

# CCNA Exploration Syllabus

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## 1. Network Fundamentals ( Duration : 40 Hrs ( Theory : 20hrs & Practical : 20 hrs )

<b>Chapter One</b>	Living in a Network Centric World ( Theory )
<b>Chapter Two</b>	Communicating Over the Network ( Theory )
<b>Chapter Three</b>	Application Layer Functionality and Protocols ( Theory )
<b>Chapter Four</b>	OSI Transport Layer ( Theory & practical )
<b>Chapter Five</b>	OSI Network Layer ( Theory )
<b>Chapter Six</b>	Addressing the Network-IPv4 (( Theory & Practical )
<b>Chapter Seven</b>	Data Link Layer ( Theory )
<b>Chapter Eight</b>	OSI Physical Layer ( Theory )
<b>Chapter Nine</b>	Ethernet ( Theory )
<b>Chapter Ten</b>	Planning and Cabling Networks ( Theory & Practical )
<b>Chapter Eleven</b>	Configuring and Testing Your Network (( Theory & Practical )

## 2. Routing Protocols and Concepts( Duration : 40 Hrs (Theory : 20hrs & Practical : 20 hrs )

<b>Chapter One</b>	Introduction to Routing and Packet Forwarding (Theory )
<b>Chapter Two</b>	Static Routing (Theory & Practical )
<b>Chapter Three</b>	Introduction to Dynamic Routing Protocols (Theory )
<b>Chapter Four</b>	Distance Vector Routing Protocols (Theory )
<b>Chapter Five</b>	RIP version 1 (Theory & Practical )
<b>Chapter Six</b>	VLSM and CIDR (Theory & Practical )
<b>Chapter Seven</b>	RIPv2 (Theory & Practical )
<b>Chapter Eight</b>	The Routing Table: A Closer Look (Theory )
<b>Chapter Nine</b>	EIGRP (Theory & Practical )
<b>Chapter Ten</b>	Link-State Routing Protocols (Theory )
<b>Chapter Eleven</b>	OSPF (Theory & Practical)

## 3. LAN Switching and Wireless ( Duration : 40 Hrs ( Theory : 20hrs & Practical : 20 hrs )

<b>Chapter One</b>	LAN Design (Theory )
<b>Chapter Two</b>	Basic Switch concepts and configuration (Theory & Practical )
<b>Chapter Three</b>	VLANS (Theory & Practical )
<b>Chapter Four</b>	VTP (Theory & Practical )
<b>Chapter Five</b>	STP (Theory & Practical )
<b>Chapter Six</b>	Inter-VLAN Routing (Theory & Practical )
<b>Chapter Seven</b>	Basic Wireless concepts and configuration (Theory & Practical )

**4. Accessing the WAN ( Duration : 40 Hrs ( Theory : 20hrs & Practical : 20 hrs )**

<b>Chapter One</b>	Introduction to WANs (Theory )
<b>Chapter Two</b>	PPP (Theory & Practical )
<b>Chapter Three</b>	Frame Relay (Theory & Practical )
<b>Chapter Four</b>	Network Security (Theory )
<b>Chapter Five</b>	ACLs (Theory & Practical )
<b>Chapter Six</b>	Teleworker Services (Theory )
<b>Chapter Seven</b>	IP Addressing Services (Theory & Practical )
<b>Chapter Eight</b>	Network Troubleshooting (Theory & Practical )

# *Detailed Syllabus of CCNA Exploration*

## **Semester-1**

### **CCNA Exploration: Network Fundamentals**

#### **Chapter - 1**

##### **Living in a Network-Centric World**

###### 1.1 Communicating in a Network-Centric World

###### 1.1.1 Networks Supporting the Way We Live

###### 1.1.2 Examples of Today's Popular Communication Tools

###### 1.1.3 Networks Supporting the Way We Learn

###### 1.1.4 Networks Supporting the Way We Work

###### 1.1.5 Networks Supporting the Way We Play

###### 1.2 Communication - An Essential Part of Our Lives

###### 1.2.1 What is Communication?

###### 1.2.2 Quality of Communications

###### 1.3 The Network as a Platform

###### 1.3.1 Communicating over Networks

###### 1.3.2 The Elements of a Network

###### 1.3.3 Converged Networks

###### 1.4 The Architecture of the Internet

###### 1.4.1 The Network Architecture

###### 1.4.2 A Fault Tolerant Network Architecture

###### 1.4.3 A Scaleable Network Architecture

###### 1.4.4 Providing Quality of Service

###### 1.4.5 Providing Network Security

###### 1.5 Trends in Networking

###### 1.5.1 Where Is It All Going?

###### 1.5.2 Networking Career Opportunities

###### 1.6 Chapter Labs

###### 1.6.1 Using Collaboration Tools-IRC and IM

###### 1.6.2 Using Collaboration Tools-Wiki and Web Logs

###### 1.7 Summary

###### 1.7.1 Summary and Review

###### 1.8 Chapter Quiz

###### 1.8.1 Chapter Quiz

## **Chapter - 2**

### **Communicating over the Network**

#### 2.1. The Platform for Communications

##### 2.1.1. The Elements of Communication

##### 2.1.2. Communicating the Messages

##### 2.1.3. Components of the Network

##### 2.1.4. End Devices and their Role on the Network

##### 2.1.5. Intermediary Devices and their Role on the Network

##### 2.1.6. Network Media

#### 2.2 LANs, WANs, and Internetworks

##### 2.2.1. Local Area Networks

##### 2.2.2. Wide Area Networks

##### 2.2.3. The Internet - A Network of Networks

##### 2.2.4. Network Representations

##### 2.2.5. Activity - Using NeoTrace™ to View Internetworks

##### 2.2.6. Model adaptation

#### 2.3. Protocols

##### 2.3.1. Rules that Govern Communications

##### 2.3.2. Network Protocols

##### 2.3.3. Protocol Suites and Industry Standards

##### 2.3.4. The Interaction of Protocols

##### 2.3.5. Technology Independent Protocols

#### 2.4. Using Layered Models

##### 2.4.1. The Benefits of Using a Layered Model

##### 2.4.2. Protocol and Reference Models

##### 2.4.3. The TCP/IP Model

##### 2.4.4. The Communication Process

##### 2.4.5. Protocol Data Units and Encapsulation

##### 2.4.6. The Sending and Receiving Process

##### 2.4.7. The OSI Model

##### 2.4.8. Comparing the OSI Model with the TCP/IP Model

#### 2.5. Network Addressing

##### 2.5.1. Addressing in the Network

##### 2.5.2. Getting the Data to the End Device

##### 2.5.3. Getting the Data through the Internetwork

##### 2.5.4. Getting the Data to the Right Application

##### 2.5.5. Warriors of the Net

## 2.6. Chapter Labs

### 2.6.1. Lab: Topology Orientation and Building a Small Network

### 2.6.2. Lab: Using Wireshark™ to View Protocol Data Units

## 2.7. Chapter Summary

### 2.7.1. Summary and Review

## 2.8. Chapter Quiz

### 2.8.1. Chapter Quiz

## **Chapter - 3**

### **Application Layer Functionality and Protocols**

## 3.1 Applications - The Interface Between the Networks

### 3.1.1 OSI and TCP/IP Model

### 3.1.2 Application Layer Software

### 3.1.3 User Applications, Services, and Application Layer Protocols

### 3.1.4 Application Layer Protocol Functions

## 3.2 Making Provisions for Applications and Services

### 3.2.1 The Client-Server Model

### 3.2.2 Servers

### 3.2.3 Application Layer Services and Protocols

### 3.2.4 Peer-to-Peer Networking and Applications (P2P)

## 3.3 Application Layer Protocols and Services Examples

### 3.3.1 DNS Services and Protocol

### 3.3.2 WWW Service and HTTP

### 3.3.3 E-mail Services and SMTP/POP Protocols

### 3.3.4 FTP

### 3.3.5 DHCP

### 3.3.6 File Sharing Services and SMB Protocol

### 3.3.7 P2P Services and Gnutella Protocol

### 3.3.8 Telnet Services and Protocol

## 3.4 Chapter Labs and Activities

### 3.4.1 Data Stream Capture

### 3.4.2 Lab – Managing a Web Server

### 3.4.3 Lab – E-mail Services and Protocols

## 3.5 Chapter Summary

### 3.5.1 Summary and Review

## 3.6 Chapter Quiz

### 3.6.1 Chapter Quiz

## **Chapter - 4**

### **OSI Transport Layer**

#### 4.1 Roles of the Transport Layer

- 4.1.1 Purpose of the Transport Layer
- 4.1.2 Controlling the Conversations
- 4.1.3 Supporting Reliable Communication
- 4.1.4 TCP and UDP
- 4.1.5 Port Addressing
- 4.1.6 Segmentation and Reassembly – Divide and Conquer

#### 4.2 The TCP Protocol – Communicating with Reliability

- 4.2.1 TCP – Making Conversations Reliable
- 4.2.2 TCP Server Processes
- 4.2.3 TCP Connection Establishment and Termination
- 4.2.4 TCP Three-Way Handshake
- 4.2.5 TCP Session Termination

#### 4.3 Managing TCP Sessions

- 4.3.1 TCP Segment Reassembly
- 4.3.2 TCP Acknowledgement with Windowing
- 4.3.3 TCP Retransmission
- 4.3.4 TCP Congestion Control – Minimizing Segment Loss

#### 4.4 The UDP Protocol – Communicating with Low Overhead

- 4.4.1 UDP – Low Overhead vs. Reliability
- 4.4.2 UDP Datagram Reassembly
- 4.4.3 UDP Server Processes and Requests
- 4.4.4 UDP Client Processes

#### 4.5 Lab Activities

- 4.5.1 Observing TCP and UDP using Netstat
- 4.5.2 TCP/IP Transport Layer Protocols, TCP and UDP
- 4.5.3 Application and Transport Layer Protocols

#### 4.6 Chapter Summary

- 4.6.1 Summary and Review

#### 4.7 Chapter Quiz

- 4.7.1 Chapter Quiz

## **Chapter – 5**

### **OSI Network Layer**

#### 5.1 IPv4

- 5.1.1 Network Layer - Communication from Host to Host
- 5.1.2 The IPv4 protocol - Example Network Layer Protocol
- 5.1.3 IPv4 Protocol - Connectionless
- 5.1.4 IPv4 Protocol - Best Effort
- 5.1.5 The IPv4 Protocol - Media Independent
- 5.1.6 IPv4 Packet - Packaging the Transport Layer PDU
- 5.1.7 IPv4 Packet Header

#### 5.2 Networks - Dividing Hosts into Groups

- 5.2.1 Networks - Separating Hosts Into Common Groups
- 5.2.2 Why Separate Hosts Into Networks? - Performance
- 5.2.3 Why Separate Hosts Into Networks? - Security
- 5.2.4 Why Separate Hosts Into Networks? - Address Management
- 5.2.5 How Do We Separate Hosts Into Networks? - Hierarchical addressing
- 5.2.6 Dividing the Networks - Networks from Networks

#### 5.3 Routing - How Our Data Packets are Handled

- 5.3.1 Device Parameters - Supporting Communication Outside Our Network
- 5.3.2 IP Packets - Carrying Data End to End
- 5.3.3 A Gateway - The Way Out of Our Network
- 5.3.4 A Route - The Path to a Network
- 5.3.5 The Destination Network
- 5.3.6 The Next Hop - Where the Packet Goes Next
- 5.3.7 Packet Forwarding - Moving the Packet Toward its Destination

#### 5.4 Routing Processes: How Routes are Learned

- 5.4.1 Routing Protocols - Sharing the Routes
- 5.4.2 Static Routing
- 5.4.3 Dynamic Routing

#### 5.5 Labs

- 5.5.1 Lab – Examining a Device’s Gateway
- 5.5.2 Lab – Examining a Route

#### 5.6 Summary

- 5.6.1 Summary

#### 5.7 Quiz

- 5.7.1 Chapter Quiz

## **Chapter – 6**

### **Addressing the Network – IPv4**

#### 6.1 IP v4 Addresses

##### 6.1.1 The Anatomy of an IPv4 Address

##### 6.1.2 Knowing the Numbers – Binary to Decimal Conversion

##### 6.1.3 Practicing Binary to Decimal Conversions

##### 6.1.4 Knowing the Numbers – Decimal to Binary Conversions

##### 6.1.5 Practicing Decimal to Binary Conversion

#### 6.2 Addresses for Different Purposes

##### 6.2.1 Types of Addresses in an IPv4 Network

##### 6.2.2 Calculating Network, Hosts and Broadcast Addresses

##### 6.2.3 Unicast, Broadcast, Multicast – Types of Communication

##### 6.2.4 Reserved IPv4 Address Ranges

##### 6.2.5 Public and Private Addresses

##### 6.2.6 Special IPv4 Addresses

##### 6.2.7 Legacy IPv4 Addressing

#### 6.3 Assigning Addresses

##### 6.3.1 Planning to Address the Network

##### 6.3.2 Static or Dynamic Addressing for End User Devices

##### 6.3.3 Assigning Addresses to Other Devices

##### 6.3.4 Who Assigns the Different Addresses?

##### 6.3.5 ISPs

##### 6.3.6 Overview of IPv6

#### 6.4 Is It On My Network?

##### 6.4.1 The Subnet Mask – Defining the Network and Host Portions

##### 6.4.2 ANDing – What Is In Our Network?

##### 6.4.3 The ANDing Process

#### 6.5 Calculating Addresses

##### 6.5.1 Basic Subnetting

##### 6.5.2 Subnetting – Dividing Networks into Right Sizes

##### 6.5.3 Subnetting – Subnetting a Subnet

##### 6.5.4 Determining the Network Address

##### 6.5.5 Calculating the Number of Hosts

##### 6.5.6 Determining Valid Addresses for Hosts

##### 6.5.7 Assigning Addresses

##### 6.5.8 Addressing in a Tiered Internetwork

#### 6.6 Testing the Network Layer

##### 6.6.1 Ping 127.0.0.1 – Testing the Local Stack

##### 6.6.2 Ping Gateway – Testing Connectivity to the Local LAN

- 6.6.3 Ping Remote Host – Testing Connectivity to Remote LAN
- 6.6.4 Traceroute (tracert) – Testing the Path
- 6.6.5 ICMPv4 – The Protocol Supporting Testing and Messaging

## 6.7 Labs and Activities

- 6.7.1 Lab – Ping and Traceroute
- 6.7.2 Lab – Examining ICMP Packet
- 6.7.3 Activity: IPv4 Address Subnetting Part 1
- 6.7.4 Activity: IPv4 Address Subnetting Part 2
- 6.7.5 Lab: Subnet and Router Configuration

## 6.8 Chapter Summaries

- 6.8.1 Summary and Review

## 6.9 Chapter Quiz

- 6.9.1 Chapter Quiz

# **Chapter – 7**

## **Data Link Layer**

### 7.1 Data Link Layer – Accessing the Media

- 7.1.1 Data Link Layer – Supporting & Connecting to Upper Layer Services
- 7.1.2 Data Link Layer – Controlling Transfer across Local Media
- 7.1.3 Data Link Layer – Creating a Frame
- 7.1.4 Data Link Layer – Connecting Upper Layer Services to the Media
- 7.1.5 Data Link Layer – Standards

### 7.2 Media Access Control Techniques

- 7.2.1 Placing Data on the Media
- 7.2.2 Media Access Control for Shared Media
- 7.2.3 Media Access Control for Non-Shared Media
- 7.2.4 Logical Topology vs. Physical Topology
- 7.2.5 Point-to-Point Topology
- 7.2.6 Multi-Access Topology
- 7.2.7 Ring Topology

### 7.3 Media Access Control Addressing and Framing Data

- 7.3.1 Data Link Layer Protocols – The Frame
- 7.3.2 Framing – Role of the Header
- 7.3.3 Addressing – Where the Frame Goes
- 7.3.4 Framing – Role of the Trailer
- 7.3.5 Data Link Layer Protocols – The Frame

### 7.4 Putting it All Together

- 7.4.1 Follow Data Through an Internetwork

## 7.5 Labs and Activities

### 7.5.1 Investigating Layer 2 Frame Headers

### 7.5.2 Lab – Frame Examination

## 7.6 Chapter Summary

### 7.6.1 Summary and Review

## 7.7 Chapter Quiz

### 7.7.1 Chapter Quiz

## **Chapter – 8** **OSI Physical Layer**

### 8.1 The Physical Layer - Communication Signals

#### 8.1.1 Physical Layer - Purpose

#### 8.1.2 Physical Layer - Operation

#### 8.1.3 Physical Layer - Standards

#### 8.1.4 Physical Layer Fundamental Principles

### 8.2 Physical Signaling and Encoding: Representing Bits

#### 8.2.1 Signaling Bits for the Media

#### 8.2.2 Encoding - Grouping Bits

#### 8.2.3 Data Carrying Capacity

### 8.3 Physical media - Connecting Communication

#### 8.3.1 Types of Physical Media

#### 8.3.2 Copper Media

#### 8.3.3 Unshielded Twisted Pair (UTP) Cable

#### 8.3.4 Other Copper Cable

#### 8.3.5 Copper Media Safety

#### 8.3.6 Fiber Media

#### 8.3.7 Wireless Media

#### 8.3.8 Media Connectors

### 8.4 Lab - Media Connectors

#### 8.4.1 Media Connectors Lab Activity

## 8.5 Chapter Summaries

### 8.5.1 Summary and Review

## 8.6 Chapter Quiz

### 8.6.1 Chapter Quiz

## **Chapter – 9** **Ethernet**

## 9.1 Overview of Ethernet

### 9.1.1 Ethernet – Standards and Implementation

### 9.1.2 Ethernet – Layer 1 and Layer 2

### 9.1.3 Logic Link Control – Connecting to the Upper Layers

### 9.1.4 MAC – Getting Data to the Media

### 9.1.5 Physical Implementations of Ethernet

## 9.2 Ethernet – Communication through the LAN

### 9.2.1 Historic Ethernet

### 9.2.2 Ethernet Collision Management

### 9.2.3 Moving to 1 Gbps and Beyond

## 9.3 The Ethernet Frame

### 9.3.1 The Frame – Encapsulating the Packet

### 9.3.2 The Ethernet MAC Address

### 9.3.3 Hexadecimal Numbering and Addressing

### 9.3.4 Another Layer of Addressing

### 9.3.5 Ethernet Unicast, Multicast & Broadcast

## 9.4 Ethernet Media Access Control

### 9.4.1 Media Access Control in Ethernet

### 9.4.2 CSMA/CD – The Process

### 9.4.3 Ethernet Timing

### 9.4.4 Interframe Spacing and Backoff

## 9.5 Ethernet Physical Layer

### 9.5.1 Overview of Ethernet Physical Layer

### 9.5.2 10 and 100 Mbps Ethernet

### 9.5.3 1000 Mbps Ethernet

### 9.5.4 Ethernet – Future Options

## 9.6 Hubs and Switches

### 9.6.1 Legacy Ethernet – Using Hubs

### 9.6.2 Ethernet – Using Switches

### 9.6.3 Switches – Selective Forwarding

### 9.6.4 Ethernet – Comparing Hubs and Switches

## 9.7 Address Resolution Protocol (ARP)

### 9.7.1 The ARP Process – Mapping IP to MAC Addresses

### 9.7.2 The ARP Process – Destinations outside the Local Network

### 9.7.3 The ARP Process – Removing Address Mappings

### 9.7.4 ARP Broadcasts – Issues

## 9.8 Chapter Labs

### 9.8.1 Lab – Address Resolution Protocol (ARP)

### 9.8.2 Lab – Cisco Switch MAC Table Examination

9.8.3 Lab – Intermediary Device as an End Device

9.9 Chapter Summary

9.9.1 Summary and Review

9.10 Chapter Quiz

9.10.1 Chapter Quiz

## **Chapter – 10**

### **Planning and Cabling Networks**

10.1 LANs - Making the Physical Connection

10.1.1 Choosing the Appropriate LAN Device

10.1.2 Device Selection Factors

10.2 Device Interconnections

10.2.1 LAN and WAN - Getting Connected

10.2.2 Making LAN Connections

10.2.3 Making WAN Connections

10.3 Developing an Addressing Scheme

10.3.1 How Many Hosts in the Network?

10.3.2 How Many Networks?

10.3.3 Designing the Address Standard for our Internetwork

10.4 Calculating the Subnets

10.4.1 Calculating Addresses: Case 1

10.4.2 Calculating Addresses: Case 2

10.5 Device Interconnections

10.5.1 Device Interfaces

10.5.2 Making the Device Management Connection

10.6 Chapter Labs

10.6.1 Lab - Creating a Small Lab Topology

10.6.2 Lab - Establishing a Console Session with HyperTerminal

10.6.3 Lab - Establishing a Console Session with Minicom

10.7 Chapter Summary

10.7.1 Summary and Review

10.8 Chapter Quiz

10.8.1 Chapter Quiz

## **Chapter – 11**

### **Configuring and Testing Your Network**

## 11.1 Configuring Cisco devices – IOS basics

### 11.1.1 Cisco IOS

### 11.1.2 Configuration Files

### 11.1.3 Cisco IOS Modes

### 11.1.4 Basic IOS Command Structure

### 11.1.5 Using CLI Help

### 11.1.6 IOS “Examination” Commands

### 11.1.7 IOS Configuration Modes

## 11.2 Applying a Basic Configuration Using Cisco IOS

### 11.2.1 Devices Need Names

### 11.2.2 Limiting Device Access – Configuring Passwords and Using Banners

### 11.2.3 Managing Configuration Files

### 11.2.4 Configuring Interfaces

## 11.3 Verifying Connectivity

### 11.3.1 Test the Stack

### 11.3.2 Testing the Interface Assignment

### 11.3.3 Testing Local Network

### 11.3.4 Testing Gateway and Remote Connectivity

### 11.3.5 Tracing and Interpreting Trace Results

## 11.4 Monitoring and Documenting of Networks

### 11.4.1 Basic Network Baselines

### 11.4.2 Capturing and Interpreting Trace Information

### 11.4.3 Learning About the Nodes on the Network

## 11.5 Lab Activity

### 11.5.1 Basic Cisco Device Configuration

### 11.5.2 Managing Device Configuration

### 11.5.3 Configure Host Computers for IP Networking

### 11.5.4 Network Testing

### 11.5.5 Network Documentation with Utility Commands

### 11.5.6 Case Study

## 11.6 Summary

### 11.6.1 Summary and Review

## 11.7 Chapter Quiz

### 11.7.1 Chapter Quiz

# **Semester – 2**

## **Routing Protocols and Concepts**

### **Introduction to Routing and Packet Forwarding**

#### **Chapter-1**

#### 1.1 Inside the Router

- 1.1.1 Routers are Computers
- 1.1.2 Router CPU and Memory
- 1.1.3 Internetwork Operating System
- 1.1.4 Router Boot-up Process
- 1.1.5 Router Interfaces
- 1.1.6 Routers and the Network Layer

#### 1.2 CLI Configuration and Addressing

- 1.2.1 Implementing Basic Addressing Schemes
- 1.2.2 Basic Router Configuration

#### 1.3 Building the Routing Table

- 1.3.1 Introducing the Routing Table
- 1.3.2 Directly-Connected Networks
- 1.3.3 Static Routing
- 1.3.4 Dynamic Routing
- 1.3.5 Routing Table Principles

#### 1.4 Path Determination and Switching Functions

- 1.4.1 Packet Fields and Frame Fields
- 1.4.2 Best Path and Metric
- 1.4.3 Equal Cost Load Balancing
- 1.4.4 Path Determination
- 1.4.5 Switching Function

#### 1.5 Router Configuration Labs

- 1.5.1 Cabling a Network and Basic Router Configuration
- 1.5.2 Basic Router Configuration
- 1.5.3 Challenge Router Configuration

#### 1.6 Summary

- 1.6.1 Summary and Review

#### 1.7 Chapter Quiz

- 1.7.1 Chapter Quiz

## **Chapter – 2**

### **Static Routing**

#### 2.1 Routers and Network

##### 2.1.1 Role of the Router

##### 2.1.2 Introducing the Topology

##### 2.1.3 Examining the Connections of the Router

#### 2.2 Router Configuration Review

##### 2.2.1 Examining Router Interfaces

##### 2.2.2 Configuring an Ethernet Interface

##### 2.2.3 Verifying Ethernet Interface

##### 2.2.4 Configuring a Serial Interface

##### 2.2.5 Examining Router Interfaces

#### 2.3 Exploring Directly Connected Networks

##### 2.3.1 Verifying Changes to the Routing Table

##### 2.3.2 Devices on Directly Connected Networks

##### 2.3.3 Cisco Discovery Protocol (CDP)

##### 2.3.4 Using CDP for Network Discovery

#### 2.4 Static Routes with "Next Hop" Addresses

##### 2.4.1 Purpose and Command Syntax of ip route

##### 2.4.2 Configuring Static Routes

##### 2.4.3 Routing Table Principles and Static Routes

##### 2.4.4 Resolving to an Exit Interface

#### 2.5. Static Routes with Exit Interfaces

##### 2.5.1 Configuring a Static Route with an Exit Interface

##### 2.5.2 Modifying Static Routes

##### 2.5.3 Verifying the Static Route Configuration

##### 2.5.4 Static Routes with Ethernet Interfaces

#### 2.6 Summary and Default Static Routes

##### 2.6.1 Summary Static Routes

##### 2.6.2 Default Static Route

#### 2.7 Managing and Troubleshooting Static Routes

##### 2.7.1 Static Routes and Packet Forwarding

##### 2.7.2 Troubleshooting a Missing Route

##### 2.7.3 Solving the Missing Route

#### 2.8 Static Route Configuration Labs

##### 2.8.1 Basic Static Route Configuration

##### 2.8.2 Challenge Static Route Configuration

2.8.3 Troubleshooting Static Routes

2.9 Chapter Summary

2.9.1 Summary and Review

2.10 Chapter Quiz

2.10.1 Chapter Quiz

## **Chapter – 3**

### **Introduction to Dynamic Routing Protocols**

3.1 Introduction and Advantages

3.1.1 Perspective and background

3.1.2 Network discovery and routing table maintenance

3.1.3 Advantages

3.2 Classifying Dynamic Routing Protocols

3.2.1 Overview

3.2.2 IGP and EGP

3.2.3 Distance Vector and Link State

3.2.4 Classful and Classless

3.2.5 Convergence

3.3 Metrics

3.3.1 Purpose of a Metric

3.3.2 Metrics and Routing Protocols

3.3.3 Load Balancing

3.4 Administrative Distances

3.4.1 Purpose of Administrative Distance

3.4.2 Dynamic Routing Protocols

3.4.3 Static Routes

3.4.4 Directly Connected Networks

3.5 Routing Protocols and Subnetting Activities

3.5.1 Identifying Elements of the Routing Table

3.5.2 Subnetting Scenario 1

3.5.3 Subnetting Scenario 2

3.5.4 Subnetting Scenario 3

3.6 Summary

3.6.1 Summary and Review

3.7 Chapter Quiz

3.7.1 Chapter Quiz

## **Chapter – 4**

### **Distance Vector Routing Protocols**

#### 4.1 Introduction to Distance Vector Routing Protocols

##### 4.1.1 Distance Vector Routing Protocols

##### 4.1.2 Distance Vector Technology

##### 4.1.3 Routing Protocols Algorithms

##### 4.1.4 Routing Protocols Characteristics

#### 4.2 Network Discovery

##### 4.2.1 Cold Start

##### 4.2.2 Initial Exchange of Routing Information

##### 4.2.3 Exchange of Routing Information

##### 4.2.4 Convergence

#### 4.3 Routing Table Maintenance

##### 4.3.1 Periodic Updates: RIPv1 and IGRP

##### 4.3.2 Bounded Updates: EIGRP

##### 4.3.3 Triggered Updates

##### 4.3.4 Random Jitter

#### 4.4 Routing Loops

##### 4.4.1 Definition and Implications

##### 4.4.2 Problem: Count to Infinity

##### 4.4.3 Setting a Maximum

##### 4.4.4 Preventing Routing Loops with Holddown Timers

##### 4.4.5 Split Horizon Rule

##### 4.4.6 Split Horizon with Poison Reverse or Route Poisoning

##### 4.4.7 IP and TTL

#### 4.5 Distance Vector Routing Protocols today

##### 4.5.1 RIP and EIGRP

#### 4.6 Lab Activities

##### 4.6.1 Lab Activities

#### 4.7 Summary

##### 4.7.1 Summary and Review

#### 4.8 Quiz

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## **Chapter – 5**

## **RIP version 1**

### 5.1 RIPv1: Distance Vector, Classful Routing Protocol

#### 5.1.1 Background and Perspective

#### 5.1.2 RIPv1 Characteristics and Message Format

#### 5.1.3 RIP Operation

#### 5.1.4 Administrative Distance

### 5.2 Basic RIPv1 Configuration

#### 5.2.1 Basic RIPv1 Configuration

#### 5.2.2 Enabling RIP: router rip command

#### 5.2.3 Specifying Networks

### 5.3 Verification and Troubleshooting

#### 5.3.1 Verifying RIP: show ip route

#### 5.3.2 Verifying RIP: show ip protocols

#### 5.3.3 Verifying RIP: debug ip rip

#### 5.3.4 Passive Interfaces

### 5.4 Automatic Summarization

#### 5.4.1 Modified Topology: Scenario B

#### 5.4.2 Boundary Routers and Automatic Summarization

#### 5.4.3 Processing RIP Updates

#### 5.4.4 Sending RIP Updates

#### 5.4.5 Advantages and Disadvantages of Automatic Summarization

### 5.5 Default Route and RIPv1

#### 5.5.1 Modified Topology: Scenario C

#### 5.5.2 Propagating the Default Route in RIPv1

### 5.6 RIPv1 Configuration Labs

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