Report Date: 09/30/2022
To: ematson@purdue.edu, ahsmith@purdue.edu, lee3450@purdue.edu
From: 454P
- Seokhyeon Bang (kzrt0123@cau.ac.kr)
- Junyoung Jang (junjang99@cau.ac.kr)
- Yuseon Choi (181133@jnu.ac.kr)
- Minju Ro (romj98@cau.ac.kr)
- Doyong Kwon (doyong365@knu.ac.kr)

Summary

The main purpose of this week was to build the local LoRaWAN for the project. To solve these Network problems, there were debugging processes to find out what caused the system to malfunction. Other LoRaWAN network servers were also tested including Chirpstack and The Things Stack. Also, to start writing the paper, a literature review was conducted by researching prior studies [13]-[16]. Team members organized the flow of the paper and wrote the introduction part.

What 454P completed this week:

- Installing Docker to use Chirpstack

    MultiTech Conduit is the device for constructing LoRaWAN included in the MultiConnect Conduit IoT Starter Kit for LoRa Technology. The conduit was used as a gateway and was connected to the switch and the router of the K-SW square building physically. After installing Docker to use Chirpstack, the gateway could send a signal to the switch and a router but it could not send it to Google DNS, which means it was not connected to Internet [1], [2]. However, the laptop which is connected to the switch could access the Internet. Mr. Larry Hiday helped resolve the problem. The most probabilistic cause was DHCP daemon [8]. However, there was no permission for suspending the daemon, and no methods were found to delete this demon entirely from the mLinux system. Therefore, the conclusion reached was that building a local LoRaWAN using MultiTech Conduit is complicated and requires more research.

- Writing Introduction draft of paper

    Research is conducted to devise the flow of the introduction of the project. The Introduction included advantages, use-cases, security issues of LoRa, and the purpose of this research [16].

- Using a Raspberry Pi as a new gateway
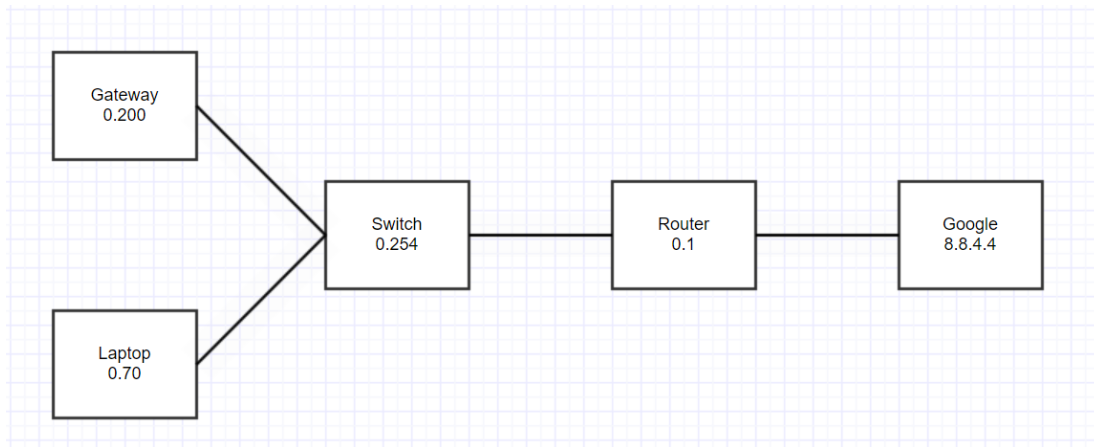
Fig. 1. LoRaWAN network architecture designed this week

 LoRa Hat is a low-power consumption data transmission module [7]. By attaching LoRa Hat to Raspberry Pi, it can transmit and receive LoRa signals [9]. As a network server, there are many options, such as Chirpstack [3], The Thing Stack [4], and ResIoT [12]. After testing, ResIoT was found to be not suitable for this project. There were several reset processes because the ResIoT user was not removed. Chirpstack was used as a substitute and was successful in one of the Raspberry Pis. However, LoRa Hat SX1262 did not support the gateway function [7].

- Solving credential errors

 There was a confirmation and verification process for The Thing Stack to join into their server as an admin or a client. The client could not get a handshake to get the certification file so it could not conduct the join process. To solve this problem, an attempt to use its own certification was conducted, which did not resolve the issue. The next troubleshooting technique tested was killing the entire run-time process. However, it did not make any changes. Lastly, OAuth migration into Docker was conducted. However, HTTP 401 error was returned [6]. Although the HTTPS connection was executed, the certificate Authorized name did not match the requested name [5]. Also, whenever the client which is not a local host joins, it returned HTTP 403 error which is refuse of authorization. Migration into raspberry pi to make The Thing Stack not local host, but still in local WAN is performed, which ended up to be not suitable application for us, because The Thing Stack needs the packet broker if raspberry pi is used, which means the Internet might be needed [5].

- Configuration of Chirpstack to use Multitech Conduit

Things to do by next week

- Set up the local LoRaWAN network with Chirpstack as a network server and an application server.

- Decide what to use for the literature review among the organized papers and write a literature review.
- Verify whether hacking LoRaWAN which is connected to the cloud is allowed.
- Set up a raspberry pi network server using Chirpstack OS and LoRa HAT(SX1302) that we ordered Friday.
- Send Multitech support an email to ask whether they can help to set up the network or not.
- Setting LoRaWAN using Tektelic kona gateway [17].

Problems or challenges:

For this project, building local LoRaWAN is mandatory because hacking may cause legal issues. However, there were not enough manuals for building LoRaWAN. Companies did not provide exact solutions for LoRaWAN issues. Furthermore, most solutions were outdated. Therefore, we are going to contact people who have experience with building LoRaWAN.

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