When to Add a Repeater vs. When to Move One

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Every mesh network operator eventually faces two related but distinct decisions: should you spend money on new hardware, or should you reallocate what you already have? This page gives you a structured framework for making that call.

Signs You Need a New Repeater

Adding hardware is justified when a gap in coverage is genuine and cannot be resolved by repositioning existing nodes. Look for these indicators:

- **Coverage gap identified by hop count:** If you can see, in the app's path/hop display, that users in an area consistently route through four or more hops - or experience frequent message failures - that location likely needs a node. MeshCore supports up to 64 hops in firmware, so there is no hard 3-hop protocol limit; however, delivery reliability declines with each hop because per-hop success probabilities multiply, and latency rises as paths grow. As a community rule of thumb (not a protocol spec), many operators treat roughly three hops as the point beyond which time-critical delivery becomes unreliable. Validate the real threshold for your network with measured delivery rates rather than hop count alone.
- **New neighborhood with active users:** A cluster of users has joined from an area that was previously uninhabited or where no one had a radio. Coverage there is zero - there is no node to reposition.
- **Edge-of-coverage user:** A new member joins from a location that can hear the mesh but with marginal signal. Rather than asking them to upgrade antenna hardware, a well-placed intermediate repeater improves reliability for all nearby users simultaneously.

Signs You Should Move an Existing Repeater

Repositioning is often higher-impact per dollar than buying new hardware. Consider moving a repeater when:

- **Low-traffic repeater competing for airtime:** A node that forwards very few messages per hour - check logs or room server statistics - may be co-located with a better-positioned node. Redundant coverage in the same area wastes airtime that could instead serve a gap elsewhere. Note that when two radios are co-located, receiver desensitization (front-end overload) occurs regardless of how far apart their channels are; it is mitigated primarily by physical separation, shielding, and filtering. Channel/frequency separation only addresses adjacent-channel interference, not strong-signal desense.
- **Changed environment:** A building constructed after your original deployment may now block the path your repeater was designed to bridge. Treat your network map as a living document; re-audit coverage whenever significant physical changes occur nearby.
- **Better site identified:** A rooftop access agreement, a new community partner with a tower, or simply a higher hill - if a superior site becomes available, the math usually favors moving over adding.

Cost-Benefit Framework

Before committing to either action, estimate the impact. As a rough rule of thumb (an editorial heuristic, not a fixed rule), a new repeater - roughly $60-$220, matching this library's Budget (~$57) and Pro (~$217) builds - is easy to justify when it brings a meaningful cluster of users into reliable coverage, on the order of 10-15 or more active users. But for emergency communications, even a single critical location - a responder staging area, a shelter - can justify a repeater regardless of headcount. Repositioning an existing repeater costs only your time (a few hours) and the risk of temporarily losing coverage during the move - usually 30-90 minutes. If repositioning achieves 80% of the benefit of a new node, move first and buy later.

One practical heuristic: if the candidate site for repositioning serves both the existing coverage area AND the gap, move the node. If the candidate site would leave the existing area uncovered, buy a second node to fill the gap and keep the original in place.

Documentation Practice

Record every deployment decision in a simple network log: node ID, site, date placed, reason for placement, date and reason for any relocation. This history becomes invaluable when diagnosing problems or onboarding new network operators who were not present for the original decisions.

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