Post-Lab 5: LoRa

## What to submit?

Please use this document as a template, add your responses directly, and export it as a PDF to Gradescope. Each group should submit one post-lab.

**Group name:**

**Team member names:**

**Link to GitHub repository:**

## E. LoRaWAN Documentation

## **TASK: What is the largest payload which can be legally transmitted in the United States?**

1. **On SF7, SF8, SF9, SF10?**
2. **For one of the above calculations, “show your work” (i.e. write out the math you did, the assumptions you made, etc).**

**TASK: Think some about LoRa performance…**

1. Assume you are trying to transmit an 8-byte payload from [SIO](https://maps.app.goo.gl/GZ36SaFavRLV8hwn8) back to CSE. You do some testing using SF7, SF8, SF9, SF10 and find…
   1. **that SF10 is most reliable, why might that be?**
2. The data that SIO needs to upload has changed and now you have 20-bytes of data to send for each measurement…
   1. **How do you change your approach?  
      What considerations drive your decision?**
3. A new deployment requires you to transmit 4-byte payloads from the [Nobel Drive Trolley Station](https://maps.app.goo.gl/izWLs9uokri4t87t8) back to CSE. You again do some testing trying SF7–10 and find…
   1. **that SF7 is the most reliable, why might that be?**

## F. Basic Communication

**TASK: What LoRaWAN configurations did you choose?**

1. **Which channel are you communicating on?**
2. **Which data rate are you communicating with?**

**TASK: Demonstrate ability to communicate between two devices**

1. **Show me the terminal output from communication**
2. **Commit your lora-communication code to your shared repo**

## G. Range Testing

**TASK: How did you maximize range?**

1. **What configuration choices did you make to maximize your communication range?**
2. **Commit your lora-range code to your shared repo**

**TASK: What is the maximum range you achieved?**

1. **Include an estimate in meters**
2. **A picture of a map seems like it would be helpful here**

**TASK: Include a graph/table of the signal strength as the distance changes**

## H. Signal Scavenger Hunt

**TASK: Find the signal with the message for your group**

1. **Which channel are we transmitting your group’s message on? (make sure this is the channel with the strongest RSSI, if you see multiple) Record the actual frequency, so we know we’re talking about the same thing.**
2. **What are the contents of your group’s message?**
3. **Which room number do you think the device is in?**

**TASK: Submit your scanner application code**

1. **Commit your lora-scanner code to your shared repo**

I. Protocol Design and Implementation

**TASK: Describe your protocol design**

1. **What are the physical layer parameters you chose for your protocol?**
2. **What is the packet format(s) for your protocol?**
3. **For each packet type, explain how you implemented it.**
4. **Also describe any other protocol decisions you made.**

**TASK: Demonstrate your full application**

1. **Show me screenshots of it working in terminal**
2. **CHECKOFF: Demonstrate your full application with a single Gateway and two End Devices**
3. **Commit your lora-custom-gateway and lora-custom-device code to your shared repo**