Seize the Means of Communication

DC720: Meshtastic for Emergency Communications

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The Grid is Fragile

Centralized infrastructure concentrates points of failure!

- Most communication infrastructure depends on centralized communication landlords.
- Outages cascade quickly and unpredictably during disasters.
- Even systems with "99.9% uptime" fail during crises of failing underlying infra.
- High congestion or distant environments are not able to use centralized infrastructure.
- Blackouts can completely remove access to means to operate conventional radio equipment or charge cell phones.

Conclusion: We need fully decentralized communication systems, which are battery powered, able to charged by solar, and able to be made to go into sleep mode(s) to conserve energy.

The Grid is Watched

Centralized infrastructure enables surveillance!

- Most communication infrastructure depends on centralized providers which the government has abundant access.
- High surveillance and control over centralized networks
- IMSI from cell phone
- *No need to upload your I.D. to chat on Meshtastic*

Conclusion: Oh hey same thing: a community needs decentralized communication options and definitely with a minimum of security options.

Peer-to-Peer Networking

The Basics

- "Everyone is a cell tower:" Each client node relays messages through the network!
- No central servers
- A smart phone can connect to the device over Bluetooth
- No Internet Service Providers required!
- Devices communicate directly node-to-node

Result:

- Self-forming network
- Resilient communication

Hardware Overview:

Typical components for a meshtastic networks includes nodes in operation in the 900 MHz ISM band. Generally, meshtastic devices can be grouped into three broad categories in proportion to their transmit power (range):

- Smaller devices (Set these to **CLIENT MUTE**)
- Larger nodes (Set these to **CLIENT** or **CLIENT BASE**)
- Secret third option (for experienced operators only)

Examples of specific hardware: See Appendix: “Demo Gear” on Slide 17

Configure Your Node

After you set your general LoRA region, you can set the *Range LoRA Preset*. The default is LongFast 20 and you can leave it if you want to join the public network. You can read more about *the modes HERE*

Next, you set *Device Role URL*. This will almost always be best set to **CLIENT MUTE** in a larger network for weaker devices and **CLIENT** for relatively strong devices. By setting the appropriate mode, the network can transmit packets with the fewest hops.

Why Would Anyone Bother With This? Example 1

RAVES

- Activate location settings to rally easy
- Campgrounds/dancefloors remote from cell towers
- Crowds can swamp and towers that may be reachable
- Secure comms and create channels

Why Would Anyone Bother With This? Example 2

SPECIAL RAVES

- Disable location in advance!
- Venues in cities and thus near cell towers, which means Stingrays! Oh my!
- Use burner cell or have a mesh device with keyboard (such as a LilyGo)
- **Leave your real phone at home!**
- *Absolutely* secure comms and create channels. Talk to friends in advance about settings and setup, do not allow changes to network once headed to the special rave.

Why Would Anyone Bother With This? Example 3

HIKING

- Enable location
- Maybe upgrade your antenna
- Campgrounds and wilderness remote from cell towers
- Max out on range settings

Configure Your Node - COMMON USE CASES

Pre-configured channel setups for common use cases:

- Default Meshtastic - Standard LongFast configuration
- MtnMesh Community - MediumFast with slot 20
- Emergency/SAR - Maximum range for emergency operations
- Urban High-Density - ShortFast for city networks
- Private Group - Custom encrypted channels
- Long Range - Maximum distance configuration
- Repeater/Router - Infrastructure node setup **NO DON'T EVEN THINK ABOUT USING THIS MODE UNLESS YOU KNOW WHAT YOU ARE DOING**

Questions?

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Is There Anything Better Than Meshtastic?

There are multiple meshnet projects in existence. Meshcore is an alternative to Meshtastic not covered in this presentation. An arguably much "better" way to go would be Reticulum.

Don't worry, you don't need more hardware to consider this route. Reticulum supports almost all the same hardware as Meshtastic, just different software.
More on Reticulum versus Meshtastic in the following Appendix slides:

Appendix: Reticulum vs Meshtastic part 1

Comparing Meshtastic to Reticulum, part 1

Reticulum offers more than a meshnet:

Feature	**Meshnet**	**Reticulum**
Hardware	hw limits (e.g., LoRa)	hw agnostic (LoRa, Packet Radio, TCP/IP)
Security	Optional, basic encryption	Encrypted & authenticated by default
Routing	Basic flooding or simple routing	Self-configuring delay-tolerant routing
Flexibility	Limited to specific protocols	Unified network across any medium

Appendix: Reticulum vs Meshtastic part 2

Comparing Meshtastic to Reticulum, part 2 Traditional LoRa Mesh Networks Actually Kinda Sucks Because:

- **Flat Network** → Oops, only text, mqtt (optional) and location information
- **Flood routing** → packet duplication, airtime exhaustion
- **Sweet Spot of Reliability** → performance collapses as node count grows
- **Weak security models** → shared keys or optional encryption
- **Device addressing** → identities tied to hardware
- **Limited delay tolerance** → network fails when paths disappear **OR IF SOMEONE INSERTS A ROUTER OR REPEATER RANDOMLY IN A PLACE THAT WRECKS THE NETWORK**
- **Bad Setup Adds Hops** → packet dupes, airtime exhaustion, also with angry network users

Appendix: Reticulum vs Meshtastic part 3

Comparing Meshtastic to Reticulum, part 3 What *Reticulum* Does Differently

- Adaptive routing instead of broadcast flooding, thanks to a better network model.
- Works across **multiple transports** (LoRa, packet radio, TCP/IP, serial)
- **End-to-end encrypted** destinations by default
- **Delay-tolerant networking** (store-and-forward)
- **Cryptographic identities** independent of hardware

When to use either?

Mesthastic: Ad-hoc contexts where the main information is gonna be brief messages and maybe location information. Camping, protes- uh, raving, or other events with large enough crowds to drown local cell infrastructure are decent candidates for using Meshtastic.

Reticulum (fans call it "rns"): Sturdy "alternet" that can continue to serve things on its network even if cell towers and the internet become inaccessible. This network is scalable and has a stronger security model, making it more suitable for the long-term.

Appendix: Demo Gear

- **KeepTeen D5L Meshcore Repeater** Solar panel system with Heltec ESP32 V3 LoRa modules and battery controller
- **Sensecap Solar Node P1-Pro** Outdoor solar-powered Meshtastic node
- **LILYGO T-Deck** Handheld terminal with ESP32, screen, and keyboard
- **T-1000E** Portable tracker and node for Meshtastic networks
- **Lecrow ThinkNode M5** LoRa transceiver with GPS and e-paper display

Bibliography & Notes

Sources

- Reticulum Network Stack
- Meshtastic Project
- "Gadgets For People Who Don't Trust The Government" by Benn Jordan:

Made in Beamer LaTeX

Note: Please Consider Using Less AI
LLM tools should at most assist with thoughtless tasks, never to replace thinking.
Maintaining independent reasoning will always be valuable.