

NET 126 ROUTING BASICS

COURSE DESCRIPTION:

Prerequisites: NET 125

Corequisites: None

This course focuses on initial router configuration, router software management, routing protocol configuration, TCP/IP, and access control lists (ACLs). Emphasis will be placed on the fundamentals of router configuration, managing router software, routing protocol, and access lists. Upon completion, students should have an understanding of routers and their role in WANs, router configuration, routing protocols, TCP/IP, troubleshooting, and ACLs. Course Hours Per Week: Class, 1. Lab, 4. Semester Hours Credit, 3.

LEARNING OUTCOMES:

Upon successful completion of this course, students will be able to:

- a. Describe the purpose, nature, and operations of a router
- b. Explain the critical role routers play in enabling communications across multiple networks
- c. Describe the purpose and nature of routing tables
- d. Describe how a router determines a path and switches packets
- e. Explain the route lookup process and determine the path packets will take in a network
- f. Configure and verify basic operations for a newly-installed router
- g. Describe the purpose of static routes and the procedure for configuring them
- h. Configure and verify static and default routing
- i. Describe the role of dynamic routing protocols and place these protocols in the context of modern network design
- j. Describe how metrics are used by routing protocols and identify the metric types used by dynamic routing protocols
- k. Identify the characteristics of distance vector routing protocols
- l. Describe the network discovery process of distance vector routing protocols using Routing Information Protocol (RIP)
- m. Describe the functions, characteristics, and operations of the RIPv1 protocol
- n. Compare and contrast classful and classless IP addressing
- o. Describe classful and classless routing behaviors in routed networks
- p. Design and implement a classless IP addressing scheme for a given network
- q. Describe the main features and operations of the Enhanced Interior Gateway Routing Protocol (EIGRP)
- r. Use advanced configuration commands with routers implementing EIGRP and OSPF
- s. Describe the basic features and concepts of link-state routing protocols
- t. Describe the purpose, nature, and operations of the Open Shortest Path First (OSPF) Protocol

- u. Configure and verify basic RIPv1, RIPv2, single area OSPF, and EIGRP operations in a small routed network
- v. Use router commands to troubleshoot common errors that occur in small routed networks.

OUTLINE OF INSTRUCTION:

- I. Introduction to Routing and Packet Forwarding
 - a. Inside the Router
 - b. CLI Configuration and Addressing
 - c. Building the Routing Table
 - d. Path Determination and Switching Functions
- II. Static Routing
 - a. Routers in Networks
 - b. Router Configuration Review
 - c. Exploring Directly-Connected Networks
 - d. Static Routes with “Next Hop” Addresses
 - e. Static Routes with Exit Interfaces
 - f. Summary and Default Static Routes
 - g. Managing and Troubleshooting Static Routes
- III. Introduction to Dynamic Routing Protocols
 - a. Introduction and Advantages
 - b. Classifying Dynamic Routing Protocols
 - c. Metrics and Administrative Distances
 - d. Routing Protocol and Subnetting Activities
- IV. Distance Vector Routing Protocols
 - a. Introduction to Distance Vector Routing Protocols
 - b. Network Discovery
 - c. Routing Table Maintenance
 - d. Routing Loops
 - e. Distance Vector Routing Protocols Today
- V. RIP Version 1
 - a. RIPv1: Distance Vector, Classful Routing Protocol
 - b. Basic RIPv1 Configuration
 - c. Verification and Troubleshooting
 - d. Automatic Summarization
 - e. Default Route and RIPv1
- VI. VLSM and CIDR
 - a. Classful and Classless Addressing
 - b. VLSM
 - c. CIDR
 - d. VLSM and Route Summarization Activity

- VII. RIPv2
 - a. RIPv1 Limitations
 - b. Configuring RIPv2
 - c. VLSM and CIDR
 - d. Verifying and Troubleshooting RIPv2
- VIII. The Routing Table: A Closer Look
 - a. The Routing Table Structure
 - b. Routing Table Lookup Process
 - c. Routing Behavior
- IX. EIGRP
 - a. Introduction to EIGRP
 - b. Basic EIGRP Configuration
 - c. EIGRP Metric Calculation
 - d. DUAL
- X. Link-State Routing Protocols
 - a. Link-State Routing Protocols
 - b. Implementing Link-State Routing Protocols
- XI. OSPF
 - a. Introduction to OSPF
 - b. Basic OSPF Configuration
 - c. The OSPF Metric
 - d. OSPF and Multi-Access Networks

REQUIRED TEXTBOOK AND MATERIALS:

Text to be assigned by the instructor each semester

STATEMENT FOR STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 919-536-7207, ext. 1413 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1209.