Legal and Regulatory

- FCC Part 15 Compliance for LoRa Mesh
- Operating in Canada: ISED Rules
- Operating Outside North America

FCC Part 15 Compliance for LoRa Mesh

Meshtastic and MeshCore operate in the 902-928 MHz ISM band under FCC Part 15 in the United States. This section explains what the rules require, what they allow, and what you need to know for compliant operation.

FCC Part 15 Basics

Part 15 covers unlicensed intentional radiators - devices that deliberately emit radio frequency energy. The key rules for 902-928 MHz spread spectrum:

- **Maximum conducted power: 1 watt (30 dBm)** - Measured at the radio's antenna connector, before any external antenna
- **Antenna gain above 6 dBi: reduce conducted power dB-for-dB** - For antenna gain above 6 dBi, the rule (15.247(b)(4)) requires reducing conducted power by the number of dB the gain exceeds 6 dBi. This reduction is keyed to antenna gain alone; feedline (cable) loss does not offset the required reduction. With a 6 dBi antenna at full 1 W conducted, this works out to a 36 dBm (4 W) EIRP - but the 4 W figure is a derived result of the gain-reduction rule, not a separate flat EIRP allowance you can "spend" cable loss against.
- **No license required** for operation within these limits
- **Non-interference** - Part 15 devices must accept interference and cannot cause harmful interference to licensed services
- **No protection from interference** - You have no recourse if a licensed service interferes with your mesh

The 1W + Antenna Gain Calculation

Most LoRa hardware ships configured at or below 1W (30 dBm) conducted power. Note that the 1 W limit under 15.247 applies to digitally-modulated systems whose minimum 6 dB bandwidth is at least 500 kHz; many Meshtastic/MeshCore presets use 125-250 kHz bandwidth, which may be certified under different provisions - so treat 1 W as an upper ceiling, not a guaranteed allowance for every preset. If you add a high-gain external antenna, you must reduce conducted power for

any antenna gain above 6 dBi.

Example calculation:

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First example:
Antenna gain: +6 dBi (at the 6 dBi threshold - no reduction required)
Conducted power: 30 dBm (1W) - COMPLIANT
(Resulting EIRP works out to about 36 dBm / 4 W, the derived ceiling.)

Second example:
Antenna gain: +9 dBi (3 dB above 6 dBi)
Rule: reduce conducted power by (9 - 6) = 3 dB
Maximum conducted power: 30 - 3 = 27 dBm (500 mW)
Running 30 dBm conducted into a 9 dBi antenna is NON-COMPLIANT.
Note: feedline (cable) loss does NOT offset this 3 dB reduction - the
reduction is based on antenna gain alone.
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For typical community deployments with 5-6 dBi antennas and short coax runs, full 1W conducted power is generally compliant (gain is at or below the 6 dBi threshold). With 8-9 dBi antennas, you must reduce conducted power by the dB of gain above 6 dBi - e.g. to 27-28 dBm for a 8-9 dBi antenna.

Point-to-Point Operations (Fixed Infrastructure)

Important: at 902-928 MHz there is **no** special power allowance for fixed point-to-point links. The relaxed point-to-point rule that some guides cite applies only to other bands:

- Under **47 CFR 15.247(b)(4)**, if you use a directional antenna with more than 6 dBi of gain at 915 MHz, you must reduce conducted output power by 1 dB for every 1 dB of gain above 6 dBi (dB-for-dB). This holds EIRP at the 36 dBm (4 W) ceiling whether the link is point-to-point or area coverage.
- The relaxed "reduce power 1 dB for every 3 dB of gain above 6 dBi" point-to-point allowance in **15.247(c)(1)(i)** applies *only* to the 2400-2483.5 MHz (2.4 GHz) band, and the 5725-5850 MHz band (15.247(c)(1)(ii)) allows extra gain with no power reduction at all. **Neither applies to the 902-928 MHz band that Meshtastic and MeshCore use.**
- Bottom line for 915 MHz: plan around the 36 dBm (4 W) EIRP ceiling regardless of antenna type or link geometry - there is no higher point-to-point limit to unlock.

Pre-Certified Hardware

Reputable mesh hardware sold in the US should carry an FCC ID - check the device label or the FCC ID database. Verify this before deploying: some imported hobbyist dev boards are not properly certified, or carry only module-level certification rather than full device authorization. This certification confirms Part 15 compliance when used with the included antenna and at the specified power levels. Using third-party antennas or modifying conducted power beyond the certified levels may affect compliance status. For community mesh operations, using hardware within its certified parameters is the simplest path to compliance.

What Part 15 Does NOT Require

- No license - operators need no FCC authorization
- No station identification - Part 15 devices do not require ID (unlike Part 97 ham radio)
- No frequency coordination - you may operate anywhere in the 902-928 MHz band without coordination
- No notification of your installation

Operating in Canada: ISED Rules

In Canada, LoRa mesh networking in the 902-928 MHz band operates under Innovation, Science and Economic Development Canada (ISED) regulations, primarily RSS-247 (Digital Transmission Systems, Frequency Hopping Systems and Licence-Exempt LAN Devices) together with RSS-Gen.

Key Canadian Rules

- **License-exempt operation** - The 902-928 MHz band is license-exempt under RSS-247 for frequency-hopping and digitally-modulated devices meeting power limits
- **Maximum conducted power: 1 watt (30 dBm)** - Same as US FCC Part 15
- **Maximum EIRP** - 4 W e.i.r.p. for digitally modulated devices, effectively equivalent to FCC Part 15 limits - see RSS-247 section 5.4 for specific values and conditions
- **Hardware certification** - Devices must be certified under ISED (previously IC) marking. Most hardware certified for the US (FCC) market also carries ISED certification.

Canadian ISM Band Availability

The 902-928 MHz band is available across Canada for license-exempt operation, making it directly compatible with US equipment and networks. Canadian and US mesh operators using 915 MHz hardware can interoperate seamlessly near the border.

Interference Considerations

Canada shares the 902-928 MHz ISM band with various Part 15 equivalent users. The non-interference and no-protection rules apply equivalently: you must not cause harmful interference, and you have no protection from interference by other users.

Quebec/French Language Considerations

Canada's Official Languages Act applies only to federal institutions and certain federally regulated businesses - it does not cover hobbyist mesh groups or typical nonprofits publishing software documentation. Organizations doing business in Quebec should instead be aware of Quebec's Charter of the French Language. For individual hobbyist operation, no language requirements affect technical operation of mesh networks.

ARES Canada

In Canada, the Amateur Radio Emergency Service (ARES) is organized by Radio Amateurs of Canada (RAC); its volunteers operate on amateur frequencies under their individual ISED (formerly Industry Canada) Amateur Radio Operator Certificates, not under organization-held spectrum licenses. When MeshCore or Meshtastic is used on ISM frequencies (902-928 MHz), ARES volunteers operate under the same license-exempt rules as all other Part 15 equivalent operators - no additional authorization is required.

Operating Outside North America

LoRa mesh hardware designed for North America operates on 902-928 MHz, which is an ISM band in the US and Canada but is *not* an ISM band in most of the rest of the world. Traveling or deploying internationally requires care.

European Union: 868 MHz

Europe uses 863-870 MHz for LoRa operations, under ETSI EN 300 220 harmonized standards. EU regulations differ from US Part 15:

- **Frequency: 863-870 MHz** - 915 MHz hardware will not meet EU spectrum regulations and may cause interference with other licensed services
- **Duty cycle limits** - EU regulations impose maximum duty cycle limits (e.g., 1% in some sub-bands) that are not required in the US. This significantly limits how frequently nodes can transmit
- **Power limits** - Most EU sub-bands are limited to 25 mW ERP, but the 869.4-869.65 MHz sub-band used by Meshtastic's EU_868 default allows 500 mW ERP with a 10% duty cycle - still far below the US 4 W EIRP
- **CE marking required** for devices placed on the EU market

US hardware (915 MHz) must not be operated in EU countries. If you are deploying in Europe, purchase EU 868 MHz hardware specifically.

Australia and New Zealand

Australia (ACMA) and New Zealand (Radio Spectrum Management) allow LoRa operation on 915-928 MHz under license-exempt rules broadly equivalent to US Part 15. US-band hardware covers the AU/NZ 915-928 MHz range (set region to ANZ), but check that the device carries Australian/NZ RCM compliance marking - FCC certification alone does not authorize sale or use.

Asia-Pacific

Regulations vary significantly by country:

- **Japan** - 920-928 MHz is available under the ARIB STD-T108 standard. Power limits differ from US.
- **South Korea** - 920-923 MHz available under MSIT/RRA regulations (Meshtastic KR region).
- **China** - 470-510 MHz and 779-787 MHz LoRa bands; 915 MHz is NOT a license-exempt band in China.
- **India** - 865-867 MHz for LoRa under WPC guidelines.

General International Guidance

- Before operating in any country, verify local spectrum regulations for the frequency band of your hardware
- Do not assume US-certified hardware is legal to operate in other countries
- When traveling, check the destination country's rules before bringing or operating LoRa gear; FCC certification does not authorize operation outside the US. Consider not transmitting at all unless you confirm legality.
- Consider purchasing locally-certified hardware for extended international deployments