CS Capstone Design

Technical Demo Grading Sheet (100 pts)

TEAM: Team Lora

Overview: The main purpose of the "Technical Demos" is to very clearly communicate the extent to which the team has identified key challenges in the project, and has proven solutions to those challenges. Grading is based on how complete/accurate the list of challenges is, and how convincingly and completely the given demos cover the given challenges.

This template is fleshed out by the team, approved by CS mentor, and brought to demo as a grading sheet.

Risky technical challenges

Based on our requirements acquisition work and current understanding of the problem and envisioned solution, the following are the key technical challenges that we will need to overcome in implementing our solution:

C1: Connect the Android phone to the LoRa Node The challenge here will be showing a "network handshake" between the android libraries and the LoRa Node. The LoRa node connects to the phone via Wifi. For this we will need to connect the "android studio phone" via WiFi using the built in Android OS.

To prove that our solution will work we will have to build Kotlin Libraries and can reference them within our Android Application (Which is connected to the Wifi)

C2: Handle Messages Received from the LoRa Gateway When a message arrives on the LoRa Gateway, it must be decompressed and then forwarded to the web application the message was originally intended for. Since the LoRa Gateway must be able to service multiple applications concurrently, we need a way to sort messages based upon their intended destination. The challenge here is to route these messages to their intended destination while not backing up the LoRa Gateway.

To demonstrate an effective solution to this problem, we would need to produce a proxy server which could connect to the LoRa Gateway and easily transmit messages to different endpoints.

C3: Compress/Decompress Messages The message needs to be compressed into a smaller form to be transmitted over LoRaWAN. Prior to the message being sent off to its ultimate destination, it must be decompressed. The challenge here is to intelligently compress the message to preserve its information within a very small format.

To demonstrate an effective solution to this problem, we would need to produce a function which could take a message, compress it into a form small enough to be transmitted over LoRaWan (roughly 13 bytes), and then decompress it without any loss of information.

In this section, we outline the demonstrations we have prepared, and exactly which of the challenge(s) each one of them proves a solution to.

Demonstration 1: Kotlin Library

Challenges addressed: <List which of above challenges are addressed in this demo>

Flight Plan: Step by step overview of demo

1. First we will show the Android Phone connected to the node via Wifi
2. Then we will show the Kotlin Libraries that we created
3. A "test application" that will utilize our libraries showing that they are correctly imported and referenced.

Evaluation:

- ✔ Convincingly demoed each of listed challenges?
- ✔ Other evaluative comments:

Demonstration 2: Backend Server with Mosquito

Challenges addressed: **C2: Handle Messages Received from the LoRa Gateway**

Flight Plan: Step by step overview of demo

1. First, we will demonstrate the mosquito server starting up on
2. On a second machine, we will subscribe to a specific topic on the mosquito server
3. On a third machine, we will publish a message to that specific topic on the mosquito server
4. We will demonstrate that the message from the third machine arrived on the second machine

Evaluation:

- ✔ Convincingly demoed each of listed challenges?
- ✔ Other evaluative comments:

Other challenges recognized by not addressed by demo:

C3: Compress/Decompress Messages

We did not address the compression and decompression of messages in our demo. The CANIS lab has developed code to compress and decompress a specific type of message and

we plan to extend and refactor this code to suit our purposes. This should dramatically reduce the risk posed by this challenge.