Chicago FM Club

Presentation: Meshtastic

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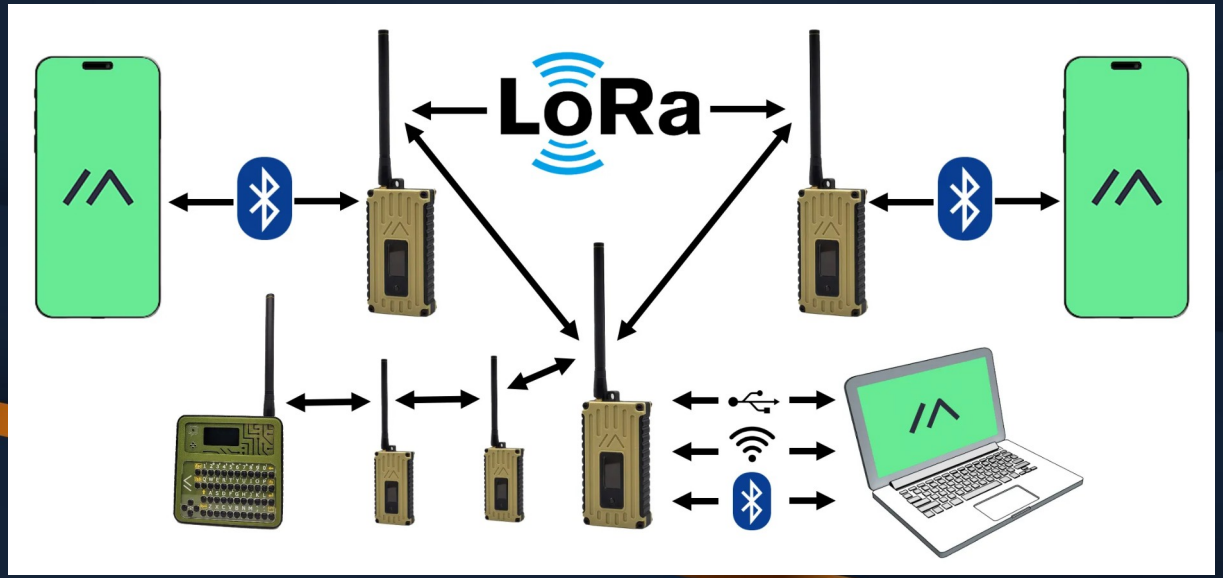
Meshtastic

What is it?
How does it work?
Who uses it?
Why do we need it?

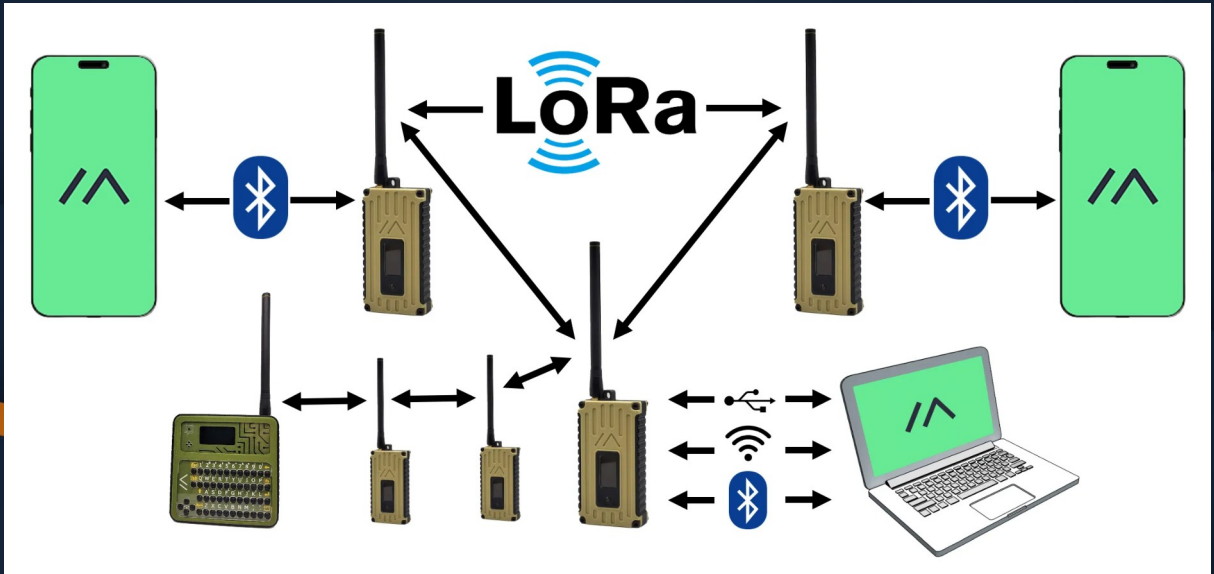
Meshtastic

- Inexpensive radios
- Long range off-grid communication
- Utilizes LoRA



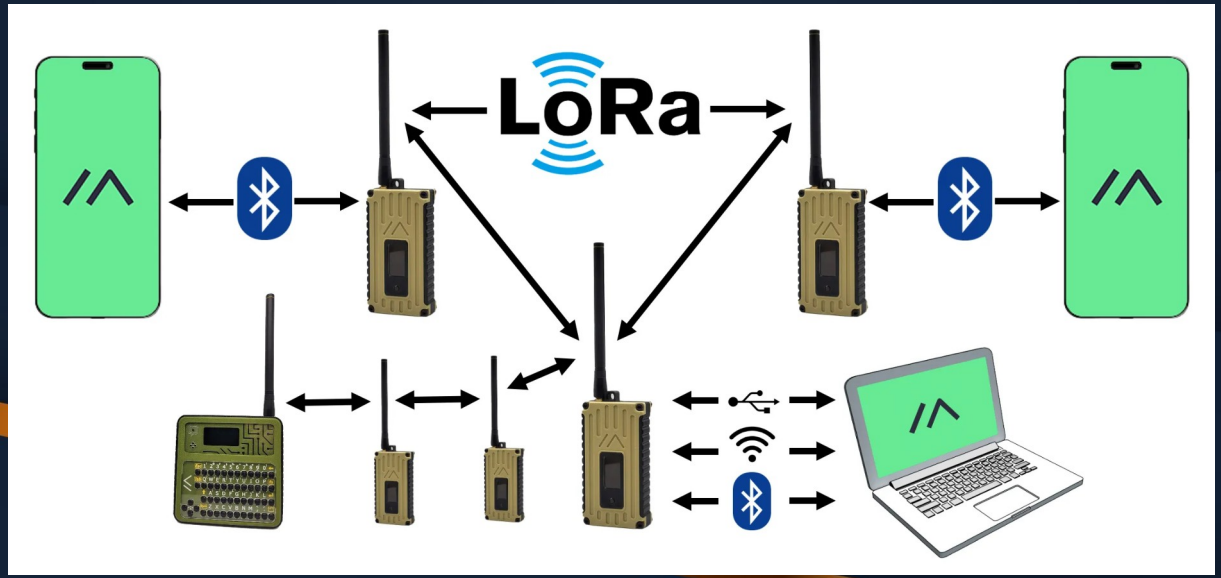
Meshtastic

- Decentralized communication
- No dedicated router required
- Encrypted communication

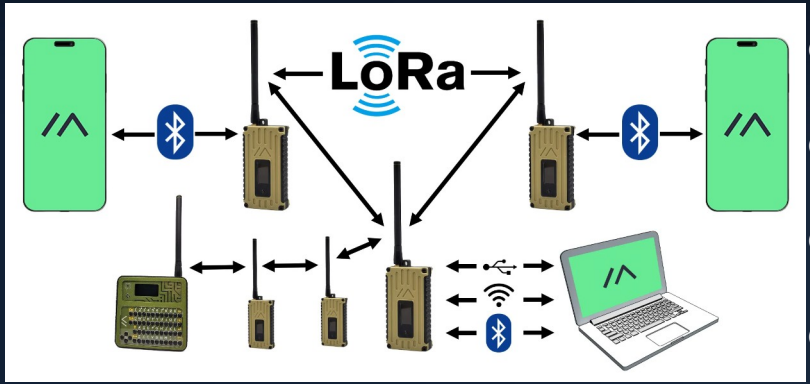


Meshtastic

- Great Battery Life
- TX and RX text messages
- Optional GPS based location features

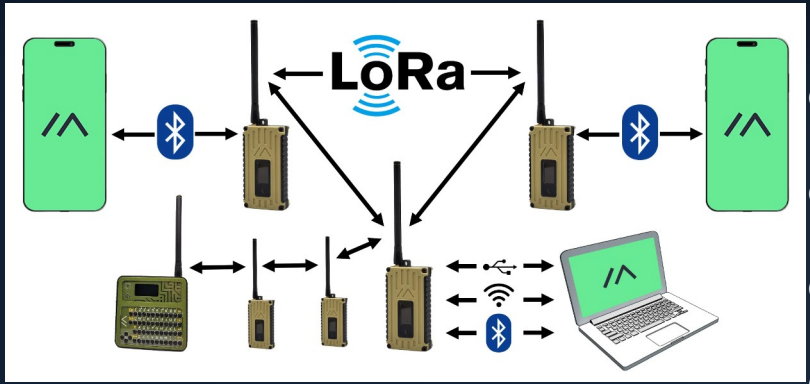


LoRA



- Long-range radio protocol
- No license required
- Widely accessible
- Radios paired with a single phone, Wi-Fi, or serial connection

LoRA



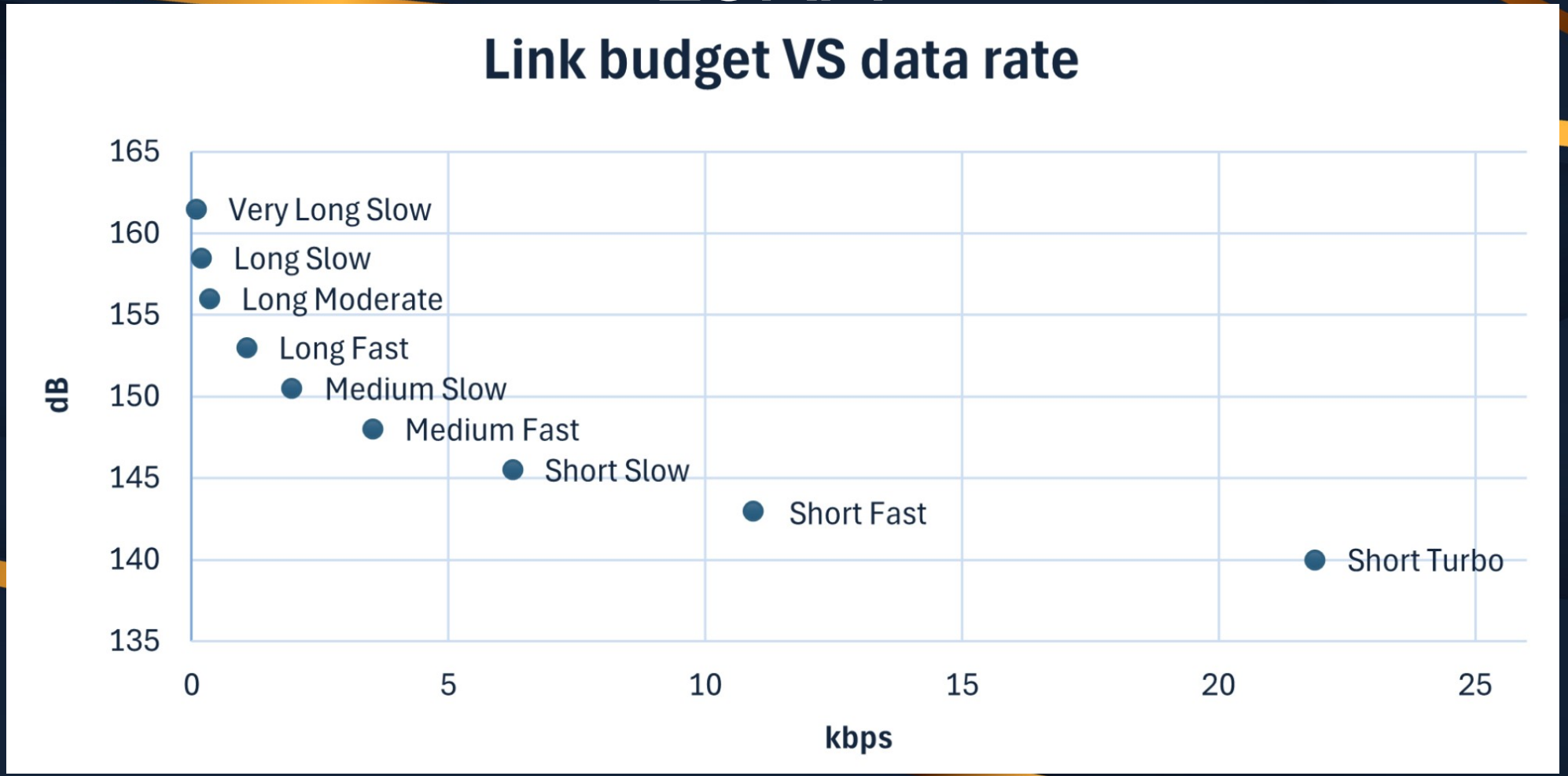
- 915Mhz (ISM Band)
- 104 Frequency slots
- 902-928Mhz
- Max power: 30dBm

LoRA

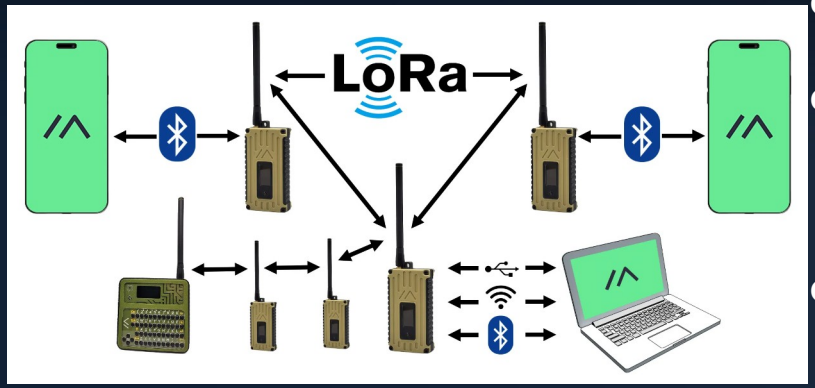
Radio presets:

Channel setting	Alt Channel Name	Data-Rate	SF / Symbols	Coding Rate	Bandwidth	Link Budget
Short Range / Turbo	Short Turbo	21.88 kbps	7 / 128	4/5	500[1]	140dB
Short Range / Fast	Short Fast	10.94 kbps	7 / 128	4/5	250	143dB
Short Range / Slow	Short Slow	6.25 kbps	8 / 256	4/5	250	145.5dB
Medium Range / Fast	Medium Fast	3.52 kbps	9 / 512	4/5	250	148dB
Medium Range / Slow	Medium Slow	1.95 kbps	10 / 1024	4/5	250	150.5dB
Long Range / Fast	Long Fast	1.07 kbps	11 / 2048	4/5	250	153dB
Long Range / Moderate	Long Moderate	0.34 kbps	11 / 2048	4/8	125	156dB
Long Range / Slow	Long Slow	0.18 kbps	12 / 4096	4/8	125	158.5dB
Very Long Range / Slow	Very Long Slow	0.09 kbps	12 / 4096	4/8	62.5	161.5dB

LoRA


Link budget VS data rate
165
160
155
150
145
140
135
dB
0
5
10
15
20
25
kbps
Very Long Slow
Long Slow
Long Moderate
Long Fast
Medium Slow
Medium Fast
Short Slow
Short Fast
Short Turbo

LoRA



- AES256-CTR encryption
- Direct messages use Public Key Cryptography (PKC)
- Periodic broadcasts of traffic are encrypted (position, telemetry, traceroutes)

LoRA Hardware

- Meshtastic works with Micro-Controller Units (MCU)
- ESP32
- NRF52
- RP2040

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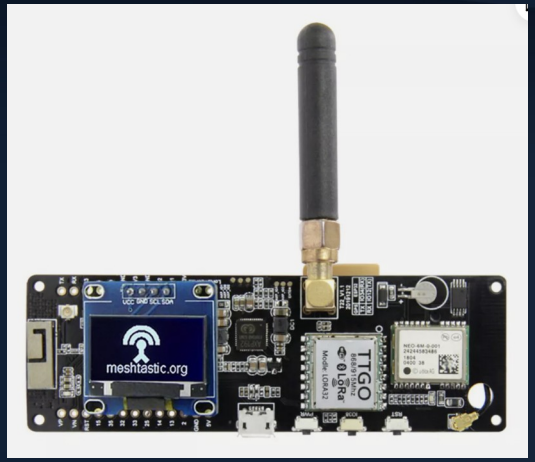
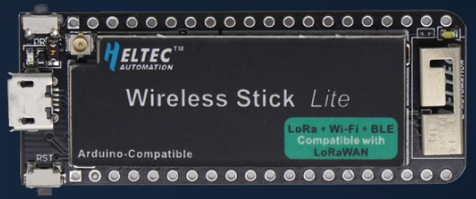
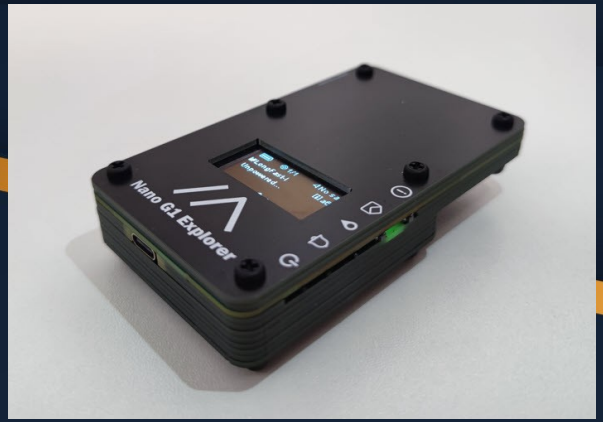
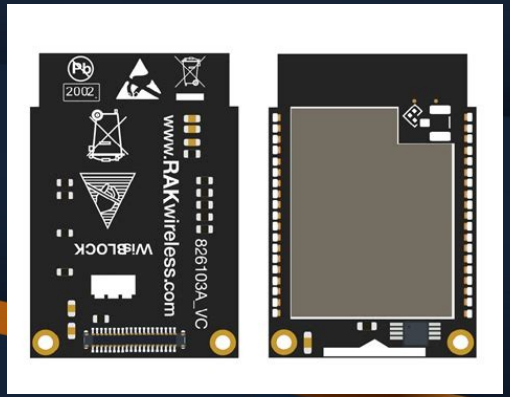
LoRA ESP32 Hardware









LoRA ESP32 Hardware

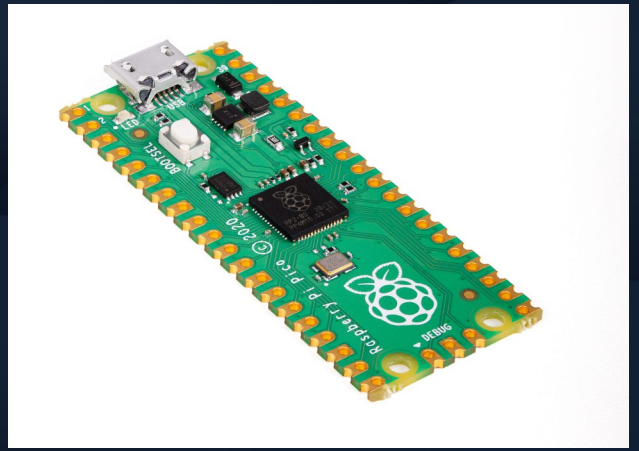
- LILYGO® TTGO T-Beam (>V1.1 recommended)
- LILYGO® TTGO Lora (>V2.1 recommended)
- Nano G1
- Station G1
- Heltec V3 and Wireless Stick Lite V3
- RAK11200 Core module for RAK WisBlock modular boards
- Support WiFi and Bluetooth

LoRA nRF52 Hardware

LoRA nRF52 Hardware

- RAK4631 Core module for RAK WisBlock modular boards
- LILYGO® TTGO T-Echo
- More power efficient than ESP32 chip and easier to update, only supports bluetooth

LoRA RP2040 Hardware



LoRA RP2040 Hardware

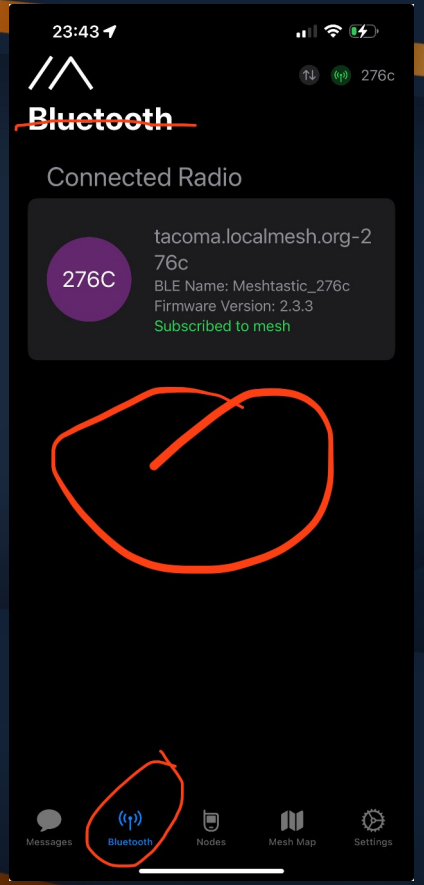
- The RP2040 is a dual-core ARM chip developed by Raspberry Pi. Supported RP2040 devices include:
- Raspberry Pi Pico + Waveshare LoRa Module (Note: Bluetooth on the Pico W is not yet supported by Meshtastic)
- RAK11310 Core module for RAK WisBlock modular boards

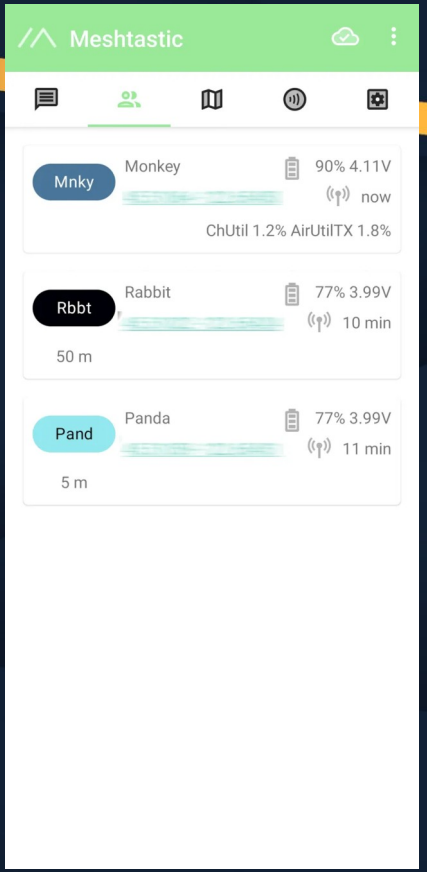
Meshtastic Connections

- Android and Apple iOS applications

GET IT ON Google Play

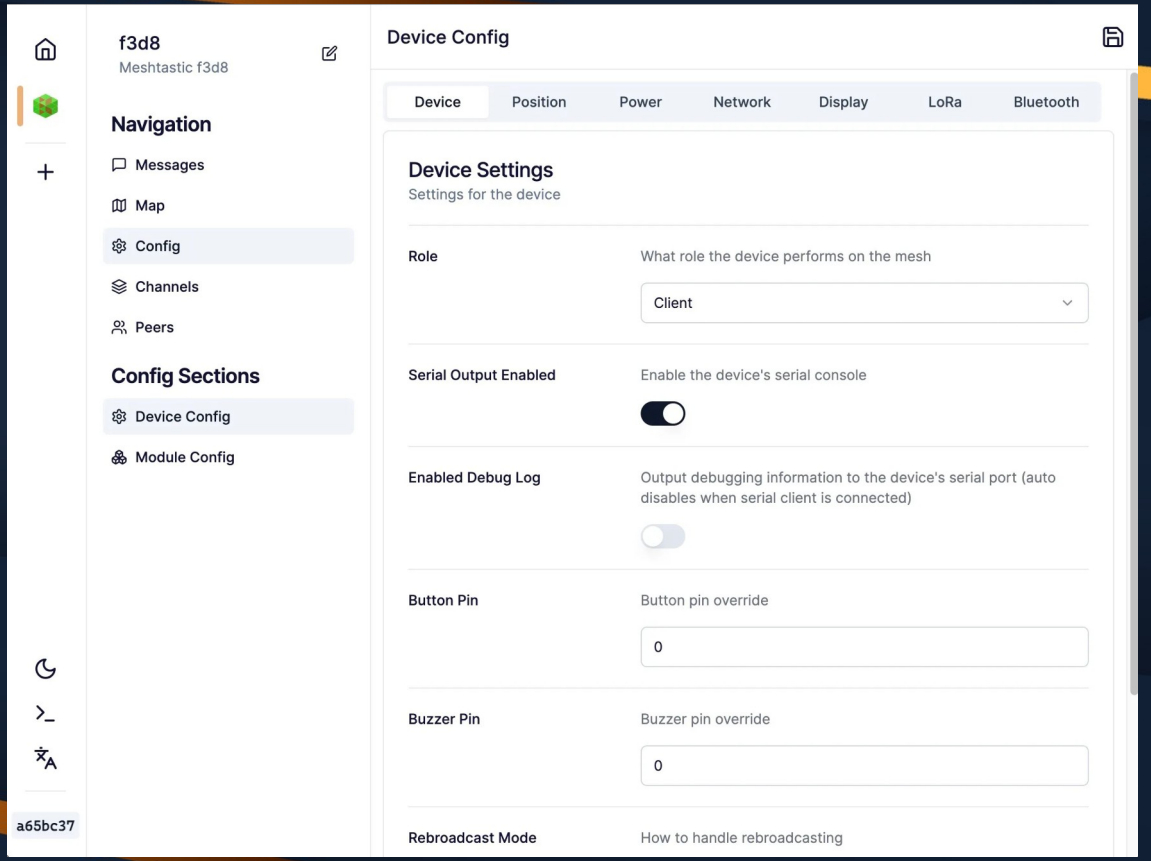
Download on the App Store





Meshtastic Connections

- Web GUI
- Client.meshtastic.org
- Mehstastic.local



CFMC: Meshtastic

Questions???
Comments???