Networking Academy

Networking Basics

Scope and Sequence

Version 1.0

Contents

Target Audience

The Networking Basics course is appropriate for learners with a high school reading proficiency, basic computer literacy, and interest in pursuing an entry-level IT job.

Prerequisites

There are no prerequisites for this course.

Certification Alignment

This course, from the Cybersecurity Career Path which aligns with the CCST Cybersecurity certification (formerly known as IT Specialist Cybersecurity certification from Certiport).

Course Description

Networking Basics teaches the fundamentals of networking by covering basic concepts and skills needed to set up and manage a small office or home office (SOHO) network. The learner is presented with an engaging and exploratory view of networks, the devices that comprise them, how they work, and basic troubleshooting tools and techniques. The course has many features that help learners better comprehend these concepts:

- Rich multimedia content, including interactive activities, videos, games, and quizzes address a variety of learning styles stimulating learning and increasing knowledge retention.
- Packet Tracer simulation-based learning activities develop critical thinking abilities and complex problem-solving skills.
- Innovative assessments provide immediate feedback evaluating knowledge and acquired skills.
- Technical concepts are explained using language that works well for learners at all levels. Embedded interactive activities breaks-up reading large content blocks and reinforces understanding.
- The course emphasizes applied skills and encourages learners to continue a networking education.

Course Objectives

Networking Basics provides an engaging, exploratory view of networks, including the internet. The online course material assists learners communicate their knowledge and can develop their desire to specialize in networking-related professions. Upon completion of Networking Basics, learners can perform the following:

- Explain important concepts in network communication.
- Explain network types, components, and connections.
- Configure mobile devices for wireless access.
- Configure an integrated wireless router and wireless client to connect securely to the internet.
- Explain the importance of standards and protocols in network communications.
- Describe common network media.
- Explain how communication occurs on Ethernet networks.

- Explain the features of an IP address.
- Explain how IPv4 addresses are used in network communication and segmentation.
- Explain features of IPv6 addressing.
- Configure a DHCP server.
- Explain how routers connect networks together.
- Explain how ARP enables communication on a network.
- Create a fully connected LAN.
- Explain how clients access internet services.
- Explain the function of common application layer services.
- Use various tools to test and troubleshoot network connectivity.

Equipment Requirements

For the best learning experience, we recommend using a Personal Computer (PC) for the Cisco Packet Tracer activities.

Software

- Cisco Packet Tracer activities are designed to use Packet Tracer 8.1 or higher

Recommended PC Hardware Requirements

- Computer with either Windows (8.1, 10, 11), MacOS (10.14 or newer) or Ubuntu 20.04 LTS operating system, amd64(x86-64) CPU, 4 GB of free RAM, 10 GB of free disk space. (Not supported: macOS with a M1 CPU and Chromebooks)
- High speed internet access

Course Outline

Networking Basics provides a comprehensive introduction to the components, tools, protocols, and basic troubleshooting procedures critical for network operation.

Table 1 details the modules and associated competencies. Each module is an integrated unit of learning that consists of content, activities, and assessments that target a specific set of competencies. The size of the module depends on the depth of knowledge and skill needed to master the competency.

Table 1: Module Title and Objective

Module Title / Topic Title	Objective
Module 1 Communications in a Connected World	
1.0 Communications in a Connected World	Explain important concepts in network communication.
1.1 Network Types	Explain the concept of a network.
1.2 Data Transmission	Describe network data.

Module Title / Topic Title	Objective
1.3 Bandwidth and Throughput	Explain network transmission speed and capacity.
Module 2 Network Components, Types, and Connections	
2.0 Network Components, Types, and Connections	Explain network types, components, and connections.
2.1 Clients and Servers	Explain the roles of clients and servers in a network.
2.2 Network Components	Explain the roles of network infrastructure devices.
2.3 ISP Connectivity Options	Describe ISP connectivity options.
Module 3 Wireless and Mobile Networks	
3.0 Wireless and Mobile Networks	Configure mobile devices for wireless access.
3.1 Wireless Networks	Describe the different types of networks used by cell phones and mobile devices.
3.2 Mobile Device Connectivity	Configure mobile devices for wireless connectivity.
Module 4 Build a Home Network	
4.0 Build a Home Network	Configure an integrated wireless router and wireless client to connect securely to the internet.
4.1 Home Network Basics	Describe the components required to build a home network.
4.2 Network Technologies in the Home	Describe wired and wireless network technologies.
4.3 Wireless Standards	Describe Wi-Fi.
4.4 Set Up a Home Router	Configure wireless devices for secure communications.
Module 5 Communication Principles	
5.0 Communication Principles	Explain the importance of standards and protocols in network communications.
5.1 Communication Protocols	Describe network communication protocols.
5.2 Communication Standards	Describe network communication standards.
5.3 Network Communication Models	Compare the OSI and TCP/IP models.
5.0 Communication Principles	Explain the importance of standards and protocols in network communications.
Module 6 Network Media	
6.0 Network Media	Describe common network media.
6.1 Network Media Types	Describe common types of network cables.
Module 7 The Access Layer	
7.0 The Access Layer	Explain how communication occurs on Ethernet networks.
7.1 Encapsulation and the Ethernet Frame	Explain the process of encapsulation and Ethernet framing.
7.2 The Access Layer	Explain how to improve network communication at the access layer.

Module Title / Topic Title	Objective
Module 8 The Internet Protocol	
8.0 The Internet Protocol	Explain the features of an IP address.
8.1 Purpose of an IP Address	Explain the purpose of an IPv4 address.
8.2 The IPv4 Address Structure	Explain how IPv4 addresses and subnets are used together.
Module 9 IPv4 Addressing	
9.0 Introduction	Explain how IPv4 addresses are used in network communication and segmentation.
9.1 IPv4 Unicast, Broadcast, and Multicast	Compare the characteristics and uses of the unicast, broadcast and multicast IPv4 addresses.
9.2 Types of IPv4 Addresses	Explain public, private, and reserved IPv4 addresses.
9.3 Network Segmentation	Explain how subnetting segments a network to enable better communication.
Module 10 IPv6 Addressing	
10.0 IPv6 Addressing	Explain features of IPv6 addressing.
10.1 IPv4 Issues	Explain the need for IPv6 addressing.
10.2 IPv6 Addressing	Explain how to represent IPv6 addresses.
Module 11 Dynamic Addressing with DHCP	
11.1 Static and Dynamic Addressing	Configure a DHCP server.
11.2 DHCPv4 Configuration	Configure a DHCPv4 server to dynamically assign IPv4 addresses.
Module 12 Gateways to Other Networks	
12.0 Gateways to Other Networks	Explain how routers connect networks together.
12.1 Network Boundaries	Describe network boundaries.
12.2 Network Address Translation	Explain the purpose of Network Address Translation in small networks.
Module 13 Address Resolution	
13.0 Address Resolution	Explain how ARP enables communication on a network.
13.1 MAC and IP	Compare the roles of the MAC address and the IP address.
13.2 Broadcast Containment	Explain why it is important to contain broadcasts within a network.
Module 14 Routing Between Networks	
14.0 Routing Between Networks	Create a fully connected LAN.
14.1 The Need for Routing	Explain the need for routing.
14.2 The Routing Table	Explain how routers use tables
14.3 Create a LAN	Build a fully connected network.
Module 15 Transport Layer	

Module Title / Topic Title	Objective
15.0 Transport Layer	Explain how clients access internet services.
15.1 TCP and UDP	Compare TCP and UDP transport layer functions.
15.2 Port Numbers	Explain how TCP and UDP use port numbers.
Module 16 Application Layer Services	
16.0 Application Layer Services	Explain the function of common application layer services.
16.1 The Client Server Relationship	Explain client and server interaction.
16.2 Network Application Services	Describe common network applications.
16.3 Domain Name System	Describe DNS.
16.4 Web Clients and Servers	Describe HTTP and HTML.
16.5 FTP Clients and Servers	Describe FTP.
16.6 Virtual Terminals	Describe Telnet and SSH.
16.7 Email and Messaging	Describe email protocols.
Module 17 Network Testing Tools	
17.0 Network Testing Tools	Use various tools to test and troubleshoot network connectivity.
17.1 Troubleshooting Commands	Troubleshoot using network utilities.