Glossary of Mesh Networking Terms

A reference for terminology used throughout this wiki and in the mesh networking community.

A

Advertisement (advert)
: A packet broadcast by a MeshCore node to announce its existence on the network. Advertisements contain the node's identity, position (if configured), and routing credentials. Other nodes use advertisements to discover repeaters and build routing tables.

APRS (Automatic Packet Reporting System)
: An amateur radio protocol for broadcasting GPS positions and short messages. Some mesh gateways bridge position data to the APRS network, making mesh nodes visible on aprs.fi.

Autonomy period
: How many days a battery-powered node can operate without solar input or recharging. This wiki uses 5 days of autonomy as a recommended design target for solar-powered repeaters; it is an editorial rule of thumb rather than a documented industry standard, so size your own deployment for your local worst-case weather.

B

Bandwidth (BW)
: In LoRa, the width of the frequency channel used for transmission. Wider bandwidth = faster data rate but less range. Common values: 62.5, 125, 250, 500 kHz. The MeshCore USA/Canada preset uses 62.5 kHz BW.

BLE (Bluetooth Low Energy)
: The wireless connection method used by most LoRa mesh apps to communicate with companion devices. BLE has a typical range of 30 - 100 feet and consumes very little power.

C

CAD (Channel Activity Detection)
: A LoRa radio feature that listens for activity on the channel before transmitting, reducing collisions. Also called listen-before-talk (LBT).

Channel
: A logical grouping of nodes that can communicate with each other. Nodes must be on the same channel to exchange messages. Channels can be public (no PSK) or private (encrypted with a shared PSK). Both MeshCore and Meshtastic support multiple channels.

Coding Rate (CR)
: A LoRa parameter that controls forward error correction overhead. Higher CR (e.g., 4/8) adds more redundancy, allowing the receiver to reconstruct damaged packets. Lower CR (4/5) has less overhead but requires cleaner signals. Affects airtime and link budget.

CascadiaMesh
: A MeshCore community mesh network covering the Pacific Northwest (Oregon, Washington, and into British Columbia). Operates a backbone infrastructure along the I-5 corridor. See cascadiamesh.org.

D

dBi (decibels relative to isotropic)
: A measure of antenna gain relative to a theoretical perfect omnidirectional antenna. A 6 dBi antenna radiates ~4× more power in its main direction compared to an isotropic antenna (6 dB = ~4× power), which corresponds to roughly 2× the range in free space (range scales with the square root of power). Higher dBi = more directional (for verticals: more concentrated horizontally).

dBm (decibels relative to milliwatt)
: A measure of power level. 0 dBm = 1 mW. 27 dBm ≈ 500 mW. 30 dBm = 1000 mW = 1W. Used to express transmit power and signal strength (RSSI).

DFU (Device Firmware Update)
: A firmware update mode on nRF52840-based devices (T-Echo, RAK4631, etc.). Entered by double-tapping the reset button. The device appears as a USB drive, and firmware is updated by copying a .uf2 file to it.

E

EIRP (Effective Isotropic Radiated Power)
: The total RF power broadcast in the main direction of the antenna, accounting for both transmit power and antenna gain. Under FCC Part 15.247(b)(3)-(b)(4) for the 902-928 MHz band, conducted power is capped at 1 W (30 dBm) and full power is allowed with antenna gain up to 6 dBi; above 6 dBi the conducted power must be reduced dB-for-dB, so EIRP is effectively held near 36 dBm rather than there being a standalone "4 W EIRP" allowance.

With a 6 dBi antenna at 30 dBm TX, EIRP = 36 dBm - the boundary of the gain allowance.

EasySkyMesh
: A community fork of MeshCore firmware optimized for ultra-low power consumption, targeting a Heltec board (commonly referred to as the Heltec V3/V4 family; the exact revision should be confirmed against the project's own documentation). Reported to achieve roughly 5.5 mA average idle current. Not the official MeshCore firmware.

F

Flooding
: A routing approach in which every received packet is re-broadcast by every router node (up to the hop limit). Simple and robust but creates significant traffic in dense networks. Meshtastic uses flooding as its primary routing method. MeshCore relies mainly on path-discovery routing, but it still floods traffic that has no specific destination - notably adverts and channel (group) messages - so it is not accurate to say MeshCore never floods.

Firmware
: The software that runs on a LoRa device. Determines which protocol (MeshCore or Meshtastic), which features are active, and how the radio is configured. Flashed to the device via USB using a web flasher or PlatformIO.

G - H

Gateway
: A node that bridges the mesh network to the internet. In Meshtastic, gateways typically use MQTT. In MeshCore, gateways are usually implemented via room servers with internet uplinks.

HAL (Hardware Abstraction Layer)
: A software layer in MeshCore firmware that separates platform-specific hardware code (ESP32, nRF52840) from the common protocol logic. Allows the same firmware core to run on different MCU families.

Hop
: One relay of a message from one node to the next. A message with 3 hops has been relayed through 3 intermediate nodes between sender and receiver. Each hop adds latency and reduces reliability. Most deployments target 3 - 5 hop maximum.

Hop limit
: The maximum number of times a packet is relayed before being discarded. Prevents packets from circulating indefinitely in the mesh.

I - L

ISM band

Industrial, Scientific, and Medical frequency bands designated for unlicensed use. In North America, the 902 - 928 MHz band (commonly called "915 MHz") is used for LoRa mesh. In Europe, 863 - 870 MHz ("868 MHz").

LiFePO4 (Lithium Iron Phosphate)

A rechargeable battery chemistry preferred for outdoor mesh deployments. Advantages over LiPo: wider temperature range, longer cycle life (2000+ vs 300 - 500 cycles), much safer - highly resistant to thermal runaway and far less prone to fire than LiPo, though not categorically fireproof under severe abuse, and it still requires proper charging and protection. Lower energy density. Nominal voltage: 3.2V per cell.

Link budget

The total signal loss a radio link can absorb while still achieving reliable communication. Calculated as TX power + antenna gains − required receive sensitivity. Higher link budget = more range or better penetration through obstacles. A larger spreading factor increases the link budget (but reduces data rate).

LoRa (Long Range)

A proprietary chirp spread-spectrum radio modulation developed by Semtech. LoRa achieves exceptional range at low power and low data rates. The physical layer technology underlying both MeshCore and Meshtastic.

LoRaWAN

A network protocol that uses LoRa radio. Different from LoRa mesh - LoRaWAN requires centralized gateways and a network server. MeshCore and Meshtastic are not LoRaWAN.

M - N

MCU (Microcontroller Unit)

The processor chip in a LoRa node. Common MCUs: ESP32-S3 (higher power, has Wi-Fi), nRF52840 (ultra-low power, BLE only). Choice of MCU significantly affects power consumption and available interfaces.

MeshCore

A free, open-source LoRa mesh networking protocol and firmware. Uses path-discovery routing. Per community technical write-ups, its channel encryption is an Encrypt-then-MAC construction using AES-128 in ECB mode with an HMAC-SHA256 MAC; note that ECB is a known cryptographic weakness. Refer to the MeshCore repository/official docs for the authoritative cipher details. Strong North American community with several regional networks. Not to be confused with Meshtastic.

Meshtastic

A free, open-source LoRa mesh networking protocol and firmware. Uses flooding-based routing. Larger global community. Not interoperable with MeshCore.

MPPT (Maximum Power Point Tracking)

A solar charge controller algorithm that continuously adjusts the operating point to extract maximum power from a solar panel. More efficient than PWM controllers, especially on larger systems and in cold climates; on very small, low-current LoRa nodes the advantage is

marginal and an inexpensive PWM controller is often adequate and more cost-effective.

MQTT (Message Queuing Telemetry Transport)
: A lightweight publish/subscribe messaging protocol. Used by Meshtastic gateways to bridge mesh traffic to the internet. Some MeshCore room servers also support MQTT bridging for monitoring and integration.

NoDakMesh
: A MeshCore community mesh network covering North Dakota and the Northern Plains. One of the regional networks using the standard USA/Canada MeshCore preset. See nodakmesh.org.

P - R

Path-discovery routing
: The routing approach used by MeshCore. When a node wants to reach a destination, it broadcasts a route request (path discovery packet). Repeaters append themselves to build a route record. The destination responds with a route reply (path acknowledgment). Subsequent traffic follows the discovered path rather than flooding. Note that MeshCore still floods channel (group) messages and adverts that have no specific destination. More efficient than flooding for directed traffic in large or busy networks.

Preset
: A named set of radio parameters (spreading factor, bandwidth, coding rate) that determines the tradeoff between range and data rate. Meshtastic ships roughly 9-10 modem presets (Short Turbo through Very Long Slow); the exact count changes between firmware versions, so check meshtastic.org/docs/configuration/radio/lora for the current list (as of 2026-06-08). MeshCore uses regional presets (USA/Canada, Europe, etc.). Nodes must use the same preset to communicate.

PSK (Pre-Shared Key)
: A shared secret key used to encrypt messages on a private channel. All nodes on the channel must have the same PSK configured. Meshtastic encrypts each channel with AES-CTR (128- or 256-bit) keyed by the channel PSK; MeshCore uses per-contact / Diffie-Hellman-derived keys with AES-128 and an HMAC-SHA256 MAC.

RegionMesh
: A United States community mesh network built on MeshCore; community-run and open-source with no usage fees. See regionmesh.com for current coverage.

Room server
: A MeshCore infrastructure component that runs on a server (Raspberry Pi, VPS, etc.) and provides message persistence, node discovery, and optionally internet bridging. The MeshCore equivalent of a Meshtastic MQTT gateway, but with more features.

RSSI (Received Signal Strength Indicator)
: The power level of a received radio signal, measured in dBm. More negative = weaker. As a rule of thumb, usable LoRa RSSI ranges from roughly −40 to −60 dBm (very strong) down to about −120 to −137 dBm at high spreading factors (the Semtech SX1262 datasheet quotes sensitivity near −137 dBm at SF12). SNR is more informative than RSSI alone for assessing

link quality.

S - Z

SNR (Signal-to-Noise Ratio)
: The ratio of signal strength to background noise, measured in dB. Unlike RSSI, SNR indicates how far above the noise floor the signal is. LoRa can decode signals below the noise floor - roughly −7.5 dB at SF7 down to about −20 dB at SF12 under ideal conditions (per the Semtech SX1262 datasheet). Use conservative margins for emergency link planning in noisy environments. SNR is a better indicator of link quality than RSSI for LoRa links.

Spreading Factor (SF)
: A LoRa parameter (SF7 to SF12) that controls how long each symbol is transmitted. Higher SF = longer range, longer airtime, lower data rate. SF12 roughly quadruples range over SF7 in open terrain but is on the order of 32× slower (each SF step doubles airtime), drastically reducing data rate.

SWR (Standing Wave Ratio)
: A measure of impedance mismatch between a transmitter and antenna. Perfect match = 1:1 SWR. <1.5:1 is excellent for LoRa; >3:1 indicates a significant problem (damaged connector, wrong frequency antenna, etc.). Importantly, a very high SWR - such as transmitting with the antenna missing or disconnected - reflects power back into the power amplifier and can damage the transmitter, which is why a node should never transmit without an antenna attached.

WCMesh (West Coast Mesh)
: A MeshCore community mesh network covering the US West Coast, with a strong presence in Oregon, Washington, and northern California. Uses the USA/Canada preset (with some regional frequency variations). See wcmesh.com.

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