Module 2: Online Connections

Networking Essentials (NETESS)

Module Objectives

Module Title: Online Connections
Module Objective: Explain the basic requirements for getting online.

Topic Title	Topic Objective
Wireless Networks	Describe the different types of networks used by cell phones and mobile devices.
Local Network Connections	Describe the requirements for host connectivity.
Network Documentation	Explain the importance of network documentation.

2.1 Wireless Networks
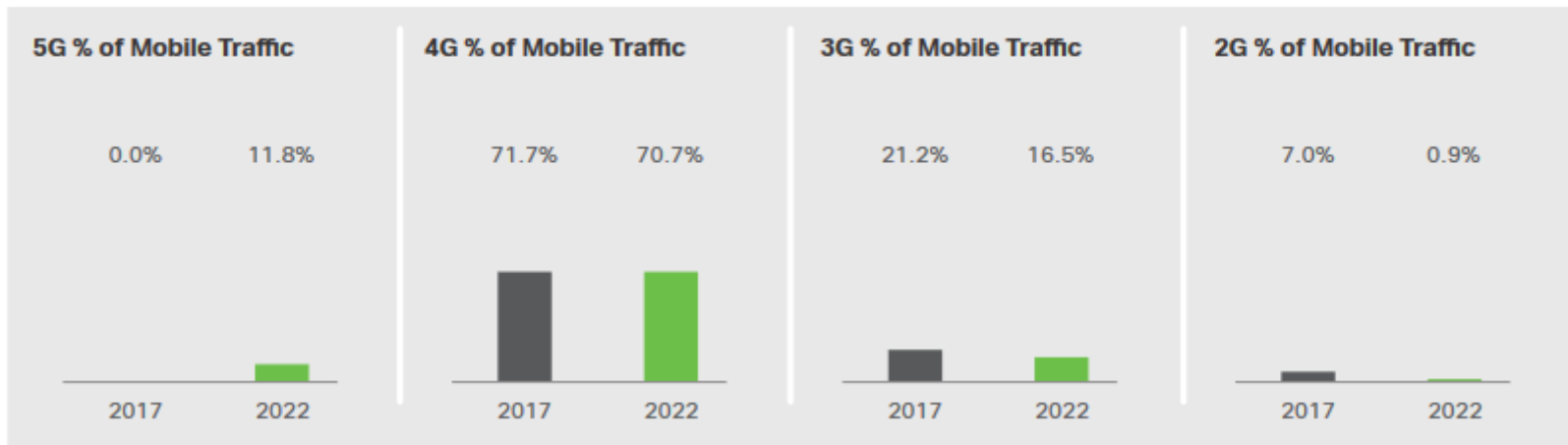
CISCO

Video - Types of Wireless Networks

Mobile Telephones

Did you know that most mobile phones can be connected to many different types of networks simultaneously?

Mobile phones use radio waves to transmit voice signals to antennas mounted on towers located in specific geographic areas. Mobile phones are often referred to as "cell phones" because the geographic area in which an individual tower can provide a signal to a phone is called a cell. When a telephone call is made, the voice signal is relayed from one tower to another tower until it is delivered to its destination. It is also used to send text messages directly from the phone.

Cell Phone Network

The abbreviations 3G, 4G, 4G-LTE, and 5G are used to describe enhanced cell phone networks that are optimized for the fast transmission of data. The "G" in these designations represents the word "generation," so 5G is the fifth generation of the cell network. The figure shows that 4G will continue to be the dominant source of global mobile traffic in 2022. However, 5G will use an increasingly larger portion.

5G % of Mobile Traffic		4G % of Mobile Traffic		3G % of Mobile Traffic		2G % of Mobile Traffic	
0.0%	11.8%	71.7%	70.7%	21.2%	16.5%	7.0%	0.9%
2017	2022	2017	2022	2017	2022	2017	2022

# Video - Cell Phone Interactions with Different Networks

Other Wireless Networks

The **GPS** uses satellites to transmit signals that cover the globe. The smart phone can receive these signals and calculate the phone's location to an accuracy of within 10 meters.

Wi-Fi transmitters and receivers located within the smartphone let the phone connect to local networks and the internet. To receive and send data on a Wi-Fi network, the phone needs to be within the range of the signal from a wireless network access point.
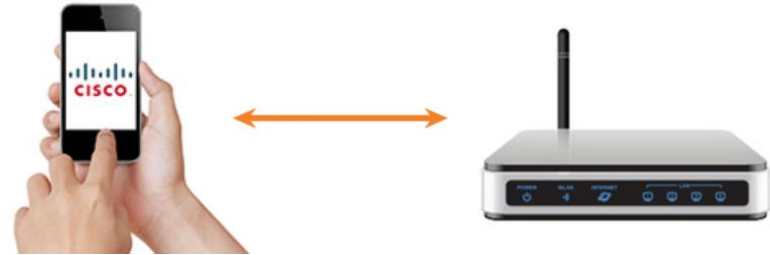
Other Wireless Networks (Cont.)

Bluetooth is wireless technology that allows devices to communicate over short distances. Because Bluetooth technology can be used to transmit both data and voice, it can be used to create small local networks.

NFC stands for near field communications. NFC is a wireless communication technology that enables data to be exchanged by devices that are in very close proximity to each other, usually less than a few centimeters.

2.2 Local Network Connections

Video - Types of Network Components

LAN Components

There are many components that can be part of a local area network (LAN). Some examples of network components are personal computers, servers, networking devices, and cabling. These components can be grouped into four main categories:

- **Hosts** - Hosts send and receive user traffic. A host is a generic name for most end-user devices. A host has an IP address. Examples of hosts are personal computers and network attached printers.
- **Peripherals** - Shared peripheral devices do not communicate directly on the network. Instead, peripherals rely on their connected host to perform all network operations. Examples of shared peripherals are cameras, scanners, and locally attached printers.
- **Network devices** - Networking devices connect other devices, mainly hosts. These devices move and control network traffic. Examples of network devices include hubs, switches, and routers.
- **Network media** - Network media provides connections between hosts and network devices. Network media can be wired, such as copper and fiber optic, or use wireless technologies.

# Video - Configure IP Addressing Information on Windows

End Device Addressing

To physically connect to a network, an end-user device must have a network interface card (NIC) and some configuration of the operating system so that the device can participate in the network. There are three parts to the IP configuration which must be correct for the device to send and receive information on the network:

- **IP address** - This identifies the host on the network.
- **Subnet mask** - This is used to identify the network on which the host is connected.
- **Default gateway** - This identifies the networking device that the host uses to access the internet or another remote network.
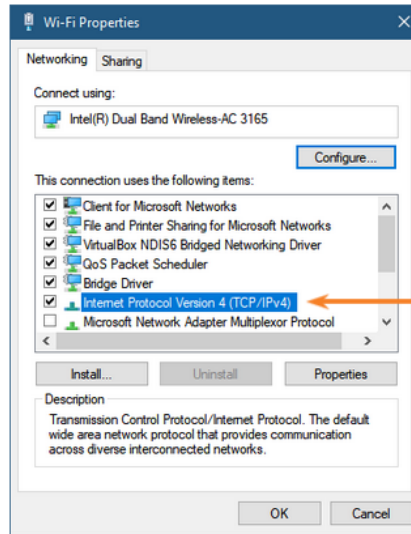
For manual static assignments, enter addresses:
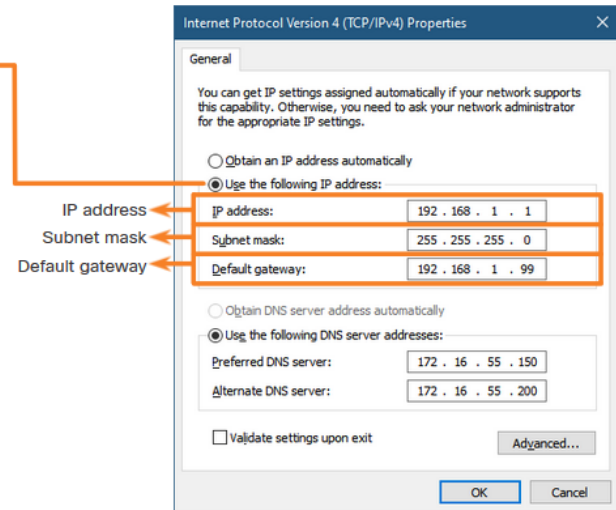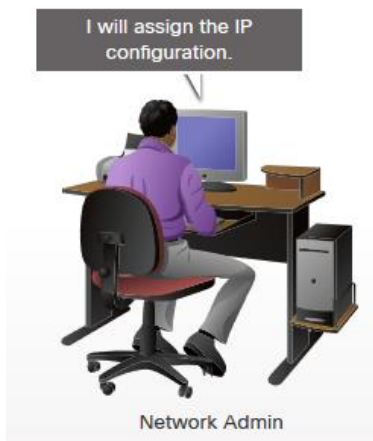
Video - Manual and Automatic Addressing

Manual and Automatic Address Assignment

With manual configuration, the required values are entered into the device by a network administrator. The IP address that is entered is referred to as a static address and must be unique on the network.

Manual IP Configuration

I will assign the IP configuration.

Network Admin

Most end-user devices can be set up to receive network configuration information dynamically. The device requests an address from a pool of addresses assigned by a Dynamic Host Configuration Protocol (DHCP) server located within the network.

Dynamic IP Configuration

I will assign the IP configuration.

Server

- IP address
- Subnet mask
- Default gateway

Host
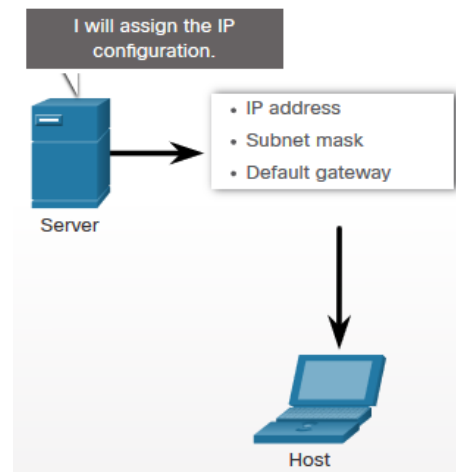
Lab - Determine the IP Address Configuration of a Computer

In this lab, you will determine the IP address assigned to your computer.

2.3 Network Documentation
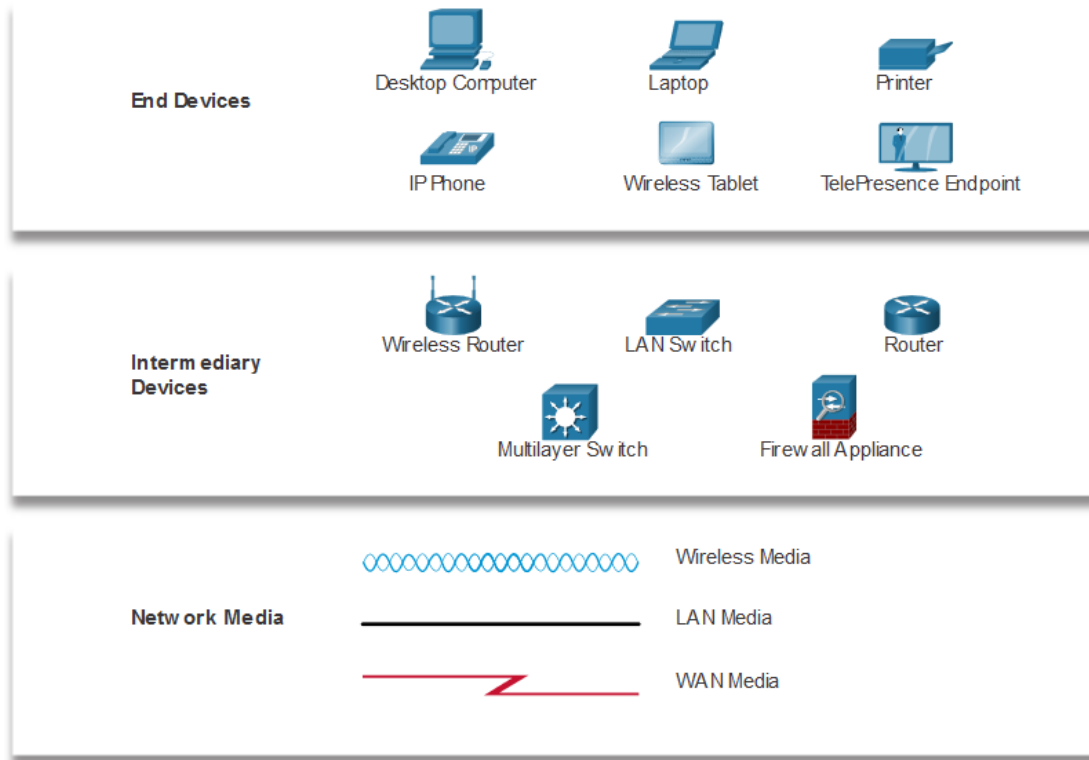
Device Names and Address Planning

The use of logical device naming and addressing conventions that are well documented can greatly simplify the task of training and network management and can help as well with troubleshooting when problems arise.
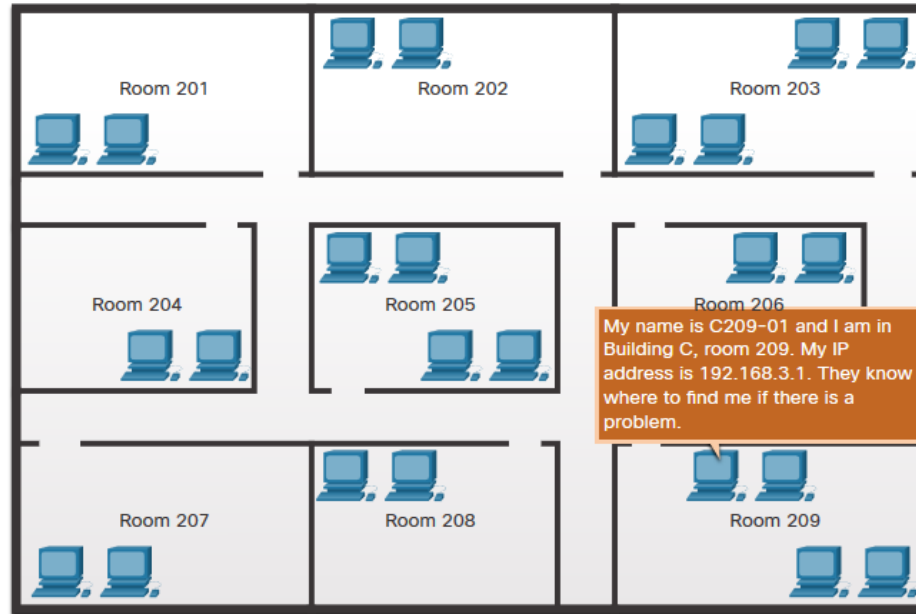
Building C - Second Floor

Network Topologies and Representations

The physical topology shows where the wiring is installed and the locations of the networking devices that connect the hosts. These diagrams use symbols or icons to represent the different devices and connections that make up a network.


End Devices

Desktop Computer   Laptop   Printer

IP Phone   Wireless Tablet   TelePresence Endpoint

Intermediary Devices

Wireless Router   LAN Switch   Router

Multilayer Switch   Firewall Appliance

Network Media

Wireless Media
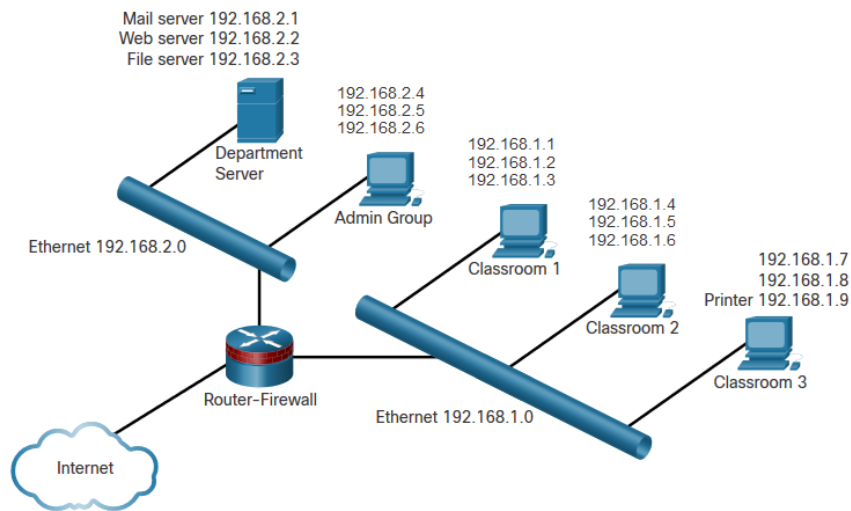
LAN Media

WAN Media

Video - Network Documentation

Logical Network Information

A physical topology shows how network devices connect.
A diagram called a logical topology illustrates the relevant network configuration information.
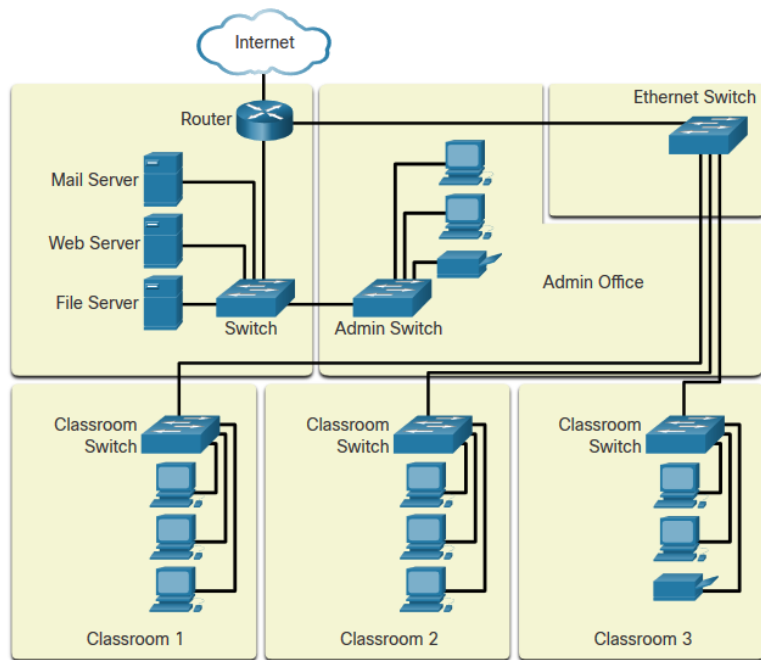
Physical Topology

Logical Topology

2.4 Online Connections Summary

What Did I Learn in this Module?

- Mobile phones use radio waves to transmit voice signals to antennas mounted on towers. Mobile phones are often referred to as "cell phones" because the geographic area in which an individual tower can provide a signal to a phone is called a cell.
- The abbreviations 3G, 4G, 4G-LTE, and 5G are used to describe enhanced cell phone networks that are optimized for the fast transmission of data. The "G" in these designations represents the word "generation," so 5G is the fifth generation of the cell network.
- The GPS uses satellites to transmit signals that cover the globe.
- Wi-Fi transmitters and receivers located within the smartphone let the phone connect to local networks and the internet.
- **Bluetooth** is wireless technology that allows devices to communicate over short distances.
- **NFC** stands for near field communications.
- There are many components that can be part of a local area network (LAN). These components can be grouped into four main categories: hosts, peripherals, network devices, and network media.
- There are three parts to the IP configuration which must be correct for the device to send and receive information on the network: IP address, subnet mask, and default gateway.

What Did I Learn in this Module? (Cont.)

- With manual configuration, the required values are entered into the device by a network administrator. The address must be unique on the network.
- With automatic addressing, the device requests an address from a pool of addresses assigned by a Dynamic Host Configuration Protocol (DHCP) server located within the network.
- The use of logical device naming and addressing conventions that are well documented can greatly simplify the task of training and network management and can help as well with troubleshooting when problems arise.
- The physical topology uses symbols or icons, and shows where the wiring is installed and the locations of the networking devices that connect the hosts. Each object represents a physical device.
- A diagram called a logical topology illustrates the relevant network configuration information.

New Terms and Commands

- cell phone network
- GPS
- Wi-Fi
- Bluetooth
- NFC
- host
- peripheral
- network device
- Ethernet
- network interface card (NIC)
- Media Access Control (MAC) address
- network media

- IP address
- subnet mask
- default gateway
- DNS server
- manual IP configuration
- dynamic IP configuration
- Dynamic Host Configuration Protocol (DHCP)
- network topology
- physical topology
- logical topology