When Cell Service Fails — Common Scenarios

Cell networks fail in predictable ways during disasters. Understanding when and how they fail helps you plan for when mesh becomes your primary communication path.

Mesh is a supplement, not a lifeline. LoRa mesh is best-effort with no guaranteed delivery: messages may silently fail to arrive, the shared radio channel can saturate under heavy load, and coverage depends on powered relay nodes being in range. It is NOT a replacement for 911, NWS alerts, or licensed amateur/voice nets. For any life-threatening emergency, use 911/voice first; use mesh as a fallback when those are unavailable.

Power Outage

What happens to cell service: Cell sites are required to have at least 8 hours of battery backup (24 hours at switching sites), and many add generators. In an extended blackout without refueling, battery-only sites can go silent within hours, and broader coverage degrades over the following day or two.

What mesh does: Nodes run entirely on their own batteries — no grid required. A fully charged T-Echo or similar device runs roughly 12–48 hours depending on message volume and screen-on time (treat this as an estimate; actual runtime depends on the device and how it is used). Depending on the device and screen use, a 10,000 mAh bank can extend a node's runtime to several days.

Practical steps:

- When power goes out, turn your node on and send an immediate check-in on your family channel.
- Reduce check-in frequency to conserve battery if the outage is expected to last more than a day.
- Place a node in a high window to maximize range to nearby family members — even a second-floor window makes a meaningful difference.

Wildfire Evacuation

What happens to cell service: Towers in or near fire zones are destroyed or de-energized. A mass evacuation can spike demand and congest remaining towers, making calls and data slow or unreliable, sometimes within minutes of an evacuation order.

What mesh does: LoRa mesh has no central tower to overload, so it is more resilient than cellular under mass demand. But the radio channel is shared and half-duplex; heavy local traffic still causes collisions and delays, so keep messages short and infrequent.

Practical steps:

- Turn your node on as soon as you hear an evacuation order — before you start packing.
- Nodes still transmit from a moving vehicle, but range is short and MeshCore works best with fixed repeaters; do not rely on staying connected to other evacuees while driving.
- Send your evacuation route and destination to your coordinator before you get too far from other nodes.
- **Limitation:** If family members take different evacuation routes and no intermediate nodes exist, direct contact may fail. Fall back to your pre-agreed secondary rally point.

Earthquake

What happens to cell service: Physical tower damage, severed fiber backhaul, and simultaneous call attempts make cell networks unreliable in the hours following a major earthquake. Call failure rates can be very high near the epicenter of a major quake.

What mesh does: No central infrastructure to fail. If your node is intact and powered, it communicates with any nearby node — even if every cell tower in the region is down.

Practical steps:

- Keep nodes charged and somewhere accessible — not at the bottom of a bag in a closet. A bedside table or desk drawer is ideal.
- After the shaking stops, do a rapid safety check before sending your first message so your status report is accurate.
- Nodes in damaged or collapsed structures won't communicate. If a family member in a vulnerable building goes silent, treat it as a welfare check situation.
- Monitor the public channel — neighbors will be sharing road conditions, shelter locations, and damage reports that official sources won't have for hours.

Hurricane and Severe Weather

What happens to cell service: Tower damage, flooding, and grid failure cumulatively degrade coverage. Service is often worst in the 12–48 hours after a direct hit.

What mesh does: Nodes deployed before the storm can operate through and after it.

Practical steps:

- **Pre-position before the storm:** Place a node at a high, sheltered location (a second-floor interior windowsill, under a covered porch overhang) before landfall. This extends coverage regardless of whether you shelter in place or evacuate.
- Seal nodes in a zip-lock bag — common consumer node enclosures carry no IP water rating and are not designed for rain exposure.
- If evacuating, take all nodes with you. A node left in a flooded home is a lost node.

What Mesh Cannot Do

Honest limitations — important to understand before you depend on mesh in an emergency:

- **No voice.** MeshCore is text and data only. You cannot make a phone call.
- **No photos or images.** The bandwidth is far too low. It carries short text and small data like position, not media.
- **Not a substitute for 911.** Always attempt to reach emergency services first in a life-threatening situation, even if you expect congestion. A mesh acknowledgment is a best-effort radio confirmation, not proof a human received or will act on your message.
- **Range is finite.** Without repeater infrastructure, two handhelds may not communicate across a large city. Know your actual range from pre-disaster testing.
- **Battery-dependent.** A dead node cannot send or receive. Battery discipline is critical.
- **Not instant.** Message delivery takes seconds to minutes depending on hop count and mesh load — not suitable for split-second coordination.

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