WIreless Networking Basics

**Lesson Description:** In this learning module, students will learn the differences between the different networks they are exposed to (WiFi, 4G, and Bluetooth), as well as the devices that can connect to them (computer, hotspots, access points, etc.). Different types of modems will be discussed such as DSL or cable modems.

**Prerequisite Knowledge:** Previous knowledge on IP addressing and MAC addressing.

**Length of Completion**: 60 minutes

**Level of Instruction:** High School or Middle school introductory level.

**Applicable First Principles &/or Concepts:**

**GenCyber First Principles**

Domain Separation Abstraction

Process Isolation Data Hiding

Resource Encapsulation Layering

Modularity Simplicity

Least Privilege Minimization

**GenCyber Cybersecurity Concepts**

**Defense in Depth** **Availability**

Confidentiality **Think Like an Adversary**

Integrity Keep it Simple

**Resources that are Needed:** To complete this lesson, the student will need a wireless router, an Ethernet cable, a computer with an Ethernet port, and a portable device (smart phone or pad).

**Accommodations Needed:** May need someone to read items that are on the screens if there is a visually impaired participant.

# learning outcomes

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* Identify the hardware required for a wireless network
* Explain the purpose of different types of wireless networks
* Compare the speed/throughput of different types of wireless networks
* Explain the advantages of a wireless network system
* Explain how to change the wireless card configuration on a computer
* Explain how a MAC address and IP address is used on a wireless network

# Lesson Details

**Interconnection:** Lays out foundations of wireless networking which will be referenced in a lesson on Thursday of this week. 4.1 Connecting Raspberry Pi to the Network.

**Assessment:** Post exercise discussions, Observations, Walk around.

**Extension Activities:** None

**Differentiated Learning Opportunities:**

# lesson 1.5

**Lesson 1.5 Details:**

**Warm Up:** “Airmail Me That Message”

Each table group will create paper airplanes with a message on the inside. Using the IP addresses created in a previous lesson, they will write the origination and destination IP addresses on the plane to send it to that person. The receiver will answer the question and send it back. A couple students will secretly be designated as “Hackers” and will try to intercept a couple of messages, and either change them and forward or completely destroy the message.

**Lesson:**

- Describe the Focused Activity:

1. Students will connect to a 4G hotspot device.

2. Students will join different wireless networks in the room

3. Participants will do an nmap scan on the network to show who is connected to the network

- Describe the Teacher Instruction:

30 minutes of lecture with a Power Point, supporting PDF materials, and through demonstration to explain all of the ways to connect a computer or device to a WiFi or 4G network. The participants will perform activities 1 through 3 in small groups, with multiple instructors in the room to assist. The following topics will be discussed.

A. Wireless network hardware

1. Wireless capability on a laptop/device

2. Wireless router (use examples from home)

3. Cable and DSL modems

4. Wireless access points

5. Wireless hotspots

B. Wireless network types

1. Wifi networks

2. 4G networks

3. Bluetooth networks

4. Comparing the speed of wireless networks

5. Data usage and restrictions on wireless networks

Acknowledgement: Lesson developed by Roger Spears, Tami Norris, Gary Border.