

SYLLABUS PART II
EDISON STATE COMMUNITY COLLEGE
CIS 214S Networking Essentials
3 CREDIT HOURS

Section/Term:	CIS-214S-401FS
Class Meeting Time:	W 6:00 p.m. – 7:15 p.m.
Location:	Room 443B
Required items:	CERTMASTER LEARN NETWORK+ (N10-009) COMPTIA/TESTOUT ISBN13: 9781642745245 PUBLISHER: CompTIA Learning COPYRIGHT: 4/1/2024
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Faculty Contact:	If you have questions or concerns, please contact me via email with the course name and number in the subject line (CIS 214 401FS) through your Edison State email. You are encouraged to set up an appointment to meet virtually or stop by my office.

All course assignments will be submitted on the Edison State Blackboard Course website (www.edisonohio.blackboard.com) You are required to use your Edison State email for all course work and communications in this course.

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Getting Started

Read this entire document and familiarize yourself with the Blackboard course site for this class. All of the assignments, and any information you will need for completing this course will be available on the Edison blackboard course website and are as outlined in this syllabus.

Course Objectives

This course is designed to prepare you for the CompTIA Network+ (Exam N10-009) certification examination and a job role in network administration. It utilizes a learning progression model to help you learn and build skills related to the course objectives and job task requirements. This learning methodology uses a series of steps to contextualize what you're learning, elaborate on areas where additional instruction is needed, and provide relevance through practice and personalized feedback. You'll then apply what you learned and demonstrate the skills you've gained through a series of lab activities and quizzes.

On course completion, you will be able to:

- Deploy and troubleshoot Ethernet networks.
- Support IPv4 and IPv6 networks.
- Configure and troubleshoot routers.
- Support network services and applications.
- Ensure network security and availability.
- Deploy and troubleshooting wireless networks.
- Support WAN links and remote access methods.
- Support organizational procedures and site security controls.
- Summarize cloud and data center architecture.

Teaching Philosophy

The Courseware used in this course is designed to create a virtualized learning environment that employs a hands-on approach. Many labs will focus on configuring and troubleshooting hardware and software components that constitute and secure enterprise networks. The primary objective of this class is to help students understand and handle computer components and how they interact within a network. Therefore, gaining as much hands-on experience as possible is a key goal of the course. Every effort will be made to provide students with access to the available and relevant equipment necessary to achieve this goal.

The Module Tests, Skills Demonstrations, and Exams are designed to evaluate students' progress in understanding the course material. The Assigned Video lectures, Video Demonstrations, and Readings are created as practical scenarios that allow students to apply their knowledge in a virtualized environment that closely resembles what they will encounter in the IT industry.

Daily Responsibilities

You are expected to use proper English, sign your emails with your full name, and include the course name and number in any correspondence at the college level. Remember, most of you are in college to

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prepare for technical careers, and using proper grammar and spelling demonstrates respect and professionalism.

Follow the instructions, course outline, and rubrics to stay on track. Manage your time effectively to avoid falling behind. Trying to catch up later can be overwhelming. All assignments must be completed by Sunday at 11:59 PM in the week they were assigned. However, you can work ahead on many assignments, such as chapter quizzes, exams, and labs, to plan accordingly. Please note that assignments completed early may not be graded until after the due date.

This course will require a significant amount of time. The time needed per week will vary, so you need to plan accordingly. As per the time requirements specified in the Edison Academic Catalog, students should set aside a minimum of 18 hours per week for this course. Students are responsible for making up any missed work. Students must complete any missed assignments. I will not repeatedly approach students to complete work; it's your responsibility.

Grading and Evaluation Policy

Discussion Post Assignments

You will be responsible for completing the Discussion Board posts included in each module of the course. The Discussion Board posts allow you to engage with, share your insights, reflect on course topics, and collaborate with your peers. Typically, the discussions will deepen in complexity as the semester progresses, encouraging more critical thinking and application of concepts. These discussion posts combined account for 5% of your overall grade for the course.

Video Lectures, Video Demonstrations, Readings and Section Quizzes

You will be responsible for watching Video Lectures, Video Demonstrations, Assigned Readings and Section Quizzes. These Items Account for 10% of your overall grade for the course.

Tests/Skills Demonstrations

You will be responsible for completing the Section Tests (20%) and Skills Demonstrations (25%) in each Section of the course. The combined scores from these assessments account for 45% of your overall grade for the course.

Final Exams

You will complete a comprehensive set of final exams in Week15, of this course, assessing your overall knowledge of the materials. The final exams will consist of multiple choice, matching, short answer, lab simulations and possibly essay questions. The exam is open-resource but timed, with a question range of around 100. The assessments accounts for 40% of your overall grade for the course.

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Weighted Grading Scale

Assessed Items	%
Discussion Board Posts	5%
Videos, Readings, and Section Quizzes	10%
Tests and Skills Demonstrations	45%
Final Exams	40%
Total	100%

Final grades

A letter grade is earned based on the final weighted percentage for all Section Tests, Quizzes, Skills Demonstrations, Skills Demonstration FINAL EXAM 1 of 2 and the Final Exam 2 of 2.

This course will conform to the following grading scale:

90 - 100%	A
80 - 89.99%	B
70 - 79.99%	C
60 - 69.99%	D
Below 60%	F

TESTING YOUR FAITH ACT POLICY

Edison State Community College is committed to providing an environment respectful of students' beliefs. Students are permitted to be absent for up to 3 days each semester based on their faith, religion, or spiritual belief system with no academic penalty. Students must complete the Testing Your Faith Act Accommodations Form, <https://www.edisonohio.edu/services-support/registration-records>, located in "Forms" and provide a copy to their individual faculty within 14 days from the start of the course. The entire policy can be found in the student handbook at <https://www.edisonohio.edu/services-support/student-resources>.

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Weekly Coursework Outline

******ANY STUDENT NOT COMPLETING THE ASSIGNMENT LISTED IN WEEK 1 LABLED "1.5 Section Test" TO A SCORE OF 80% OR BETTER, BY THE DUE DATE WILL BE AUTOMATICALLY DROPPED FROM THE COURSE FOR NON PARTICIPATION. **** ALL SECTIONS OF THE WEEKLY SEQUENCE MUST BE COMPLETED BEFORE YOU CAN ACCESS THE "1.5 Module Test" ASSIGNMENT.******

Week 1 Assignments

Module 1.0 Explaining Network Topologies

Section 1.1 Networking Overview

Text 1.1.1 Networking Concepts

Text 1.1.2 Network Types

Text 1.1.3 Network Topology

Text 1.1.4 Star Topology

Text 1.1.5 Mesh Topology

Quiz. 1.1.6 Network Topologies

Simulation 1.1.7 Lab: Create Network Topologies

Quiz 1.1.8 Section Quiz

Section 1.2 OSI Model Concepts

Text 1.2.1 Open Systems Interconnection Model

Text 1.2.2 Data Encapsulation and Decapsulation

Text 1.2.3 Layer 1 - Physical

Text 1.2.4 Layer 2 - Data Link

Text 1.2.5 Layer 3 - Network

Text 1.2.6 Layer 4 - Transport

Text 1.2.7 Upper Layers

Text 1.2.8 OSI Model Summary

Quiz 1.2.9 Section Quiz

Section 1.3 SOHO Networks

Text 1.3.1 SOHO Routers

Text 1.3.2 Physical Layer Functions

Text 1.3.3 Data Link Layer Functions

Text 1.3.4 Network Layer Functions

Text 1.3.5 Transport and Application Layer and Security Functions

Text 1.3.6 The Internet

Text 1.3.7 Binary and Hexadecimal

Simulation 1.3.8 Lab: Explore a Single Location in a Lab

Simulation 1.3.9 Lab: Create a Home Wireless Network

Simulation 1.3.10 Lab: Create a SOHO Network

Quiz 1.3.11 Section Quiz

Section 1.4 Troubleshooting Methodology

Text 1.4.1 Network Troubleshooting Methodology

Text 1.4.2 Identify the Problem

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Text 1.4.3 Identify Problem Symptoms
Text 1.4.4 Establish a Theory of Probable Cause
Text 1.4.5 Test the Theory to Determine the Cause
Text 1.4.6 Establish a Plan of Action
Text 1.4.7 Implement the Solution
Text 1.4.8 Verify the Solution
Text 1.4.9 Document Findings, Actions, and Outcomes
Simulation 1.4.10 Lab: Troubleshooting Methodology
Quiz 1.4.11 Section Quiz
Test 1.5 Module Test

Week 2 Assignments

Module 2.0 Supporting Cabling and Physical Installations

Section 2.1 Ethernet

Text 2.1.1 Network Data Transmission
Text 2.1.2 Ethernet Standards
Text 2.1.3 Media Access Control and Collision Domains
Text 2.1.4 100BASE-TX Fast Ethernet Standards
Text 2.1.5 Gigabit Ethernet Standards
Text 2.1.6 Fiber Ethernet Standards
Quiz 2.1.7 Ethernet Specifications
Simulation 2.1.8 Lab: Reconnect to an Ethernet Network
Quiz 2.1.9 Section Quiz

Section 2.2 Copper Cables and Connectors

Text 2.2.1 Unshielded Twisted Pair Cable
Text 2.2.2 Shielded and Screened Twisted Pair Cable
Text 2.2.3 Cat Cable Standards
Text 2.2.4 Twisted Pair Connector Types
Text 2.2.5 Plenum and Riser-rated Cable
Text 2.2.6 Coaxial and Twinaxial Cable and Connectors
Simulation 2.2.7 Lab: Connect to an Ethernet Network
Simulation 2.2.8 Lab: Connect a Cable Modem
Quiz 2.2.9 Identify Cabling
Quiz 2.2.10 Identify Connectors
Quiz 2.2.11 Section Quiz

Section 2.3 Wiring Implementation

Text 2.3.1 Structured Cabling System
Text 2.3.2 T568A and T568B Termination Standards
Text 2.3.3 Patch Panels
Text 2.3.4 Structured Cable Installation
Text 2.3.5 Termination Tools and Techniques
Simulation 2.3.6 Lab: Explore Multiple Locations in a Lab
Simulation 2.3.7 Lab: Connect Network Devices
Simulation 2.3.8 Lab: Connect Patch Panel Cables 1
Simulation 2.3.9 Lab: Connect Patch Panel Cables 2

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Quiz 2.3.10 Section Quiz

Section 2.4 Fiber Optic Cables and Connectors

Text 2.4.1 Fiber Optic Cable Considerations
Text 2.4.2 Single Mode Fiber and Multimode Fiber
Text 2.4.3 Fiber Optic Connector Types
Text 2.4.4 Fiber Optic Cable Installation
Text 2.4.5 Fiber Distribution Panels
Text 2.4.6 Multi-Fiber Push On Connectors
Text 2.4.7 Wavelength Division Multiplexing
Simulation 2.4.8 Lab: Connect Fiber Optic Cables
Quiz 2.4.9 Identify Fiber Optic Connectors
Quiz 2.4.10 Section Quiz

Section 2.5 Physical Installation Factors

Text 2.5.1 Rack Systems
Text 2.5.2 Humidity and Temperature
Text 2.5.3 Power Management
Text 2.5.4 Fire Suppression
Quiz 2.5.5 Section Quiz

Section 2.6 Cable Troubleshooting

Text 2.6.1 Specification and Limitations
Text 2.6.2 Cable Issues
Text 2.6.3 Cable Category Issues
Text 2.6.4 Cable Testers
Text 2.6.5 Wire Map Testers and Tone Generators
Text 2.6.6 Attenuation and Interference Issues
Text 2.6.7 Crosstalk Issues
Text 2.6.8 Fiber Optic Cable Testing Tools
Text 2.6.9 Cable Troubleshooting Strategies
Simulation 2.6.10 Lab: Explore Physical Connectivity 1
Simulation 2.6.11 Lab: Explore Physical Connectivity 2
Simulation 2.6.12 Lab: Troubleshoot Physical Connectivity 1
Simulation 2.6.13 Lab: Troubleshoot Physical Connectivity 2
Simulation 2.6.14 Lab: Troubleshoot Physical Connectivity 3
Simulation 2.6.15 Lab: Troubleshoot Physical Connectivity 4
Quiz 2.6.16 Section Quiz
Test 2.7 Module Test

Week 3 Assignments

Module 3.0 Configuring Interfaces and Switches

Section 3.1 Network Interfaces

Text 3.1.1 Network Interface Cards
Text 3.1.2 Modular Transceivers
Text 3.1.3 Transceiver Mismatch Issues
Text 3.1.4 Transceiver Signal Strength Issues

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Text 3.1.5 Ethernet Frame Format
Text 3.1.6 Media Access Control Address Format
Quiz 3.1.7 Compare Network Adapters
Simulation 3.1.8 Lab: Select and Install a Network Adapter
Simulation 3.1.9 Lab: Connect a Media Converter
Quiz 3.1.10 Section Quiz

Section 3.2 Ethernet Switches

Text 3.2.1 Hubs
Text 3.2.2 Bridges
Text 3.2.3 Switches
Text 3.2.4 Ethernet Switch Types
Text 3.2.5 Switch Interface Configuration
Video 3.2.6 Cisco IOS Basics
Simulation 3.2.7 Lab: Install a Switch in the Rack
Simulation 3.2.8 Lab: Secure a Switch
Simulation 3.2.9 Lab: Cisco IOS Basics
Quiz 3.2.10 Section Quiz

Section 3.3 Switch Port Configuration

Text 3.3.1 Link Aggregation and NIC Teaming
Text 3.3.2 Maximum Transmission Unit
Text 3.3.3 Spanning Tree Protocol
Text 3.3.4 Spanning Tree Protocol Configuration
Text 3.3.5 Power Over Ethernet
Simulation 3.3.6 Lab: Configure Port Aggregation
Simulation 3.3.7 Lab: Enable Jumbo Frame Support
Simulation 3.3.8 Lab: Configure PoE
Quiz 3.3.9 Section Quiz

Section 3.4 Switch Troubleshooting

Text 3.4.1 Hardware Failure Issues
Text 3.4.2 Port Status Indicators
Text 3.4.3 Switch Show Commands
Text 3.4.4 Interface Error Counters
Text 3.4.5 MAC Address Table
Text 3.4.6 Network Loop and Broadcast Storm Issues
Text 3.4.7 Power Over Ethernet Issues
Simulation 3.4.8 Lab: Troubleshoot Disabled Ports
Simulation 3.4.9 Lab: Switching Loop
Quiz 3.4.10 Section Quiz
Test 3.5 Module Test
Test 3.6 Checkpoint Review Test

Week 4 Assignments

Module 4.0 Configuring Network Addressing

Section 4.1 Internet Protocol Basics

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- Text 4.1.1 IPv4 Datagram Header
- Text 4.1.2 Layer 2 vs. Layer 3 Addressing and Forwarding
- Text 4.1.3 Address Resolution Protocol
- Text 4.1.4 Unicast and Broadcast Addressing
- Text 4.1.5 Multicast and Anycast Addressing
- Simulation 4.1.6 Lab: Explore Packets and Frames
- Simulation 4.1.7 Lab: Explore ARP in Wireshark
- Quiz 4.1.8 Section Quiz

Section 4.2 IP Version 4 Addressing

- Text 4.2.1 IPv4 Address Format
- Text 4.2.2 Network Masks
- Text 4.2.3 Subnet Masks
- Text 4.2.4 Host Address Ranges
- Text 4.2.5 Default Gateway
- Text 4.2.6 Broadcast Addresses
- Text 4.2.7 IP Interface Configuration in Windows
- Text 4.2.8 IP Interface Configuration in Linux
- Simulation 4.2.9 Lab: Configure IP Addresses
- Simulation 4.2.10 Lab: Configure IP Addresses on Mobile Devices
- Simulation 4.2.11 Lab: Configure IP Addresses on Linux
- Quiz 4.2.12 Section Quiz

Section 4.3 IP Version 4 Subnetting

- Text 4.3.1 Classful Addressing
- Text 4.3.2 Public vs Private Addressing
- Text 4.3.3 Other Reserved Address Ranges
- Text 4.3.4 IPv4 Address Scheme Design
- Text 4.3.5 Classless Inter-Domain Routing
- Text 4.3.6 Variable Length Subnet Masks
- Simulation 4.3.7 Lab: Configure IP Networks and Subnets
- Quiz 4.3.8 Section Quiz

Section 4.4 IP Troubleshooting Tools

- Text 4.4.1 ipconfig
- Text 4.4.2 ifconfig and ip
- Text 4.4.3 arp
- Text 4.4.4 ping
- Simulation 4.4.5 Lab: IPv4 Troubleshooting Tools
- Simulation 4.4.6 Lab: IPv4 Troubleshooting Tools for Linux
- Simulation 4.4.7 Lab: Use IPv4 Test Tools
- Quiz 4.4.8 Section Quiz

Section 4.5 IP Version 6

- Text 4.5.1 IPv4 vs IPv6
- Text 4.5.2 IPv6 Address Format
- Text 4.5.3 IPv6 Network Prefixes
- Text 4.5.4 IPv6 Unicast Addressing

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Text 4.5.5 IPv6 Link Local Addressing
Text 4.5.6 IPv6 Multicast and Anycast Addressing
Text 4.5.7 IPv4 and IPv6 Transition Mechanisms
Text 4.5.8 Common IPv6 Address Prefixes
Simulation 4.5.9 Lab: Configure an IPv6 Address
Quiz 4.5.10 Section Quiz

Section 4.6 IP Troubleshooting

Text 4.6.1 IP Configuration Issues
Text 4.6.2 Duplicate IP and MAC Address Issues
Text 4.6.3 IP Forwarding Issues
Simulation 4.6.4 Lab: Use ping and tracert on Windows
Simulation 4.6.5 Lab: Use ping and traceroute on Linux
Simulation 4.6.6 Lab: Assisted Troubleshooting 1
Simulation 4.6.7 Lab: Assisted Troubleshooting 2
Simulation 4.6.8 Lab: Assisted Troubleshooting 3
Quiz 4.6.9 Section Quiz
Test 4.7 Module Test

Week 5 Assignments

Module 5.0 Configuring Routing and Advanced Switching

Section 5.1 Routing Technologies

Text 5.1.1 Routing Tables and Path Selection
Text 5.1.2 Static and Default Routes
Text 5.1.3 Routing Table Example
Text 5.1.4 Packet Forwarding
Text 5.1.5 Fragmentation
Text 5.1.6 Router Configuration
Text 5.1.7 Routing Table Tools
Text 5.1.8 tracert and traceroute
Simulation 5.1.9 Lab: Install an Enterprise Router
Simulation 5.1.10 Lab: Cisco Troubleshooting Tools
Quiz 5.1.11 Section Quiz

Section 5.2 Dynamic Routing Technologies

Text 5.2.1 Dynamic Routing Protocols
Text 5.2.2 Routing Information Protocol
Text 5.2.3 Enhanced Interior Gateway Routing Protocol
Text 5.2.4 Open Shortest Path First
Text 5.2.5 Border Gateway Protocol
Text 5.2.6 Route Selection
Quiz 5.2.7 Section Quiz

Section 5.3 Network Address Translation

Text 5.3.1 Edge Routers
Text 5.3.2 Network Address Translation Types
Text 5.3.3 Port Address Translation

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Simulation 5.3.4 Lab: Configure NAT
Quiz 5.3.5 Section Quiz

Section 5.4 Firewalls

Text 5.4.1 Firewall Uses and Types
Text 5.4.2 Firewall Selection and Placement
Quiz 5.4.3 Section Quiz

Section 5.5 Enterprise Network Topologies

Text 5.5.1 Hybrid Topology
Text 5.5.2 Three-Tiered Network Hierarchy
Quiz 5.5.3 Compare Three-Tier Hierarchical Model
Simulation 5.5.4 Lab: Create a Three-Tier Network
Quiz 5.5.5 Section Quiz

Section 5.6 Virtual LANs

Text 5.6.1 Virtual LANs and Subnets
Text 5.6.2 Virtual LAN IDs and Membership
Text 5.6.3 Trunking and IEEE 802.1Q
Text 5.6.4 Tagged and Untagged Ports
Text 5.6.5 Voice VLANs
Text 5.6.6 Default VLAN and Native VLAN
Text 5.6.7 VLAN Routing
Simulation 5.6.8 Lab: Configure Switch IP and VLAN - GUI
Simulation 5.6.9 Lab: Create VLANs - GUI
Simulation 5.6.10 Lab: Configure Trunking
Simulation 5.6.11 Lab: Configure Switch IP Settings - CLI
Simulation 5.6.12 Lab: Configure Management VLAN Settings - CLI
Quiz 5.6.13 Section Quiz

Section 5.7 Routing and VLAN Troubleshooting

Text 5.7.1 Routing Table Issues
Text 5.7.2 Default Route and Routing Loop Issues
Text 5.7.3 VLAN Assignment Issues
Quiz 5.7.4 Section Quiz
Test 5.8 Module Test

Week 6 Assignments

Module 6.0 Implementing Network Services

Section 6.1 Transport and Application Layer Protocols

Text 6.1.1 Transport Layer Ports and Connections
Text 6.1.2 Transmission Control Protocol
Text 6.1.3 TCP Handshake and Teardown
Text 6.1.4 User Datagram Protocol
Text 6.1.5 netstat
Text 6.1.6 Common TCP and UDP Ports
Simulation 6.1.7 Lab: Explore Three-Way Handshake in Wireshark

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Simulation 6.1.8 Lab: View Open Ports with netstat

Quiz 6.1.9 Section Quiz

Section 6.2 Dynamic Host Configuration Protocol

Text 6.2.1 DHCP Process

Text 6.2.2 DHCP Server Configuration

Text 6.2.3 DHCP Options

Text 6.2.4 DHCP Reservations and Exclusions

Simulation 6.2.5 Lab: Configure a DHCP Server

Simulation 6.2.6 Lab: Configure DHCP Server Options

Simulation 6.2.7 Lab: Create DHCP Exclusions

Simulation 6.2.8 Lab: Create DHCP Client Reservations

Video 6.2.9 Configure Client Addressing

Simulation 6.2.10 Lab: Configure Client Addressing for DHCP

Quiz 6.2.11 Section Quiz

Section 6.3 APIPA and SLAAC

Text 6.3.1 Automatic Private IP Addressing

Text 6.3.2 IPv6 Interface Autoconfiguration and Testing

Text 6.3.3 DHCPv6 Server Configuration

Simulation 6.3.4 Lab: Explore APIPA Addressing

Simulation 6.3.5 Lab: Explore APIPA Addressing in Network Modeler

Video 6.3.6 Set Up Alternate Addressing

Quiz 6.3.7 Section Quiz

Section 6.4 DHCP Relay and Troubleshooting

Text 6.4.1 DHCP Relay and IP Helper

Text 6.4.2 DHCP Issues

Video 6.4.3 Troubleshooting DHCP Exhaustion

Simulation 6.4.4 Lab: Configure a DHCP Relay Agent

Simulation 6.4.5 Lab: Add a DHCP Server on Another Subnet

Simulation 6.4.6 Lab: Troubleshoot Address Pool Exhaustion

Simulation 6.4.7 Lab: Explore DHCP Troubleshooting

Simulation 6.4.8 Lab: Troubleshoot IP Configuration 1

Simulation 6.4.9 Lab: Troubleshoot IP Configuration 2

Simulation 6.4.10 Lab: Troubleshoot IP Configuration 3

Quiz 6.4.11 Section Quiz

Section 6.5 Domain Name System

Text 6.5.1 Host Names and Domain Names

Text 6.5.2 DNS Hierarchy

Text 6.5.3 Name Resolution Using DNS

Text 6.5.4 Resource Record Types

Text 6.5.5 Host Address and Canonical Name Records

Text 6.5.6 Mail Exchange, Service, and Text Records

Text 6.5.7 Pointer Records

Text 6.5.8 DNS Server Configuration

Text 6.5.9 Internal vs External DNS

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Text 6.5.10 DNS Security
Simulation 6.5.11 Lab: Configure DNS Addresses
Simulation 6.5.12 Lab: Create Standard DNS Zones
Simulation 6.5.13 Lab: Create Host Records
Simulation 6.5.14 Lab: Create CNAME Records
Simulation 6.5.15 Lab: Troubleshoot DNS Records
Video 6.5.16 Configuring DNS Caching on Linux
Quiz 6.5.17 Section Quiz

Section 6.6 DNS Troubleshooting

Text 6.6.1 Client DNS Issues
Text 6.6.2 Name Resolution Issues
Text 6.6.3 nslookup
Text 6.6.4 dig
Simulation 6.6.5 Lab: Explore nslookup
Simulation 6.6.6 Lab: Use nslookup
Quiz 6.6.7 Section Quiz

Test 6.7 Module Test
Test 6.8 Checkpoint Review Test

Week 7 Assignments

Module 7.0 Explaining Application Services

Section 7.1 Application Security and Time Synchronization

Text 7.1.1 Transport Layer Security
Text 7.1.2 Network Time Protocol
Text 7.1.3 Precision Time Protocol
Simulation 7.1.4 Lab: Configure NTP on Linux
Quiz 7.1.5 Section Quiz

Section 7.2 Web, File, Print, and Database Services

Text 7.2.1 Hyper Text Transfer Protocol
Text 7.2.2 HTTP Secure
Text 7.2.3 File Transfer Protocol
Text 7.2.4 Secure File Transfer Protocol
Text 7.2.5 Server Message Block
Text 7.2.6 Network Attached Storage
Text 7.2.7 Database Services
Simulation 7.2.8 Lab: Scan for Web Services with Nmap
Quiz 7.2.9 Section Quiz

Section 7.3 Email and Voice Services

Text 7.3.1 Simple Mail Transfer Protocol
Text 7.3.2 Internet Message Access Protocol
Text 7.3.3 Voice and Video Services
Text 7.3.4 VoIP Protocols
Text 7.3.5 VoIP Phones

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Simulation 7.3.6 Lab: Connect VoIP 1
Simulation 7.3.7 Lab: Connect VoIP 2
Quiz 7.3.8 Section Quiz

Section 7.4 Disaster Recovery and High Availability

Text 7.4.1 Disaster Recovery Concepts
Text 7.4.2 Disaster Recovery Metrics
Text 7.4.3 Disaster Recovery Sites
Text 7.4.4 Fault Tolerance and Redundancy
Text 7.4.5 Load Balancers
Text 7.4.6 High Availability Clusters
Text 7.4.7 First Hop Redundancy
Simulation 7.4.8 Lab: Configure NIC Teaming
Quiz 7.4.9 Section Quiz
Test 7.5 Module Test

Week 8 Assignments

Module 8.0 Supporting Network Management

Section 8.1 Organizational Policies and Documentation

Text 8.1.1 Configuration Management
Text 8.1.2 Network Device Backup Management
Text 8.1.3 Change Management
Text 8.1.4 Asset Inventory Documentation
Text 8.1.5 Lifecycle Management
Text 8.1.6 Decommissioning
Text 8.1.7 Physical Network Diagrams
Text 8.1.8 Logical Network Diagrams
Text 8.1.9 IP Address Management
Text 8.1.10 Common Agreements
Simulation 8.1.11 Lab: Update Firmware
Quiz 8.1.12 Section Quiz

Section 8.2 Host Discovery and Monitoring

Text 8.2.1 Network Discovery
Text 8.2.2 Nmap
Text 8.2.3 Nmap Port Scanning
Text 8.2.4 Discovery Protocols
Text 8.2.5 Performance Monitoring
Text 8.2.6 Availability Monitoring
Text 8.2.7 Configuration Monitoring
Simulation 8.2.8 Lab: Scan Using Zenmap
Quiz 8.2.9 Section Quiz

Section 8.3 Simple Network Management Protocol

Text 8.3.1 SNMP Agents and Monitors
Text 8.3.2 SNMP Security
Video 8.3.3 Configuring an SNMP System on a Router

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Video 8.3.4 Monitoring a Switch with SNMP

Video 8.3.5 Configuring SNMP Trap

Quiz 8.3.6 Section Quiz

Section 8.4 Event Management

Text 8.4.1 Network Device Logs

Text 8.4.2 Log Collectors and Syslog

Text 8.4.3 Event Prioritization and Alerting

Text 8.4.4 Security Information and Event Management

Text 8.4.5 Log Reviews

Simulation 8.4.6 Lab: Configure Logging in pfSense

Simulation 8.4.7 Lab: Evaluate Event Logs in pfSense

Simulation 8.4.8 Lab: Auditing Device Logs on a Cisco Switch

Simulation 8.4.9 Lab: Configure Logging on Linux

Simulation 8.4.10 Lab: View Event Logs

Quiz 8.4.11 Section Quiz

Section 8.5 Packet Capture and Analysis

Text 8.5.1 Packet Capture

Text 8.5.2 tcpdump

Text 8.5.3 Protocol Analyzers

Video 8.5.4 Using Wireshark to Troubleshoot Network Issues

Simulation 8.5.5 Lab: Troubleshoot with Wireshark

Simulation 8.5.6 Lab: Configure Port Mirroring

Quiz 8.5.7 Section Quiz

Section 8.6 Traffic Monitoring

Text 8.6.1 Common Performance Issues

Text 8.6.2 Interface Statistics

Text 8.6.3 Flow Data

Text 8.6.4 Traffic Testing Tools

Text 8.6.5 Bandwidth Management

Text 8.6.6 Traffic Shaping

Simulation 8.6.7 Lab: Configure QoS

Video 8.6.8 Monitoring Interface Statistics

Quiz 8.6.9 Section Quiz

Test 8.7 Module Test

Week 9 Assignments

Module 9.0 Explaining Network Security Concepts

Section 9.1 Security Concepts

Text 9.1.1 Common Security Terminology

Text 9.1.2 Security Audits and Assessments

Text 9.1.3 Regulatory Compliance

Text 9.1.4 Encryption

Text 9.1.5 Vulnerability and Exploit Types

Text 9.1.6 Deception Technologies

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Simulation 9.1.7 Lab: Create a Honeypot
Quiz 9.1.8 Section Quiz

Section 9.2 Network Threats and Attacks

Text 9.2.1 Threat Types and Assessment
Text 9.2.2 Attack Types
Text 9.2.3 Distributed DoS Attacks and Botnets
Text 9.2.4 Malware Attacks
Simulation 9.2.5 Lab: Analyze a DoS Attack
Simulation 9.2.6 Lab: Analyze a DDoS Attack
Quiz 9.2.7 Section Quiz

Section 9.3 Spoofing Attacks

Text 9.3.1 On-Path Attacks
Video 9.3.2 Performing an On-Path DHCP Attack
Video 9.3.3 Poison ARP
Text 9.3.4 MAC Flooding Attack
Video 9.3.5 Using SMAC to Spoof MAC Addresses
Text 9.3.6 VLAN Hopping Attacks
Simulation 9.3.7 Lab: Poison ARP and Analyze with Wireshark
Simulation 9.3.8 Lab: Spoof MAC Addresses with SMAC
Simulation 9.3.9 Lab: Perform a DHCP Spoofing On-Path Attack
Quiz 9.3.10 Section Quiz

Section 9.4 Rogue System Attacks

Text 9.4.1 Rogue Devices and Services
Text 9.4.2 Rogue DHCP
Video 9.4.3 Setting Up DHCP Snooping
Text 9.4.4 DNS Attacks
Video 9.4.5 Poisoning DNS
Simulation 9.4.6 Lab: Discover a Rogue DHCP Server
Simulation 9.4.7 Lab: Configure DHCP Snooping
Simulation 9.4.8 Lab: Poison DNS
Simulation 9.4.9 Lab: Analyze DNS Spoofing
Quiz 9.4.10 Section Quiz

Section 9.5 Social Engineering

Text 9.5.1 Social Engineering Attacks
Text 9.5.2 Password Attacks
Simulation 9.5.3 Lab: Respond to Social Engineering Exploits
Simulation 9.5.4 Lab: Crack a Password with John the Ripper
Quiz 9.5.5 Section Quiz
Test 9.6 Module Test
Test 9.7 Checkpoint Review

Week 10 Assignments

Module 10.0 Applying Network Security Features

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Section 10.1 Authentication

- Text 10.1.1 Access Control
- Text 10.1.2 Authentication Methods
- Text 10.1.3 Local Authentication
- Text 10.1.4 Single Sign-On and Kerberos
- Text 10.1.5 Digital Certificates and PKI
- Text 10.1.6 Key Management
- Text 10.1.7 Federated Identity and SAML
- Text 10.1.8 Remote Authentication
- Quiz 10.1.9 Section Quiz

Section 10.2 Authorization and Account Management

- Text 10.2.1 Authorization and Role-Based Access Control
- Text 10.2.2 Privileged Access Management
- Text 10.2.3 Lightweight Directory Access Protocol
- Text 10.2.4 LDAP Secure
- Simulation 10.2.5 Lab: Manage Account Policies
- Quiz 10.2.6 Section Quiz

Section 10.3 Network Hardening

- Text 10.3.1 Defense in Depth
- Text 10.3.2 Device and Service Hardening
- Simulation 10.3.3 View Linux Services
- Video 10.3.4 Scanning for Unsecure Protocols
- Simulation 10.3.5 Lab: Scan for Unsecure Protocols
- Simulation 10.3.6 Lab: Enable and Disable Linux Services
- Simulation 10.3.7 Lab: Disable Network Service
- Quiz 10.3.8 Section Quiz

Section 10.4 Switch Security

- Text 10.4.1 Network Access Control and Port Security
- Simulation 10.4.2 Lab: Secure Access to a Switch
- Simulation 10.4.3 Lab: Secure Access to a Switch 2
- Simulation 10.4.4 Lab: Disable Switch Ports - GUI
- Text 10.4.5 Extensible Authentication Protocol and IEEE 802.1X
- Text 10.4.6 Port Guards
- Simulation 10.4.7 Lab: Harden a Switch
- Text 10.4.8 Port Mirroring
- Quiz 10.4.9 Section Quiz

Section 10.5 Network Security Rules

- Text 10.5.1 Security Rules and ACL Configuration
- Text 10.5.2 Proxy Servers
- Text 10.5.3 Content Filtering
- Text 10.5.4 Misconfigured Firewall and ACL Issues
- Video 10.5.5 Creating Firewall ACLs
- Simulation 10.5.6 Lab: Configure Network Security Appliance Access
- Simulation 10.5.7 Lab: Configure a Security Appliance
- Simulation 10.5.8 Lab: Configure a Perimeter Firewall

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Simulation 10.5.9 Lab: Restrict Telnet and SSH Access
Simulation 10.5.10 Lab: Permit Traffic
Simulation 10.5.11 Lab: Block Source Hosts
Quiz 10.5.12 Section Quiz
Test 10.6 Module Test

Week 11 Assignments

Module 11.0 Supporting Network Security Design

Section 11.1 Zone-based Security

Text 11.1.1 Network Security Zones
Video 11.1.2 Configuring a Screened Subnet
Text 11.1.3 Perimeter Networks
Text 11.1.4 Screened Subnets
Simulation 11.1.5 Lab: Configure a Screened Subnet (DMZ)
Simulation 11.1.6 Lab: Configure Screened Subnets
Text 11.1.7 Intrusion Detection and Prevention Systems
Video 11.1.8 Implementing Intrusion Detection and Prevention
Simulation 11.1.9 Lab: Implement Intrusion Prevention
Quiz 11.1.10 Section Quiz

Section 11.2 Internet of Things

Text 11.2.1 IoT Devices
Text 11.2.2 Industrial Embedded Systems
Text 11.2.3 IoT Networks
Text 11.2.4 IoT Network Security
Simulation 11.2.5 Lab: Scan for IoT Devices
Quiz 11.2.6 Section Quiz

Section 11.3 Physical Security

Text 11.3.1 Locks
Text 11.3.2 Cameras
Text 11.3.3 Geofencing
Simulation 11.3.4 Lab: Implement Physical Security
Quiz 11.3.5 Section Quiz
Test 11.4 Module Quiz Module Test

Week 12 Assignments

Module 12.0 Configuring Wireless Networks

Section 12.1 Wireless Concepts and Standards

Text 12.1.1 IEEE 802.11 Wireless Standards
Text 12.1.2 IEEE 802.11a and 5GHz Channel Bandwidth
Text 12.1.3 IEEE 802.11b/g and 2.4GHz Channel Bandwidth
Text 12.1.4 IEEE 802.11n, MIMO, and Channel Bonding
Text 12.1.5 Wi-Fi 5 and Wi-Fi 6
Text 12.1.6 Multiuser MIMO and Band Steering
Text 12.1.7 Cellular Technologies
Text 12.1.8 Satellite Technologies

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Simulation 12.1.9 Lab: Configure Wireless Profiles

Exam 12.1.10 Section Quiz

Section 12.2 Enterprise Wireless Network Design

Text 12.2.1 Infrastructure Network Type

Text 12.2.2 Range and Signal Strength

Text 12.2.3 Wireless Surveys and Heat Maps

Text 12.2.4 Wireless Roaming

Text 12.2.5 Wireless Controllers

Text 12.2.6 Antenna Types

Text 12.2.7 Other Wireless Network Types

Simulation 12.2.8 Lab: Design an Indoor Wireless Network

Simulation 12.2.9 Lab: Design an Outdoor Wireless Network

Simulation 12.2.10 Lab: Implement an Enterprise Wireless Network

Exam 12.2.11 Section Quiz

Section 12.3 Wireless Security

Text 12.3.1 Wi-Fi Encryption Standards

Text 12.3.2 Personal Authentication

Text 12.3.3 Enterprise Authentication

Text 12.3.4 Guest Networks and Captive Portals

Text 12.3.5 Bring Your Own Device Issues

Text 12.3.6 Wireless Network Attacks

Simulation 12.3.7 Lab: Configure a Captive Portal

Simulation 12.3.8 Lab: Create a Guest Network for BYOD

Simulation 12.3.9 Lab: Secure an Enterprise Wireless Network

Simulation 12.3.10 Lab: Secure a Home Wireless Network

Simulation 12.3.11 Lab: Enable Wireless Intrusion Prevention

Exam 12.3.12 Section Quiz

Section 12.4 Wireless Troubleshooting

Text 12.4.1 Wireless Performance Assessment

Text 12.4.2 Insufficient Wireless Coverage Issues

Text 12.4.3 Channel Overlap Issues

Text 12.4.4 Interference Issues

Text 12.4.5 Roaming and Client Disassociation Issues

Text 12.4.6 Overcapacity Issues

Simulation 12.4.7 Lab: Explore Wireless Network Problems

Simulation 12.4.8 Lab: Troubleshoot Wireless Network Problems

Simulation 12.4.9 Lab: Optimize a Wireless Network

Exam 12.4.10 Section Quiz

Test 12.5 Module Test

Test 12.6 Checkpoint Review

Week 13 Assignments

Module 13.0 Comparing Remote Access Methods

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Section 13.1 WAN and Internet Connectivity

Text 13.1.1 Wide Area Networks and the OSI Model
Text 13.1.2 Internet Access Types
Text 13.1.3 Fiber to the Curb and Fiber to the Premises
Quiz 13.1.4 Section Quiz

Section 13.2 Virtual Private Networks

Text 13.2.1 Remote Access Considerations
Text 13.2.2 Tunneling Protocols
Text 13.2.3 Internet Protocol Security
Text 13.2.4 Internet Key Exchange
Text 13.2.5 Client-to-Site VPNs
Text 13.2.6 Clientless VPNs
Text 13.2.7 Site-to-Site VPNs
Simulation 13.2.8 Lab: Configure a Remote Access VPN
Simulation 13.2.9 Lab: Configure an iPad VPN Connection
Simulation 13.2.10 Lab: Configure a RADIUS Solution
Quiz 13.2.11 Section Quiz

Section 13.3 Remote Management

Text 13.3.1 Remote Host Access
Text 13.3.2 Secure Shell
Text 13.3.3 Telnet
Text 13.3.4 Remote Desktop Protocol
Text 13.3.5 Console Connections and Out-of-Bound Management
Text 13.3.6 Jump Boxes
Text 13.3.7 API Connection Methods
Simulation 13.3.8 Lab: Allow Remote Desktop Connections
Simulation 13.3.9 Lab: Use PowerShell Remote
Quiz 13.3.10 Section Quiz
Test 13.4 Module Test

Week 14 Assignments

Module 14.0 Summarizing Cloud Concepts

Section 14.1 Datacenter and Storage Networks

Text 14.1.1 Data Center Network Design
Text 14.1.2 Spine and Leaf Topology
Text 14.1.3 Storage Area Networks
Text 14.1.4 Fibre Channel
Simulation 14.1.5 Lab: Configure an iSCSI Target
Simulation 14.1.6 Lab: Configure an iSCSI Initiator
Quiz 14.1.7 Section Quiz

Section 14.2 Cloud Concepts

Text 14.2.1 Cloud Scalability and Elasticity
Text 14.2.2 Cloud Deployment Models
Text 14.2.3 Cloud Service Models

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Text 14.2.4 Content Delivery Networks

Quiz 14.2.5 Section Quiz

Section 14.3 Cloud Networking

Text 14.3.1 Cloud Instances

Text 14.3.2 Virtual Private Clouds

Text 14.3.3 Cloud Gateways

Text 14.3.4 Cloud Connectivity Options

Text 14.3.5 Cloud Firewall Security

Text 14.3.6 Security Groups and Security Lists

Quiz 14.3.7 Section Quiz

Section 14.4 Modern Network Environments

Text 14.4.1 Infrastructure as Code

Text 14.4.2 Uses for Infrastructure as Code

Text 14.4.3 Source Control

Text 14.4.4 Software-Defined Networking

Text 14.4.5 Software-Defined WAN

Text 14.4.6 Overlay Networks

Text 14.4.7 Zero Trust Architecture

Text 14.4.8 Secure Access Service Edge

Quiz 14.4.9 Section Quiz

Test 14.5 Module Test

Week 15 Assignments

Module B.1 - Prepare for CompTIA Network+ Certification

Section B.1 - Prepare for CompTIA Network+ Certification

B.1.1 - Why Should I Take a Certification Exam?

B.1.2 - Exam Details for CompTIA Network+ N10-009

B.1.3 - Exam Objectives for CompTIA Network+ N10-009

B.1.4 - Course Mapping with CompTIA Network+ N10-009 Exam Objectives

B.1.5 - How to Take the Certification Exam

B.1.6 - Tips for Taking the Certification Exam

Section B.2 - CompTIA Network+ N10-009 Practice Materials

Test B.2.1 - Exam Practice 1: Networking Concepts Preparation Test

PROTIP: Use the CHECK MY ANSWER (Optional) Link If you get stuck on a question. The Test is of your preparation skills for the exam.

Test B.2.2 - Exam Practice 2: Network Implementations Preparation Test

PROTIP: Use the CHECK MY ANSWER (Optional) Link If you get stuck on a question. The Test is of your preparation skills for the exam.

Test B.2.3 - Exam Practice 3: Network Operations Preparation Test

PROTIP: Use the CHECK MY ANSWER (Optional) Link If you get stuck on a question. The Test is of your preparation skills for the exam.

Test B.2.4 - Exam Practice 4: Network Security Preparation Test

PROTIP: Use the CHECK MY ANSWER (Optional) Link If you get stuck on a question. The Test is of your preparation skills for the exam.

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Test B.2.5 - Exam Practice 5: Network Troubleshooting Preparation Test

PROTIP: Use the CHECK MY ANSWER (Optional) Link If you get stuck on a question. The Test is of your preparation skills for the exam.

Week 16 Assignments

Test B.2.6 - Skills Demonstration Final Exam 1 of 2

B.2.6 - Skills Demonstration Final Exam 1 of 2

Test B.2.7 - Final Exam 2

B.2.7 - Final Exam 2 of 2

Week 16 Discussion Post (Final Thoughts)