



FALLEN EXPOSURE
THE LIGHT WAS ALWAYS THERE

EVIDENCE LOCKER
FILE 003
FIELD TUTORIAL
OCT 2026

FIELD MANUAL

SELF-RELIANT COMMUNICATION · STEP BY STEP

BUILD YOUR OWN NETWORK

A beginner's field guide to off-grid mesh messaging with Reticulum and LoRa radios, built from Data Slayer's "How to Become Your Own ISP" and checked against official sources

What the video really builds · what to buy · how to set it up

Three build stages, from two radios on a kitchen table to a public node
FCC, FAA and cloud-bill guardrails · troubleshooting · sources

SECTION 1

01 AT A GLANCE

Six things to know before you buy a single radio.

- 1 **“Your own internet” here means your own text-message network.** The video does not replace your home internet. It builds a small, encrypted messaging network using free software called **Reticulum** and cheap long-range radios called **LoRa** boards. Messages can travel by cell data, Wi-Fi, satellite internet or radio, whichever is available.^{1,2}
- 2 **It works without cell towers or Wi-Fi.** In the video, a phone with no internet received a message over radio after it was relayed through a drone-mounted radio and a Starlink-connected base station.¹
- 3 **The starter kit is cheap.** Two Heltec V4 radio boards cost about **\$18–\$28 each** on Heltec’s store (checked Oct 24, 2026). Add two Android phones you already own and the free **Columba** or **Sideband** app.^{10,11,16}
- 4 **Build it in three stages.** **A:** two radios, two phones, no internet. **B:** a small home “gateway” computer that links your radio to the wider network. **C (optional):** a public node in the cloud, like the one in the video.
- 5 **It is legal when you stay in your lane.** Use only the 902–928 MHz license-free band at modest power. Do not use ham-radio frequencies for encrypted traffic, which the FCC forbids. If you fly a drone, follow FAA rules.^{23–27}
- 6 **Know the limits.** It moves short text messages and small files slowly. It cannot stream video, browse websites over radio, or call 911. Range depends on height and line of sight. In the video, a ground-level link died at about 2.3–2.5 miles in trees.¹

A word of caution from the software’s own author

Reticulum’s official page warns that “entirely LLM-generated fakes of Reticulum implementations, ‘documentation’, ‘guides’ and user-facing applications” are circulating.⁶ This guide teaches only from the official manual and from apps listed in the manual’s “Programs Using Reticulum” chapter. Those apps are **Sideband**, **Columba**, **Nomad Network** and **MeshChat**.⁵ When in doubt, trust **reticulum.network** over any guide, including this one.

SECTION 2

02 WHAT THE VIDEO TEACHES

“How to Become Your Own ISP,” Data Slayer (@DataSlayerMedia), published Aug 9, 2026. Runs 21 min 59 s, with about 1.24 million views on Oct 24, 2026.¹

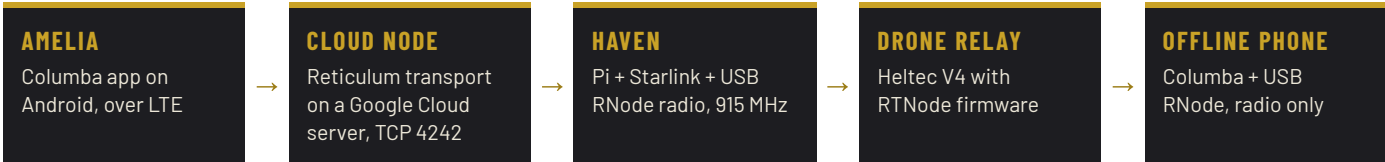
The creator frames the project as part of his channel’s goal to “build a free, open-source internet that anyone can use, build, and own.” The title says “ISP,” but he never sells internet service. What he builds is a **network of networks** for encrypted messages, and he tests whether an ordinary person can use it.¹

THE CHALLENGE

His partner Amelia has no Reticulum experience. Could she install a free app, enter one address, and trade messages with a phone that has *no internet at all*? He set it up in five steps:¹

1. **A public “front door.”** He rented a small Google Cloud server, installed Reticulum, and turned on *transport*, which is relay mode. He gave the server a public address on TCP port 4242 and closed the other ports. The node shows up on **rmap.world**, a live map of the Reticulum network.

- 2. **A builder’s test.** He reached the node from his Mac with CrossTalk, a Reticulum client his team builds.
- 3. **The ordinary-person test.** Amelia used **Columba**, an Android app, over LTE cell data. She entered only that public address. He says that in his experience Columba has been “considerably more reliable than Sideband”; that is his opinion.
- 4. **The bridge to radio.** “Haven” is a Raspberry Pi field kit with Starlink internet and a USB LoRa radio (a Heltec V4 running RNode firmware). It passed messages between the internet and 915 MHz radio. Haven is an open-source do-it-yourself project on GitHub, not a store product.¹⁴
- 5. **The offline phone and the drone.** The test phone had cell, Wi-Fi and Bluetooth turned off. Its only link was a USB radio. Messages got through at 0.84 miles, but the ground link failed at about 2.3–2.5 miles in foliage. He then flew a second Heltec V4, nicknamed “old faithful,” on a drone. It ran standalone relay firmware called **RTNode**. After a few tries, Amelia’s message reached the offline phone.



The message path shown in the video, as the creator describes it. He jokes that it is “perhaps the most over-engineered text message in history.”¹

OTHER POINTS HE MAKES

- On a drive from Florida to New Hampshire he says he picked up 458 Meshtastic radios. Meshtastic is a different, popular LoRa mesh system. He used this as evidence that a large hobby community already exists. Meshtastic and Reticulum **do not talk to each other**.^{1,31}
- To cover large areas you need many raised relays. He says cell-tower leasing companies quoted him a \$3,000 installation fee plus a three-year minimum and monthly rent. That is his own account; we did not verify it.¹
- **Disclosure.** The video is sponsored by TryHackMe. The creator also promotes his own paid course and sells hardware, including a drone mount. This tutorial uses only free, official documentation.

Transcript note: this summary comes from the video’s English captions, which may be auto-generated. The captions contain mistakes such as “Laura” for LoRa. Quotes were checked against context.

SECTION 3

03 HOW IT WORKS, IN PLAIN WORDS

You don’t need to be an engineer. Learn these eight words and you can follow every step that comes later.

RETICULUM

Free, open-source networking software by Mark Qvist. It can send encrypted messages over almost anything: internet, Wi-Fi, radio, even very slow links. The manual says it needs as little as **5 bits per second**.²

ADDRESS (“DESTINATION”)

Reticulum uses a long code tied to your encryption key instead of a phone number or an IP address. Whoever holds the key owns the address, and no company hands it out.²

ENCRYPTION

Encryption is built in and always on. Only the person you write to can read the message. The manual lists modern methods such as X25519, Ed25519 and AES-256.²

LORA

LoRa stands for “long range.” It is a radio method that trades speed for distance. It is slow, about as fast as a 1980s modem or slower, but a palm-sized board can reach miles with a clear view.

TRANSPORT NODE

A device that *relays* traffic for others, like a post office. You switch it on with one setting, `enable_transport = Yes`. Phones usually don’t need to do this.^{2,4}

RNODE

A LoRa board flashed with free **RNode firmware** so that Reticulum can use it as a radio. The Heltec V4 is a supported board.^{8,9}

ANNOUNCE & LXMF

An “announce” is how a device tells the network “I exist, here’s how to reach me.” LXMF is the messaging format that Sideband, Columba and similar apps use on top of Reticulum.^{2,5}

INTERFACE

Any path Reticulum can use, such as home Wi-Fi, a USB radio, or an internet link to another node. One device can use several at once.³

THE BIG IDEA

Reticulum does not care *how* a message travels. When the internet works, it uses the internet. When the internet goes down, the same message can still move by radio from relay to relay. That fallback is why preppers, hikers, rural families and church disaster teams are interested in it.

SECTION 4

04 WHAT YOU NEED

Prices were checked on Oct 24, 2026. They change often, and shipping and tax are extra. Items marked “not checked” come from our research tool and were not confirmed by hand.

ITEM	STAGE	PRICE	NOTES & SOURCE
Heltec WiFi LoRa 32 V4 , 915 MHz (902–928) version ×2	A	\$17.90–\$27.50 each	The board used in the video. Comes with a small antenna. On Heltec’s store the US-warehouse OLED version (\$19.90) was out of stock ; China-warehouse versions were in stock. Order the 915 MHz band for the US. ¹⁶ CHECKED
Alternative: LilyGO T-Beam (has GPS)	A	from \$30.77	Also supported by RNode firmware. Make sure you pick the 915 MHz version. ^{8,18} CHECKED
Android phone (Android 12 or newer) ×2	A	\$0 if you own one	Needed for Columba. Sideband also runs on Android, Linux, macOS and Windows. ^{10,11} iPhone options are newer and were not tested for this guide.
USB-C <i>data</i> cable (and an OTG adapter if your phone needs one)	A	Likely already owned	Some cheap cables only charge and carry no data. That is the #1 cause of “device not found.”
Desktop or laptop with Chrome or Edge	A	\$0	Used once to flash the radios with the web flasher. ⁹

Raspberry Pi Zero 2 W (gateway)	B	\$19.05	Adafruit price. An old laptop running Linux also works. ¹⁷ CHECKED
Raspberry Pi 4 or 5, 2GB (gateway with more power)	B	\$67.50 / \$77.50 list	Official list prices after Raspberry Pi's price increase announcement. Retailers may charge more; Adafruit listed the Pi 5 2GB at \$90. ¹⁷ CHECKED
microSD card, power supply, small weatherproof box	B	varies	Mount the radio high . Height matters more than anything else you can buy.
Cloud server , Google Cloud e2-micro	C	Free tier*	*One e2-micro in us-west1, us-central1 or us-east1, with a 30 GB disk and 1 GB of outbound data a month. Usage beyond that is billed. ²⁰ CHECKED
Alternative: DigitalOcean Droplet	C	\$4 or \$6 /mo	512 MB or 1 GB memory. Simple flat monthly price. ²² CHECKED
SkyMesh LoRa drone mount (optional)	Extra	\$8.94	Sold by the video creator's company. Sold out on Oct 24, 2026. ¹⁹ CHECKED
Upgraded antenna (optional)	Extra	not checked	Keep the gain at 6 dBi or less unless you lower power to match (see Section 7). ²³ NOT CHECKED

Realistic budgets

Stage A: about **\$36–\$55** plus shipping for two radios, using phones you already own. **Stage B:** add about **\$20–\$80** for a Pi and its accessories, or \$0 with an old laptop. **Stage C:** \$0–\$6 a month. Your biggest real cost is time: plan on an afternoon for Stage A and a weekend for Stage B.

SECTION 5

05 STEP-BY-STEP BUILD

Do the stages in order. Each one works on its own, so you can stop after any stage and still have something useful.

STAGE A TWO RADIOS, TWO PHONES, ZERO INTERNET

Goal: two people text each other over radio with no cell service or Wi-Fi at all.

- Flash both radios with RNode firmware.** On a desktop, open Chrome or Edge and go to liamcottle.github.io/rnode-flasher. Plug in the Heltec V4 with a *data* cable, select “Heltec LoRa32 v4,” and follow the prompts.⁹ If the board isn't detected, put it in boot mode: hold the **PRG** button, tap **RST**, then release PRG.¹⁶ Repeat for the second radio. Command-line alternative: `pip install rns`, then `rnodeconf --autoinstall`. This is the official tool, and it walks you through the same steps.^{4,8}
- Install the app.** Columba is available from its official GitHub “Releases” page as an APK. The latest stable version was v2.2.6 (Sept 25, 2026). Sideband 2.2.0 was released Oct 1, 2026.^{10,11} Download only from these official links; Section 1 explains why.
- Create your identity.** Open the app and set a display name. The app creates your encryption key and your address automatically.

4. **Connect the radio to the phone.** In the app's interface settings, add an RNode (LoRa) connection by USB or Bluetooth. Enter the **same radio settings on both phones**, for example:

```
Frequency      915.000 MHz    # inside 902-928 MHz
Bandwidth      125 kHz
Spreading factor 8          # 7 = faster, 12 = farther
Coding rate    5
TX power       17 dBm    # modest; well under the legal ceiling
```

These values follow the manual's example layout.³ Avoid parking on Meshtastic's busy US default (906.875 MHz) so you don't step on your neighbors.³¹ If a local Reticulum group already uses a common frequency, match theirs.

5. **Swap addresses.** Show your QR code or share your address with the other phone, then send "hello." In the video, a delivered message shows check marks.¹
6. **Prove it's radio.** Turn on airplane mode on both phones (leave Bluetooth on if the radio uses it) and send again. If it arrives, you have your own network.

STAGE B A HOME GATEWAY THAT RELAYS FOR THE WHOLE HOUSE

Goal: a small always-on computer with a radio that (1) relays radio traffic, (2) lets phones on your home Wi-Fi join with no radio of their own, and (3) optionally links your home mesh to the wider Reticulum network. This is the same job Haven did in the video.^{1,14}

1. **Prepare the Pi.** Install Raspberry Pi OS (Lite is fine), connect it to your network, and log in. Plug one of your RNode radios into its USB port.
2. **Install Reticulum.** The official package is on PyPI; version 1.5.7 was released Oct 5, 2026.⁷

```
sudo apt update && sudo apt install -y pipx
pipx install rns          # or: pip install rns --break-system-packages
pipx ensurepath           # then log out and back in
sudo usermod -aG dialout $USER # lets you use the USB radio; log out/in again
rnsd                      # first run creates ~/.reticulum/config; press Ctrl+C
```

3. **Edit the settings file** (`nano ~/.reticulum/config`). Keep what's there and make these sections match:³

```
[reticulum]
  enable_transport = Yes          # this box relays for others

[interfaces]
  [[Default Interface]]          # finds phones/PCs on your home Wi-Fi
    type = AutoInterface
    enabled = yes

  [[Home LoRa Radio]]
    type = RNodeInterface
    enabled = yes
    port = /dev/ttyACM0          # check with: ls /dev/ttyACM* /dev/ttyUSB*
    frequency = 915000000        # must match the phones exactly
    bandwidth = 125000
    txpower = 17
    spreadingfactor = 8
    codingrate = 5

  [[Wider Network]]              # OPTIONAL: link to a public node
    type = TCPClientInterface
    enabled = yes
    target_host = rns1.buildwithparallel.com # the video's public node
    target_port = 4242
```

The last block is optional. Leave it out (or set `enabled = no`) for a home network that never touches the internet. Other public entry points are listed on **rmap.world** and **directory.rns.recipes**; links on those directories are run by volunteers.²⁹

4. **Start it and check it.** Run `rnsd`, then in a second window run `rnstatus`. Each interface should say **Up**.⁴

5. **Make it start at boot.** Follow the manual's system-service recipe:⁴

```
sudo ln -s $(which rnsd) /usr/local/bin/
sudo nano /etc/systemd/system/rnsd.service
# [Unit]
# Description=Reticulum Network Stack Daemon
# After=multi-user.target
# [Service]
# Type=simple
# Restart=always
# RestartSec=3
# User=YOURUSERNAME
# ExecStart=rnsd --service
# [Install]
# WantedBy=multi-user.target
sudo systemctl enable --now rnsd
```

6. **Join from home.** A family phone with Columba or Sideband on the same Wi-Fi should find the gateway automatically. Your radio phone from Stage A can now reach it over LoRa from down the road.

STAGE C OPTIONAL: A PUBLIC “FRONT DOOR” IN THE CLOUD

This is what the video built. It lets anyone on the internet, like Amelia on LTE, reach your mesh with a single address. **Most families don't need it.** Skip it unless you want to give a community a shared doorway.

1. **Don't host it at home.** Residential internet terms often forbid running public servers. Xfinity's acceptable-use policy is one example.²⁸ A small cloud server avoids that problem and keeps your home IP address private.
2. **Create the server.** Use a free-tier Google Cloud e2-micro in an eligible region, or a \$4–\$6 Droplet.^{20,22} Choose Debian or Ubuntu and sign in with SSH keys, not a password.
3. **Install Reticulum** as in Stage B, and set `enable_transport = Yes`.
4. **Add a listener.** The manual recommends the Backbone interface on Linux. It is fully compatible with the standard TCP server and client.³

```
[[Public Entry]]
type = BackboneInterface
enabled = yes
listen_on = 0.0.0.0
port = 4242
```

5. **Open only one door.** In the cloud firewall, allow **TCP port 4242** (plus SSH from your own IP address) and nothing else, which is what the video describes.¹ Run it as a normal user with the system service from Stage B.
6. **Protect your wallet.** Set billing alerts. Google's standard budgets *send alerts* but do not stop spending on their own.²¹ Delete the server when you're done.
7. **Share the address** (an IP address or a hostname, plus port 4242). Phones add it as a TCP connection in Columba or Sideband. Your Stage B gateway can point its “Wider Network” block at it.

Privacy note

Message *contents* are encrypted end to end. A TCP connection, however, still shows your IP address to the server you connect to. The manual offers I2P interfaces for people who need to hide that too.³

SECTION 6

06 TESTING AND EXPANDING

Run the same kind of field test the video did, but safely and on the ground first.

THE WALK-AWAY TEST

- ☐ Leave one person at the gateway or base phone. The other drives or walks away with the radio phone in airplane mode.
- ☐ Send a message at each landmark and note the distance and whether it was delivered. The video’s ground link worked at 0.84 mi and failed around 2.3–2.5 mi in trees.¹
- ☐ When messages stop, step onto higher ground and try again. Height usually beats power.
- ☐ On the gateway, use `rnpath` and `rnprobe` to see whether a route exists.⁴

WAYS TO REACH FARTHER

- ☐ **Raise the antenna.** An attic, a roof mast, a church steeple or a friend’s hilltop house, with permission.
- ☐ **Add relays.** Any device running Reticulum with transport turned on can relay. A third radio plus a Pi on a hill can bridge two neighborhoods.
- ☐ **Slow down to go farther.** A higher spreading factor (up to 12) and coding rate (up to 8) add range at the cost of speed. Every radio must match.³
- ☐ **Standalone relays (advanced).** The video’s drone ran RTNode, a beta firmware built on microReticulum.^{12,13} See the caution below.

Caution about the drone relay firmware

microReticulum, by Chad Attermann, is listed by the Reticulum project as a recognized community implementation.^{6,13} RTNode-HeltecV4, the firmware built on top of it, is labeled **beta** by its developer, who says it was built with AI assistance. It is *not* listed in the manual’s software chapter.^{5,12} Treat it as an experiment, not as equipment for an emergency plan. For a dependable relay, use the Stage B setup (a Pi with a USB RNode and transport turned on).

SECTION 7

07 LEGAL AND SAFETY NOTES

You don’t need a license for this build if you stay inside these lines. This is general information, not legal advice.

TOPIC	THE RULE	WHAT IT MEANS FOR YOU
License-free radio (FCC Part 15)	In 902–928 MHz, §15.247 allows up to 1 watt of conducted power with antennas up to 6 dBi . With a higher-gain antenna, power must drop by the same amount. ²³ Part 15 devices must not cause harmful interference, must accept interference, and must stop if the FCC tells the operator to. ²⁴	Use 915 MHz boards, use the stock or a modest antenna, keep power modest, and never add an amplifier .
Fine print	§15.247(a)(2) says digital-modulation systems in this band must have a 6 dB bandwidth of at least 500 kHz . ²³ Hobby LoRa settings commonly use 125–250 kHz.	How hobby LoRa gear fits the FCC’s categories is a technical certification question that this guide cannot settle. Buy boards with an FCC ID where you can, and keep power low.
Ham radio bands (Part 97)	Amateur rules forbid “messages encoded for the purpose of obscuring their meaning.” ²⁵	Reticulum is always encrypted, so do not run it on ham frequencies or at ham power levels, even if you hold a license.

Drones (FAA)	Recreational flyers must pass the free TRUST test, register drones of 250 g or more, broadcast Remote ID, keep the drone in sight, and stay at or below 400 ft. ^{26,27}	Carrying a radio for a demonstration or a YouTube video may count as non-recreational. If in doubt, assume Part 107 (commercial) rules apply. Check state and local rules as well.
Internet service terms	Home internet plans often ban public servers. ²⁸ There is no FCC “ISP license” involved in this project.	Put any <i>public</i> node in the cloud (Stage C), not on your home connection.
Software license	Reticulum uses its own Reticulum License. It is permissive like MIT, but it forbids use in systems built to harm people and forbids using the code for AI training datasets. ⁶	Fine for personal, family and community use.

Physical safety

Never put up an antenna near power lines. Use a proper ladder and a second person for roof work. Ground any outdoor mast. Keep batteries out of hot cars; the video’s drone overheated in the field.¹

SECTION 8

08 HONEST LIMITS

Set expectations before you depend on it.

IT IS NOT HOME INTERNET

Over radio you can send texts, small files and simple text pages (Nomad Network). You can’t send video, normal web browsing or app updates.⁵

EVERYONE MUST MATCH

Every radio needs the same frequency, bandwidth, spreading factor and coding rate. One wrong digit means silence.³

IT IS NOT AN EMERGENCY LINE

It cannot call or text 911. In an emergency, use real emergency services first.

NOT MESHTASTIC-COMPATIBLE

Reticulum radios won’t talk to the many Meshtastic radios around you. They are separate systems.^{1,31}

RANGE IS EARNED, NOT BOUGHT

Trees, hills and buildings block LoRa. Miles are possible only with height and line of sight. The video needed a drone to get past one stand of trees.¹

YOUNG, FAST-MOVING SOFTWARE

Apps update often, and some community projects are betas. Write down your settings, and test your setup monthly so you know it works before you need it.

SECTION 9

09 TROUBLESHOOTING

Most problems come down to a cable, a permission or a mismatched setting.

SYMPTOM	LIKELY CAUSE	FIX
Flasher or computer can't see the board	Charge-only cable, or the board isn't in boot mode	Use a data cable. Hold PRG, tap RST, release PRG. ¹⁶ Try a different USB port.
Web flasher shows no “connect” option	The browser lacks Web Serial	Use desktop Chrome or Edge; Safari and Firefox won't work. ⁹
Pi says “permission denied” on <code>/dev/ttyACM0</code>	Your user isn't in the <code>dialout</code> group	Run <code>sudo usermod -aG dialout \$USER</code> , then log out and back in.
Radio port isn't <code>/dev/ttyACM0</code>	The board shows up under a different name	Run <code>ls /dev/ttyACM* /dev/ttyUSB*</code> and use the name it shows.
<code>rnسد: command not found</code>	The pipx path isn't loaded	Run <code>pipx ensurepath</code> , then log out and back in.
Interfaces show Up, but messages never arrive	Radio settings differ between devices	Compare frequency, bandwidth, spreading factor and coding rate on every device.
Messages arrive slowly or after several tries	Weak signal or a path still being discovered	That's normal for LoRa. Wait, send an announce from the app, raise the antenna, or move closer. The video needed several tries too. ¹
Nobody can reach the cloud node	Firewall closed, or the wrong port	Allow TCP 4242 in the cloud firewall, and confirm the listener in <code>rnstatus</code> .
Unexpected cloud bill	Outside the free-tier region or limits	Use only the free-tier regions, set alerts, and delete unused servers and disks. ^{20,21}

For a full list of settings, the official tool `rnسد --exampleconfig` prints a complete annotated example configuration.⁴

SECTION 10

10 WHAT WE COULD NOT VERIFY

These items are stated plainly so you can weigh them yourself.

- The creator's claims of a **\$3,000 tower installation fee and three-year lease**, and the **458 Meshtastic nodes** he logged. These are his own accounts.¹
- Distances in the video come from his on-screen narration. We did not measure them independently.
- Whether the Heltec V4 carries its own FCC certification, and how narrow-bandwidth LoRa settings fit \$15.247's 500 kHz rule.
- Prices for upgraded antennas, a RAK WisBlock kit, and paid cloud plans other than DigitalOcean. Our research tool reported some of these; we did not confirm them by hand.
- Whether Google Cloud's newer “spend cap” budgets cover Compute Engine. We treated alerts as warnings only.
- iPhone app options and state-level drone laws. Both vary and were not tested.

11 SOURCES

All pages were accessed Oct 22–24, 2026.

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A CLOSING WORD

“Through wisdom a house is built, And by understanding it is established; By knowledge the rooms are filled With all precious and pleasant riches.”

PROVERBS 24:3–4 · NKJV

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