Meshtastic & Meshcore

An incomplete guide to spending more money on radios.

Prepared by:
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What’s A Mesh?

- A network of wireless devices without a central access point
- Each client is also an access point
- Adding clients extends the network

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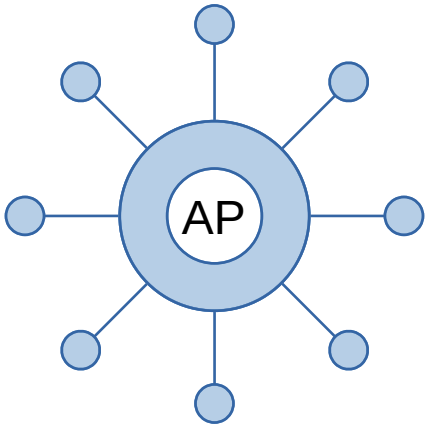
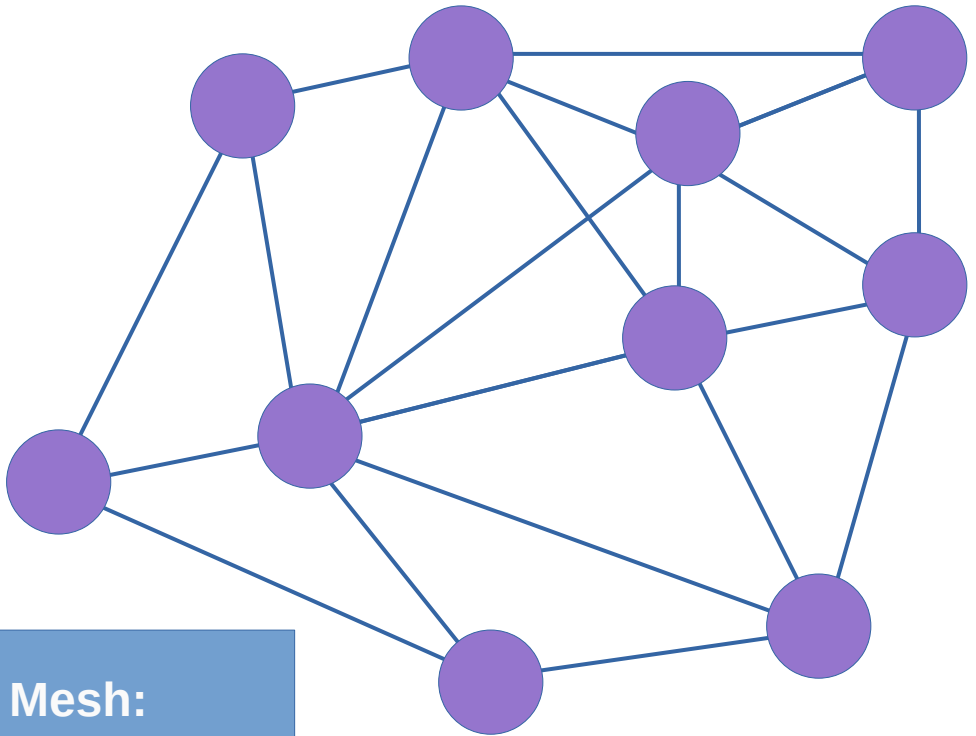
WiFi vs. Mesh



WiFi:
Central AP



Mesh:
Clients are APs

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Why Use A Mesh?

- Cheap Hardware
- Built-In Infrastructure Redundancy
- Works with no infrastructure

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What Are They?

- Basic Messaging Applications (radio texting)
- Open-source, off-grid decentralized mesh networking system
- LoRa radio wireless network based
- LoRa – developed around 2009
- Mestastic – originated 2020
- Meshcore – originated February 2025

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How Are They Used?

- People use Clients to send and receive messages
  - Companion Device w/ Cellphone App
    - No cell service required
  - Stand Alone touchscreen and Blackberry Style devices
- Messages
  - Clients send text messages to each other P2P or via repeaters
  - Clients can send and receive messgaes on store and hold systems
    - Meshcore Rooms
    - Meshtastic BBS
- Channels
  - Connect clients privately
  - Users with the private key can join the channel
  - Users without the key don’t know the channel is there

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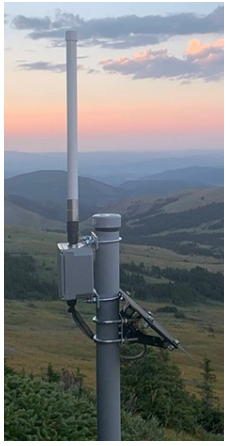
Hardware

- Companion Radio
  - Bluetooth & Cell Phone App
  - All In One
- Repeater
  - Prefab
  - DIY
  - Both feature a weatherproof enclosure, antenna, battery & solar panel
  - Roof or attic mount personal repeater
  - Tower, High rise or Mountain Top



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Hardware

- Antennas
  - Same rules as any other antenna
  - 915MHz
  - Quality matters
- Solar Panels
  - DIY, Home - Most any 5v 10w weatherproof panel works great
  - All-In-One units tend to be more rugged and tower ready

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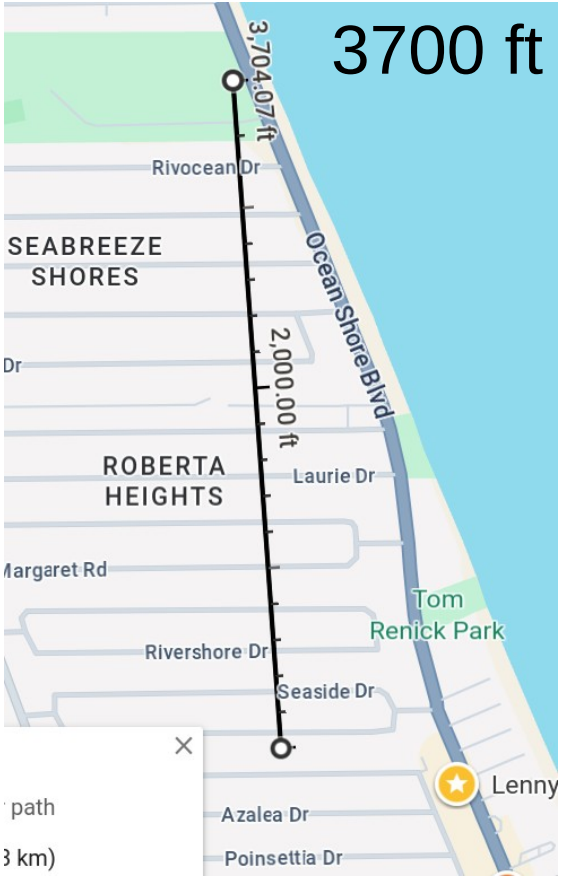
WUSRT Slightly Obstructed



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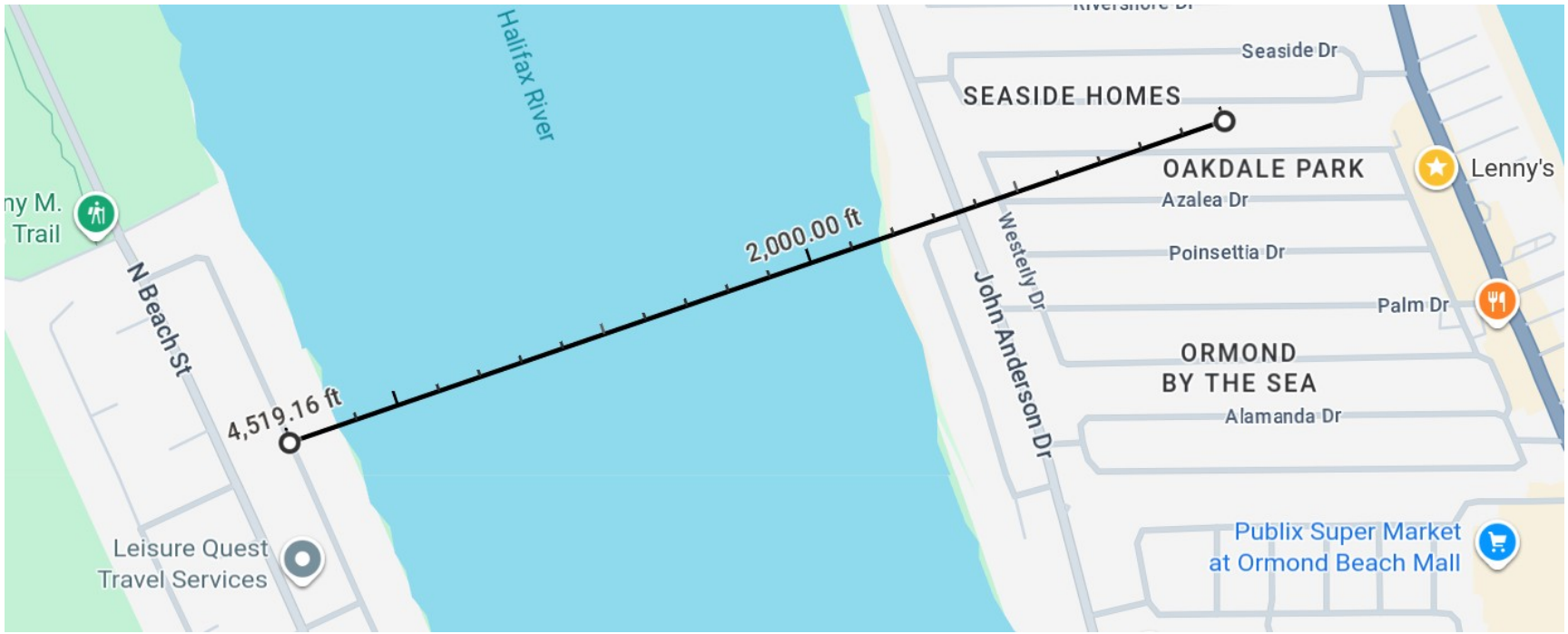
WUSRT Mostly Unobstructed



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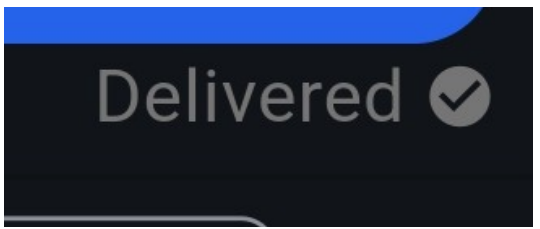
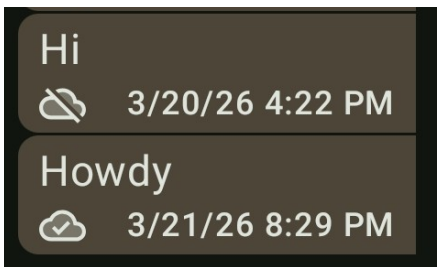
Meshcore vs. Meshtastic

- 3 Modes
- 64 hops max
- Messaging only
- Simple Setup
- Delivery notification works



- 12 Modes
- 7 hops max
  - 3 hops default
- More Options for Infrastructure planning
- Messaging and Telemetry
- IoT Solutions
- Delivery notification is more “Well, we sent it.”



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Typical Use Cases

- Meshcore
  - Planned Infrastructure
  - Long distance chats with many hops
  - Super simple setup makes it ideal for STEM and community involvement
- Meshtasic
  - No infrastructure available
    - Ad-hoc Infrastructure
    - Adding clients increases coverage
  - Groups in a confined area, events, camps, parks, response teams

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Practical Use Cases

- Meshcore
  - Campuses
  - Disaster Event Backup Communications
  - Community Networks
- Meshtasic
  - Disaster Response
  - Camping/Hunting
  - Large Events
  - Parks and Resorts

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Drawbacks

- Meshcore
  - Repeaters needed
    - Elevation + Ground Saturation
  - Clients do not rebroadcast packets
- Meshtasic
  - Hop limit greatly reduces max distance
  - “Hop Gobbling”
    - Incorrectly configured repeaters that should have been CLIENT_BASE
    - Sudden gathering of users in CLIENT vs. CLIENT_MUTE a la Hamcation

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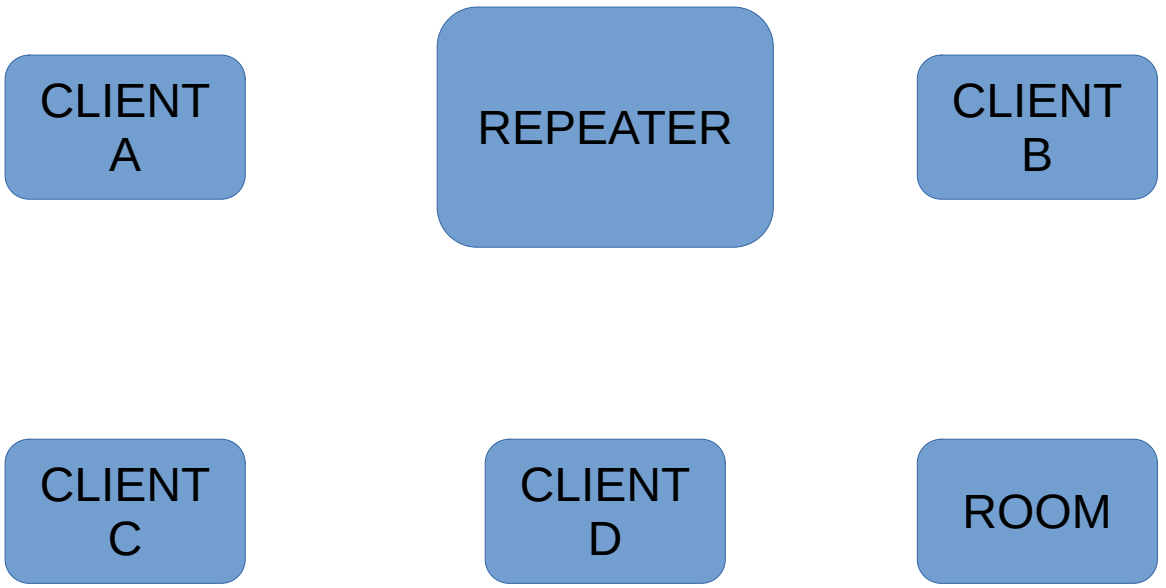
Meshcore Modes

- Client
  - Sends & Receives Message
- Repeater
  - Passes Messages Forward
- Room
  - Holds Messages



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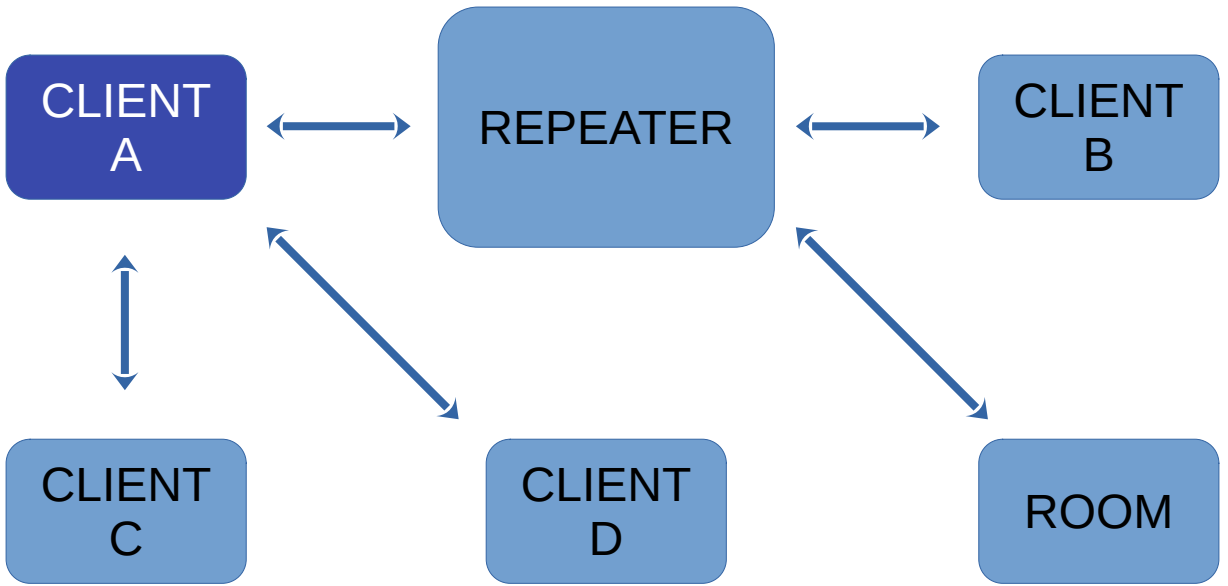
Meshcore Clients & Repeater

- Client
  - Sends & Receives Message
- Repeater
  - Passes Messages Forward
- Room
  - Holds Messages



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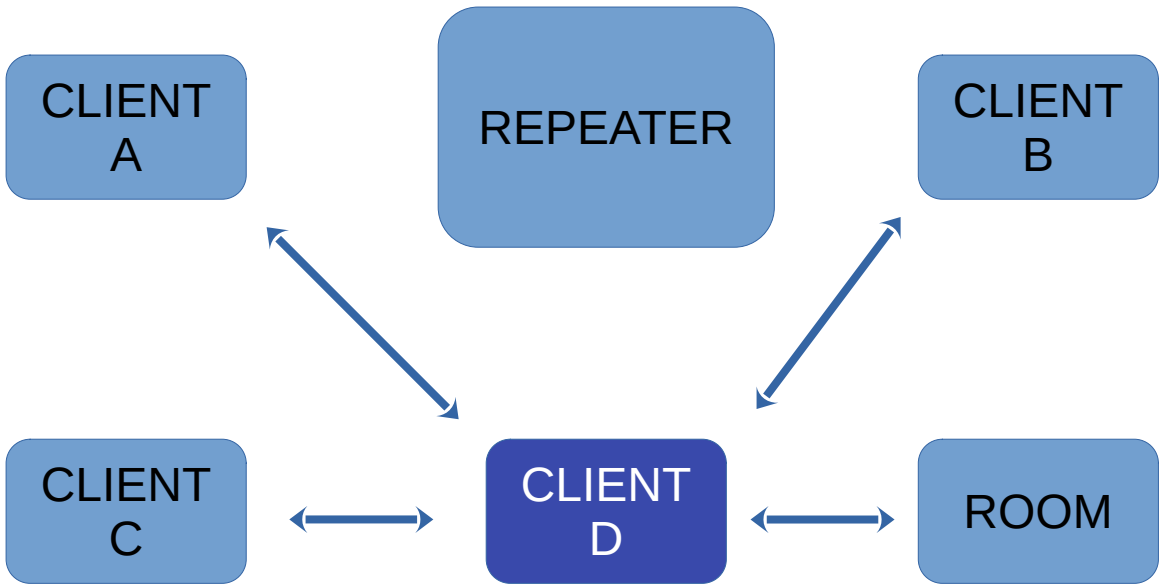
Meshcore Client P2P

- Client
  - Sends & Receives Message
- Repeater
  - Passes Messages Forward
- Room
  - Holds Messages



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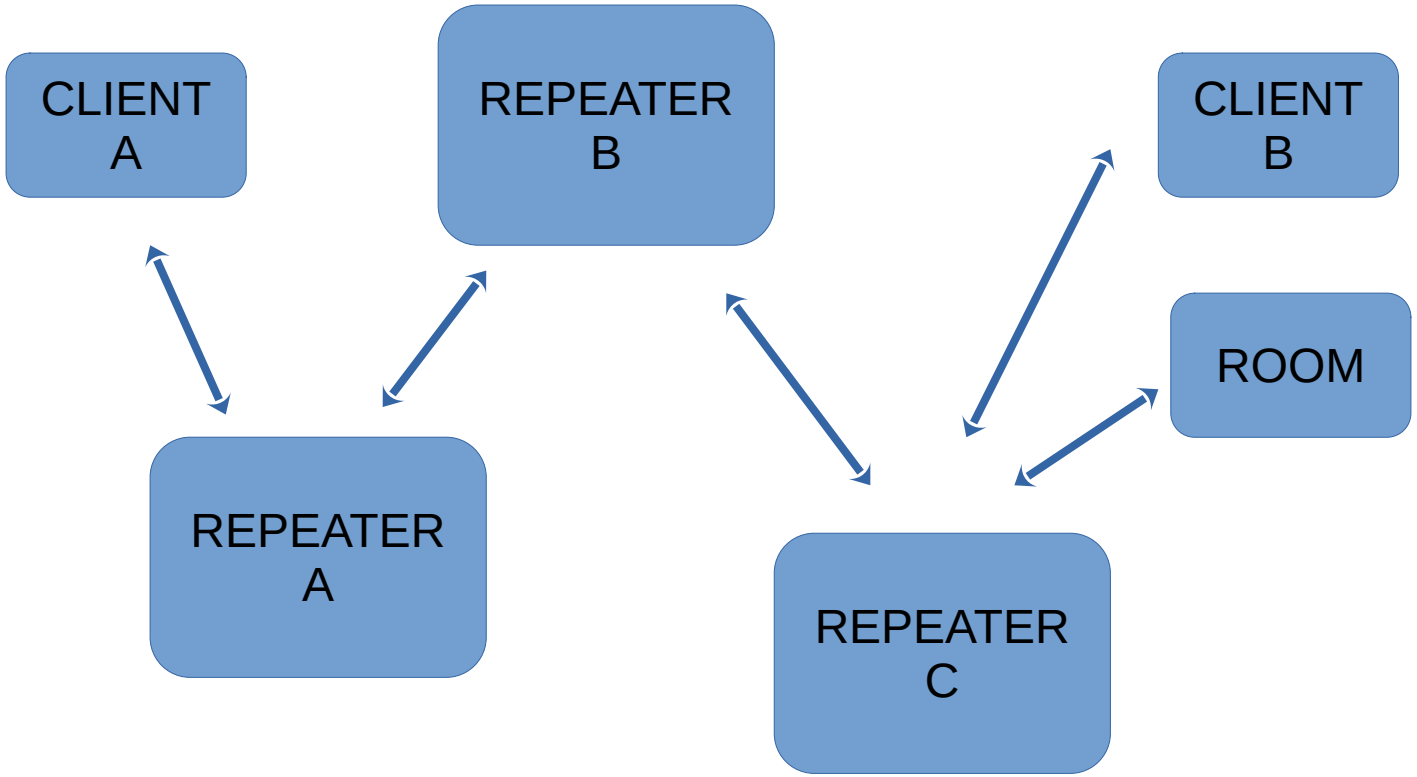
Meshcore Client Routing

- Client
  - Sends & Receives Message
- Repeater
  - Passes Messages Forward
- Room
  - Holds Messages



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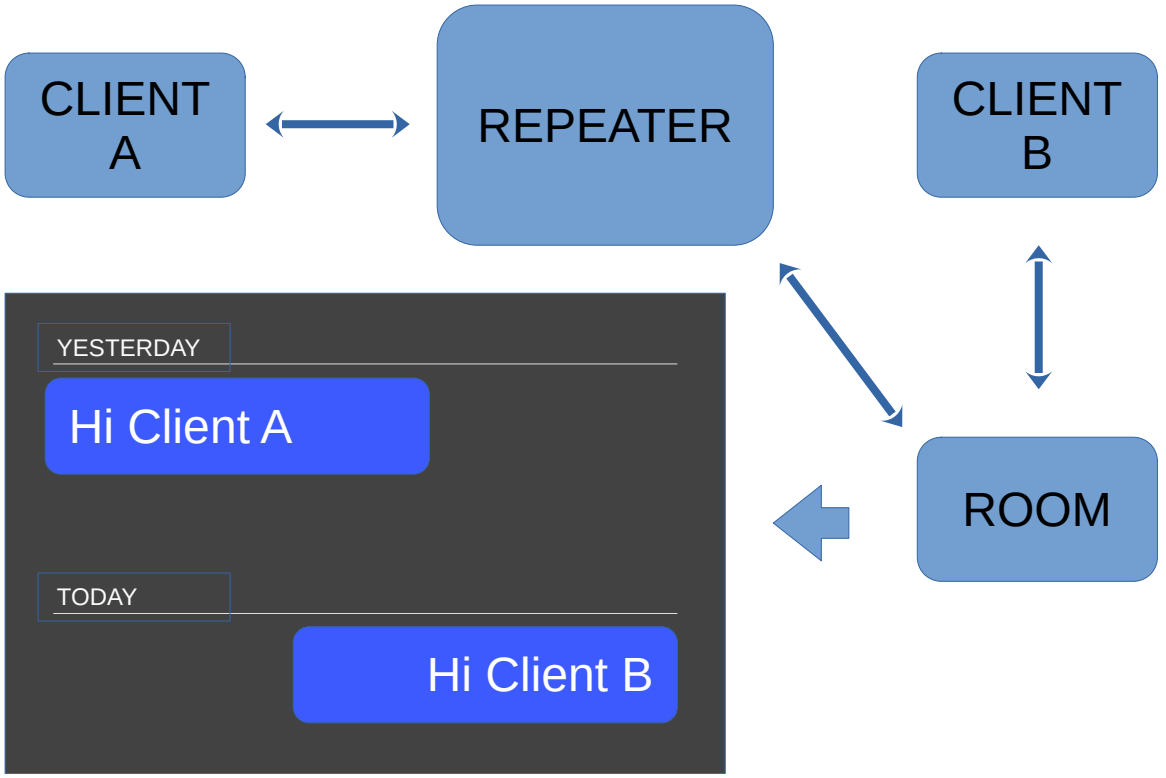
Meshcore Room Server

- Client
  - Sends & Receives Message
- Repeater
  - Passes Messages Forward
- Room
  - Holds Messages



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Meshtastic Modes

Device Role	Description	Best Uses
CLIENT	App connected or stand alone messaging device. Rebroadcasts packets when no other node has done so.	General use for individuals needing to communicate over the Meshtastic network with support for client applications.
CLIENT_MUTE	Device that does not forward packets from other devices.	Situations where a device needs to participate in the network without assisting in packet routing, reducing network load.
CLIENT_HIDDEN	Device that only broadcasts as needed for stealth or power savings.	Use in stealth/hidden deployments or to reduce airtime/power consumption while still participating in the network.
CLIENT_BASE	Personal base station: always rebroadcasts packets from or to its favorited nodes. Handles all other packets like CLIENT.	Use for stronger attic/roof “base station” nodes to distribute messages more widely from your own weaker, indoor, or less-well-positioned nodes.
TRACKER	Broadcasts GPS position packets as priority.	Tracking the location of individuals or assets, especially in scenarios where timely and efficient location updates are critical.
LOST_AND_FOUND	Broadcasts location as message to default channel regularly to assist with device recovery.	Used for recovery efforts of a lost device.
SENSOR	Broadcasts telemetry packets as priority.	Deploying in scenarios where gathering environmental or other sensor data is crucial, with efficient power usage and frequent updates.
TAK	Optimized for ATAK system communication, reduces routine broadcasts.	Integration with ATAK systems (via the Meshtastic ATAK Plugin) for communication in tactical or coordinated operations.
TAK_TRACKER	Enables automatic TAK PLI broadcasts and reduces routine broadcasts.	Standalone PLI integration with ATAK systems for communication in tactical or coordinated operations.
REPEATER 1	Infrastructure node for extending network coverage by always rebroadcasting packets once with minimal overhead. Not visible in Nodes list.	Best positioned in strategic locations to maximize the network's overall coverage. Device is not shown in topology.
ROUTER	Infrastructure node for extending network coverage by always rebroadcasting packets once. Visible in Nodes list.	Best positioned in strategic locations to maximize the network's overall coverage. Device is shown in topology.
ROUTER_LATE	Infrastructure node that always rebroadcasts packets once but only after all other modes, ensuring additional coverage for local clusters. Visible in Nodes list.	Ideal for covering dead spots or ensuring reliability for a cluster of nodes where placement doesn’t benefit the broader mesh. Device is shown in topology.

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Meshtastic Modes Getting Started

Device Role	Description	Best Uses
CLIENT	App connected or stand alone messaging device. Rebroadcasts packets when no other node has done so.	General use for individuals needing to communicate over the Meshtastic network with support for client applications.
CLIENT_MUTE	Device that does not forward packets from other devices.	Situations where a device needs to participate in the network without assisting in packet routing, reducing network load.
CLIENT_BASE	Personal base station: always rebroadcasts packets from or to its favorited nodes. Handles all other packets like CLIENT.	Use for stronger attic/roof “base station” nodes to distribute messages more widely from your own weaker, indoor, or less-well-positioned nodes.

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More Meshtastic Modes

(if you have a tower or tall mast)

Device Role	Description	Best Uses
REPEATER	Infrastructure node for extending network coverage by always rebroadcasting packets once with minimal overhead. Not visible in Nodes list.	Best positioned in strategic locations to maximize the network's overall coverage. Device is not shown in topology.
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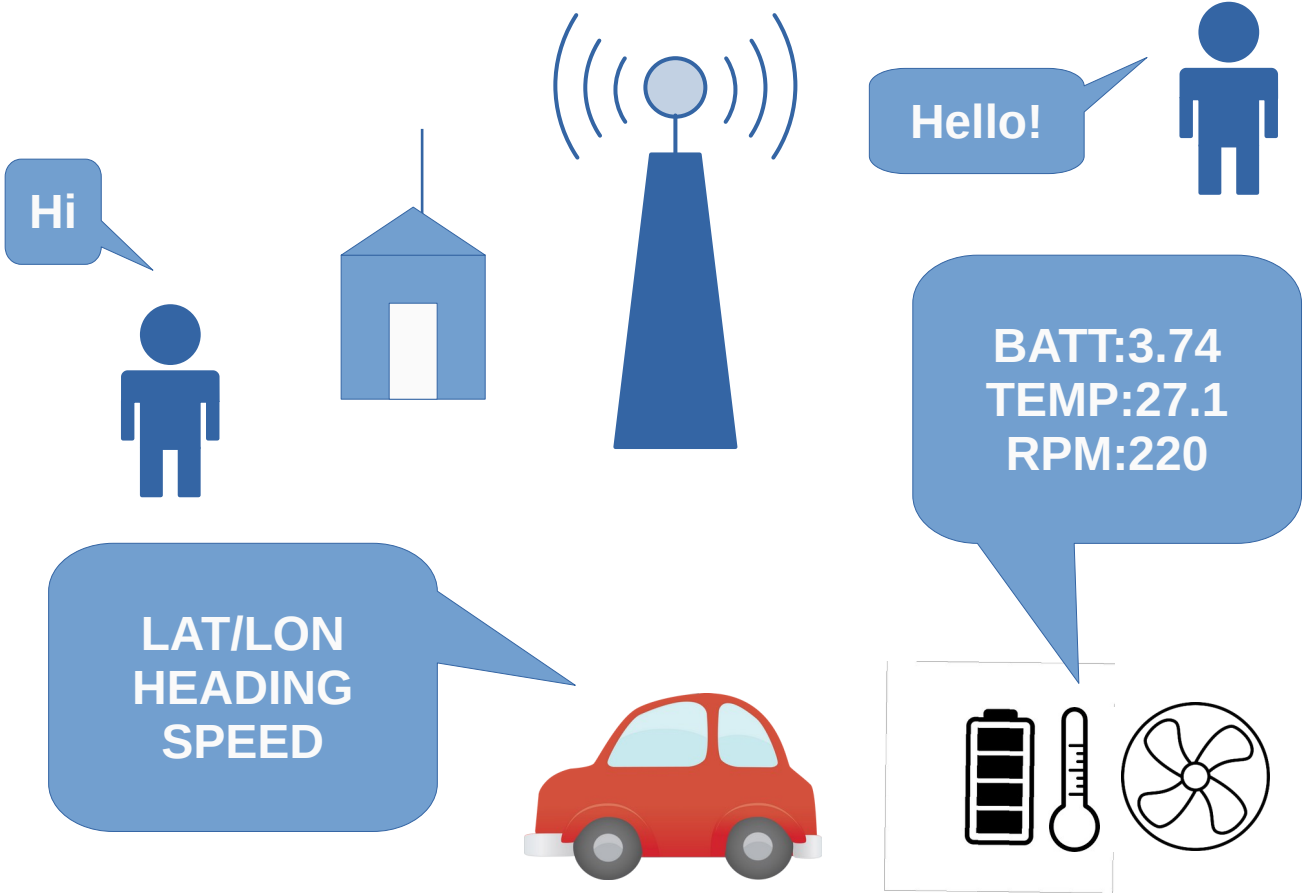
Meshtastic Clients & Repeater

- Client, Client_Base
  - Sends, Receives & Passes Message
- Client_Mute
  - Sends & Recieves
- Repeater
  - Passes Messages Forward
- Tracker
  - Prioritizes GPS position packets
- Sensor
  - Prioritizes Telemetry



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Mode Comparisons

- Repeating
  - Meshcore
    - Repeater
  - Meshtastic
    - Everything except CLIENT_MUTE
- Non-Repeating
  - Meshcore
    - Client
  - Meshtastic
    - CLIENT_MUTE

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Meshtasic Licensed Mode

Amateur Radio (ham) Privileges and Restrictions

- **Privileges**
  - Increased Transmit Power
  - Up to 10W transmit power in the United States! 47 CFR 97.313(j)
  - Higher Gain Antennas
- **Restrictions**
  - Plain-Text Only
  - On amateur radio bands, encryption is illegal. FCC Part 97.113.A.4
  - Lack of Privacy
  - As a ham operator, it is a requirement that you identify yourself by your call sign periodically when transmitting. Your call sign will be publicly transmitted at least once every 10 minutes at minimum. FCC Part 97.119.A

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Which To Use?

- What are your intentions?
- This is not an either/or choice

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Links

https://meshtastic.org/

https://flasher.meshtastic.org/

https://meshcore.co.uk/index.html

https://meshcore.co.uk/flasher.html

https://youtu.be/tXoAhebQc0c?si=qgskonzEIRpyumr8

https://meshtastic.org/docs/faq/#amateur-radio-ham

https://jaxmesh.com/

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- https://www.linkedin.com/in/alexaskills/
- https://www.tbruner.net/
- https://www.upwork.com/freelancers/tombruner