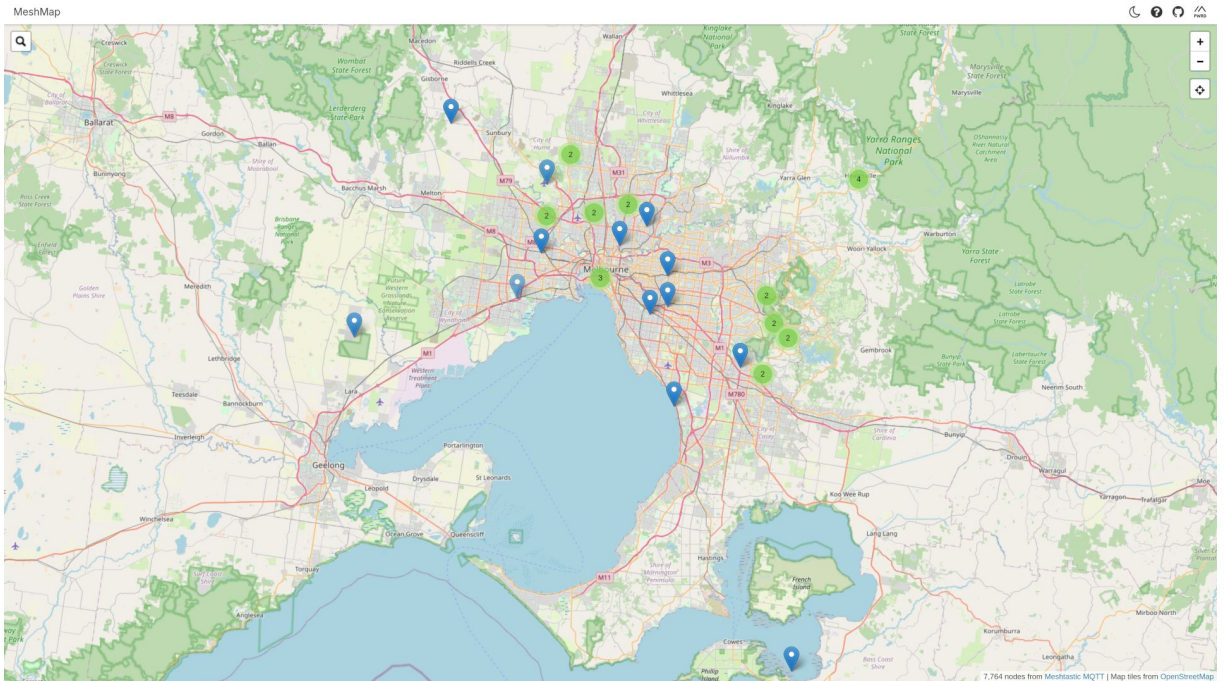
MESHTASTIC

An open source, off-grid, decentralised, mesh network built to run on affordable, low-power devices

MLUG talk
2025/09/29
- Cameron

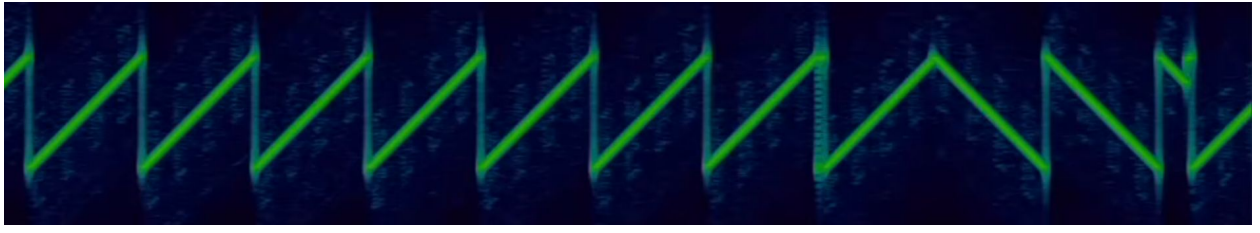
What is it?

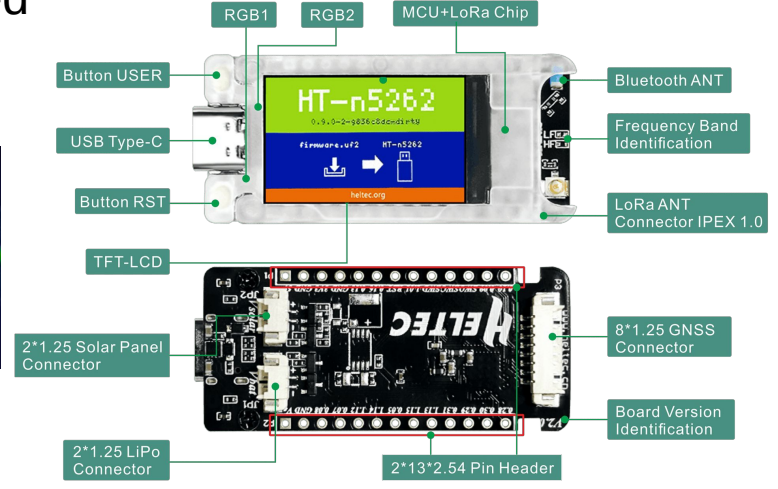
- Text messaging without using a phone network / internet
- IoT but doesn’t need the internet to do the things
- Works in a mesh - range from 1km to 50-331km
- Location tracking
- Sensor reporting



What radio does it use?

- Frequency in Australia:
  - 915MHz - 918MHz (commonly used)
  - 433.05MHz – 434.79MHz (less commonly used)
- Modulation: LoRa – low data, low power, long range
- Radio Bandwidth: 125kHz – 500kHz
- Data Rate: 0.18kbps – 21.88kbps (1.07kbps on default LongFast)
- Sensitivity (approx): From -117dBm to -137dBm (under the noise floor!)
- 915-918MHz lies within the ISM band, that is also shared with many other devices (eg smart meters?)





Hops

Default is 3 Hops, can be set from 0 to 7

Encryption

- Public channel is barely encrypted with “AQ==” key
- Private channels use AES256-CTR
- Direct Private Messages use Public Key Cryptography
- However all headers are unencrypted, to allow messages to spread on the mesh via multiple hops
- There’s no forward secrecy, no authentication; meshtastic isn’t as secure as: WPA3 / TLS1.3 / Signal protocol

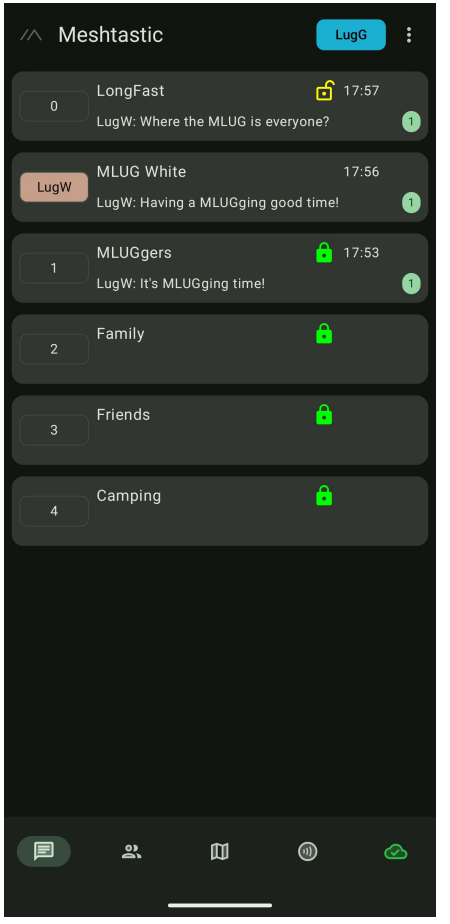
Simple messages or small data

Due to limited typical data rate (~1kbps) and packet size:

- 200 Characters max per message
- Limited data, eg: GPS, temperature, air pressure, air quality, power, detection sensor

Multiple channels

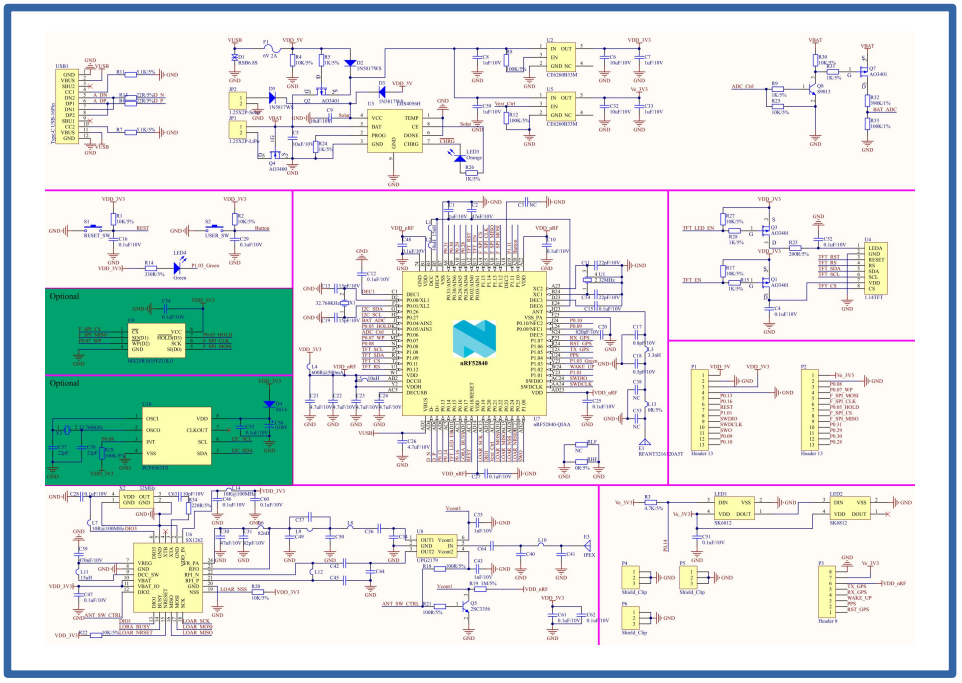
- Public channel: LongFast
- Up to 8 rearrangeable channels
  eg: LongFast, Family, Friends, Camping
- Other mesh nodes will relay private messages and channels
- Sensor data is transmitted only on the 1st channel
- GPS data can only be transmitted on only 1 channel



Hardware MCU

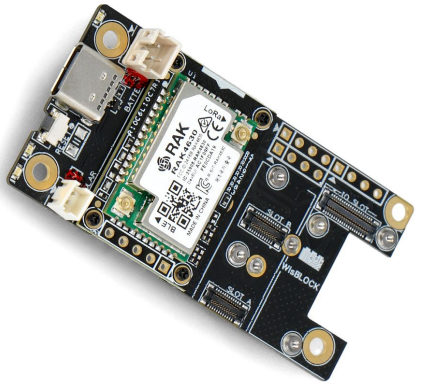
- ESP32 Based:
  +Supports wifi, bluetooth, serial, range test
  - Power hungry

- nRF52840 Based:
  +Supports bluetooth, serial, power efficient
  - No wifi, small memory, requires phone / laptop for fancy UI



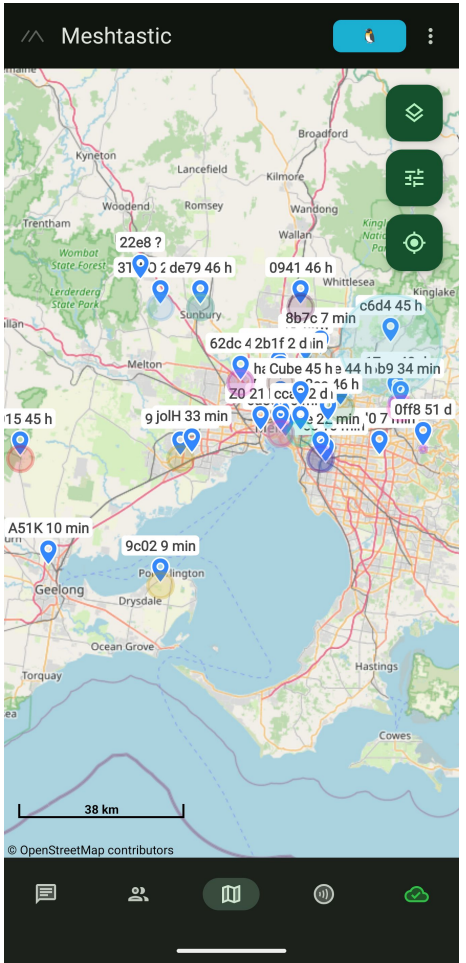
Hardware Devices

RAK – modular, lots of sensors
LILYGO – also sell all-in-one units (no phone required)
Seeed Studio – also sell rugged tracking nodes
HELTEC – big choice of nodes
B&Q Consulting – also sell high power nodes for HAM operators
Elecrow – general nodes
Linux Native Devices – via SPI and USB interfaces

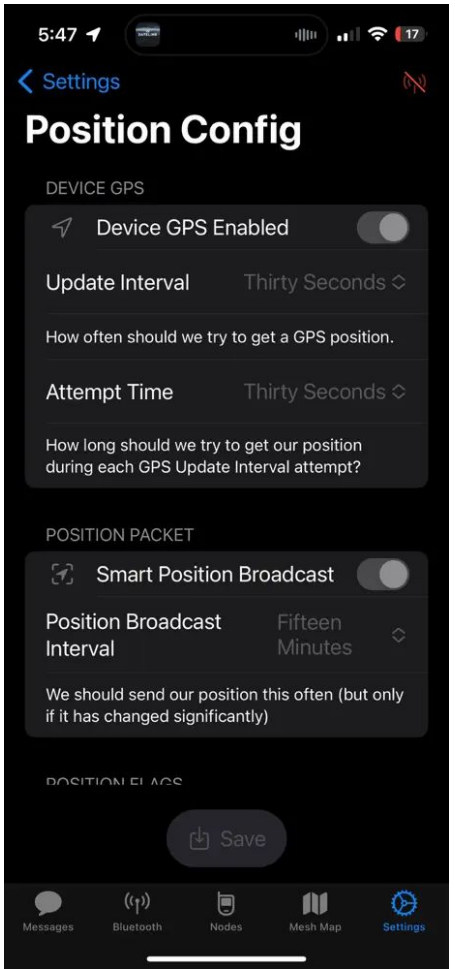
Software - Android

- F-Droid
- Play Store
- Obtanium
- Sideload



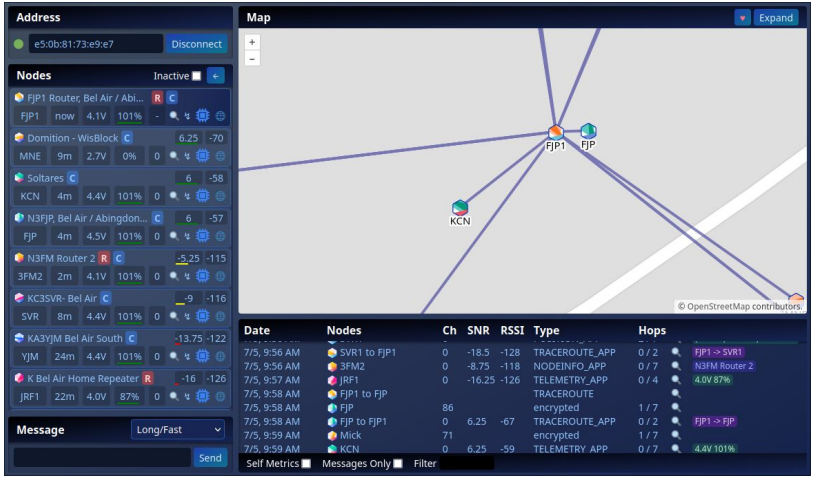
Software - iOS

App Store



Software - PC

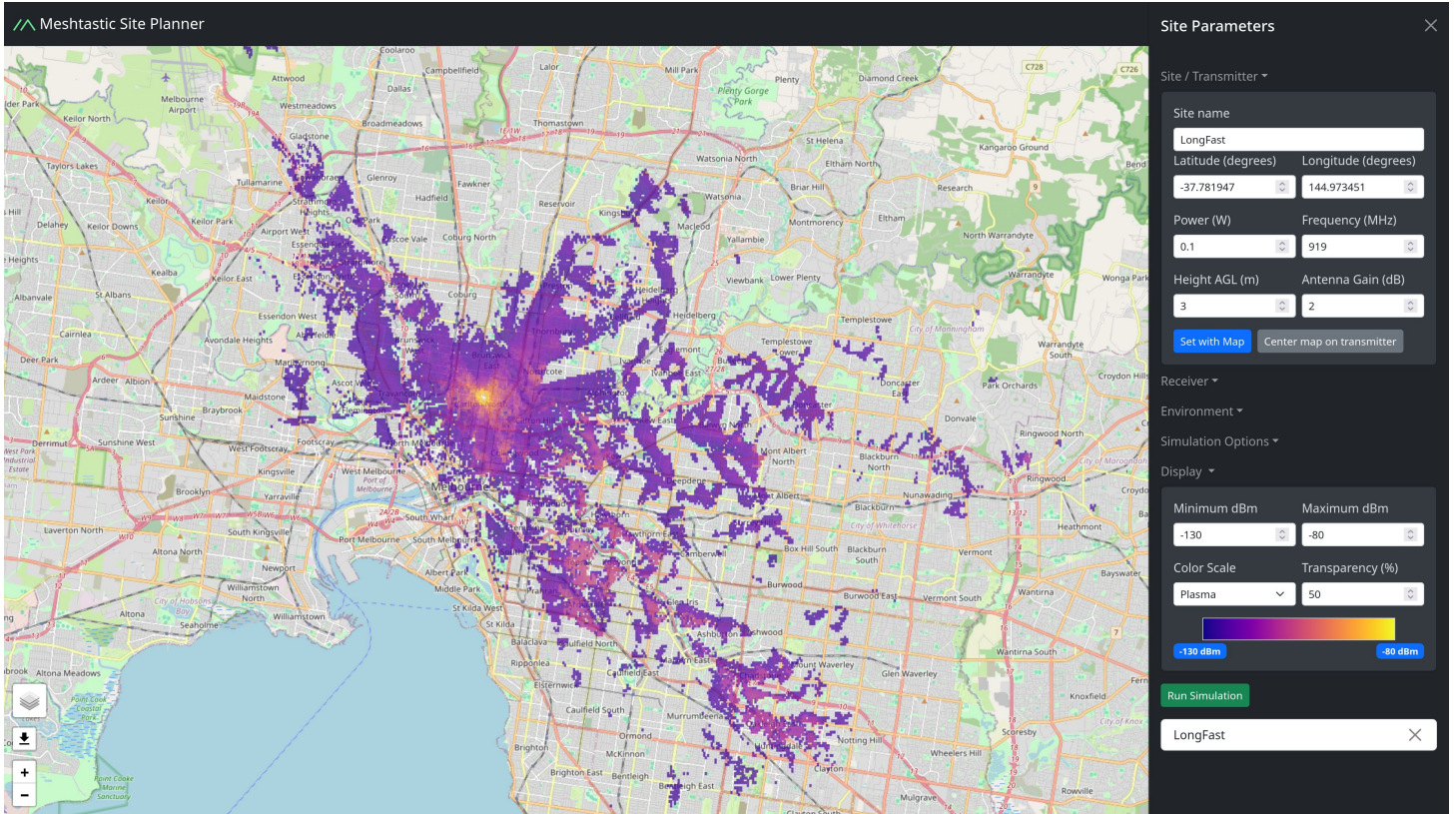
- Web Client (easiest to use with wifi)
- Python CLI
- MUI Flatpak
- MeshSense
- CalTopo / SARTopo



- MQTT – Mosquitto / Python / Home Assistant

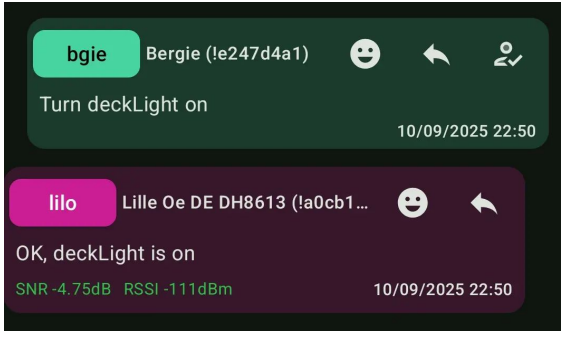
Site planner

Meshtastic Site Planner is pretty good!



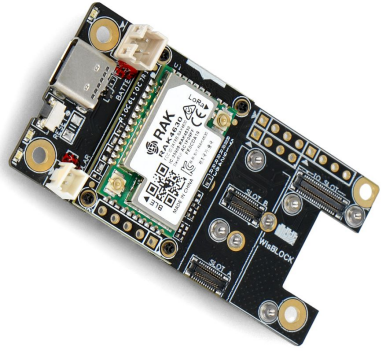
Deployment examples

- Signal K – Telemetry and alerts for managing boats
- NSW Lismore floods – building a mains + solar node



Getting started

- Buy at least 2 meshtastic devices
- Buy better antennas if needed, especially for some Heltec nodes
  - **Antenna MUST be connected while the unit is on!**
- Update firmware: Web Flasher - consider using alpha firmware
- **Set region to Australia / New Zealand** (915MHzish)
- Stick to using “client_mute” / “client” / “client_base” roles in Device Config



Community

Meshtastic:
https://meshtastic.org/

Meshtastic Victoria:
https://www.facebook.com/groups/meshtasticvictoria
https://www.reddit.com/r/VicMesh/

Meshcore Victoria:
https://discord.com/invite/Rq7hEYZAxN

Great map of meshtastic nodes responding to “MQTT ok”:
https://meshmap.net/

Meshtastic Subreddit:
https://www.reddit.com/r/meshtastic/