

Do I need an external antenna?

The stock antenna that comes with most LoRa boards is a rubber duck (flexible whip) antenna, typically 3-5 dBi gain. For many use cases, this is adequate - but upgrading to an external antenna is one of the most cost-effective improvements you can make.

When the Stock Antenna is Fine

- Indoor portable use (office, home) within 200-500m of your nearest mesh node
- Temporary deployments where you're moving frequently
- Testing and development before a permanent installation
- Dense urban areas with many nearby nodes (short hop distances)

When You Should Upgrade

- **Fixed outdoor installation** - Any permanent outdoor node should use an external antenna rated for outdoor use. Stock rubber ducks are not weatherproof.
- **Coverage issues** - If you can't reach nodes you'd expect to reach, a better antenna is the first thing to try.
- **Backbone repeater** - Repeaters covering a neighborhood or city need the best possible antenna. A 5-8 dBi fiberglass omni provides 5-8 dB more gain than a typical rubber duck - roughly doubling the effective range.
- **Point-to-point link** - If you're trying to bridge two specific locations, a directional yagi provides 10-15 dBi gain and extends range dramatically.

What External Antenna to Buy

For most fixed outdoor deployments, a 915 MHz fiberglass omnidirectional antenna is the right choice:

- **Taoglas TI.92.2113 (3 dBi)** - \$15-20, compact, good for moderate ranges
- **Proxicast 5 dBi (ANT-DB5-5)** - \$25-35, good all-around outdoor omni
- **Taoglas FXP73 (5 dBi, mag base)** - \$25-40, great for vehicle or temporary mounts
- **L-com HG908U-PRO (8 dBi)** - \$45-60, excellent for high-gain omni backbone nodes

Connector Adapters

Most LoRa boards use SMA (male pin/female body on the board) or u.FL connectors. External antennas typically use N-connector or SMA. Match your connectors:

- **Heltec V3, T-Beam:** SMA female on board - use SMA male on pigtail or antenna
- **RAK4631:** u.FL (IPEX) connector - needs u.FL to SMA pigtail (~\$5) to connect to any standard antenna
- **T-Deck, T-Echo:** SMA female - use SMA male pigtail or direct-connect SMA antenna

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