

# Formal Client Meeting

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Time: 2pm - 4pm

Date: 31/07/2024 (week 2)

Venue: Ezone North: [102A] Meeting Pod

Present: Jim, Susheel, Lilee, Fred, Jack, Bob, Katrina

## SES - Communications Support Uni (CSU)

### **Basic Info, Operations and Technology used in a search**

- Lots of radio and IT experience in the unit if we have questions we can ask them
- FOV - Forward operations vehicle search teams are based in, equipped with a Starlink, two radios, mapping tools, lots of screens, etc, expect to put 10 or 12 out for a search but don't deploy them for every search, work best with line of sight - range is a concern which is why meshing works quite well, never too far away from a vehicle, usually 15km search areas for search teams which is achievable with a good probability of detection
- The FOV is deployed to a search base - so you can have a base station communicating with the FOV
- Starlink (low orbiting satellite)
- Satellite trailer with OneWeb (slightly higher orbiting satellite) - less connection drops, satellite on horizon for longer
- Clark Mast on CSU repeater trailer (not relevant?) - VHF and UHF mobile repeaters for improved radio coverage, placed in preparation for an incident to improve comms - gives incident control vehicle coverage of a fireground, also placed in high-risk areas, unencrypted (don't broadcast sensitive data), nothing saying we can't put a mobile base station up on a repeater
- SHADMap planning for VHF and UHF coverage

### **System to be hosted via Azure**

- About \$3.5k of Azure credits available, will have to vet what we are putting up
- Azure SSO is recommended for authentication
- IoT gateways in Azure, MQTT - monitoring information that sends info through JSON to an MQTT server

### **Current SES Set up**

- Tracker -> Base stations are third party vehicles with 4g connection -> FOV
- Meshtastic is in alpha - buggy, maybe recommend just looking at LoRa instead - LoRa protocols
- Right now they use Garmin GPS units, but they have to go back to base to upload the data
- 10x 1 base station + 1 LoRa

*We will need lots of **specifics about the physical technology**, specifically the nature of the LoRa devices they are using currently, as well as the mobile base station?*

*Do we need to know about the **models or firmware of the devices**?*

- ESP32s with 915mhz radio attached
- Meshtastic open source application using LoraWan to communicate with each other
- Heltech ones, GPS built in or not - got a few we can borrow plenty of them for proof of concept
- Devices have wifi, bluetooth and LoRa
- The mobile base station would be placed on a vehicle, communicate with the search teams devices
- Powered off a USB bank
- LoRa has specific rules for how often it can be polled, 915mhz, open frequency

***What type of reports** do you need (e.g., real-time, daily summaries, historical data)?*

*Besides location tracking, are there **other types of data or metrics** you require to transmit? (battery status, signal strength, environmental data like temperature, air quality)?*

- GPS data
- Voltage, current would be handy for equipment
- Temperatures and air quality, for search team precautions during fires - smoke means air quality goes down and temp goes up

### **Data Transmission and Logging:**

*How frequently should the devices transmit data?*

*What is the expected range and coverage area for the devices?*

- Search areas are 3.5km between vehicle and search area tracker, going through LoRa, because tracking teams do not have internet connection
- Vehicle to FOV depends, could be within 5km, needs to communicate through internet

*Are there any specific security or encryption requirements for data transmission and storage?*

- Keep security in mind
- Meshtastic is encrypted
- Azure SSO is recommended for authentication
- Have a look at usage limitations for LoRa polling rates, one ping every minute is probably fine

### **User Interface:**

*Are there any specific software platforms or tools you want to use for data visualization and analysis?*

- Vesmaps? Fesmaps? Can export search grids out into something like google maps
- Recommending google maps etc

### **Risks:**

*Are there any known challenges or risks you anticipate with this project?*

*Mitigating these risks?*

- Radiowise - line of sight will be one of the biggest barriers, our expectations is not that we would need to worry about antennae and improving signal strength
- Getting it working across an oval is a good starting point, and getting it to mesh to another device

### **Client Suggested First Goal:**

- Connecting one LoRa device to the base station and having that push something to the cloud, perhaps from just across an oval - then maybe have a couple LoRa devices meshing with each other
- Lots of nice-to-haves to move into nearer the end of the project
- Jim is at UWA on Tuesdays and Fridays most weeks, will bring a couple more LoRa's on Friday for testing purposes