Multi-Repeater Network Coordination

When multiple MeshCore repeaters serve the same community, coordination between operators ensures the network behaves predictably and provides maximum benefit to users.

Radio Preset Consistency (and the Channel-Key Myth)

A common misconception is that every repeater on a community network must share a "channel key." It does not. In MeshCore, **repeaters forward packets based on routing/path information and do not decrypt message payloads** — they relay encrypted traffic for any channel without needing that channel's key. Channel keys are a client-side concern: only clients holding a channel's key can read that channel's group messages. So a repeater never "silently drops traffic it cannot decrypt." What every repeater (and client) *must* share to interoperate is the same **radio preset / frequency** — if the radio parameters don't match, the repeater literally cannot hear the packets. When deploying a new repeater, coordinate the radio preset, frequency, and repeater naming/placement with the network coordinator before commissioning.

Verify a new repeater is relaying by sending a test message from a client node so that it routes through the new repeater. A successful delivery confirms the repeater is hearing and forwarding correctly (correct preset, placement, and RF range). It does *not* test channel-key alignment — that is verified between client nodes (whether two clients can read each other's group messages), not at the repeater. A failed route-through test points to a radio-config/preset mismatch or insufficient RF range, not a missing channel key.

Coverage Overlap Planning

Adjacent repeaters should have some coverage overlap for redundancy and continuity. The exact amount depends on terrain, antenna height, and node density — there is no universal percentage. Validate overlap empirically with drive/walk tests confirming each area is reachable via at least two repeaters. Overlap provides:

- **Redundancy** - if one repeater goes offline, adjacent repeaters still serve the overlap area
- **Continuity of coverage for moving nodes** - when a mobile node leaves one repeater's range, its cached path will fail and MeshCore re-runs path discovery to find a route through the next in-range repeater. This is not a seamless cellular-style handoff — there is no association handed between repeaters; any in-range repeater simply relays. Expect a brief delivery gap while a new path is discovered. Overlap reduces, but does not eliminate, this gap.
- **Route diversity** - multiple path options between distant network segments improve end-to-end reliability

Insufficient overlap creates coverage holes where users are out of range of all repeaters. At the other extreme, deploying many repeaters very close together — covering the same footprint with no new coverage — adds channel airtime contention and flood amplification without proportional benefit. Note that close spacing is not inherently wasteful: in dense urban terrain with heavy building attenuation, sub-kilometer spacing can be necessary and appropriate (the density guidance suggests roughly one repeater per ~1 km² / ~500 m radius). Avoid overlap only where it is genuinely redundant.

Frequency and Preset Coordination

All community repeaters must use the same radio parameters (the USA/Canada preset is recommended in this region). Verify with:

```
get radio
```

The `get radio` output shows the current frequency, bandwidth, spreading factor, and coding rate (`get freq` and `get tx` report frequency and TX power individually). MeshCore presets are an app-side selection; the serial CLI reports the raw radio parameters rather than a named preset. Confirm these values match the community-standard USA/Canada preset before committing a new repeater to service.

Network Documentation

Maintain a community document with:

- Repeater name, operator callsign/contact
- Physical location (approximate - GPS coordinates if the operator consents to publishing)
- Power system type (mains, solar) and expected uptime
- Installation date and last maintenance date
- Known coverage limitations or issues

This documentation is invaluable when diagnosing network problems or planning expansion. Store it in a shared document that all operators can access and update.

Repeater Retirement and Replacement

When a repeater is permanently taken offline, notify the community so they can update routing expectations and coverage maps. Removing a node that other nodes' cached routes depend on will cause temporary routing failures until routes are rediscovered. This is normal behavior; MeshCore re-discovers routes when existing paths fail.

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