

Best Practices

Avoiding common problems, legal considerations, and config backups.

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Deployment Best Practices

Plan before you deploy

A poorly placed repeater can add network congestion without meaningfully extending coverage. Before deploying:

- Check the network map for existing nodes near your intended location
- Use the Meshtastic Site Planner and HeyWhatsThat to estimate coverage from candidate locations
- Walk or drive the coverage area with a personal node to measure real-world signal before committing to a permanent install

Avoid hop gobbling

Each relay uses one hop. If a repeater is only marginally better positioned than surrounding nodes, it will consume a hop without significantly extending message range. Place repeaters where they add substantial coverage - bridging a gap or reaching a new area - not just adding a small increment to existing coverage.

Spacing between repeaters

Overlapping coverage is good for resilience, but too many repeaters within range of each other creates redundant retransmissions that congest the network. A general guideline is to space repeaters so each covers a distinct area, with just enough overlap for redundancy.

Test after deployment

After installing, walk or drive the intended coverage area and verify that messages successfully reach destinations through the repeater. Test at the edges of expected coverage, not just close in.

Document your deployment

Record the hardware, firmware version, configuration, location coordinates, and power system details for each repeater you deploy. This makes firmware updates, troubleshooting, and handoff to other maintainers much easier. Consider contributing your repeater location to the community map.

Maintain firmware

Meshtastic releases updates regularly with performance improvements, bug fixes, and new features. Keep your repeater firmware updated using the web flasher at flasher.meshtastic.org.

Legal Considerations

Meshtastic and MeshCore both operate in license-free ISM radio bands, but license-free does not mean unregulated. You must comply with applicable FCC rules for US deployments.

US regulatory framework (FCC Part 15)

In the United States, 915 MHz operation is governed by FCC Part 15 rules for ISM band devices. The key limits for intentional radiators in the 902 - 928 MHz band:

Parameter	Limit
Conducted transmit power	1W (30 dBm) maximum
EIRP (with antenna gain)	4W (36 dBm) maximum
Duty cycle	No explicit limit for FHSS-classified devices; standard devices are compliant

Antenna gain and EIRP

EIRP combines transmit power and antenna gain: $EIRP = \text{conducted power} + \text{antenna gain (in dBi)} - \text{cable loss}$.

If you use a high-gain external antenna, you may need to reduce the transmitter's output power to stay within the 36 dBm EIRP limit. For example:

- 9 dBi antenna + 27 dBm (500 mW) conducted = 36 dBm EIRP - at the legal limit
- 9 dBi antenna + 30 dBm (1W) conducted = 39 dBm EIRP - **over the limit**

Meshtastic's default transmit power settings are compliant for standard antennas. If you upgrade to a high-gain antenna, calculate your EIRP and reduce TX power if necessary.

No amateur radio license required

Standard Meshtastic and MeshCore operation in [the 915 MHz ISM band](#) does not require an amateur radio license. The band is available to any compliant Part 15 device without licensing.

Always verify current regulations

Radio regulations can change. The information above is provided as a general guide. For definitive requirements, consult the [FCC Part 15 rules](#) directly.

Backing Up Your Configuration

Before making changes to a working repeater - or before a firmware update - back up the configuration. This saves your channel keys, LoRa settings, and device role, allowing full recovery if something goes wrong.

Export configuration via CLI

```
pip install meshtastic # if not already installed
meshtastic --export-config > my_repeater_config.yaml
```

The exported YAML file contains:

- Node ID and long/short name
- LoRa settings (region, modem preset, rebroadcast mode, TX power)
- Channel names and pre-shared keys (PSKs)
- Device role
- Power and display settings

Restore configuration

```
meshtastic --import-config my_repeater_config.yaml
```

Store backups safely

The configuration file contains your channel PSKs. Store it in a secure location. Do not share it publicly or commit it to a public repository - anyone with the PSK for a private channel can read its messages.

After a firmware update

Firmware updates sometimes reset device settings. Always verify device role, rebroadcast mode, and LoRa region after updating. If settings are lost, restore from your backup YAML file.