

# Meshtastic

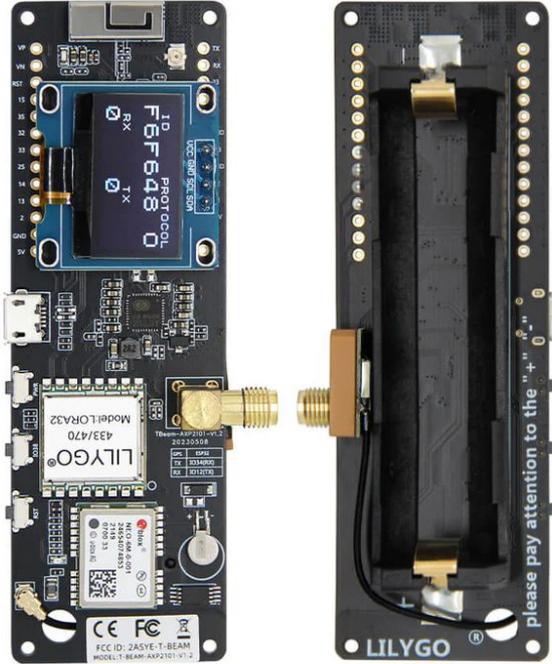
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# What is Meshtastic?

- **Long Range (LoRa)** radios operating on the **ISM band** (915 MHz in the US)
- Used to form a **mesh network**
- Where every radio is a **repeater**
- Supports **channels** (can be **encrypted**)
- Long Range does not mean high power! Nodes operate less than 1 watt (usually ~100mW)



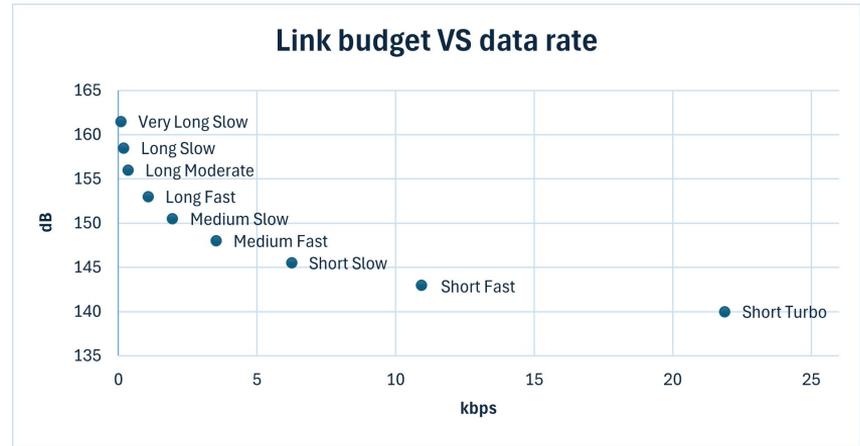
# Typical Setups



- Radio **connects** to your phone via bluetooth
- You operate the radio entirely through the **Meshtastic app**
- Alternatively, a **dedicated device** may be used with **keypad/screen**
- Nodes can also be **configured remotely** over the mesh (handy for repeaters)
- **Open source**, so the possibilities are endless

# Modem Settings

- Different **modem algorithms** may be chosen for optimization
- Trade-off between “**speed**” and “**range**”
- More range requires
  - Longer symbol duration
  - More redundancy bits
- So, **less throughput**
- Default: **LongFast**, which attempts to be a good balance



# Mesh Success



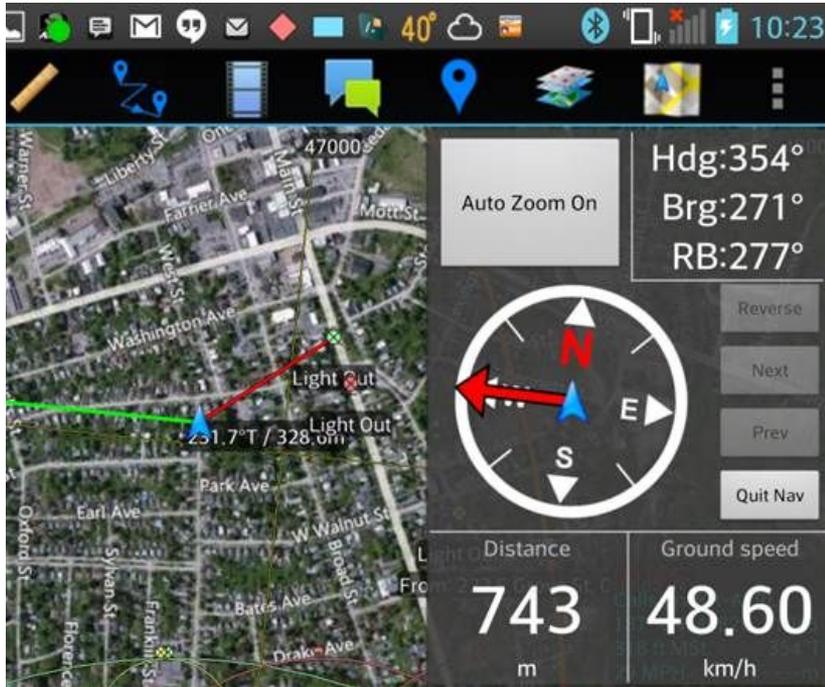
- **Line of sight + low power**, so get the nodes/antenna up **high**
- Well placed repeaters are critical for keeping the mesh together
  - Our population density is too low!
- **Low bandwidth + Repeating/Hops**, so too many messages can clog the network
  - Don't spam beacons and other unimportant data
  - Avoid "slow" modem settings

# Use Case: Disasters/SAR

- Text messaging for communication
- Sharing of team member **locations**
- Sharing **points of interest** (pins)
- **Example Setup**
  - Base station with amateur radio equipment
  - Meshtastic node on push-up mast
  - Individuals with wearable devices
- Can integrate with **ATAK**, **CalTopo**, **SARTopo**



# Android Team Awareness Kit (ATAK)



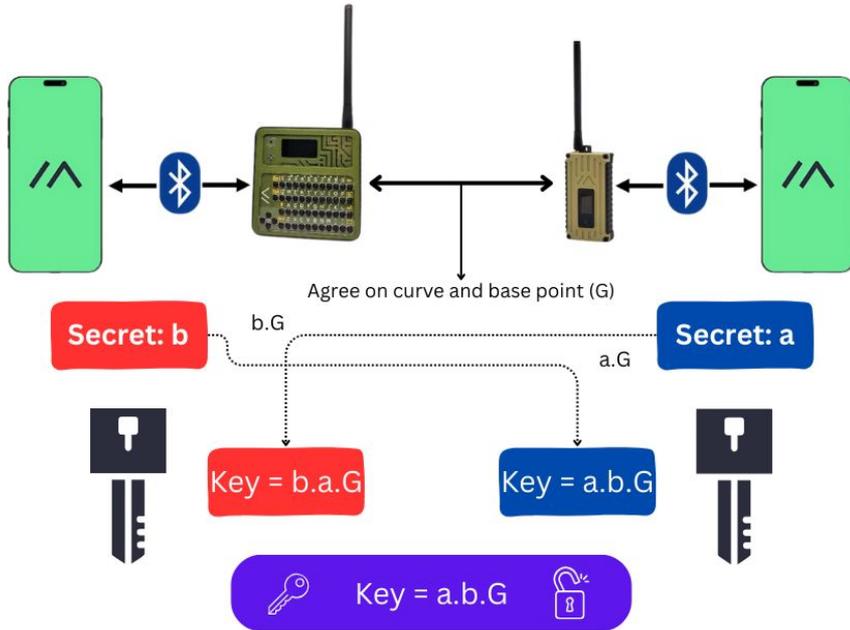
- Map based **common operating picture** app
- Can include images and other data, but **wifi or cellular connection required** for exchanging (usually\*)
- Meshtastic provides **positioning and messaging**
- **Example setup**
  - TAK server at base (with starlink)
  - individuals meshed in the field
  - Pictures, etc. exchanged at base location
- **\*ShortTurbo** enables file transfers

# Use Case: Infrastructure Outages

- With **batteries**, the entire network can function during **complete infrastructure loss**
- Low power requirements enable recharging with **small solar cells**
- Enables **indefinite, continuous operation**



# Other Use Cases



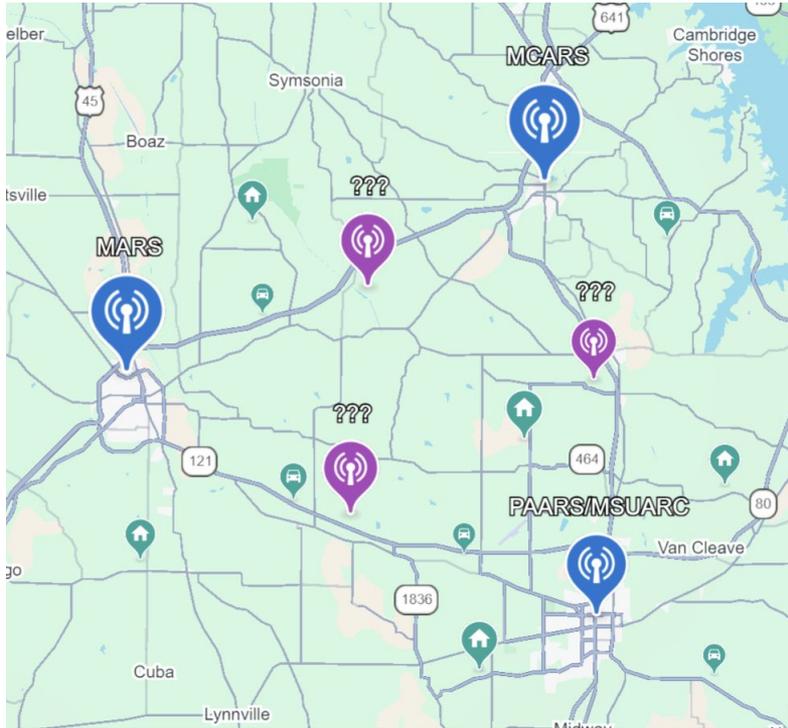
- **Privacy**
  - Encrypted data
  - No service providers
- **Telemetry**
  - Can be connected to sensors
  - Data from various nodes can be routed over long distances
- **Fun!**

# Meshtastic Vs Ham Radio

- By default, **does not require ham radio license**, due to low power
- If you have a license, you can use more power
  - This requires **disabled encryption**
  - So **no privacy**
- Much easier to setup than the equivalent using APRS, et al.
- Very low bandwidth



# Purchase Area Mesh Vision



- **Let's build it!**
- Would like to put a device on the **PAARS** tower as a test
- Scale out to towers operated by **other radio clubs**
- Fill in the gaps with **individual owned towers**
- ...and lots of individual, **mobile nodes**

# Resources

- Meshtastic
  - <https://meshtastic.org>
  - Recommended Devices: <https://meshtastic.org/docs/hardware/devices/>
  - Official Introduction: <https://meshtastic.org/docs/introduction/>
  - Web Client: <https://client.meshtastic.org/>
- Talk to me about it
  - Purchase Area Mesh: <https://nj3j.net/pam.html>
  - <https://nj3j.net>
  - [me@nj3j.net](mailto:me@nj3j.net)