

# What You Need to Get Started

Getting on a LoRa mesh network requires minimal hardware and no ongoing costs. This page covers everything you need - and what is optional but recommended.

## Minimum Requirements

To send and receive messages on a LoRa mesh network, you need:

### 1. A LoRa Device with Mesh Firmware

A LoRa-capable microcontroller board flashed with either MeshCore or Meshtastic firmware. Cost: **\$20 - \$90** depending on the device.

Popular beginner choices:

- **Heltec V3** (~\$22) - Most popular beginner board overall; runs both Meshtastic and MeshCore. ESP32-based, built-in display, compact. Available on AliExpress or directly from Heltec.
- **LILYGO T-Beam** (~\$35 - \$45) - Includes GPS, good for position tracking. Works with both protocols.
- **RAK WisBlock Starter Kit** (~\$40 - \$60) - Modular system, nRF52-based, very low power.
- **LILYGO T-Echo** (~\$45 - \$65, as of June 2026) - E-ink display, nRF52, excellent battery life. Good for always-on pocket carry.
- **LILYGO T-Deck / T-Deck Plus** (~\$55 - \$80) - Built-in keyboard and screen. No phone needed for standalone operation.

Check [flasher.meshtastic.org](https://flasher.meshtastic.org) (Meshtastic) or [flasher.meshcore.io](https://flasher.meshcore.io) (MeshCore) for current compatibility lists before purchasing.

### 2. A Smartphone App

For most devices, you need a phone to send and receive messages. The app is free:

- **MeshCore app** - iOS and Android, free
- [Meshtastic app](#) - iOS and Android, free

The phone connects to your LoRa device via Bluetooth Low Energy (BLE). The phone provides the user interface; the LoRa device does the radio work.

## 3. A USB Data Cable

You need this for the initial firmware flash and for future USB firmware updates (especially on ESP32 boards, where updates are typically done over USB). Day-to-day messaging is via Bluetooth, so you won't need the cable for normal use. **It must be a data-capable cable** - not a charge-only cable. Many cheap USB cables are charge-only and will not work for flashing. Use the cable that came with a known-good device, or buy a cable explicitly labeled as a data cable.

## 4. An Antenna

Most devices ship with a basic stub antenna. This is adequate for initial testing but limits your range significantly. An antenna is required - never transmit with no antenna connected, as this can damage the radio.

# Optional But Recommended

## Higher-Gain External Antenna

Upgrading your antenna is the single highest-impact improvement you can make to your range. The stock stub antenna on most devices is 2 - 3 dBi. A quality 5 - 6 dBi fiberglass whip antenna can noticeably extend your range - up to roughly 1.5x in open conditions (more if the stock antenna is poor), since the extra ~3 dB is about a 1.4x range gain in free space rather than a true doubling - for \$15 - \$30.

Connector types vary by device - the Heltec V3 uses an IPEX (U.FL) connector with an SMA-female pigtail, LILYGO boards are typically SMA female, and some RAK enclosure products use RP-SMA. Match your antenna to your specific device before buying; an RP-SMA antenna will not mate properly with an SMA jack.

## Weatherproof Enclosure

If you plan to mount a device outdoors (rooftop, hilltop, window exterior), a weatherproof enclosure protects against rain, humidity, and UV. IP65-rated plastic enclosures are available for \$5 - \$20. Many community members 3D-print custom enclosures.

If the node contains a battery, mind the heat: a sealed enclosure in direct sun can exceed safe lithium charging temperatures (around 45 degC). Shade the box or use a light-colored enclosure, prefer LiFePO4 over LiPo for anything left outdoors, and make sure the battery's BMS has over-temperature protection. Avoid PLA 3D prints outdoors - they soften and deform in heat, which can break the seal or drop the battery against a hot surface.

## Battery or Solar Power

For a portable field node: a USB power bank works well. For a permanent outdoor repeater: a small solar panel (5 - 10 W), a solar charge controller rated for LiFePO4, and a LiFePO4 battery. The right panel and battery size depends heavily on your node's average current draw (a low-power nRF52 node needs far less than a power-hungry ESP32 node), your latitude, and winter sun - 5-10 W is reasonable for an nRF52 node across most of the continental US but can be marginal for an ESP32 node in northern winters, so see the wiki's solar sizing page for a worked calculation for your specific node. **Never wire a solar panel directly to the battery** - the charge controller is not optional. A panel's open-circuit voltage exceeds the battery's safe charge voltage, and connecting them directly is an overcharge and fire hazard; the pack's BMS is a last-resort protection device, not a charge regulator.

## How Long Does Setup Take?

From unboxing to sending your first message: approximately **30 minutes**. The web-based flashers make firmware installation straightforward, and the apps guide you through initial configuration.

## Total Cost Estimate

| Component        | Minimum                        | Recommended                  |
|------------------|--------------------------------|------------------------------|
| LoRa device      | \$22 (Heltec V3)               | \$35 - \$70 (T-Beam, T-Echo) |
| Antenna          | Included with device           | \$15 - \$30 (aftermarket)    |
| Enclosure        | -                              | \$10 - \$20                  |
| Power (portable) | USB power bank you already own | \$15 - \$30                  |
| App              | Free                           | Free                         |
| <b>Total</b>     | <b>~\$22</b>                   | <b>\$60 - \$150</b>          |

There are no subscriptions, data plans, or recurring fees.

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