

MeshCore Hardware

Supported hardware platforms, compatibility requirements, and the RAK WisBlock ecosystem for MeshCore deployments.

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Supported Hardware for MeshCore

MeshCore has strict hardware requirements compared to Meshtastic. The most critical constraint is the radio: **MeshCore requires an SX1262 (or SX1268) LoRa transceiver**. Boards that use the older SX1276/SX1278 chipset cannot run MeshCore firmware at all.

Compatibility Quick Reference

Board	MCU	Radio	Firmware Variants	Flash Method	Status
RAK4631 (WisBlock)	nRF52840	SX1262	Companion, Repeater, Room Server, Sensor	UF2 drag-and-drop / WebSerial	Gold standard
T-Beam v1.2+	ESP32 (WROOM)	SX1262	Companion, Repeater, Room Server	WebSerial (Chrome/Edge)	Supported
T-Beam Supreme	ESP32-S3	SX1262	Companion, Repeater, Room Server	WebSerial (Chrome/Edge)	Supported
Heltec WiFi LoRa 32 V3	ESP32-S3	SX1262	Companion, Repeater	WebSerial (Chrome/Edge)	Supported
T114 (WisBlock-compatible)	nRF52840	SX1262	Companion, Repeater, Room Server, Sensor	UF2 drag-and-drop / WebSerial	Supported
Heltec HT-n62	nRF52840	SX1262	Companion, Repeater	UF2 drag-and-drop	Supported

Supported Boards - Detailed Profiles

RAK4631 (RAKwireless WisBlock Core) - Gold Standard

The RAK4631 module combines a Nordic nRF52840 microcontroller with a Semtech SX1262 radio and is mounted on a RAK WisBlock base board (most commonly the RAK19007 or RAK19003).

- **MCU:** nRF52840 - 64 MHz ARM Cortex-M4F, 1 MB flash, 256 KB RAM, hardware AES, BLE 5.0
- **Radio:** SX1262 - supports LoRa, FSK, up to +22 dBm TX power
- **Flash method:** UF2 drag-and-drop (double-tap reset button, copy .uf2 to the RAK4631 USB drive) or via the MeshCore Web Flasher at flasher.meshcore.io
- **Available firmware types:** Companion, Repeater, Room Server, Sensor

T-Beam v1.2 and later

The TTGO T-Beam v1.2 and subsequent revisions use an ESP32 MCU with an SX1262 radio module.

- **MCU:** ESP32 WROOM
- **Radio:** SX1262
- **Flash method:** WebSerial via Chrome or Edge at flasher.meshcore.io
- **Available firmware types:** Companion, Repeater, Room Server
- **Note:** T-Beam v0.7, v1.0, and v1.1 use SX1276 and are NOT compatible with MeshCore.

Incompatible Hardware

Board	Radio	Reason Incompatible
T-Beam v0.7 / v1.0 / v1.1	SX1276	Wrong radio chipset. Run Meshtastic instead.
Heltec WiFi LoRa 32 V2	SX1276	Wrong radio chipset.
TTGO LoRa32 V1 / V2	SX1276	Wrong radio chipset.
Heltec WiFi LoRa 32 V1	SX1276	Wrong radio chipset.

For the authoritative and up-to-date list of supported hardware, refer to the MeshCore firmware repository at github.com/meshcore-dev/MeshCore

Choosing Hardware for MeshCore vs Meshtastic

MeshCore and Meshtastic are both LoRa mesh networking platforms, but they have meaningfully different hardware requirements. This guide helps you decide which firmware to run based on the hardware you already own, or which hardware to buy if you are starting fresh.

The Fundamental Hardware Difference

The single most important distinction is the radio chipset:

- **Meshtastic** supports the SX1276, SX1278, SX1262, SX1268, and several other LoRa radios. Its hardware support surface is broad.
- **MeshCore requires the SX1262 (or SX1268)**. If your board has any other LoRa chipset, you cannot run MeshCore.

This means the decision tree starts at the radio, not the MCU.

MCU Considerations

Both platforms run on ESP32 and nRF52840 MCUs, but with different trade-offs:

MCU	MeshCore Support	Meshtastic Support	Key Advantage
nRF52840	Excellent (all firmware types)	Excellent	Hardware AES, BLE 5.0, very low sleep current (~3 μ A), UF2 flashing. Best for both platforms.
ESP32 (original)	Supported (no sensor firmware)	Excellent	WiFi support (Meshtastic uses this for MQTT bridging). Higher power draw.
ESP32-S3	Supported (no sensor firmware)	Supported	Faster CPU, native USB. Still higher power than nRF52840.
ESP32 (before S3, original Heltec V1/V2)	Not supported (wrong radio)	Supported	If you have these boards, Meshtastic is your only option.

If You Already Own Hardware

Use this decision guide based on what you currently have:

T-Beam v0.7 / v1.0 / v1.1 (SX1276)

Run Meshtastic. These boards use the SX1276 radio and are incompatible with MeshCore. They work excellently with Meshtastic. There is no upgrade path short of replacing the board.

T-Beam v1.2 or later (SX1262)

You can run either. Both platforms support this hardware. Choose MeshCore if you want path-based routing and lower channel utilization at scale. Choose Meshtastic if you need WiFi/MQTT bridging, the [Meshtastic app](#) ecosystem, or channel encryption compatibility with an existing Meshtastic network.

T-Beam Supreme (ESP32-S3 + SX1262)

You can run either. Same guidance as T-Beam v1.2+. The Supreme is a newer, more capable board and works well with both.

Heltec WiFi LoRa 32 V1 or V2 (SX1276)

Run Meshtastic. The SX1276 radio makes these incompatible with MeshCore. V1 and V2 are fully supported by Meshtastic.

Heltec WiFi LoRa 32 V3 (ESP32-S3 + SX1262)

You can run either. The V3 is specifically the compatible revision. Note that MeshCore does not support ROOM_SERVER on this board; if you need to host a room server, choose a different board.

RAK4631 / RAK WisBlock with SX1262

You can run either, but MeshCore is the stronger choice here. The RAK4631 is MeshCore's gold standard hardware. It supports all firmware types including SENSOR. It is also a fully supported Meshtastic target if needed.

Heltec HT-n62

MeshCore supported (Repeater and Room Client only). Check Meshtastic's hardware compatibility list for current support status on this board.

If You Are Buying New Hardware

If you are purchasing hardware specifically to run MeshCore, the recommendation is:

1. **RAK4631 on a RAK19007 base board** - best flexibility, all firmware types, lowest power, UF2 flashing. Recommended for repeaters, room servers, and sensor nodes.
2. **T-Beam Supreme** - good choice if you want onboard GPS and a slightly more integrated form factor. Runs Repeater, Room Client, and Room Server.
3. **Heltec WiFi LoRa 32 V3** - smallest and cheapest option for client-only or repeater-only nodes. Not suitable for room servers.

Feature Comparison: MeshCore vs Meshtastic

Feature	MeshCore	Meshtastic
Routing model	Path-based (learns routes, targeted relay)	Flood-based (rebroadcast to all)
Channel utilization at scale	Lower (targeted forwarding)	Higher (all nodes rebroadcast)
SX1276 support	No	Yes
SX1262 support	Yes (required)	Yes
WiFi / MQTT bridging	No (planned)	Yes (core feature)
Room server (group chat infrastructure)	Yes (dedicated firmware)	N/A (different model)
Sensor node firmware	Yes (nRF52840 boards)	Yes (broader support)
Mobile app	MeshCore app (Android/iOS)	Meshtastic app (Android/iOS)
BLE configuration	Yes	Yes
Community size	Smaller, growing	Larger, mature

Summary: Key Decision Rule



If your board has an SX1276 radio, you cannot run MeshCore - run Meshtastic instead.

If your board has an SX1262 radio, you can run either platform. Choose MeshCore for better scaling with path-based routing, or Meshtastic for broader app and hardware ecosystem compatibility.

RAK WisBlock System for MeshCore

The RAKwireless WisBlock ecosystem is a modular hardware platform built around stackable boards connected by standardized slot connectors. For MeshCore deployments, WisBlock is the most flexible and field-proven hardware option available. This page explains the WisBlock architecture, the relevant modules, and recommended configurations for different MeshCore node roles.

WisBlock Architecture Overview

A WisBlock node consists of three types of boards:

1. **Base Board** - provides power management (LiPo connector, solar input on some variants), USB, and slot connectors for the core and IO modules.
2. **Core Module** - the RAK4631, containing the nRF52840 MCU and SX1262 radio. This is the "brain" of the node.
3. **IO/Sensor Modules** - plug into the IO slots on the base board to add GPS, environmental sensors, displays, and other peripherals.

Base Boards

RAK19007 (Full-size Base Board)

- Dimensions: 30 × 60 mm
- Two IO module slots (Slot A and Slot B)
- LiPo battery connector (JST 1.25 mm)
- USB Type-C for charging and programming
- Solar input via separate connector
- **Recommended for:** Fixed repeaters, room servers, sensor nodes - any node where size is not constrained.

RAK19003 (Mini Base Board)

- Dimensions: 30 × 35 mm
- One IO module slot

- LiPo battery connector
- USB Type-C
- No solar input connector
- **Recommended for:** Portable client nodes, installations where size matters. Not ideal for sensor nodes requiring multiple IO modules.

RAK5005-O (Legacy Full-size Base Board)

- Older variant, still widely used in the community.
- Full-size form factor with IO slots and solar input.
- Uses Micro-USB instead of USB-C.
- Compatible with all WisBlock core and IO modules.

Core Module: RAK4631

The RAK4631 is the only WisBlock core module that supports MeshCore. Key specifications:

- **MCU:** Nordic nRF52840 - ARM Cortex-M4F @ 64 MHz, 1 MB flash, 256 KB RAM
- **Radio:** Semtech SX1262 - LoRa/FSK, 150 - 960 MHz frequency range, up to +22 dBm TX power
- **Connectivity:** BLE 5.0 (used for MeshCore app connection and CLI access), NFC (tag mode)
- **Interfaces:** SPI, I2C, UART, GPIO - all exposed on WisBlock connector and routed to IO slots
- **Power:** Operates from 3.3 V; integrates with the base board's power management
- **Antenna:** IPEX/U.FL connector on module; base board routes to SMA connector for external antenna

LoRa Module: RAK13300

The RAK13300 is a standalone SX1262 LoRa module that plugs into a WisBlock IO slot. It is an alternative radio path for custom builds, but for standard MeshCore use the integrated radio on the RAK4631 is preferred. The RAK13300 is primarily useful for advanced dual-radio or custom PCB integrations.

Sensor and Peripheral Modules

RAK1906 - BME680 Environmental Sensor

- **Measures:** Temperature, humidity, barometric pressure, and VOC (air quality index via gas resistance)
- **Interface:** I2C
- **Connects to:** IO Slot A or B on RAK19007/RAK5005-O
- **MeshCore firmware:** SENSOR variant reads BME680 data and transmits it as a sensor packet over the mesh
- **Use case:** Environmental monitoring node - weather station, air quality sensor, remote temperature logger
- **Note:** MeshCore also supports the simpler BME280 (temperature, humidity, pressure only). The RAK1906 with BME680 adds VOC sensing.

RAK12500 - GPS Module (uBlox ZOE-M8Q)

- **Provides:** GPS position, altitude, course, speed, UTC time
- **Interface:** UART or I2C
- **Connects to:** IO Slot A on RAK19007/RAK5005-O
- **MeshCore firmware:** GPS data is used for position reporting in the mesh - visible in the MeshCore app map view
- **Use case:** Any node where location tracking or time synchronization is needed
- **Cold start:** Typically 30 - 60 seconds to first fix outdoors; assisted GPS not available

RAK1921 - 0.96" OLED Display

- **Display:** 128×64 pixel SSD1306 OLED
- **Interface:** I2C
- **Use:** Shows node status, last received message, SNR, and battery level in supported firmware builds
- **Note:** MeshCore repeater firmware typically does not drive a display; Room Client firmware may show status information

Recommended Module Combinations

Basic Repeater Node

Base board	RAK19007 or RAK19003
Core	RAK4631
IO modules	None required
Firmware	REPEATER

Antenna	External 868 MHz or 915 MHz antenna via SMA connector on base board. Gain antenna (3 - 5 dBi fiberglass) strongly recommended for fixed installs.
Power	LiPo + solar panel (connected to base board solar input) for off-grid deployment

Sensor Node (Environmental Monitoring)

Base board	RAK19007
Core	RAK4631
IO Slot A	RAK1906 (BME680 environmental sensor)
Firmware	SENSOR
Antenna	868/915 MHz external antenna via SMA
Power	LiPo battery; sensor firmware uses very low duty cycle so battery life can be weeks to months depending on transmit interval

GPS-Equipped Node (Room Client with Position)

Base board	RAK19007
Core	RAK4631
IO Slot A	RAK12500 (GPS)
IO Slot B	RAK1921 (OLED display, optional)
Firmware	Companion
Use case	Field node for search and rescue, event operations, or any scenario requiring node position on the map

Enclosures

RAKwireless sells several official enclosures for WisBlock nodes:

- **RAK Unify Enclosure** - IP67-rated weatherproof enclosure for outdoor deployments. Available in multiple sizes. Includes SMA bulkhead, solar input gland, and cable glands. Ideal for permanent repeater installations.
- **RAK5804 IO Module + Custom Enclosure Kit** - for custom form-factor builds requiring additional IO.

- Third-party 3D-printable enclosure designs are available in the RAK community forums and on Printables for the RAK19007 base board.

Why WisBlock is the Most Flexible MeshCore Platform

The WisBlock system's modular design means you can build exactly the node you need:

- **Upgrade in the field:** Add a GPS module to a repeater without changing the core or base board.
- **Cost efficiency:** Buy base boards in bulk and swap core modules between development and production nodes.
- **Expandability:** RAKwireless offers over 30 IO modules covering sensors, displays, motor drivers, cellular, and more - all compatible with the same base board.
- **Low power:** The nRF52840 core draws only $\sim 3 \mu\text{A}$ in deep sleep, making solar/battery deployments practical for months of continuous operation.
- **Production-ready:** WisBlock components are FCC/CE certified and designed for real-world deployment, not just prototyping.