

Choosing a Repeater Location

Location is the single most important factor in a repeater's effectiveness. A mediocre antenna on a perfect hilltop will outperform an excellent antenna at ground level every time.

Elevation is everything

At 915 MHz, radio waves travel essentially in straight lines (line-of-sight), with only limited diffraction around obstacles. The higher your repeater, the farther it can see before the curvature of the earth and obstacles block the signal. Greater height extends the radio horizon, though the gain per additional meter diminishes — range scales with the square root of height, so doubling antenna height does not double range.

Location types - best to acceptable

Hilltops and ridgelines

The gold standard. A repeater on a hilltop with unobstructed 360-degree views dramatically extends coverage beyond ground level — typically on the order of 10-20 km (6-12 miles) to handheld nodes, and farther node-to-node when both ends are elevated with clear line of sight. Longer links of 20+ miles are achievable only under ideal, full line-of-sight conditions between two well-elevated stations; that is a best-case radio horizon, not a guaranteed coverage radius to ground-level clients, and real coverage is usually less. Use a link-budget or viewshed tool to estimate realistically and verify with field tests. Even a modest hill of 100 - 200 feet above the surrounding terrain makes a significant difference.

Rooftops

Excellent for urban and suburban coverage. The highest accessible rooftop in a neighborhood, mounted on a pole or parapet wall, provides clear line-of-sight in most directions.

Communications and water towers

Already optimized for radio coverage. Many amateur radio operators and property owners are open to hosting community infrastructure. **Never climb a communications or water tower without the owner's explicit authorization** — doing so is often illegal, and such towers carry high-power RF emitters and electrical hazards. Arrange access and any mounting work through the tower owner and a qualified climber.

Tall trees

A practical option for rural or forested areas. **Safety first:** work at height on a tree or mast carries a serious fall risk — use proper fall-protection gear or hire a qualified climber, and never free-climb. Keep all masts and the antenna well clear of power lines. Mount as high as you can safely and legally reach, and ensure the solar panel receives adequate sunlight throughout the day.

Balconies and upper-floor windows

The minimum viable option when rooftop access is unavailable. Orient toward the direction offering the clearest line of sight. Even a second-floor position is meaningfully better than ground level.

What to avoid

- **Low ground** - valleys and depressions block signal in nearly all directions
- **Dense tree cover at antenna level** - foliage attenuates 915 MHz signals through absorption and scattering (roughly 0.2-0.5 dB/m of vegetation at 900 MHz, and more when wet); keep the antenna above the canopy
- **Large metal structures nearby** - HVAC equipment and metal roofing reflect and detune signals
- **Fully indoor placement** - walls absorb a significant fraction of signal strength

Testing before committing

Before a permanent installation, test with a temporary mount. Walk around the intended coverage area while watching signal on a paired phone. Tools like [HeyWhatsThat](#) can help visualize the theoretical radio horizon from a given point, though they do not account for buildings or vegetation.

