

Scope and Sequence: CCNA Discovery v4.0

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*The course objectives and outline for the final two CCNA Discovery courses, *Introducing Routing and Switching in the Enterprise* and *Designing and Supporting Computer Networks*, are subject to change since they are still under development. The English versions of those two courses are scheduled for release in the November–December 2007 timeframe.*

Target Audience

CCNA® Discovery is primarily designed for Cisco® Networking Academy® students who are looking for career-oriented, IT-skills instruction or a quick path to job entry and career exploration.

Prerequisites

The Cisco CCNA Discovery curriculum 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

Networking for Home and Small Businesses is the first course and has no prerequisites. It is a prerequisite for the other three courses.

The courses should be taken sequentially.

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™ (Cisco Certified Entry Network Technician) exam. CCENT certifies the practical skills required for entry-level IT 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 Cisco CCNA® industry-standard certification for networking careers. After completing all four CCNA Discovery courses, students will be prepared to take the CCNA certification exam.

Curriculum Description

This curriculum presents basic networking education to equip students with knowledge and skills that can be applied toward entry-level ICT careers and also CCENT and CCNA certifications. CCNA Discovery is a blended curriculum with both online and classroom learning.

CCNA Discovery has the following features:

- Designed for students with basic PC usage skills
- Can be delivered as an independent curriculum or integrated into broader courses of study at secondary schools, technical schools, colleges, and universities
- Offers a hands-on, career-oriented approach to learning networking that emphasizes practical experience
- Maps more directly to everyday experiences with networks and covers key networking concepts according to the types of practical network environments students may encounter; ranging from small office or home office (SOHO) networking to more complex enterprise environments and theoretical networking models later in the curriculum
- Includes activities that emphasize networking implementation
- Teaches applied skills midway through the four-course series to help make the course content relevant, encourage students to consider additional education in IT or related fields, and help students prepare for entry-level IT 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 and context of networking in our everyday lives

Upon completion of the Networking for Home and Small Businesses course, students 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

Upon completion of the Working at a Small-to-Medium Business or ISP course, students 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

Upon completion of the Introducing Routing and Switching in the Enterprise course, students 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

Upon completion of the Designing and Supporting Computer Networks course, students 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 300N is preferred, but 54G is an alternative) 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 300N is preferred, but 54G is an alternative) 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 | Reviewing the Concepts of Network Design |
| 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 | Estimating the Impact of Applications on a 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 | IP Addressing in the Network Design |
| 7 | Wireless Technologies | ISP Services | Implementing Enterprise WAN Links | Prototyping the Network Design |
| 8 | Basic Security | ISP Responsibility | Filtering Traffic Using Access Control Lists | Presenting and Implementing the Network Design |
| 9 | Troubleshooting Your Network | Course Summary: Putting It All Together | Troubleshooting an Enterprise Network | Course Summary: Putting It All Together |
| 10 | Course Summary: Putting It All Together | | Course Summary: Putting It All Together | |

Networking for Home and Small Businesses

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

This course prepares students for jobs as network technicians. It also helps students 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 e-mail services, Web space, and authenticated access. Students also learn about soft skills required for help desk and customer service positions. 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 Initial Cisco 2960 Switch Configuration

5.5 Connecting the CPE to the ISP

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. Course Summary

- 9.0 Putting It All Together

Introducing Routing and Switching in the Enterprise

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 include configuration, installation, and troubleshooting.

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 Cisco Routing and Switching
- 2.4 Chapter Summary

Chapter 3. Switching in an Enterprise Network

- 3.0 Chapter Introduction
- 3.1 Using Switches
- 3.2 Preventing Switching Loops
- 3.3 Configuring VLANs
- 3.4 Managing VLANS on Switches
- 3.5 Configuring Inter-VLAN Routing
- 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 Common WAN Encapsulations
- 7.3 Configuring PPP WAN Serial Links
- 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 Routing with 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 Access Control List Issues
- 9.6 Chapter Summary

Chapter 10. Course Summary

- 10.0 Putting It All Together

Designing and Supporting Computer Networks

Learners progress through a variety of case studies and role-playing exercises, which include gathering requirements, designing basic networks, establishing proof-of-concept, and performing project management tasks. In addition, lifecycle services, including upgrades, competitive analyses, and system integration, are presented in the context of pre-sale support.

Prerequisites: Introducing Routing and Switching in the Enterprise

Chapter 1. Reviewing the Concepts of Network Design

- 1.0 Chapter Introduction
- 1.1 The Basics of Network Design
- 1.2 Core Layer Design Considerations
- 1.3 Distribution Layer Design Considerations
- 1.4 Access Layer Design Considerations
- 1.5 Server Farms and Security Considerations
- 1.6 Wireless Network Considerations
- 1.7 Support for WANs and Remote Worker
- 1.8 Chapter Summary

Chapter 2. Gathering Network Requirements

- 2.0 Chapter Introduction
- 2.1 Introduction to Lifecycle Services

- 2.2 Where Does a Good Design Start?
- 2.3 Business Goals and Technical Requirements
- 2.4 Service Level Agreements
- 2.5 Chapter Summary

Chapter 3. Characterizing the Existing Network

- 3.0 Chapter Introduction
- 3.1 The Existing Network
- 3.2 Updating the Existing Network IOS
- 3.3 Evaluating Existing Hardware Upgrade Capabilities
- 3.4 Performing a Wireless Site Survey
- 3.5 New Network Design Requirements
- 3.6 Chapter Summary

Chapter 4. Estimating the Impact of Applications on a Network Design

- 4.0 Chapter Introduction
- 4.1 The Purpose of a Network – It's all About the Applications
- 4.2 Common Network Applications
- 4.3 Quality of Service (QoS)
- 4.4 Voice and Video – What are the Options?
- 4.5 Documenting the Application Requirements and Traffic Flows
- 4.6 Chapter Summary

Chapter 5. Creating the Network Design

- 5.0 Chapter Introduction
- 5.1 Creating the Network Design
- 5.2 Selecting the Appropriate LAN Topology
- 5.3 Designing the WAN and Remote Worker Support
- 5.4 Designing a Wireless Network
- 5.5 Incorporating Security
- 5.6 Chapter Summary

Chapter 6. IP Addressing in the Network Design

- 6.0 Chapter Introduction
- 6.1 Why is Creating an Appropriate IP Addressing Design Important?

- 6.2 Creating the IP Address and Naming Structure
- 6.3 IPv4 and IPv6
- 6.4 Chapter Summary

Chapter 7. Prototyping the Network Design

- 7.0 Chapter Introduction
- 7.1 Why Build a Prototype?
- 7.2 Prototype the LAN
- 7.3 Prototype the Server Farm
- 7.4 Prototype the WAN Frame Relay
- 7.5 Prototype the VPN Connectivity for Remote Workers
- 7.6 Prototype Wireless Implementation
- 7.7 Chapter Summary

Chapter 8 Presenting and Implementing the Network Design

- 8.0 Chapter Introduction
- 8.1 The Sales Process
- 8.2 Creating a Bill-of-Materials
- 8.3 SMARTnet Services and Technical Support
- 8.4 Planning for Installation
- 8.5 Creating and Presenting the Proposal
- 8.6 Chapter Summary

Chapter 9. Course Summary

- 9.0 Putting It All Together



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