The 915 MHz ISM Band

Every LoRa mesh device you buy for use in North America operates in the **915 MHz ISM band**. Understanding what that means - and what the rules are - will help you choose the right hardware, set the right channels, and avoid interference with your neighbors.

What Is the ISM Band?

ISM stands for **Industrial, Scientific, and Medical**. These are frequency bands set aside by international agreement for unlicensed use - meaning you do not need a government license to operate a radio in these bands. The trade-off is that these bands are open to many users, and everyone has to play nicely together by following power limits and other technical rules.

In the United States, the ISM band used by LoRa spans **902 to 928 MHz** (commonly referred to as the "900 MHz band" or "915 MHz band"). It is regulated by the FCC under **Part 15** of the Code of Federal Regulations.

FCC Part 15 Power Limits

The FCC imposes strict limits on how much power you can transmit in this band:

- **1 watt (30 dBm) conducted power** - this is the maximum power at the antenna connector of the radio.
- **4 watts (36 dBm) EIRP (Equivalent Isotropically Radiated Power)** - this accounts for antenna gain. If your antenna has gain, your conducted power must be reduced proportionally.

What does this mean in practice? Most LoRa modules transmit at 20 - 27 dBm (0.1 - 0.5 watts). A typical 3 dBi gain antenna is perfectly legal at full transmit power. A high-gain directional antenna (say, 10 dBi) would require reducing your transmit power to stay under the 4-watt EIRP limit. Almost no consumer LoRa hardware comes close to these limits, so for most users, this is a non-issue.

No License Required (With Caveats)

Because LoRa operates under Part 15, **you do not need an amateur radio license or any other license** to operate a Meshtastic or MeshCore node in the United States. This makes community mesh networks accessible to everyone, not just licensed ham radio operators.

However, Part 15 devices must accept interference from other users and cannot cause harmful interference to licensed services operating in adjacent bands. In practice, the 900 MHz band is busy with cordless phones, baby monitors, some Wi-Fi equipment, and other ISM devices - but LoRa's spread-spectrum nature makes it naturally robust against narrowband interference from these sources.

Duty Cycle Considerations

In the United States, the 902 - 928 MHz band does *not* have a mandatory duty cycle limit for frequency-hopping spread spectrum systems. LoRa itself does not frequency-hop (it stays on one channel per packet), but the Part 15 rules still permit continuous operation as long as power limits are respected.

That said, good network citizenship means keeping your transmit duty cycle low. If every node on a channel is transmitting constantly, collisions will degrade performance for everyone. Meshtastic and MeshCore both implement built-in duty cycle management and back-off algorithms to prevent nodes from saturating the channel.

Channel Selection and Frequency Hopping

Within the 902 - 928 MHz band, LoRa devices can use many different center frequencies (channels). Meshtastic's default **LongFast** preset uses 906.875 MHz as its primary channel. MeshCore's USA/Canada preset uses similar frequencies.

Frequency hopping (rapidly jumping between channels) is permitted and used by some competing technologies (like the older FHSS radios), but it is not required for LoRa and is not used by Meshtastic or MeshCore in their standard modes. Instead, they use a fixed channel, relying on LoRa's spread-spectrum nature to handle interference.

Channel selection matters when:

- You want to create a private channel separate from the public mesh.
- You want to avoid interference from other mesh users or industrial equipment.
- You are deploying multiple networks in the same area and need them to coexist.

What About Europe and Other Regions?

The 915 MHz band is specific to the Americas. In Europe, LoRa community mesh devices typically use the **868 MHz ISM band** (863 - 870 MHz), regulated by the ETSI under different rules including an enforced 1% duty cycle on many sub-bands. Other regions have their own band plans:

Region	LoRa Band	Frequency Range	Key Rule
USA / Canada	915 MHz	902 - 928 MHz	1W conducted / 4W EIRP, no duty cycle limit
Europe / UK	868 MHz	863 - 870 MHz	25 mW ERP, 1% duty cycle on most sub-bands
Australia / NZ	915 MHz	915 - 928 MHz	1W EIRP
Asia (many countries)	433 MHz or 923 MHz	Varies	Varies significantly by country

This is critical: a European 868 MHz LoRa device will not work on a US 915 MHz mesh, and vice versa. Always check that the hardware you buy is rated for your region's frequency band before purchasing. Hardware sold in the US is almost always pre-configured for 915 MHz. If you are buying from overseas vendors, double-check the product listing.

Some newer hardware (such as devices using the Semtech SX1262 chip) can be configured in software to cover both 868 MHz and 915 MHz, as the chip supports a wide frequency range. However, the antenna is typically tuned for one band or the other, so even if the chip can transmit on the wrong frequency, performance will be degraded.

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