

# Network Addressing and Basic Troubleshooting

Scope and Sequence

Version 1.0

# Contents

<b>Target Audience</b>	<b>3</b>
<b>Prerequisites</b>	<b>3</b>
<b>Certification Alignment</b>	<b>3</b>
<b>Course Description</b>	<b>3</b>
<b>Course Objectives</b>	<b>3</b>
<b>Equipment Requirements</b>	<b>4</b>
<b>Course Outline</b>	<b>4</b>

## Target Audience

The Network Addressing and Basic Troubleshooting course is designed for learners who want to enhance the knowledge and skills gained in courses Network Basics, and Network Devices and Initial Configuration.

## Prerequisites

While it is not required, it is recommended that learners complete the Network Basics course and the Network Devices and Initial Configuration course prior to this course or have equivalent knowledge.

## Certification Alignment

There are no certifications for this course.

## Course Description

Network Addressing and Basic Troubleshooting examines the Physical layer in depth, topologies at the Data Link layer, and basic routing at the Network layer. It dives deep into static and dynamic IPv4 and IPv6 addressing and address resolution. It then examines the components and functionality of Cisco switches and routers. The course introduces troubleshooting methodologies and examines how to troubleshoot some of the most common networking issues. Finally, the course ends with an overview of how to provide customer support. The course has many features to help learners comprehend these concepts:

- Rich multimedia content, including interactive activities, videos, games, and quizzes, addresses a variety of learning styles to help stimulate learning and increase knowledge retention.
- Labs and Cisco Packet Tracer simulation-based learning activities help develop critical thinking abilities and complex problem-solving skills.
- Innovative assessments provide immediate feedback to support the evaluation of knowledge and acquired skills.
- Technical concepts are explained using language that works well for learners at all levels.
- Embedded interactive activities break up reading of large content blocks and reinforce understanding.
- The course emphasizes applied skills, hands-on experience, and encourages learners to consider additional Networking education.
- Cisco Packet Tracer activities are designed for use with Packet Tracer 8.1.

## Course Objectives

Network Addressing and Basic Troubleshooting provides the learner with the knowledge and skills needed to get the most out of a CCNA program. The online course assists learners in communicating their knowledge and desire to specialize in networking-related professions.

The courses assist learners in developing skills, including:

- Understand how physical layer protocols, services, and network media support communications across data networks.

- Explain how media access control in the data link layer supports communication across physical and logical networks.
- Explain how routers use network layer protocols and services to enable end-to-end connectivity.
- Calculate an IPv4 subnetting scheme to efficiently segment a network.
- Implement an IPv6 addressing scheme.
- Explain how Neighbor Discovery enables communication on a network.
- Describe Cisco routers and switches.
- Troubleshoot basic network connectivity issues.

## Equipment Requirements

For the best learning experience, we recommend using a PC for the Packet Tracer Activities and

- 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

Network Addressing and Basic Troubleshooting provides a comprehensive overview of the lower network layers, network segmentation, IPv6 addressing and network troubleshooting. Table 1 below details the modules and their 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: Physical Layer	
1.0 Physical Layer	Explain how physical layer protocols, services, and network media support communications across data networks.
1.1 Purpose of the Physical Layer	Describe the purpose and functions of the physical layer in the network.
1.2 Physical Layer Characteristics	Describe characteristics of the physical layer.
1.3 Copper Cabling	Identify the basic characteristics of copper cabling.
1.4 UTP Cabling	Explain how UTP cable is used in Ethernet networks.
1.5 Fiber-Optic Cabling	Describe fiber-optic cabling and its main advantages over other media.

Module 2: Data Link Layer	
2.0 Data Link Layer	Explain how media access control in the data link layer supports communication across physical and logical networks.
2.1 Topologies	Compare the characteristics of physical and logical topologies.
2.2 Media Access Control Methods	Explain how devices access a LAN in order to send frames.
Module 3: Network Layer	
3.0 Network Layer	Explain how routers use network layer protocols and services to enable end-to-end connectivity.
3.1 How a Host Routes	Explain how network devices use routing tables to direct packets to a destination network.
3.2 Routing Tables	Explain the function of fields in the routing table of a router.
Module 4: IPv4 Addressing	
4.1 IPv4 Addressing	Calculate an IPv4 subnetting scheme to efficiently segment a network.
4.2 Subnet a /16 and a /8 Prefix	Calculate IPv4 subnets for a Slash 16 and Slash 8 prefix.
4.3 Subnet to Meet Requirements	Given a set of requirements for subnetting, implement an IPv4 addressing scheme.
4.4 Variable Length Subnet Masking	Explain how to create a flexible addressing scheme using variable length subnet masking (VLSM).
4.5 Structured Design	Implement a VLSM addressing scheme.
Module 5: IPv6 Addressing	
5.0 IPv6 Addressing	Implement an IPv6 addressing scheme.
5.1 IPv6 Address Types	Compare types of IPv6 network addresses.
5.2 GUA and LLA Static Configuration	Explain how to configure static global unicast and link-local IPv6 network addresses.
5.3 Dynamic Addressing for IPv6 GUAs	Explain how to configure global unicast addresses dynamically.
5.4 Dynamic Addressing for IPv6 LLAs	Configure link-local addresses dynamically.
5.5 IPv6 Multicast Addresses	Identify IPv6 addresses.
Module 6: IPv6 Neighbor Discovery	
6.0 IPv6 Neighbor Discovery	Explain how Neighbor Discovery enables communication on a network.

6.1 Neighbor Discovery Operation	Describe the operation of IPv6 neighbor discovery.
Module 7: Cisco Switches and Routers	
7.0 Cisco Switches and Routers	Describe Cisco routers and switches.
7.1 Cisco Switches	Describe Cisco LAN switches.
7.2 Switch Speeds and Forwarding Methods	Describe switch forwarding methods and port settings available on Layer 2 switch ports.
7.3 Switch Boot Process	Describe the Cisco LAN switch boot process.
7.4 Cisco Routers	Describe Cisco small business routers.
7.5 Router Boot Process	Describe the Cisco router boot process.
Module 8: Troubleshoot Common Network Problems	
8.0 Troubleshoot Common Network Problems	Troubleshoot basic network connectivity issues.
8.1 The Troubleshooting Process	Describe some of the approaches used to troubleshoot networks.
8.2 Physical Layer Problems	Describe the process of detecting physical layer problems.
8.3 Troubleshoot Wireless Issues	Troubleshoot a wireless network problem.
8.4 Common Internet Connectivity Issues	Explain common internet connectivity problems.
8.5 Customer Support	Explain how to use outside sources and internet resources for troubleshooting.