



## Scope and Sequence: CCNA Discovery

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### Target Audience

The Cisco® CCNA® Discovery curriculum is primarily designed for Cisco Networking Academy® students who are seeking entry-level information and communication technology (ICT) skills. CCNA Discovery provides general networking theory, practical experience, and opportunities for career exploration and soft-skills development.

The curriculum is appropriate for students at many education levels and types of institutions, including high schools, secondary schools, universities, colleges, career and technical schools, community organizations, and other non-traditional learning environments.

### Prerequisites

CCNA Discovery is designed for students with basic PC skills and foundational math and problem solving skills. Students are not expected to have knowledge of binary math and algorithms. The curriculum provides detailed explanations and tools such as a binary calculator.

CCNA Discovery is composed of four courses:

- Networking for Home and Small Businesses
- Working at a Small-to-Medium Business or ISP
- Introducing Routing and Switching in the Enterprise
- Designing and Supporting Computer Networks

The curriculum has no prerequisites. The courses are delivered sequentially, and each course is a prerequisite for the next course.

### Target Certifications

The CCNA Discovery curriculum prepares students for two different Cisco certification exams.

After completing the first two courses of CCNA Discovery; Networking for Home and Small Businesses and Working at a Small-to-Medium Business or ISP, a student has the option to take the CCENT™ certification exam for entry network technicians. CCENT certifies the practical skills required for entry-level ICT positions. In addition, this certification demonstrates a student's aptitude and competence to work in an environment that features Cisco networking devices and software.

CCENT certification is an optional first step toward earning the industry-standard Cisco CCNA certification for networking careers. After completing all four CCNA Discovery courses, students will be prepared to take the CCNA certification exam.

### Curriculum Description

CCNA Discovery teaches networking based on application, covering networking concepts within the context of network environments students may encounter in their daily lives – from small office and home office (SOHO) networking to more complex enterprise and theoretical networking models later in the curriculum. CCNA Discovery includes the following features:

- Students learn the basics of routing, switching, and advanced technologies to prepare for Cisco CCENT and CCNA certifications and entry-level networking careers
- Courses emphasize critical thinking, problem solving, collaboration, and the practical application of skills
- Rich multimedia content, including Flash-based interactive activities, videos, games, and quizzes, addresses a variety of learning styles and help stimulate learning and increase knowledge retention
- Hands-on labs and Packet Tracer simulation-based learning activities help students develop critical thinking and complex problem solving skills
- Innovative assessments provide immediate feedback to support the evaluation of knowledge and acquired skills
- Networking concepts are explained using language that works well for learners at all levels and embedded interactive activities break up reading of the content and help reinforce understanding
- Case studies provide critical and strategic thinking scenarios to help students develop soft skills such as analyzing business objectives, planning timelines and resources, and delivering customer presentations
- The curriculum encourages students to consider additional IT education, but also emphasizes applied skills and hands-on experience early in the curriculum to help students prepare for entry-level ICT careers

### **Curriculum Goals and Objectives**

The goals of CCNA Discovery are as follows:

- Help students recognize the significant impact of networking on their lives
- Teach students how to build and support a home or small business network with wireless equipment
- Instill a sense of awe in students and encourage them to learn more about how things work and to pursue careers in networking
- Prepare students for entry-level jobs in the industry by employing interactive and engaging instructional approaches that help them understand general theory and gain practical experience
- Teach students the fundamental concepts of networking
- Provide opportunities for extensive hands-on interaction with PC and networking equipment to prepare students for careers and certification exams
- Establish the relevancy of networking in our everyday lives

Students who complete Networking for Home and Small Businesses will be able to perform the following tasks:

- Set up a personal computer system, including the operating system, interface cards, and peripheral devices
- Plan and install a home or small business network and connect it to the Internet
- Verify and troubleshoot network and Internet connectivity
- Share resources such as files and printers among multiple computers
- Recognize and mitigate security threats to a home network
- Configure and verify common Internet applications
- Configure basic IP services through a GUI

Students who complete Working at a Small-to-Medium Business or ISP will be able to perform the following tasks:

- Describe the structure of the Internet and how Internet communications occur between hosts
- Install, configure, and troubleshoot Cisco IOS® devices for Internet and server connectivity
- Plan a basic wired infrastructure to support network traffic

- Implement basic WAN connectivity using Telco services
- Demonstrate proper disaster recovery procedures and perform server backups
- Monitor network performance and isolate failures
- Troubleshoot problems using an organized, layered procedure
- Describe the OSI model and the process of encapsulation

Students who complete Introducing Routing and Switching in the Enterprise will be able to perform the following tasks:

- Implement a LAN for an approved network design
- Configure a switch with VLANs and inter-switch communication
- Implement access lists to permit or deny specified traffic
- Implement WAN links
- Configure routing protocols on Cisco devices
- Perform LAN, WAN, and VLAN troubleshooting using a structured methodology and the OSI model

Students who complete Designing and Supporting Computer Networks will be able to perform the following tasks:

- Gather customer requirements
- Design a simple Internetwork using Cisco technology
- Design an IP addressing scheme to meet LAN requirements
- Create an equipment list to meet LAN design requirements
- Create and present a proposal to a customer
- Install and configure a prototype Internetwork
- Obtain and upgrade Cisco IOS Software in Cisco devices

### Minimum System Requirements

Curriculum requirements:

- 1 Student PC per student; 1 local curriculum server

Lab bundle requirements for CCNA Discovery courses 1–4:

- 3 Cisco 1841 routers with Base IP IOS, 128MB DRAM, 32 MB Flash
- 3 2960 switches
- 2 Linksys wireless routers (Linksys WRT150N is preferred, but other acceptable models include WRT54G, WRT300N, and WRT350N) or SOHO equivalent
- 1 Lab PC with Microsoft Windows 2000 Server
- 2 Lab PCs or laptops (Microsoft Windows 2000 or Windows XP)
- Assorted Ethernet and Serial cables and hubs

Equipment requirements for new academies adopting CCNA Discovery courses 1 and 2 only:

- 3 Cisco 1841 routers with Base IP IOS, 128MB DRAM, 32 MB Flash
- 3 four-port Ethernet Switch Interface Cards for the 1841 routers
- 2 Linksys wireless routers (Linksys WRT150N is preferred, but other acceptable models include WRT54G, WRT300N, and WRT350N) or SOHO equivalent

- 1 Lab PC with Microsoft Windows 2000 Server
- 2 Lab PCs or laptops (Microsoft Windows 2000 or Windows XP)
- Assorted Ethernet and Serial cables and hubs

## Curriculum Outline

**Table 1.** CCNA Discovery Curriculum Outline

Chapter	Networking for Home and Small Businesses	Working at a Small-to-Medium Business or ISP	Introducing Routing and Switching in the Enterprise	Designing and Supporting Computer Networks
1	Personal Computer Hardware	The Internet and Its Uses	Networking in the Enterprise	Introducing Network Design Concepts
2	Operating Systems	Help Desk	Exploring the Enterprise Network Infrastructure	Gathering Network Requirements
3	Connecting to the Network	Planning a Network Upgrade	Switching in an Enterprise Network	Characterizing the Existing Network
4	Connecting to the Internet Through an ISP	Planning the Addressing Structure	Addressing in an Enterprise Network	Identifying Application Impacts on Network Design
5	Network Addressing	Configuring Network Devices	Routing with a Distance Vector Protocol	Creating the Network Design
6	Network Services	Routing	Routing with a Link-State Protocol	Using IP Addressing in the Network Design
7	Wireless Technologies	ISP Services	Implementing Enterprise WAN Links	Prototyping the Campus Network
8	Basic Security	ISP Responsibility	Filtering Traffic Using Access Control Lists	Prototyping the WAN
9	Troubleshooting Your Network	Preparing for Certification	Troubleshooting an Enterprise Network	Preparing the Proposal
10	Course Summary: Putting It All Together	Course Summary: Putting It All Together	Course Summary: Putting It All Together	Course Summary: Putting It All Together

### Networking for Home and Small Businesses v4.0

This course teaches students the skills needed to obtain entry-level home network installer jobs. It also helps students develop some of the skills needed to become network technicians, computer technicians, cable installers, and help desk technicians. It provides a hands-on introduction to networking and the Internet using tools and hardware commonly found in home and small business environments. Instructors are encouraged to facilitate field trips and outside-the-classroom learning experiences. Labs include PC installation, Internet connectivity, wireless connectivity, file and print sharing, and the installation of game consoles, scanners, and cameras.

Prerequisites: None

#### Chapter 1. Personal Computer Hardware

- 1.0 Chapter Introduction
- 1.1 Personal Computers and Applications
- 1.2 Types of Computers
- 1.3 Binary Representation of Data

- 1.4 Computer Components and Peripherals
- 1.5 Computer System Components
- 1.6 Chapter Summary

## **Chapter 2. Operating Systems**

- 2.0 Chapter Introduction
- 2.1 Choosing the Operating System
- 2.2 Installing the Operating System
- 2.3 Maintaining the Operating System
- 2.4 Chapter Summary

## **Chapter 3. Connecting to the Network**

- 3.0 Chapter Introduction
- 3.1 Introduction to Networking
- 3.2 Principals of Communication
- 3.3 Communicating on a Local Wired Network
- 3.4 Building the Access Layer of an Ethernet Network
- 3.5 Building the Distribution Layer of a Network
- 3.6 Plan and Connect a Local Network
- 3.7 Chapter Summary

## **Chapter 4. Connecting to the Internet Through an ISP**

- 4.0 Chapter Introduction
- 4.1 The Internet and How We Connect to It
- 4.2 Sending Information Across the Internet
- 4.3 Networking Devices in a NOC
- 4.4 Cables and Connectors
- 4.5 Working with Twisted-Pair Cabling
- 4.6 Chapter Summary

## **Chapter 5. Network Addressing**

- 5.0 Chapter Introduction
- 5.1 IP Addresses and Subnet Masks
- 5.2 Types of IP Addresses
- 5.3 How IP Addresses are Obtained
- 5.4 Address Management
- 5.5 Chapter Summary

## **Chapter 6. Network Services**

- 6.0 Chapter Introduction
- 6.1 Client/Servers and Their Interaction
- 6.2 Application Protocols and Services

- 6.3 Layered Model and Protocols
- 6.4 Chapter Summary

### **Chapter 7. Wireless Technologies**

- 7.0 Chapter Introduction
- 7.1 Wireless Technology
- 7.2 Wireless LANs
- 7.3 Security Considerations on a Wireless LAN
- 7.4 Configuring an Integrated AP and Wireless Client
- 7.5 Chapter Summary

### **Chapter 8. Basic Security**

- 8.0 Chapter Introduction
- 8.1 Networking Threats
- 8.2 Methods of Attack
- 8.3 Security Policy
- 8.4 Using Firewalls
- 8.5 Chapter Summary

### **Chapter 9. Troubleshooting Your Network**

- 9.0 Chapter Introduction
- 9.1 Troubleshooting Process
- 9.2 Troubleshooting Issues
- 9.3 Common Issues
- 9.4 Troubleshooting and the Help Desk
- 9.5 Chapter Summary

### **Chapter 10. Course Summary**

- 10.0 Putting It All Together

## **Working at a Small-to-Medium Business or ISP v4.1**

This course prepares students for jobs as network technicians and helps them develop additional skills required for computer technicians and help desk technicians. It provides a basic overview of routing and remote access, addressing, and security. It also familiarizes students with servers that provide email services, web space, and authenticated access. Students learn about the soft skills required for help desk and customer service positions, and the final chapter helps them prepare for the CCENT certification exam. Network monitoring and basic troubleshooting skills are taught in context.

Prerequisites: Networking for Home and Small Businesses

### **Chapter 1. The Internet and Its Uses**

- 1.0 Chapter Introduction
- 1.1 What is the Internet?
- 1.2 Internet Service Providers

- 1.3 ISP Connectivity
- 1.4 Chapter Summary

## **Chapter 2. Help Desk**

- 2.0 Chapter Introduction
- 2.1 Help Desk Technicians
- 2.2 OSI Model
- 2.3 ISP Troubleshooting
- 2.4 Chapter Summary

## **Chapter 3. Planning a Network Upgrade**

- 3.0 Chapter Introduction
- 3.1 Common Issues
- 3.2 Planning the Network Upgrade
- 3.3 Purchasing and Maintaining Equipment
- 3.4 Chapter Summary

## **Chapter 4. Planning the Addressing Structure**

- 4.0 Chapter Introduction
- 4.1 IP Addressing in the LAN
- 4.2 NAT and PAT
- 4.3 Chapter Summary

## **Chapter 5. Configuring Network Devices**

- 5.0 Chapter Introduction
- 5.1 Initial ISR Router Configuration
- 5.2 Configuring an ISR with SDM
- 5.3 Configuring a Router Using IOS CLI
- 5.4 Connecting the CPE to the ISP
- 5.5 Expanding LAN Switching Connectivity
- 5.6 Chapter Summary

## **Chapter 6. Routing**

- 6.0 Chapter Introduction
- 6.1 Enabling Routing Protocols
- 6.2 Exterior Routing Protocols
- 6.3 Chapter Summary

## **Chapter 7. ISP Services**

- 7.0 Chapter Introduction
- 7.1 Introducing ISP Services
- 7.2 Protocols That Support ISP Services

- 7.3 Domain Name Service
- 7.4 Services and Protocols
- 7.5 Chapter Summary

**Chapter 8. ISP Responsibility**

- 8.0 Chapter Introduction
- 8.1 ISP Security Considerations
- 8.2 Security Tools
- 8.3 Monitoring and Managing the ISP
- 8.4 Backups and Disaster Recovery
- 8.5 Chapter Summary

**Chapter 9. Preparing for Certification**

- 9.0 What Does a Cisco Certification Measure?
- 9.1 Ways to Prepare
- 9.2 Identifying and Correcting Layer 1 Issues
- 9.3 Identifying and Correcting Layer 2 Issues
- 9.4 Identifying and Correcting Layer 3 IP Addressing Issues
- 9.5 Identifying and Correcting Layer 3 IP Routing Issues
- 9.6 Common Upper Layer Connectivity Issues
- 9.7 Chapter Summary

**Chapter 10. Course Summary**

- 10.0 Putting It All Together

**Introducing Routing and Switching in the Enterprise v4.0**

This course familiarizes students with the equipment applications and protocols installed in enterprise networks, with a focus on switched networks, IP Telephony requirements, and security. It also introduces advanced routing protocols such as Enhanced Interior Gateway Routing Protocol (EIGRP) and Open Shortest Path First (OSPF) Protocol. Hands-on exercises, including configuration, installation, and troubleshooting, reinforce student learning.

Prerequisites: Working at a Small-to-Medium Business or ISP

**Chapter 1. Networking in the Enterprise**

- 1.0 Chapter Introduction
- 1.1 Describing the Enterprise Network
- 1.2 Identifying Enterprise Applications
- 1.3 Supporting Remote Workers
- 1.4 Chapter Summary

**Chapter 2. Exploring the Enterprise Network Infrastructure**

- 2.0 Chapter Introduction
- 2.1 Describing the Current Network
- 2.2 Supporting the Enterprise Edge

- 2.3 Reviewing Routing and Switching
- 2.4 Chapter Summary

### **Chapter 3. Switching in an Enterprise Network**

- 3.0 Chapter Introduction
- 3.1 Describing Enterprise Level Switching
- 3.2 Preventing Switching Loops
- 3.3 Configuring VLANs
- 3.4 Trunking and Inter-VLAN Routing
- 3.5 Maintaining VLANs on an Enterprise Network
- 3.6 Chapter Summary

### **Chapter 4. Addressing in an Enterprise Network**

- 4.0 Chapter Introduction
- 4.1 Using a Hierarchical IP Network Address Scheme
- 4.2 Using VLSM
- 4.3 Using Classless Routing and CIDR
- 4.4 Using NAT and PAT
- 4.5 Chapter Summary

### **Chapter 5. Routing with a Distance Vector Protocol**

- 5.0 Chapter Introduction
- 5.1 Managing Enterprise Networks
- 5.2 Routing Using the RIP Protocol
- 5.3 Routing Using the EIGRP Protocol
- 5.4 Implementing EIGRP
- 5.5 Chapter Summary

### **Chapter 6. Routing with a Link-State Protocol**

- 6.0 Chapter Introduction
- 6.1 Routing Using the OSPF Protocol
- 6.2 Implementing Single-Area OSPF
- 6.3 Using Multiple Routing Protocols
- 6.4 Chapter Summary

### **Chapter 7. Implementing Enterprise WAN Links**

- 7.0 Chapter Introduction
- 7.1 Connecting the Enterprise WAN
- 7.2 Comparing Common WAN Encapsulations
- 7.3 Using Frame Relay
- 7.4 Chapter Summary

## **Chapter 8. Filtering Traffic Using Access Control Lists**

- 8.0 Chapter Introduction
- 8.1 Using Access Control Lists
- 8.2 Using a Wildcard Mask
- 8.3 Configuring Access Control Lists
- 8.4 Permitting and Denying Specific Types of Traffic
- 8.5 Filtering Traffic Using Access Control Lists
- 8.6 Chapter Summary

## **Chapter 9. Troubleshooting an Enterprise Network**

- 9.0 Chapter Introduction
- 9.1 Understanding the Impact of Network Failure
- 9.2 Troubleshooting Switching and Connectivity Issues
- 9.3 Troubleshooting Routing Issues
- 9.4 Troubleshooting WAN Configurations
- 9.5 Troubleshooting ACL Issues
- 9.6 Chapter Summary

## **Chapter 10. Course Summary**

- 10.0 Putting It All Together

## **Designing and Supporting Computer Networks v4.0**

This course introduces students to network design processes using two examples; a large stadium enterprise network and a medium-sized film company network. Students follow a standard design process to expand and upgrade each network, which includes requirements gathering, proof-of-concept, and project management. Lifecycle services, including upgrades, competitive analyses, and system integration, are presented in the context of pre-sale support. In addition to the Packet Tracer and lab exercises found in the previous courses, there are many pen-and-paper and role-playing exercises that students complete while developing their network upgrade proposals.

Prerequisites: Introducing Routing and Switching in the Enterprise

## **Chapter 1. Introducing Network Design Concepts**

- 1.0 Chapter Introduction
- 1.1 Discovering Network Design Basics
- 1.2 Investigating Core Layer Design Considerations
- 1.3 Investigating Distribution Layer Considerations
- 1.4 Investigating Access Layer Design Considerations
- 1.5 Investigating Server Farms and Security
- 1.6 Investigating Wireless Network Considerations
- 1.7 Supporting WANs and Remote Workers
- 1.8 Chapter Summary

**Chapter 2. Gathering Network Requirements**

- 2.0 Chapter Introduction
- 2.1 Introducing Cisco Lifecycle Services
- 2.2 Explaining the Sales Process
- 2.3 Preparing for the Design Process
- 2.4 Identifying Technical Requirements and Constraints
- 2.5 Identifying Manageability Design Considerations
- 2.6 Chapter Summary

**Chapter 3. Characterizing the Existing Network**

- 3.0 Chapter Introduction
- 3.1 Documenting the Existing Network
- 3.2 Updating the Existing Cisco IOS
- 3.3 Upgrading Existing Hardware
- 3.4 Performing a Wireless Site Survey
- 3.5 Documenting Network Design Requirements
- 3.6 Chapter Summary

**Chapter 4. Identifying Application Impacts on Network Design**

- 4.0 Chapter Introduction
- 4.1 Characterizing Network Applications
- 4.2 Explaining Common Network Applications
- 4.3 Introducing Quality of Service (QoS)
- 4.4 Examining Voice and Video Options
- 4.5 Documenting Applications and Traffic Flows
- 4.6 Chapter Summary

**Chapter 5. Creating the Network Design**

- 5.0 Chapter Introduction
- 5.1 Analyzing the Requirements
- 5.2 Selecting the Appropriate LAN Topology
- 5.3 Designing the WAN and Remote Worker Support
- 5.4 Designing Wireless Networks
- 5.5 Incorporating Security
- 5.6 Chapter Summary

**Chapter 6. Using IP Addressing in the Network Design**

- 6.0 Chapter Introduction
- 6.1 Creating an Appropriate IP Addressing Design
- 6.2 Creating the IP Address and Naming Scheme
- 6.3 Describing IPv4 and IPv6

6.4 Chapter Summary

### **Chapter 7. Prototyping the Campus Network**

- 7.0 Chapter Introduction
- 7.1 Building a Prototype to Validate a Design
- 7.2 Prototyping the LAN
- 7.3 Prototyping the Server Farm
- 7.4 Chapter Summary

### **Chapter 8. Prototyping the WAN**

- 8.0 Chapter Introduction
- 8.1 Prototyping Remote Connectivity
- 8.2 Prototyping WAN Connectivity
- 8.3 Prototyping Remote Worker Support
- 8.4 Chapter Summary

### **Chapter 9. Preparing the Proposal**

- 9.0 Chapter Introduction
- 9.1 Assembling the Existing Proposal Information
- 9.2 Developing the Implementation Plan
- 9.3 Planning for the Installation
- 9.4 Creating and Presenting the Proposal
- 9.5 Chapter Summary

### **Chapter 10. Course Summary**

- 10.0 Putting It All Together