Common Beginner Questions

- Do I need an amateur radio license?
- How far can my node reach?
- MeshCore or Meshtastic - which should I choose?

Do I need an amateur radio license?

Short answer: No

Meshtastic and MeshCore operate in the 902–928 MHz ISM band under FCC Part 15 rules (47 CFR § 15.247 and related provisions). No amateur radio license is required for standard operation in the United States — meaning the device as configured by the official apps for your region, with licensed/ham mode left off. Note that unlicensed Part 15 operation carries conditions: your device must not cause harmful interference and must accept any interference received (47 CFR § 15.5).

Why many operators are licensed hams

The amateur radio community has been an early adopter of LoRa mesh. In standard (default, encrypted) configuration the protocols operate under Part 15, not Part 97 (amateur rules), and a license changes nothing about that mode. However, 902–928 MHz is also the amateur **33 cm band**, so licensed hams can optionally operate mesh radios under Part 97 with more power and higher-gain antennas — subject to the restrictions below. You don't need a license to use the mesh; a license adds optional capabilities.

When a license IS relevant

- **Operating above Part 15 power limits:** Under Part 15 the limit on 902–928 MHz is 1 W (30 dBm) conducted output for a digitally-modulated system, with an antenna gain up to 6 dBi (a 36 dBm / 4 W EIRP ceiling); above 6 dBi of gain you must reduce conducted power dB-for-dB, so you cannot simply add gain to raise EIRP. Exceeding these Part 15 limits is not permitted at all under Part 15 — and an amateur license does NOT authorize running a Part 15 device over its certified limits on the ISM band. Licensed amateurs may instead operate on 902–928 MHz under *Part 97* with more power (up to 10 W PEP for spread spectrum, 47 CFR § 97.313(j)) — **but only with encryption disabled (Part 97**

prohibits encrypting messages to obscure their meaning, § 97.113(a)(4)) and with call-sign identification at the end of each communication and at least every 10 minutes during it (§ 97.119). Default Meshtastic and MeshCore channels are encrypted, so **you cannot run encrypted mesh channels at higher amateur power, and raising power on a stock configuration is illegal even with a license.** Meshtastic's "licensed (ham) mode" handles this: it sets your callsign, transmits it periodically, and disables encryption. Standard mesh stays under Part 15 limits.
- **Amateur-band operation generally:** Transmitting LoRa hardware under amateur privileges — on the 33 cm band or any other amateur allocation — requires an amateur license and full Part 97 compliance.
- **APRS gateway:** Feeding Meshtastic traffic into APRS-IS (the internet backbone of the ham APRS network) requires a valid amateur radio callsign — APRS-IS access is restricted to licensed amateurs. Transmitting APRS over RF (144.390 MHz in North America) additionally requires at least a Technician-class license under Part 97.

Canada

Similar licence-exempt rules apply in Canada under ISED **RSS-247** (with RSS-Gen general requirements). No license is needed for standard Meshtastic/MeshCore operation. The license-relevant cases above are stated in US (FCC) terms; the Canadian amateur equivalent is the Amateur Radio Operator Certificate issued by ISED.

How far can my node reach?

Range varies enormously by terrain, antenna height, modem preset, and local conditions.

Realistic ranges

The figures below are approximate field estimates gathered from community experience, not hardware specifications or guaranteed numbers. Actual range depends heavily on antenna height at both ends, modem preset (e.g. LongFast vs. a slower long-range preset), Fresnel-zone clearance, and line of sight. Treat them as rough order-of-magnitude planning aids, and always confirm with a real on-site range test. The longer brackets assume clear line of sight between elevated antennas; the over-water figure in particular is an exceptional best-case shot, not a typical result.

Scenario	Typical Range (approximate, line-of-sight dependent)
Ground level, dense urban	200 m - 1 km
Ground level, suburban	0.5 - 2 km
Rooftop or upper floor (line of sight)	2 - 8 km
Hilltop to hilltop, clear line of sight	10 - 30 km
Mountain repeater to valley (clear line of sight)	15 - 40 km
Over water (lake, bay), unobstructed line of sight	30 - 80+ km (exceptional best case, not typical)

The dominant factor: antenna height

Radio waves travel in straight lines. Elevation beats everything else. Even 3 extra meters of height meaningfully extends the radio horizon. A mediocre antenna on a hilltop outperforms an excellent antenna at ground level.

Best approach: test it

Deploy the node, walk or drive around with a second device, and observe where packets stop arriving. The Meshtastic Range Test module (Config - Module - Range Test) automates this by logging position and signal data to a CSV file. Because the figures above are only approximate, an on-site range test is the only reliable way to know your actual coverage.

MeshCore or Meshtastic - which should I choose?

Both are excellent. Choose based primarily on what your local community already uses. Don't pick a protocol solely on technical merits (routing efficiency, encryption) if it means being alone on the mesh - community presence matters more.

Choose Meshtastic if:

- Your local area already has an active Meshtastic network
- You want the largest app ecosystem and community support
- You want the most beginner-friendly experience with polished apps
- You want the widest hardware compatibility

Choose MeshCore if:

- Your local community uses MeshCore
- You are building dedicated repeater infrastructure
- You prefer MeshCore's selective routing model for direct messages (both MeshCore and current Meshtastic use public-key encryption for direct messages; neither provides Signal-style forward secrecy)
- You are deploying a large network (50+ nodes) where flooding creates congestion

Can they interoperate?

No. Different packet formats and routing protocols. A MeshCore node and a Meshtastic node cannot communicate even on the same frequency. Many operators run both on separate devices for different purposes.

Technical comparison

Feature	Meshtastic	MeshCore
Routing	Flooding	Path-based (path discovery)
Community size	Larger	Smaller, more technical
Hardware support	Very broad	Good (915 MHz boards)
Best for	Personal use, joining existing mesh	Infrastructure, large networks