Hardware Considerations

A MeshCore repeater needs three things: a LoRa radio running repeater firmware, an antenna, and reliable power. How you combine these depends on your deployment location and budget.

The LoRa radio

Any MeshCore-compatible LoRa device can be flashed with repeater firmware. The radio is rarely the performance bottleneck - location and antenna matter far more. Key requirements:

- **915 MHz band** - required for US/Canada. Beyond interoperability, the band choice is a legal one: 902-928 MHz is the FCC-authorized license-free ISM band in the US/Canada (47 CFR 15.247). The EU 868 MHz band is *not* authorized for this use in the US, so 868 MHz hardware (common in European product listings) should not be transmitted on here regardless of network compatibility — and it would not interoperate with the US network anyway.
- **External antenna connector** - essential for connecting a quality external antenna. Devices with only a PCB trace antenna are not suitable for fixed outdoor deployment.
- **MeshCore firmware compatibility** - verify against the MeshCore compatibility list before purchasing.

Purpose-built outdoor units vs. DIY

Purpose-built solar repeater units

Several manufacturers produce all-in-one weatherproof units with integrated solar panels, batteries, and LoRa radios. These are the simplest path to a permanent outdoor installation - they arrive ready to mount and flash.

Advantages: weatherproof from the factory, integrated power system, no enclosure engineering required.
Disadvantages: higher cost, limited hardware customization.

DIY builds

A builder can assemble a repeater from individual components: a LoRa board, weatherproof enclosure, solar panel, charge controller, and battery. The main challenges are reliable weatherproofing and correctly sized cable penetrations.

Advantages: full customization, potentially lower cost, complete control over every component.
Disadvantages: requires time and skill; waterproofing failure is a leading cause of field failures.

Enclosures

Electronics exposed to outdoor conditions should live in a weatherproof enclosure rated IP65 or higher. Note that the IP rating only holds if *every* penetration is sealed with a rated cable gland — drilling unsealed holes voids the rating. Key considerations:

- Proper cable glands on all penetrations (antenna, power, USB)
- Desiccant packs inside to absorb residual moisture
- UV-resistant material for sun exposure
- Thermal management - a sealed enclosure in direct sun can reach internal temperatures that exceed electronics and battery ratings (typically around 60 °C) without ventilation or shading. Shade the box or use a light-colored, UV-resistant material to reduce solar heating.

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