Antenna Selection and Mounting

The antenna matters more than the radio

For a fixed repeater, the antenna is often the most impactful upgrade available. Moving from a 2 dBi stock antenna to a 6 dBi vertical on a rooftop pole adds about 4 dB of antenna gain, though some of that is offset by the feedline loss of the longer coax run a rooftop mount requires - so net gain at the antenna is usually less than 4 dB. The larger benefit is typically the improved line-of-sight from height, not the antenna gain alone. Note that higher gain comes with a narrower vertical pattern, which can create a dead zone directly below the antenna (see the omnidirectional notes below). **Mounting safety:** work on a roof or mast with fall protection, and keep the mast clear of overhead power lines by at least its full length plus a safety margin.

Antenna types for repeaters

Omnidirectional vertical (most common)

Radiates equally in all directions horizontally - ideal for a repeater that needs to serve a wide area. Higher gain (dBi) concentrates the signal closer to the horizontal plane, extending horizontal range but reducing coverage of areas directly below. As a general rule of thumb, moderate gain (roughly 3 - 6 dBi) is commonly a good balance for elevated repeaters; very high gain can starve coverage below the site. Very high gain antennas can create a dead zone directly beneath them.

Directional (Yagi, patch)

Focuses energy in one direction for maximum reach between two specific points. Requires careful aiming and is not suitable for general area coverage.

Gain vs. coverage angle

The figures below are general guidance, not fixed specifications - the right choice depends on your site, terrain, and mounting height.

Gain	Horizontal range	Best use
2 - 3 dBi	Short	Ground-level or indoor use
5 - 6 dBi	Medium - long	Most rooftop repeaters
8 - 9 dBi	Long, narrow beam	Tall towers over flat terrain (the narrow vertical beam needs height and level ground to avoid undershooting or overshooting on hills)

FCC compliance note: In the 902 - 928 MHz band, antennas above 6 dBi require an equal dB reduction in conducted transmit power under 47 CFR 15.247(b)(4). The maximum legal EIRP works out to 36 dBm (4 W). There is no 915 MHz point-to-point gain exemption (that applies only to 2.4 / 5.8 GHz). Plan power and antenna gain together.

Cable quality

Coaxial cable losses are significant at 915 MHz. RG-58 loses roughly 0.5 dB/m and even LMR-200 is about 0.33 dB/m - not truly low-loss for long runs. Keep the run as short as possible regardless of cable type. For runs beyond a few meters, use genuine low-loss cable in the LMR-240 / LMR-400 class (LMR-400 is about 0.11 dB/m); LMR-200 is acceptable only for very short runs. Weatherproof all outdoor connector joins with self-amalgamating tape or appropriate connector covers.

Key mounting rules

- Mount the antenna as high as practical, clear of obstructions in all directions. Use fall protection when working at height, and keep the mast clear of overhead power lines by its full length plus a margin.
- Keep the cable run short - locate the radio enclosure close to the antenna rather than running a long cable
- Use stainless steel hardware outdoors to prevent rust. Galvanic corrosion specifically occurs between dissimilar metals, so matching or electrically isolating the metals at a joint also matters.
- For a fixed outdoor antenna, bond and ground the installation per NEC Article 810.
- **Don't transmit without an antenna connected** - it's good practice to keep one attached. (The SX1262 used in these radios is fairly mismatch-tolerant, so a brief

accidental transmit into an open connector is unlikely to destroy it; the risk of permanent damage from a mismatch is more relevant to high-power PA/FEM builds.)

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