CCNP V 6.0 Scope and Sequence

Last updated March 2, 2010

Note: The course objectives and outline listed in this document for the Cisco CCNP® ROUTE and CCNP SWITCH courses are subject to change since they are still under development. The English versions of those two courses are scheduled for release in the July 2010 timeframe. The English version of the CCNP TSHOOT course is scheduled for release in April 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
- 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 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; 1 local curriculum server
- 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:
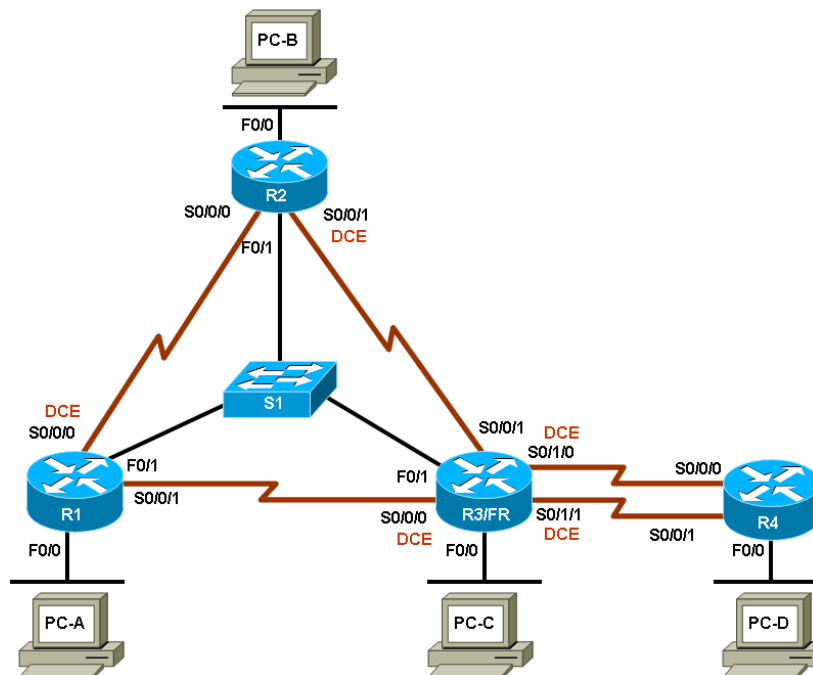
Quantity	Description	Part Number
4	Modular Router w/2xFE, 2 WAN slots, 32 FL/128 DR	CISCO1841
4	128 to 192MB SODIMM DRAM factory upgrade for the Cisco 1841	MEM1841-64D=
4	64MB Cisco 1800 Compact Flash Memory	MEM1800-64CF=
5	2-Port Async/Sync Serial WAN Interface Card or T1 Card	HWIC-2A/S or HWIC-2T
5	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 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:
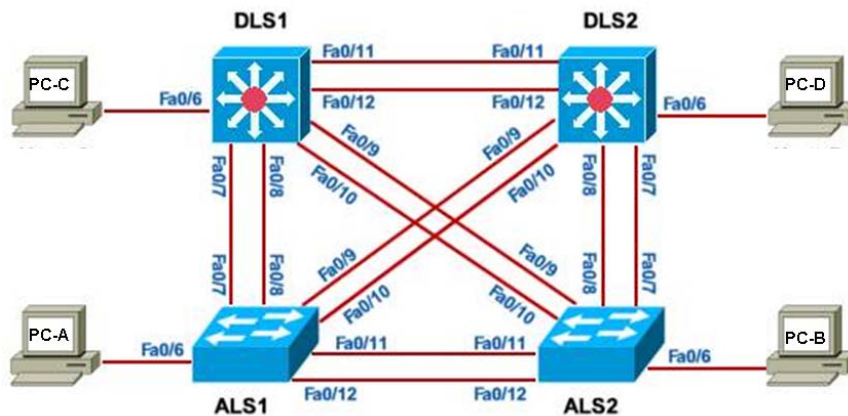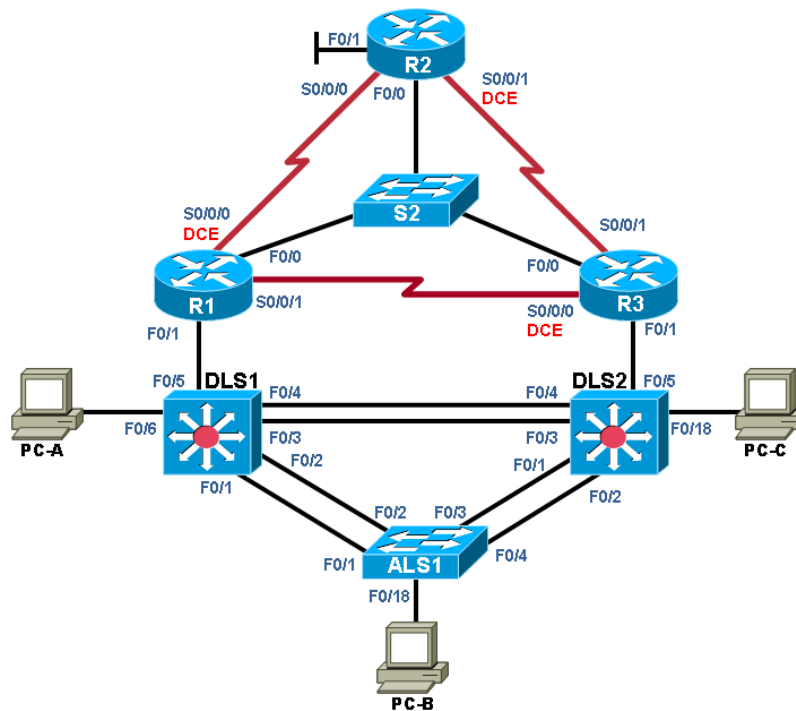

Quantity	Description	Part Number
2	Cisco Catalyst 3560-24PS EMI –24 ports – EN fast EN – 10BaseT 100Base-TX + 2 x SFP (empty)	WS-C3560V2-24PS-E
2	Cisco Catalyst 2960-24TT – 24 ports – 10/100BTX +2x1000BaseT	WS-C2960-24TT-L
4	PCs acting as clients/servers	N/A
4	Ethernet cables	
12	Ethernet cables (x-over)	
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 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 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 http://www.ayera.com/teraterm/	Ayera Technologies Freeware
PuTTY Terminal Emulator http://www.chiark.greenend.org.uk/~sgtatham/putty/	Freeware
Kiwi Syslog Daemon http://www.kiwisyslog.com/kiwi-syslog-daemon-overview/	Freeware
TFTP32 includes DHCP, TFTP, SNTP and Syslog servers as well as a TFTP client http://tfpd32.jounin.net/	Freeware
Wireshark network protocol analyzer http://www.wireshark.org/	Freeware
Cisco SDM requires Sun Java Runtime Environment (JRE) http://java.com/en/download/manual.jsp	Sun Microsystems, Inc. (Free download)

Curriculum Outline

Chapter	ROUTE: Implementing IP Routing	SWITCH: Implementing IP Switching	TSHOOT: 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 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 BGP 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

Note: The course objectives and outline listed in this document for CCNP ROUTE and CCNP SWITCH are subject to change since they are still under development.

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
Chapter 1. Routing Services	**Explain complex network requirements and design models for implementing advanced routing services in an enterprise network**
1.1 Assessing Complex Enterprise Network Requirements	Describe common enterprise traffic requirements and network design models
1.2 Reviewing IP Routing Principles	Review the fundamentals of routing and compare various routing protocols
1.3 Creating and Documenting an Implementation Plan	Describe how to create an implementation plan for implementing routing services in an enterprise network
Chapter 2. Configuring the Enhanced Interior Gateway Routing Protocol	**Implement EIGRP in an enterprise network**
2.1 EIGRP Capabilities and Attributes	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
Chapter 3. Configuring the Open Shortest Path First Protocol	**Implement OSPF in an enterprise network**
3.1 Understanding OSPF Terminology and Operation	Describe OSPF terminology and operation within various enterprise environments
3.2 OSPF Packets	
3.3 Planning OSPF Routing Implementations	Plan OSPF routing
3.4 Configuring and Verifying Basic OSPF	Configure and verify basic OSPF
3.5 Understanding OSPF Network Types, Link State Advertisements, and Tables	Describe and configure OSPF in various WAN network types
3.6 Configuring and Verifying Advanced OSPF Features	Configure and verify advanced OSPF features
3.7 Configuring OSPF Authentication	Configure and verify OSPF authentication
Chapter 4. Manipulating Routing Updates	**Implement various mechanisms for controlling routing updates and traffic**
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 verify various methods for controlling routing update traffic
4.3 Using Multiple Routing Protocols on a Network	Describe the purpose of and considerations for using multiple protocols in a network
4.4 Implementing Route Redistribution	Configure and verify route redistribution of multiple protocols
Chapter 5. Implementing Path Control	**Implement path control using IP SLA and PBR**
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 SLA	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
Chapter 6. Implementing a Border Gateway Protocol Solution for ISP connectivity	**Implement BGP to allow an enterprise network to connect to an ISP**
6.1 Planning the Enterprise-to-ISP Connection	Describe the requirements for connecting an enterprise network to an ISP
6.2 Understanding BGP Terminology and Operation	Describe basic BGP terminology and operation, including EBGP and IBGP
6.3 Configuring and Verifying BGP	Configure and verify basic BGP
6.4 Basic BGP Path Manipulation Using Route Maps	Describe and configure various methods for manipulating path selection
6.5 Inbound and Outbound EBGP Path Selections	Describe and configure various methods for manipulating path selection
Chapter 7: Implementing Routing Facilities for Branch Offices and Mobile Workers	**Describe a basic implementation for branch office and mobile worker connectivity**
7.1 Planning the Branch Office Implementation	Describe the fundamentals of branch office connectivity
7.2 Analyzing Services in the Branch Office	Describe the various services that can be implemented for branch office connectivity
7.3 Routing Traffic to the Branch Office	Describe the necessary configurations for a branch office to connect to an enterprise network
7.4 Planning for Mobile Worker Implementations	Describe the fundamentals of mobile worker connectivity
7.5 Routing Traffic to the Mobile Worker	Describe the necessary configurations for a mobile worker to connect to an enterprise network
Chapter 8. Implementing IPv6 in an Enterprise Network	**Describe and configure IPv6 in an enterprise network**
8.1 IPv6 Addressing in an Enterprise Network	Describe the basics of IPv6 addressing
8.2 Assigning IPv6 Addresses	Describe and configure IPv6 addresses
8.3 Routing IPv6 Traffic	Describe and configure IPv6 routing
8.4 Tunneling IPv6 Traffic	Describe and configure IPv6 tunneling
8.5 IPv6 Static and Dynamic 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
Chapter 1. Analyzing the Cisco Enterprise Campus Architecture	**Assess the structure and components used to build or expand an enterprise campus network**
1.1 Campus Network Design Principles	Describe common campus design options and how design choices affect implementation and support of a campus LAN
1.2 Applying the Lifecycle Approach to Campus Design	Describe managing and supporting a campus LAN using a network life-cycles approach
Chapter 2. Implementing VLANs in Campus Networks	**Implement VLANs in campus networks**
2.1 Implementing VLAN Technologies in a Campus Network	Given a large enterprise network design, plan VLAN technologies, trunks, and addressing schemes to meet business and technical requirements and constraints
2.2 Configuring VLANs and Trunks	Configure VLANs and VLAN trunks in a campus network to support business and technical requirements
2.3 Configuring Link Aggregation	Given a design, addressing scheme, and business/technical requirements and constraints, configure and verify Layer 2 EtherChannel
Chapter 3. Implementing Spanning Tree Protocol	**Implement, monitor, and maintain spanning tree protocol in an enterprise campus network**
3.1 Spanning Tree Protocols	Describe spanning tree protocols
3.2 Configuring Spanning Tree	Given a network topology and business and technical requirements and constraints, configure and verify spanning tree protocols in a Layer 2 topology that contains bridging loops
3.3 Spanning Tree Enhancements	In a given network topology, configure STP features to enhance resiliency and prevent forwarding loops
3.4 Troubleshooting Spanning Tree Issues	Given a campus VLAN topology and spanning tree installation in an enterprise network, troubleshoot spanning tree issues
Chapter 4. Implementing InterVLAN Routing	**Implement, monitor, and maintain interVLAN routing in an enterprise campus network**
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 Protocol in a Multilayer Switched Environment	Explain DHCP operation and configure DHCP
4.4 Deploying CEF-Based Multilayer Switching	Configure and verify CEF
Chapter 5. Implementing High Availability and Redundancy in a Campus Network	**Configure and optimize high availability on switches to provide Layer 3 redundancy**

5.1 Implementing and Monitoring High Availability	Implement and monitor high availability
5.2 Understanding Supervisor Redundancy	Describe switch supervisor redundancy
5.3 Understanding Gateway Redundancy Protocols	Describe gateway redundancy protocols
5.4 Configuring Layer 3 Redundancy with HSRP, VRRP, and GLBP	Configure and verify gateway redundancy protocols
5.5 Implementing Server Load Balancing	Configure and verify Cisco IOS server load balancing (SLB)
Chapter 6. Securing the Campus Infrastructure	**Describe and implement LAN security features**
6.1 Switch Security Fundamentals	Identify attacks and threats to switches and methods to mitigate attacks
6.2 VLAN Attacks	Configure tight control of trunk links to mitigate VLAN hopping attacks
6.3 MAC-Based Attacks	Configure switches to guard against MAC-based attacks
6.4 Spoof 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 Troubleshooting Performance and Connectivity	Describe tools used to monitor and analyze network traffic
Chapter 7. Preparing the Campus Infrastructure for Advanced Services	**Plan and prepare for advanced services in a campus infrastructure**
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
Chapter 1. Planning Maintenance for Complex Networks	**Plan and document the most common maintenance functions in complex enterprise networks**

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
Chapter 2. Troubleshooting Processes for Complex Enterprise Networks	**Develop a troubleshooting process to identify and solve problems in complex enterprise networks**
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
Chapter 3. Using Maintenance and Troubleshooting Tools and Applications	**Select tools that best support specific troubleshooting and maintenance processes in large, complex enterprise networks**
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
Chapter 4. Maintaining and Troubleshooting Campus Switched Solutions	**Practice maintenance procedures and fault resolution in switched environments**
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.
Chapter 5. Maintaining and Troubleshooting Routing Solutions	**Practice maintenance procedures and fault resolution in routing environments**
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
Chapter 6. Troubleshooting Addressing Services	**Troubleshoot NAT/PAT, DHCP, and other services**
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
Chapter 7. Troubleshooting Network Performance Issues	**Identify and troubleshoot network performance issues.**
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
Chapter 8. Troubleshooting Converged Networks	**Troubleshoot wireless connectivity, VoIP, and video**
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
Chapter 9. Maintaining and Troubleshooting Network Security Implementations	**Practice maintenance procedures and fault resolution in a secure infrastructure**
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
Chapter 10. Review and Preparation for Troubleshooting Complex Enterprise Networks	**Practice maintenance procedures and fault resolution in a complex environment**
10.1 Troubleshooting Complex Environments	Diagnose and resolve problems in integrated, complex enterprise networks