

General Questions

Answers to the most common general questions about LoRa mesh networking, MeshCore, and Meshtastic.

Do I need a license to use Meshtastic or MeshCore?

No. Both protocols operate in the 902-928 MHz band in the US and Canada, which is license-free for compliant unlicensed devices - in the US under FCC Part 15, and in Canada under ISED's RSS-247 rules. This is the band commonly called the "915 MHz ISM band," but note that it is a *shared* band: the unlicensed mesh use is a secondary, non-interference allocation, not an exclusive ISM allocation. You do not need an amateur (ham) radio license to buy, own, or operate a LoRa mesh node for MeshCore or Meshtastic.

The FCC Part 15 rules that apply (47 CFR 15.247(b)(3) and (b)(4)): maximum 1 W (30 dBm) conducted transmit power. Antenna gain up to 6 dBi is allowed at full power; above 6 dBi, conducted power must be reduced dB-for-dB, so EIRP stays at roughly 36 dBm. There is no standalone "4 W EIRP" allowance that lets you run full power into a high-gain antenna. Mass-market LoRa boards ship at FCC-compliant default power, but some hardware (external PA modules, Station G2) can be configured above legal limits - verify your settings.

Note: if you are a licensed amateur radio operator and choose to operate on amateur frequencies using Part 97 rules, different rules apply - but standard ISM band operation requires no license at all.

Does this work without internet or cell service?

Yes - the radio layer needs no internet or cell service. That is the entire point of LoRa mesh networking. The mesh operates entirely on LoRa radio signals transmitted directly between devices. There is no internet connection, no cell network, no infrastructure, and no central server

involved in basic mesh operation.

Each node talks directly to nearby nodes via radio. Messages hop from node to node until they reach the destination. As long as there is a path of nodes in range of each other between sender and receiver, messages get through - regardless of whether any internet or cell service exists.

Important caveat: the mesh only works if other nodes are within radio range, either directly or via repeaters. A single node with no peers in range talks to no one. In an area with no nearby nodes - or in a wide-area disaster where nodes lose power and paths collapse - an off-grid node may have no working path. Build and verify local coverage before relying on the mesh for critical communications.

Some users optionally connect gateway nodes to the internet via Wi-Fi (primarily for Meshtastic's MQTT bridging feature), but this is entirely optional and not required for the mesh to function.

How far can messages travel?

Range depends heavily on environment, antenna height, and channel settings. The figures below are approximate field observations, not manufacturer guarantees, and real-world results vary widely:

- **Urban, near ground level (node to node):** roughly 1 - 5 km - highly site-dependent; dense urban can be well under 1 km
- **Rural, open terrain (node to node):** roughly 5 - 20 km
- **Elevated repeater on a hilltop or tower:** 20 - 50+ km with line of sight. Line-of-sight distance scales with antenna height (roughly the square root of height via the radio-horizon relationship), so these numbers depend on how high the node is, not a fixed figure.

Those are *single-hop* figures. With a mesh network of repeater nodes, a message can travel beyond any single-hop range by relaying across a chain of nodes. In practice, reliable multi-hop range is limited by the firmware's hop limit (Meshtastic defaults to 3, with a hard cap of 7), per-hop latency, and accumulating packet loss, so long cross-region delivery is the exception rather than the rule.

The single most effective way to increase range is elevation. Because line-of-sight distance follows the radio horizon (which scales with the square root of antenna height), a hilltop or tower repeater can reach far-off nodes that a ground-level node cannot reach at all - elevated repeaters commonly reach tens of kilometres to other elevated or distant nodes. (As an illustration, the radio horizon from about 500 ft to ground level is roughly 30 km.)

Can I use MeshCore and Meshtastic devices together on the same network?

No. MeshCore and Meshtastic use different protocols and different packet formats. A MeshCore device cannot decode Meshtastic packets, and vice versa. You need all devices on the same protocol to form a communicating network.

If you want to communicate with someone using a different protocol than you, one of you needs to switch. Check what protocol your local network and community uses before purchasing or flashing hardware.

What does this cost? Are there any ongoing fees?

Hardware cost: **\$20 - \$150** depending on the device. A basic Heltec V3 for MeshCore costs around \$22. A LILYGO T-Deck Plus with built-in keyboard and screen runs around \$100-115. (Prices are approximate and as of June 2026; hardware pricing changes often, so confirm against a current retailer listing.)

There are no ongoing fees, subscriptions, data plans, or service charges. Once you have the hardware, the network is free to use indefinitely. The firmware is open source and free. The apps are free. There are no cloud services you are paying for.

Optional costs: a better antenna (\$15 - \$30), a weatherproof enclosure (\$10 - \$20), and power hardware for a permanent outdoor node. None of these are required to get started.

Can I use this without a smartphone?

Most LoRa mesh devices require a smartphone running the companion app ([Meshtastic app](#) or MeshCore app) for messaging. The phone connects via Bluetooth and provides the user interface.

However, some devices have built-in keyboards and screens and can operate completely standalone (prices approximate and as of June 2026; verify against a current listing):

- **LILYGO T-Deck** (around \$55-75) - built-in QWERTY keyboard and color display
- **LILYGO T-Deck Plus** (around \$100-115) - T-Deck with larger battery and improved hardware

These standalone devices are popular for go-bag use, field operations, and anyone who prefers not to depend on a phone. They are fully functional mesh nodes without any external device required.

There is also a desktop application and web interface available for Meshtastic for use with a computer connected via USB or Bluetooth.

Is this secure? Can others read my messages?

Both platforms encrypt traffic, but they use different schemes, so it helps to keep them separate:

- **Meshtastic:** channel messages are encrypted with a per-channel pre-shared key (PSK) using AES-128 or AES-256 in CTR mode. Direct messages can additionally use public-key (PKI) encryption (see below).
- **MeshCore:** channel messages use AES (AES-128) with a shared channel key, while direct messages use Curve25519 ECDH public-key encryption between the two parties.

In both systems, the **default public channel** uses a well-known key that anyone can configure - it is essentially unencrypted in practice, similar to a public radio channel. For private communication, create a private channel with a custom key and share it only with intended recipients.

Direct messages (DMs) between specific nodes are encrypted with the recipient's public key in MeshCore. In Meshtastic (firmware v2.5 and later), DMs are also encrypted with the recipient's public key using public-key cryptography (X25519 key exchange + AES-CCM), the same general approach as MeshCore. Pre-2.5 Meshtastic firmware fell back to the shared channel key.

Revision #6

Created 2026-05-03 01:35:45 UTC by Mesh America Admin

Updated 2026-06-08 19:57:41 UTC by Mesh America Admin