troubleshooting Network Security Implementations       |
| 10      |   |   | Review and Preparation for Troubleshooting Complex Enterprise Networks |

## CCNP ROUTE: Implementing IP Routing

This course teaches students how to implement, monitor, and maintain routing services in an enterprise network. Students will learn how to plan, configure, and verify the implementation of complex enterprise LAN and WAN routing solutions, using a range of routing protocols in IPv4 and IPv6 environments. The course also covers the configuration of secure routing solutions to support branch offices and mobile workers. Comprehensive labs emphasize hands-on learning and practice to reinforce configuration skills.

**Course Prerequisites:** None. CCNA-level knowledge and skills required.

| Chapter/Section  | Objectives  |
|--|---|
| <b>Chapter 1. Routing Services</b>   | <b>Explain complex network requirements and design models for implementing advanced routing services in an enterprise network</b> |
| 1.1 Complex Enterprise Network Frameworks, Architectures, and Models         | Describe common enterprise traffic requirements and network design models   |
| 1.2 Creating, Documenting, and Executing an Implementation Plan              | Describe how to create an implementation plan for implementing routing services in an enterprise network                          |
| 1.3 Reviewing IP Routing Principles  | Review the fundamentals of routing and compare various routing protocols  |
| <b>Chapter 2. Configuring the Enhanced Interior Gateway Routing Protocol</b> | <b>Implement EIGRP in an enterprise network</b>   |
| 2.1 Understanding EIGRP Terminology and Operation                            | Describe the basic functions and operation of EIGRP   |
| 2.2 Planning EIGRP Routing Implementations                                   | Plan and implement EIGRP routing  |
| 2.3 Configuring and Verifying EIGRP  | Verify EIGRP routing  |
| 2.4 Configuring and Verifying EIGRP in an Enterprise WAN                     | Configure and verify basic EIGRP in an enterprise WAN   |
| 2.5 Configuring and Verifying EIGRP Authentication                           | Configure and verify EIGRP authentication   |
| 2.6 Optimizing EIGRP Implementations   | Describe and configure EIGRP optimization mechanisms; verify and troubleshoot the overall implementation                          |
| <b>Chapter 3. Configuring the Open Shortest Path First Protocol</b>          | <b>Implement OSPF in an enterprise network</b>  |
| 3.1 Understanding OSPF Terminology and Operation                             | Describe OSPF terminology and operation within various enterprise environments  |
| 3.2 OSPF Packets   | Explain the OSPF packet types   |
| 3.3 Configuring and Verifying Basic OSPF Routing                             | Plan OSPF   |
| 3.4 Understanding OSPF Network Types   | Describe and configure OSPF   |
| 3.5 Understanding OSPF LSAs  | Describe common LSAs  |
| 3.6 Interpreting the OSPF LSDB and Routing Table                             | Describe how LSAs form the layout of the OSPF LSDB  |
| 3.7 Configuring and Verifying Advanced OSPF Features                         | Configure and verify advanced OSPF features   |
| 3.8 Configuring OSPF Authentication  | Configure and verify OSPF authentication  |
| <b>Chapter 4. Manipulating Routing Updates</b>                               | <b>Implement various mechanisms for controlling routing updates and traffic</b>   |

|   |   |
|---|---|
| 4.1 Assessing Network Routing Performance Issues  | Describe network performance issues and ways to control routing updates and traffic           |
| 4.2 Controlling Routing Update Traffic  | Describe, configure, and considerations for controlling routing update traffic                |
| 4.3 Implementing Route Redistribution   | Describe the purpose of multiple protocols  |
| 4.4 Controlling Routing Update Traffic  | Describe, configure, and verify various methods for controlling routing update traffic        |
| <b>Chapter 5. Implementing Path Control</b>   | <b>Implement path control using IP SLA and PBR</b>  |
| 5.1 Understanding Path Control  | Describe how the various path control methods affect traffic                                  |
| 5.2 Implement Path Control using Offset-Lists   | Configure offset-lists for path control   |
| 5.3 Implement Path Control using IP SLAs  | Configure the IP Service-Level Agreement feature for path control                             |
| 5.4 Implement Path Control using Policy Based Routing                                   | Configure policy-based routing (PBR) for path control   |
| 5.5 Advanced Path Control Tools   | Describe the Cisco IOS Optimized Edge Routing technology.                                     |
| <b>Chapter 6. Implementing a Border Gateway Protocol Solution for ISP connectivity</b>  | <b>Implement BGP to allow an enterprise network to connect to an ISP</b>                      |
| 6.1 BGP Terminology, Concepts, and Operation  | Describe basic BGP terminology and operation, including EBGP and IBGP                         |
| 6.2 Configuring BGP   | Verify and troubleshoot basic BGP configurations  |
| 6.3 Verifying and Troubleshooting BGP   | Describe and configure various methods for manipulating path selection                        |
| 6.4 Basic BGP Path Manipulation Using Route Maps  | Describe and configure various methods for manipulating path selection                        |
| 6.5 Filtering BGP Routing Updates   | Describe how to filter routes in BGP  |
| <b>Chapter 7: Implementing Routing Facilities for Branch Offices and Mobile Workers</b> | <b>Describe a basic implementation for branch office and mobile worker connectivity</b>       |
| 7.1 Planning the Branch Office Implementation   | Describe the fundamentals of branch office connectivity                                       |
| 7.2 Planning for Mobile Worker Implementations  | Describe the fundamentals of mobile worker connectivity                                       |
| 7.3 Routing Traffic to the Mobile Worker  | Describe the necessary configurations for a mobile worker to connect to an enterprise network |
| <b>Chapter 8. Implementing IPv6 in an Enterprise Network</b>                            | <b>Describe and configure IPv6 in an enterprise network</b>                                   |
| 8.1 Introducing IPv6  | Describe the basics of IPv6   |
| 8.2 IPv6 Addressing   | Describe the basics of IPv6 addressing  |
| 8.3 Configuring and Verifying IPv6 Unicast Addresses                                    | Describe and configure IPv6 addresses   |
| 8.4 Routing IPv6 Traffic  | Describe and configure IPv6 routing   |
| 8.5 Tunneling IPv6 Traffic  | Describe and configure IPv6 tunneling   |
| 8.6 Translation Using NAT-PT  | Describe and configure static and dynamic NAT-PT  |



## CCNP SWITCH: Implementing IP Switching

This course teaches students how to implement, monitor, and maintain switching in converged enterprise campus networks. Students will learn how to plan, configure, and verify the implementation of complex enterprise switching solutions. The course also covers the secure integration of VLANs, WLANs, voice, and video into campus networks. Comprehensive labs emphasize hands-on learning and practice to reinforce configuration skills.

**Course Prerequisites:** None. CCNA-level knowledge and skills required.

| Chapter/Section  | Objectives  |
|--|---|
| <b>Chapter 1. Analyzing the Cisco Enterprise Campus Architecture</b> | <b>Assess the structure and components used to build or expand an enterprise campus network</b>   |
| 1.1 Introduction to Campus Network Design Principles                 | Describe common campus design options and how design choices affect implementation and support of a campus LAN  |
| 1.2 Enterprise Campus Design   | Describe managing and supporting a campus LAN using a network lifecycles approach   |
| <b>Chapter 2. Implementing VLANs in Campus Networks</b>              | <b>Implement VLANs in campus networks</b>   |
| 2.1 Implementing VLAN Technologies in a Campus Network               | Given a large enterprise network design, configure VLAN technologies to meet business and technical requirements and constraints  |
| 2.2 Implementing Trunking in a Cisco Campus Network                  | Configure VLAN trunks in a campus network to support business and technical requirements  |
| 2.3 VLAN Trunking Protocol   | Given a design, addressing scheme, and business/technical requirements and constraints, configure and verify VLAN Trunking Protocol   |
| <b>Chapter 3. Implementing Spanning Tree</b>                         | <b>Implement, monitor, and maintain spanning tree protocols in an enterprise campus network</b>   |
| 3.1 Spanning Tree Protocols  | Provide an overview of spanning tree protocols  |
| 3.2 Spanning Tree Protocol Basics                                    | Given a network topology and business and technical requirements and constraints, configure and verify IEEE 802.1D spanning tree protocols in a Layer 2 topology that contains bridging loops |
| 3.3 Rapid Spanning Tree Protocol                                     | Describe and configure Rapid Spanning Tree Protocol   |
| 3.4 Multiple Spanning Tree   | Describe and configure Multiple Spanning Tree   |
| 3.5 Spanning Tree Enhancements                                       | In a given network topology, configure STP features to enhance resiliency and prevent forwarding loops  |
| 3.6 Recommended Spanning Tree Practices                              | Explain recommended best practices for STP configurations   |
| 3.7 Troubleshooting STP  | Given a campus VLAN topology and spanning tree installation in an enterprise network, troubleshoot spanning tree issues   |
| <b>Chapter 4. Implementing InterVLAN Routing</b>                     | <b>Implement, monitor, and maintain interVLAN routing in an enterprise campus network</b>   |
| 4.1 Describing InterVLAN Routing                                     | Explain methods of interVLAN routing  |
| 4.2 Configuring InterVLAN Routing                                    | Configure and verify interVLAN routing using multilayer switching   |
| 4.3 Implementing Dynamic Host Configuration                          | Explain DHCP operation and configure DHCP   |

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|---|--|
| Protocol in a Multilayer Switched Environment                                       |  |
| 4.4 Deploying CEF-Based Multilayer Switching  | Configure and verify CEF   |
| <b>Chapter 5. Implementing High Availability and Redundancy in a Campus Network</b> | <b>Configure and optimize high availability on switches to provide Layer 3 redundancy</b>  |
| 5.1 Understanding High Availability   | Describe high availability solutions   |
| 5.2 Implementing High Availability  | Implement Layer 3 redundancy solutions   |
| 5.3 Implementing Network Monitoring   | Describe and configure network monitoring solutions  |
| 5.4 Implementing Supervisor Engines in Catalyst Switches                            | Describe switch supervisor redundancy  |
| 5.5 Understanding First Hop Redundancy Protocols                                    | Describe and configure first hop redundancy protocols  |
| 5.6 Implementing Server Load Balancing  | Configure and verify Cisco IOS server load balancing (SLB)   |
| <b>Chapter 6. Securing the Campus Infrastructure</b>                                | <b>Describe and implement LAN security features</b>  |
| 6.1 Switch Security Fundamentals  | Identify attacks and threats to switches and methods to mitigate attacks   |
| 6.2 Understanding and Protecting Against MAC Layer Attacks                          | Configure switches to guard against MAC-based attacks  |
| 6.3 Understanding and Protecting Against VLAN Attacks                               | Configure tight control of trunk links to mitigate VLAN hopping attacks  |
| 6.4 Understanding and Protecting Against Spoofing Attacks                           | Configure switches to guard against DHCP, MAC, and address resolution protocol (ARP) threats                                       |
| 6.5 Securing Network Switches   | Secure Layer 2 devices   |
| 6.6 Switch Security Considerations  | Describe organizational security policies, secure switch devices and protocols, and mitigate compromises launched through a switch |
| 6.7 Troubleshooting Performance and Connectivity                                    | Describe tools used to monitor and analyze network traffic   |
| <b>Chapter 7. Preparing the Campus Infrastructure for Advanced Services</b>         | <b>Plan and prepare for advanced services in a campus infrastructure</b>   |
| 7.1 Assessing Converged Traffic in the Campus Infrastructure                        | Assess the impact of WLANs, voice, and video on campus infrastructure operations   |
| 7.2 Understanding QoS   | Describe quality of service in a campus infrastructure to support advanced services  |
| 7.3 Implementing IP Multicast   | Implement multicast in a campus infrastructure to support advanced services  |
| 7.4 Preparing the Campus Infrastructure to Support Wireless                         | Prepare campus networks for the integration of wireless LANs   |
| 7.5 Preparing the Campus Infrastructure to Support Voice                            | Prepare campus networks for the integration of voice capabilities  |
| 7.6 Preparing the Campus Infrastructure to Support Video                            | Prepare campus networks for the integration of video capabilities  |

## CCNP TSHOOT: Maintaining and Troubleshooting IP Networks

This course teaches students how to monitor and maintain complex, enterprise routed and switched IP networks. Skills learned include the planning and execution of regular network maintenance, as well as support and troubleshooting using technology-based processes and best practices, based on systematic and industry recognized approaches. Extensive labs emphasize hands-on learning and practice to reinforce troubleshooting techniques.

**Course Prerequisites:** Both CCNP ROUTE and CCNP SWITCH

| Chapter/Section  | Objectives   |
|--|--|
| <b>Chapter 1. Planning Maintenance for Complex Networks</b>                    | <b>Plan and document the most common maintenance functions in complex enterprise networks</b>                                  |
| 1.1 Applying Maintenance Methodologies   | Evaluate commonly-practiced models and methodologies for network maintenance   |
| 1.2 Maintenance Processes and Procedures                                       | Identify the processes and procedures that are a fundamental part of any network maintenance methodology                       |
| 1.3 Network Maintenance Tools, Applications, and Resources                     | Identify, evaluate, and select tools, applications, and resources to support network maintenance processes                     |
| <b>Chapter 2. Troubleshooting Processes for Complex Enterprise Networks</b>    | <b>Develop a troubleshooting process to identify and solve problems in complex enterprise networks</b>                         |
| 2.1 Troubleshooting Methodologies  | Identify troubleshooting principles and evaluate troubleshooting methodologies   |
| 2.2 Implementing Troubleshooting Procedures                                    | Plan and implement troubleshooting procedures as part of a structured troubleshooting methodology                              |
| 2.3 Integrating Troubleshooting into the Network Maintenance Process           | Plan and implement troubleshooting and network maintenance procedures to effectively support each other                        |
| <b>Chapter 3. Using Maintenance and Troubleshooting Tools and Applications</b> | <b>Select tools that best support specific troubleshooting and maintenance processes in large, complex enterprise networks</b> |
| 3.1 Using Cisco IOS Software for Maintenance and Troubleshooting               | Use Cisco IOS commands to gather information in support of diagnostic processes  |
| 3.2 Using Specialized Maintenance and Troubleshooting Tools                    | Identify tools used for specific maintenance and troubleshooting processes   |
| <b>Chapter 4. Maintaining and Troubleshooting Campus Switched Solutions</b>    | <b>Practice maintenance procedures and fault resolution in switched environments</b>   |
| 4.1 Troubleshooting VLANs  | Diagnose VLAN, VTP, and trunking problems using the IOS command line interface   |
| 4.2 Troubleshooting Spanning Tree  | Diagnose spanning tree problems using the IOS command line interface   |
| 4.3 Troubleshooting Switched Virtual Interfaces (SVIs) and InterVLAN Routing   | Diagnose problems with SVIs and interVLAN routing  |
| 4.4 Troubleshooting First Hop Redundancy Protocol Operation                    | Diagnose and resolve problems related to first hop redundancy protocols such as HSRP, VRRP, and GLBP.                          |
| <b>Chapter 5. Maintaining and Troubleshooting Routing Solutions</b>            | <b>Practice maintenance procedures and fault resolution in routing environments</b>  |

|   |   |
|---|---|
| 5.1 Troubleshooting Network Layer Connectivity  | Diagnose network layer connectivity problems using the IOS command line interface   |
| 5.2 Troubleshooting EIGRP   | Diagnose and resolve problems in EIGRP  |
| 5.3 Troubleshooting OSPF  | Diagnose and resolve OSPF problems  |
| 5.4 Troubleshooting Route Redistribution  | Diagnose and resolve problems when redistributing routes  |
| 5.5 Troubleshooting BGP   | Diagnose and resolve problems when using BGP to connect to Internet service providers   |
| <b>Chapter 6. Troubleshooting Addressing Services</b>                                     | <b>Troubleshoot NAT/PAT, DHCP, and other services</b>   |
| 6.1 Identifying Common IPv4 Addressing Service Issues                                     | Understand common issues related to NAT/PAT and DHCP  |
| 6.2 Identifying Common IPv6 Routing and Tunneling Issues                                  | Identify common IPv6 routing and tunneling issues   |
| <b>Chapter 7. Troubleshooting Network Performance Issues</b>                              | <b>Identify and troubleshoot network performance issues.</b>  |
| 7.1 Troubleshooting Network Application Services  | Describe network application services   |
| 7.2 Troubleshooting Performance Issues on Switches  | Diagnose performance problems on Catalyst switches  |
| 7.3 Troubleshooting Performance Issues on Routers   | Identify and troubleshoot performance problems on routers   |
| <b>Chapter 8. Troubleshooting Converged Networks</b>                                      | <b>Troubleshoot wireless connectivity, VoIP, and video</b>  |
| 8.1 Troubleshooting Wireless Issues in a Converged Network                                | Identify common issues when integrating wireless capabilities into a network  |
| 8.2 Troubleshooting Unified Communications Issues in a Converged Network                  | Identify common issues when integrating voice into a network  |
| 8.3 Troubleshooting Video Issues in a Converged Network                                   | Identify common issues when integrating video into a network  |
| <b>Chapter 9. Maintaining and Troubleshooting Network Security Implementations</b>        | <b>Practice maintenance procedures and fault resolution in a secure infrastructure</b>  |
| 9.1 Troubleshooting Secure Networks   | Describe security features commonly implemented in complex networks and explain how those features affect the troubleshooting process |
| 9.2 Troubleshooting Management Plane Security   | Diagnose and resolve problems related to management plane security features   |
| 9.3 Troubleshooting Control Plane Security  | Diagnose and resolve problems related to control plane security features  |
| 9.4 Troubleshooting Data Plane Security   | Diagnose and resolve problems related to data plane security features   |
| 9.5 Troubleshooting Branch Office and Remote Worker Connectivity                          | Describe issues related to branch office and remote worker implementations  |
| <b>Chapter 10. Review and Preparation for Troubleshooting Complex Enterprise Networks</b> | <b>Practice maintenance procedures and fault resolution in a complex environment</b>  |
| 10.1 Troubleshooting Complex Environments   | Diagnose and resolve problems in integrated, complex enterprise networks  |