LoRa vs LoRaWAN: What's the Difference?

This is one of the most common points of confusion for newcomers. LoRa and LoRaWAN are related but completely different things. MeshCore and Meshtastic use **LoRa** - not LoRaWAN. Understanding the distinction helps explain why mesh networking is fundamentally different from IoT sensor networks.

LoRa: The Physical Radio Layer

LoRa refers specifically to Semtech's Chirp Spread Spectrum modulation technology. It defines *how bits are encoded onto radio waves*. Any software protocol can use LoRa as its radio layer - LoRaWAN uses it, and so do MeshCore and Meshtastic.

Think of LoRa as the engine. Multiple different vehicles can use the same engine.

LoRaWAN: A Centralized IoT Network Protocol

LoRaWAN is a specific network architecture built on top of LoRa, designed by the LoRa Alliance for IoT (Internet of Things) deployments:

- **Topology:** Star - devices talk to gateways; no peer-to-peer relaying (an optional single-hop Relay extension exists but is rarely deployed)
- **Infrastructure required:** Gateways and backend servers (The Things Network, Chirpstack, etc.)
- **Internet dependency:** Gateways connect to the internet to reach the network server
- **Use cases:** Smart meters, asset tracking, environmental sensors, industrial monitoring
- **Encryption:** AES-128 with separate network and application session keys, managed via the network/join server
- **Messaging:** Sensors send data to servers - not person-to-person communication

If there is no gateway in range, a LoRaWAN device cannot communicate at all. It cannot mesh - at most an optional single-hop Relay extension exists, which is rarely deployed.

LoRa Mesh (MeshCore & Meshtastic): Decentralized Peer-to-Peer

MeshCore and Meshtastic use LoRa radio but implement their own peer-to-peer mesh networking protocols on top of it:

- **Topology:** Mesh - every node can relay for other nodes
- **Infrastructure required:** None - no gateways, no servers, no internet
- **Works completely off-grid:** Yes, by design
- **Use cases:** Off-grid messaging, emergency communications, outdoor recreation, community networks
- **Encryption:** Group channels use pre-shared keys (Meshtastic); direct messages use per-node public-key encryption (Meshtastic v2.5+, MeshCore)
- **Messaging:** Person-to-person text messages, group channels, GPS position sharing

Side-by-Side Comparison

Feature	LoRaWAN	LoRa Mesh (MeshCore/Meshtastic)
Network topology	Star (hub-and-spoke)	Mesh (peer-to-peer)
Requires internet	Yes (at gateway)	No
Requires servers	Yes	No
Works off-grid	No	Yes
Node-to-node relay	No (an optional single-hop Relay extension exists, rarely deployed)	Yes
Primary use case	IoT sensors	Off-grid communication
Message type	Sensor data to server	Person-to-person text/GPS
Managed by	LoRa Alliance	Open-source communities
License required?	No (ISM band)	No (ISM band)

What This Wiki Covers

This wiki covers **LoRa mesh networking** using MeshCore and Meshtastic. LoRaWAN is a separate topic entirely and is not covered here. If you are reading about "The Things Network," "Chirpstack," or "LoRa gateways," you are reading about LoRaWAN - a different technology from what this wiki describes.

When someone says they have a "LoRa device" that works with MeshCore or Meshtastic, they mean a device that uses LoRa radio with peer-to-peer mesh firmware - not a LoRaWAN end node.

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