# CPP Community Garden Meeting Note

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# Overview

1. Discuss data aggregation.
2. Decide the testing procedure to assure data integrity.
3. Address LoraWAN to stakeholders to support IoT large scale deployment.
4. Architecture Differences.
5. Potential Developement.

# When do we aggregate sensor data?

- Additional json attribute requirement may arise. NOTE: ecowitt doesn't provide location info.
- Naming the farming zone based on the moisture sensor radius coverate.
- Shift the data modifying process to local before sending it to the cloud to avoid extra cost or overrelying on lambda function. (optional)

# Sensors Test

- Find out tests that can run against data.
  - Regression Testing (consolidate with data team).
  - Different moisture sensors would have different measurement. How to solve this?

# Estitimate on the Cost of Moisture Sensors
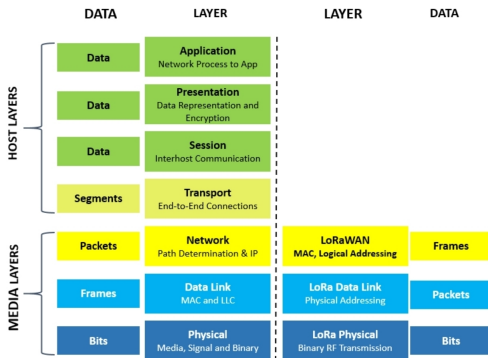
Wihout solar cost



Figure: Example of moisture sensor component (Source: Modest Maker)

# Architecture Differences with selected criteria

- Understand the correlation of bandwith and power consumption.
  - sensors are end devices in Lora network.
  - reduce the transmitting size would reduce power consumption.
  - how long does it take to send one message of LoraWAN?
  - Seperate the Sensors Network from the could. The Cloud shoud be last mileage component.

# How does Lora fit in with OSI network stack



Figure 3: OSI seven-layer network model

Figure: Lora in OSI stack (Source: SEIMEN Lora IOT)

# Components of LoraWAN network

- LoraWAN Gateway.
- Virtual Lora Network (can be hosted on raspberry pi or AWS).
- End Device type (refer to device classification)

# How to Build One?

What include:

# End Device Classification

- Classification based on the payload bandwith of end device send to gateway.
- It reflects the interval of data transfer.
- In short, there are three types of lora end devices.
  - Class A: sending and receiving message within 2s (required low latency connection with the cloud)
  - Class B: receiving mode only, used for pump control only accept downlink messages.
  - Class C: deeper sleeping cycle, every 5s device wake up to listen to receiving messages.

# Key Benefits of Lora IoT Deployment

- Reduce the cost of hardware on the field.

- Thus reduce the cost to power them.

- Utilize right message sending cycle.

- Open-source and fully developed with AWS IoT Core. Refer to
  `https://docs.aws.amazon.com/iot/latest/developerguide/`
  `connect-iot-lorawan.html` AWS IoT Core for LoraWAN.

# Key Benefits cont.



**Long Range**
- Deep indoor coverage (including multi-floor buildings)
- Star topology network design
  ↳ bring down to one base station

**Long Battery Life**
- Low-power optimized
- Up to 10-year lifetime
- Up to 10x versus Cellular M2M

**High Capacity**
- High capacity – millions of messages per base station / gateway
- Multi-tenant interoperability
- Public or private network deployments

**Low Cost**
- Minimal infrastructure
- Low cost end-node
- Open source software

**Geolocation**
- Indoor/outdoor
- Accurate without the need for GPS
- No battery life impact

**FUOTA**
- Firmware Updates Over-the-Air for applications and the LoRaWAN stack

**Roaming**
- Roaming: Seamless handovers from one network to another

**Security**
- Embedded end-to-end AES-128 encryption
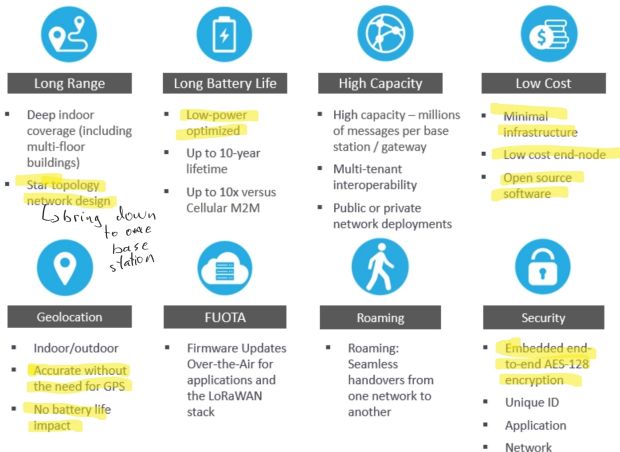- Unique ID
- Application
- Network

Figure 2: Advantages of deploying a LoRaWAN network

# Reference
Sources

- https://www.youtube.com/watch?v=ciL0MOtm50A&t=118s&ab_channel=MilesightIoTLORAWAN
- https://wiki.seeedstudio.com/WM1302_Pi_HAT/Pi HAT