Hiking and Backpacking with Mesh

Why Mesh for Hiking?

Wilderness hiking and backpacking take groups far beyond reliable cellular coverage. Mesh networking with LoRa-based devices solves this by providing two-way text communications and position tracking without satellite subscription fees. Key benefits include:

- Two-way text messaging across the group with no ongoing subscription cost
- Automatic position sharing so all members can see each other on a map
- Works entirely offline - no cell towers, no internet required
- Multi-hop routing means one device out of direct range can still reach the group via intermediate nodes

Recommended Hardware

For multi-day trips, prioritize small form factor and long battery life. Avoid power-hungry ESP32-based boards.

- **Heltec T114** (nRF52840, ~21-22 dBm output - the SX1262 maxes out at +22 dBm) - compact, runs weeks on a small battery, one of the best options for extended trips
- **RAK4631** - nRF52840-based, low power consumption, excellent for custom enclosures
- **T-Echo** - nRF52840 with built-in ePaper screen and GPS; excellent battery life, reads last position even when phone is stowed
- **Avoid T-Beam (ESP32)** for multi-day trips - the ESP32 draws significantly more power; same 1000 mAh battery lasts roughly 1 - 2 days vs. 3 - 7 days on nRF52840 devices (actual runtime depends on GPS, Bluetooth, and preset settings)

Battery Life Expectations

Battery runtime depends heavily on message frequency and modem preset. The figures below are rough estimates that assume duty-cycled GPS and a moderate message rate; actual runtime varies with position interval, Bluetooth, and preset:

- **RAK4631 / T-Echo on a 1000 mAh LiPo:** approximately 3 - 7 days depending on message frequency and modem preset
- **T-Beam (ESP32) on a 1000 mAh LiPo:** approximately 1 - 2 days under similar conditions
- Disabling Bluetooth when not actively using the companion app can extend runtime further on all platforms

Modem Preset Considerations

Wilderness use is generally low-traffic, so slower presets that trade throughput for range are appropriate:

- **Long Fast** or **Medium Slow** - good all-around choice for most hiking scenarios
- **Long Slow** - maximum range, ideal for above-treeline ridgeline hops; be aware that slow presets increase airtime per message, which matters if the group is chatty
- Verify all devices in the group are on the same modem preset before departure - mismatched presets mean devices cannot decode each other's packets

Practical Range

Real-world range varies enormously with terrain. Treat the figures below as best-case estimates that depend on antenna, line-of-sight, and conditions:

- **Ridgelines and open terrain:** 10 - 30+ km node-to-node is achievable only with elevated endpoints, good antenna orientation, and clear line-of-sight
- **Dense forest or deep valleys:** roughly 0.4 - 2.5 km is typical depending on density; vegetation and terrain absorb and diffract the signal significantly, and deep valleys can block it entirely
- Multi-hop routing extends effective group coverage - a node at a summit can relay messages between parties on opposite sides of a ridge

Group Use Tips

- Set a shared channel name and PSK before departure so all devices communicate on the same private channel

- Designate one person's phone as the "base" with full power settings; others can operate as client-only devices to save battery
- Set position update interval to 30 minutes to conserve battery - continuous GPS polling is one of the largest power draws
- Set a descriptive long name on each device (e.g., "Alice-RED" or "Trail Lead") so messages are identifiable without needing to look up node IDs

Pre-Trip Checklist

- All devices fully charged
- Shared channel name and PSK configured on every node
- Modem preset verified identical on all devices
- Each device has a recognizable long name with contact info
- Position update interval set appropriately (30 min recommended)
- Offline maps cached in the companion app on each phone
- Quick test message exchange confirmed before hitting the trailhead

Emergency Position Sharing

Meshtastic position packets are available to any app with channel access, making your location visible to all group members without any action on your part. MeshCore also transmits position in advertisement packets received by any node in range.

Important: Mesh networking is a group coordination tool, not a rescue beacon. It is *not* a replacement for a Personal Locator Beacon (PLB) or satellite communicator (e.g., Garmin inReach, SPOT) for true emergencies. Mesh devices require another mesh node within range to relay a message - in a genuine emergency in remote terrain, that may not exist. Carry a PLB or satellite communicator on any serious backcountry trip.

Revision #3
Created 2026-05-03 04:10:46 UTC by Mesh America Admin
Updated 2026-06-10 00:30:20 UTC by Mesh America Admin