Choosing a Repeater Location

Placement determines performance. A well-placed repeater with modest hardware will consistently outperform a poorly placed repeater with expensive equipment.

The primacy of line-of-sight

LoRa signals travel best when there is a clear, unobstructed path between transmitter and receiver. Any obstruction - a building, a ridge, a dense stand of trees - attenuates the signal. The higher your repeater, the more of the surrounding terrain is in line-of-sight.

Location types

Hilltops and ridgelines

The best possible placement. A repeater on a hilltop with 360-degree unobstructed views can serve an area many times larger than the same hardware at ground level. As a rule of thumb, even modest height gains above the surrounding obstructions can noticeably improve coverage; how much depends on the local terrain. The underlying mechanism is the radio horizon, which grows with the square root of antenna height - roughly $3.57\times\sqrt{h_{m}}$ km (or about $1.23\times\sqrt{h_{ft}}$ miles) - so the first few tens of feet above ground level deliver the largest gains.

Rooftops

The most practical option for urban deployments. The highest accessible rooftop in a neighborhood, with the antenna mounted on a short mast, gives excellent urban coverage. Flat commercial rooftops are ideal.

Towers and elevated structures

Communications towers, water towers, and fire lookout towers are excellent platforms. Many communities with amateur radio infrastructure already have tower access - connecting with local ham radio clubs is a good path to shared hosting arrangements.

When co-locating on a registered antenna structure or shared tower, coordinate with the structure owner. RF-exposure (MPE) evaluation and antenna-structure-registration obligations rest with the tower owner, and your Part 15 unlicensed device must not interfere with the licensed services already on the structure.

Mast installations

A 15 - 30 foot mast in a yard or field dramatically improves line-of-sight over the surrounding area. Particularly effective in flat terrain where even modest height above obstructions makes a large difference.

Common placement mistakes

- **Hop gobbling:** A poorly placed repeater that is only marginally better than other nodes can consume hop budget without meaningfully extending range. Every hop used by a marginal relay is a hop unavailable for a more distant leg. Place repeaters where they add significant coverage, not just incremental reach.
- **Too many repeaters too close together:** Dense clusters of repeaters can flood the network with redundant retransmissions. Space repeaters to provide overlapping but not excessively redundant coverage.
- **Ignoring the coverage below:** Very high-gain antennas on tall structures can create dead zones directly beneath them. Size antenna gain to match your deployment height.

Coverage planning tools

- Meshtastic Site Planner - the official Meshtastic tool; estimates theoretical coverage from a given location
- HeyWhatsThat - third-party tool for radio horizon visualization based on terrain elevation
- meshmap.net - third-party community map showing existing Meshtastic nodes near you (only shows nodes reporting to the public MQTT server, so it is incomplete)

Always validate coverage estimates with real-world testing - planning tools do not account for buildings, vegetation, or local RF environment.

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