

GPS Modules for LoRa Nodes

GPS provides automatic position reporting for mesh mapping and navigation. Many boards include an integrated GPS; for those that don't, external GPS modules can be added via UART or I2C.

Integrated GPS vs External Module

Approach	Boards	Pros	Cons
Integrated GPS	T-Beam, T-Echo, some RAK boards	All-in-one, no wiring	Higher cost; disabling GPS to save power depends on whether the board provides GPS power gating (some integrated boards switch GPS power via the PMIC/GPIO, others do not)
External UART GPS	Any board with UART pins	Flexible, replaceable, can be positioned for best sky view	Wiring required, adds bulk
GPS from phone via BLE	Any (Meshtastic only)	No hardware needed	Requires active phone connection; phone must remain near node

Popular External GPS Modules

Module	Interface	TTFF (cold)	Current Draw	Notes
u-blox NEO-M8N	UART	26s	23 mA	Excellent sensitivity; widely supported
Quectel L76K	UART	30s	~29 mA (acquisition/tracking)	Used on the LilyGO T-Echo (and some Wio Tracker L1 boards); compact. The T-Beam Supreme uses a u-blox M10-series module, not the L76K
u-blox MAX-M8Q	UART	26s	15 mA	Compact form factor; patch antenna

Module	Interface	TTFF (cold)	Current Draw	Notes
ATGM336H	UART	~35s	~20 mA	Inexpensive Chinese alternative; adequate for most uses (figures approximate)
GT-U7 (NEO-6M clone)	UART	60s+	~45 mA	Very inexpensive; poor sensitivity; not recommended (figures approximate)

TTFF = Time To First Fix from a cold start in open sky conditions.

Wiring an External UART GPS

Most GPS modules use 3.3V logic and UART at 9600 baud. Connect:

- GPS VCC → 3.3V on LoRa board
- GPS GND → GND on LoRa board
- GPS TX → UART RX pin on LoRa board
- GPS RX → UART TX pin on LoRa board (needed only if sending commands to GPS)

Configure in Meshtastic: Config → Position → GPS Mode = Enabled; GPS RX pin = RX pin number from your board's pinout.

GPS Power Management

GPS is one of the largest power consumers on a LoRa node. For battery-powered nodes:

- **Disable GPS if fixed position is configured** - A repeater at a known location doesn't need active GPS
- **Increase GPS update interval** - For slow-moving applications, a 60-300 second GPS update interval with smart beaconing works well
- **GPS power gating** - Some boards route GPS power through a GPIO-controlled switch. Meshtastic can be configured to power-cycle the GPS between fixes, which can substantially reduce average GPS current; the exact average depends on the module and update interval
- **Almanac caching** - After a successful fix, Meshtastic caches almanac data to flash and reloads it on boot, enabling faster warm starts on subsequent power-ups. Meshtastic has no internet/app-based AGPS preload feature; it does not download almanac or ephemeris over WiFi/internet

