Course Outline

Networking Basics: Understanding Networking Fundamentals

Course Summary

Description

Build a foundation of networking knowledge in a real-world, multi-vendor environment.

A strong foundation of basic networking concepts is fundamental to a successful career in information technology. Networking technologies underlie all IT activities and a strong comprehension of the hardware and protocols used to create networks is essential to future success. In this course, you will learn how to configure a workstation to connect to a network, analyze network traffic using a protocol analyzer, examine switch and router configurations, perform basic IPv4 addressing and subnetting, and research network security solutions. You will gain an understanding of basic network functions, standards, and protocols, to prepare you to tackle advanced networking skills.

Objectives

After taking this course, students will be able to:

- Understand the basics of layered network protocols and compare the two primary reference models: OSI and TCP/IP
- Inspect a structured cabling system, including the proper use and installation of UTP and fiber optic cables
- Configure a workstation to connect to a network
- Understand ethernet operations and the use of VLANs by examining the configuration and operation of switches on a network
- Understand Spanning Tree operation as a method of eliminating broadcast storms on a switched network
- Configure a Wi-Fi router for operation on a SOHO network, including security, SSID, and Wi-Fi channel
- Understand various IP addressing considerations, including binary to decimal conversion, dotted decimal notation, classful vs. classless addressing, private vs. public addresses, and the use of network masking
- Create a subnet for a small network, selecting the correct masks for various situations to accommodate the current number of hosts in each subnet and to also allow for future growth
- Understand the operation of various TCP/IP protocols on a network, including connectionless and connection-oriented communications using UDP and TCP, translation between private and public addresses using NAT, and support protocols such as ARP, DNS, and DHCP
- Understand router configurations to determine the function of various routing protocols, including RIP, IGRP, and OSPF, within and between networks
- Understand various WAN technologies, including circuit switched solutions such as leased lines and packet switched solutions, such as Carrier Ethernet, and determine the best WAN connectivity solution for a given corporate network
- Use a protocol analyzer to capture and view network traffic, including e-mail, instant message exchanges, and web transactions
- Understand basic network security implementations by testing the impact a router that has been configured as a firewall has on the flow of traffic through a network
- Research the suitability of popular anti-malware suites for mitigating network security threats
- Research Mobile Device Management (MDM) solutions to support BYOD deployments

Course Outline

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Course Summary (cont'd)

Topics

- Introduction to Networking
- Network Standards
- Physical Network Connections
- Ethernet LANs
- Ethernet Switching
- Wireless LANs
- IP Addressing
- IPv4 Subnetting
- TCP and UDP
- Support and Management Protocols
- Routing
- Wide Area Networks
- Communications Protocols
- Web Protocols
- Network Security
- Emerging Networking Technologies

Audience

This course is designed for new IT professionals who want to learn the basics of a structured, layered approach to networking, including the fundamentals of network hardware and components, network protocols, IP addressing and sub-netting, and various tools used in network monitoring and troubleshooting. Ideal candidates include:
Entry-level and newly hired technical professionals, including PC support, help desk, and networking professionals
Sales and marketing professionals looking to increase their ability to communicate with technical professionals and increase sales
Technical professionals looking to strengthen core skill before pursuing advanced topics and certifications

Prerequisites

Before taking this course, you should have taken a CompTIA Fundamentals Certification course.

Duration

Five days

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I. Introduction to Networking
- A. What Is Network Computing?
- B. Building Blocks of Networks
- C. Network Infrastructure: Media
- D. Network Infrastructure: Switches and Access Points
- E. Network Infrastructure: Routers
- F. Network Services
- G. Network Types
- H. Network Topologies
- I. Locating Network Resources: Peer-to-Peer Networking
- J. Locating Network Resources: Client-Server Networking
- K. Virtual Computing
- L. Cloud Computing
- M. Module Review and Discussion Questions

II. Network Standards
- A. Introduction
- B. Standards Organizations
- C. Example Standards Development Process
- D. OSI Mode Overview
- E. TCP/IP Model
- F. Module Review and Discussion Questions

III. Physical Network Connections
- A. Introduction
- B. UTP Cabling
- C. Fiber Optic Cabling
- D. Wireless Connections
- E. Module Review and Discussion Questions

IV. Ethernet LANs
- A. Introduction
- B. NIC and MAC Addresses
- C. Ethernet Standards
- D. Ethernet Frame Structures
- E. Ethernet Equipment Types
- F. Ethernet Connectors
- G. Ethernet Performance Issues
- H. Module Review and Discussion Questions

V. Ethernet Switching
- A. Introduction
- B. Benefits of Switching
- C. Switch Installations
- D. Switch Operations Overview
- E. Switch Loop Problems
- F. Spanning Tree Protocol Overview
- G. Configuring Switches
- H. VLAN Overview
- I. Link Aggregation
- J. Troubleshooting
- K. Module Review and Discussion Questions

VI. Wireless LANs
- A. Introduction
- B. WLAN Standards: IEEE & Wi-Fi Alliance
- C. WLAN Components
- D. SSID
- E. Wi-Fi Channels
- F. Wi-Fi Speeds Overview
- G. WLAN Security
- H. WLAN Performance Issues
- I. Module Review and Discussion Questions

VII. IP Addressing
- A. What Are Logical Addresses?
- B. Binary Numbering
- C. Dotted Decimal Notation
- D. Three Types of IP Addresses
- E. Classful Addressing
- F. Assigning IP Addresses
- G. Reserved Addresses
- H. Private Addresses
- I. Network Masking
- J. Classless Addressing
- K. Introduction to IPv6
- L. Module Review and Discussion Questions

VIII. IPv4 Subnetting
- A. Purpose of Subnetting
- B. Subnet Communications
- C. Subnet Mask Rules
- D. The Art of Subnetting
- E. The Science of Subnetting
- F. Calculating Subnets
- G. Four Key Addresses
- H. Implementing the Plan
- I. Subnetting Case Study
- J. Variable-Length Subnet Masking
- K. Module Review and Discussion Questions

IX. TCP and UDP
- A. Introduction
- B. TCP and UDP Headers
- C. Connection-Oriented vs. Connectionless Communications
- D. Transmission Control Protocol
- E. User Datagram Protocol
- F. TCP and UDP Port Numbers
- G. Network Address Translation
- H. Module Review and Discussion Questions

X. Support and Management Protocols
- A. Introduction
- B. Address Resolution Protocol
- C. Dynamic Host Configuration Protocol
- D. Domain Name System

Course Outline (cont'd)

E. Internet Control Message Protocol (ICMP)
F. Internet
G. Group Management Protocol (IGMP)
H. Telnet
I. Simple Network Management Protocol (SNMP)
J. Legacy Protocols: NetBIOS and NetBEUI
K. Module Review and Discussion Questions

XI. Routing

A. Routing Overview
B. Logical Segmentation
C. Static vs. Dynamic Routing
D. Routing Decision Process
E. Route Protocol Operation
F. Common Routing Protocols
G. Configuring Routers
H. Module Review and Discussion Questions

XII. Wide Area Networks

A. Introduction
B. Evolution of WAN Technologies
C. Sources of WAN Solutions
D. Circuit Switched vs. Packet Switched
E. Circuit Switched WAN Solutions
F. Packet Switched WAN Solutions
G. Internet WANs
H. Module Review and Discussion Questions

XIII. Communications Protocols

A. Introduction
B. Electronic Mail
C. Instant Messaging
D. Voice over IP
E. Unified Communications
F. Module Review and Discussion Questions

XIV. Web Protocols

A. Introduction
B. Hypertext Transfer Protocol (HTTP)
C. Secure Sockets Layer (SSL)
D. Transport Layer Security (TLS)
E. Remote Desktop Protocols
F. File Transfer Protocol (FTP)
G. Module Review and Discussion Questions

XV. Network Security

A. Introduction
B. Security Threats
C. Threat Mitigation
D. Developing a Security Plan
E. Module Review and Discussion Questions

XVI. Emerging Networking Technologies

A. Introduction
B. Improved Wireless Technologies
C. Enterprise Mobility
D. Internet of Things
E. Software Defined Networks
F. Keeping Up with New Technology
G. Module Review and Discussion Question

XVII. Labs

- Connect and Configure a Workstation
- Protocol Analysis with Wireshark
- Examine Current Switch Configurations
- Examine Spanning Tree
- Configure a Wi-Fi Router
- IPv4 Addressing Considerations
- Create a Subnet Plan for a Small Network
- Examine Support Protocols
- Examine Router Configurations
- Recognize Application of Different WAN Technologies
- Examine an E-Mail Message with Wireshark
- Examine an Instant Message Exchange with Wireshark
- Examine a Web Transaction with Wireshark
- Test Firewall
- Research Anti-Malware
- Research MDM Software