Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_ Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Wavelength VS Frequency

**Aim:** How can we describe the relationship between wavelength and frequency through modeling WiFi signal?

**Do now:** We use 5 GHz and 2.4 GHz frequency for our Wifi service. Based on the equation v= fλ, what is the wavelength for 5 GHz? What is the wavelength for 2.4 GHz? Based on the electromagnetic spectrum diagram, what kind of waves are they? (Be careful with the unit! GHz=gigaHertz MHz=megaHertz)

**Group work: Follow the structure below, please write a description of your group work.**

My group is the \_\_\_\_\_\_\_\_\_\_\_\_ (transmitter/receiver group). My group members are \_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Their duties are \_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. In this activity, we will …

**Procedure:**

1. The two groups in charge of the SDR receiver should check if the SDR receiver is attached to your computer and your antenna (400 MHz antenna).
2. Download the 1-4-Walkie-Talkie constellation.grc to have the program running in your computer.
3. Test if the program is running.
4. Pair up with a transmitter group and make sure to adjust your walkie-talkies to the same channel. (Make sure you are on the different channel with another transmitter-receiver pair).
5. Receiver group should stay at the end of the hallway and put the COSMOS toolkit on a flat surface. (This represents 0 meters.)
6. The transmitter should travel along a straight path, moving 5 meters away for every stop.
7. Push the button of the walkie-talkie for every stop and record the signal strength on the data table.
8. Repeat steps 6-7 until the distance reaches 50 meters.

|  |  |
| --- | --- |
| Distance (m) | Signal Strength (Db) |
| 0 |  |
| 5 |  |
| 10 |  |
| 15 |  |
| 20 |  |
| 25 |  |
| 30 |  |
| 35 |  |
| 40 |  |
| 45 |  |
| 50 |  |

Plot your data below to show the relationship between distance Vs signal strength (label your graph properly)



**Summary:**

1. What do you notice from the data? How can you explain the relationship between distance and signal strength.
2. How can you explain the relationship between frequency and wavelength, how would you think wavelength may affect the covering range?
3. Based on what you learned today, think about your wifi service at home. How can you implement what you learned today when you decide where to put your modem at home?