Repeater Performance and Maintenance

A deployed repeater requires periodic attention to maintain performance. This page covers the key maintenance tasks and performance metrics for Meshtastic infrastructure nodes. Throughout, "infrastructure node" means the general concept; **ROUTER** and **REPEATER** refer to the specific device roles (which behave differently - a ROUTER appears in the node list, a REPEATER does not).

Key performance indicators

The targets below are **recommended operational goals set by the author**, not official Meshtastic or manufacturer specifications. Treat them as starting points, not hard specs.

Metric	Healthy range	Action if outside range
Node uptime	>95% over 30 days (baseline only)	>95% is a baseline health indicator, not a reliability guarantee - it still allows ~36 hours/month offline, and says nothing about *when* the downtime falls. For nodes an emergency operator depends on, investigate ANY unexplained downtime and treat repeated outages as disqualifying for sole-path infrastructure. Redundancy, not a high uptime number, is what guarantees coverage during an incident.
Average RSSI to neighbors	−70 to −100 dBm typical	RSSI down to roughly −120 to −130 dBm can still be decodable depending on spreading factor (SX1262 sensitivity ~−137 dBm at SF12). Judge link health by SNR margin and packet success, not RSSI alone; a sudden RSSI drop versus a known baseline is the useful warning sign, not a fixed −110 dBm threshold.

Metric	Healthy range	Action if outside range
SNR to nearest neighbor	SNR margin above the per-SF demod limit	LoRa decodes well below 0 dB SNR - demod limits run from ~−7.5 dB (SF7) to ~−20 dB (SF12). What matters is SNR margin above the per-SF limit. For Long Fast (SF11, limit ~−17.5 dB), SNR down to about −12 dB is comfortable and approaching −17 dB is marginal. A backbone link at −10 to −12 dB SNR is normal and healthy, not a fault - do not treat SNR < 0 dB as "noise floor / unreliable."
Battery voltage (solar)	Depends on pack configuration	State your battery configuration before reading these numbers. A *single* LiFePO4 cell has a working range of roughly 3.2 - 3.6 V; a 4S LiFePO4 pack is ~12.8 V nominal; a single Li-ion runs 3.0 - 4.2 V. Use the per-chemistry, per-configuration cutoff for your pack and align it with the cutoffs on the remote-monitoring page (e.g. ~11.5 V for a 12 V lead-acid pack, ~3.0 V per cell for LiPo). Repeated readings near the low end of *your* pack's range indicate an undersized power system.
Packets forwarded per hour	Varies by location	Sudden drop to 0 = node possibly offline

Routine maintenance checklist (quarterly)

- Check the node appears on a current community/third-party map (such as the official Meshtastic map or a community MQTT-based map) - verify the service is still live, as these third-party maps come and go. Note that a node set to the REPEATER role will **not** appear on node maps (it is hidden from the nodes list); a ROUTER will. These maps only show nodes reporting to a public MQTT server and are not authoritative.
- Verify RSSI/SNR to neighboring nodes hasn't significantly degraded versus your baseline
- Check battery voltage logs if monitoring - look for downward trend
- Inspect solar panel: clean off debris, verify no shading from new growth
- Check antenna connector for corrosion or loosening (especially after winter)
- Verify firmware version - update if significantly behind current release
- Check enclosure for water intrusion - condensation inside is an early warning sign

Firmware update process for deployed nodes

Flashing new firmware (reflashing the binary) on a deployed repeater requires physical USB/serial access. Configuration changes can be made remotely via Remote Admin over the mesh, but a firmware reflash cannot be done remotely. Prepare:

1. **Before taking ANY repeater offline for a firmware update, confirm an alternate path covers its users** (run traceroutes from both sides). NEVER update the only repeater serving an area without a tested spare on hand or a deployed temporary relay - a failed flash can leave the firmware in a crash loop, knocking out coverage with no rollback. Bring a known-good spare and a copy of the prior firmware so you can roll back on-site if the flash fails.
2. Schedule a maintenance window and notify the community (the node will be offline during update)
3. Bring: laptop, USB cable for your device type, and the firmware binary or web browser access
4. Before disconnecting: record current configuration (region, TX power, role, channel settings, position) with a restorable backup: `meshtastic --export-config > config_backup.yaml`. (Do **not** rely on `meshtastic --info` - that is only a human-readable status dump and cannot be re-imported.)
5. Flash new firmware via web flasher (flasher.meshtastic.org)
6. Verify settings after flash - firmware updates occasionally reset some settings to defaults
7. Confirm node reappears on the network before leaving the site

Common hardware failures

Symptom	Likely cause	Fix
Node gone offline after storm	Water intrusion, lightning strike, blown fuse	Inspect enclosure, check fuse, examine for burn marks on PCB
Range suddenly reduced	Antenna connector loosened or corroded	Re-seat antenna, check connector for oxidation, replace if needed
Frequent reboots	Power supply instability (low battery/solar)	Check battery voltage, check charge controller output
Firmware crash loop	Corrupted flash or incompatible firmware	Factory reset and reflash
BLE not discoverable	BLE antenna loose (V3 only); software issue	For V3: reseat u.FL BLE antenna. Otherwise reflash.

When to replace vs. repair

LoRa boards are inexpensive ($15 - 75). General guidance:

- Physical damage to SMA connector or RF front-end: replace board. Repair costs often exceed replacement.
- Software issue (firmware bugs, configuration corruption): reflash before considering hardware replacement.
- Battery degradation (LiFePO4): replace battery after 5+ years or when capacity drops below 70% of original.
- Solar panel degradation: typical panels lose 0.5% efficiency per year. Replace if output is more than 20% below original spec after 10+ years.

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