Events and Festivals

Large outdoor events - music festivals, county fairs, sporting events, religious gatherings - are a scenario where mesh networking can help and where cellular networks often struggle. Tens of thousands of people in one area can saturate cell towers, making calls and texts unreliable precisely when coordination is most needed. (At large planned events, operators frequently deploy temporary capacity such as Cells on Wheels (COWs) to mitigate this.)

The Cell Tower Problem at Large Events

Cell capacity in a single sector is finite. A single LTE sector typically handles on the order of 100-200 simultaneously active users before the experience degrades significantly; a full macro tower may carry far more attached devices, but throughput collapses under crowd load. *The following is an illustrative example, not a measured figure:* a 10,000-person music festival in a field served by only a few local towers can easily exceed available capacity, so text messages may take minutes or fail entirely and calls often don't connect. Actual congestion depends on the carrier's deployed capacity (including temporary equipment).

LoRa mesh avoids the centralized cell-tower bottleneck because each node relays for others, extending coverage without a central base station. However, it is not free of its own congestion limits: LoRa mesh shares one half-duplex channel, so total capacity is airtime-limited and *declines* as node count and traffic rise (more active nodes means more collisions and contention). Adding relay nodes can improve coverage, but adding many active participants on the shared channel can reduce reliability - density helps coverage, not raw capacity. Reliable event coverage comes from a planned fixed-router backbone with controlled client counts and separate channels, not from crowd density.

Event Staff and Volunteer Coordination

The highest-value application is staff and volunteer coordination:

- **Security teams** - Reporting incidents, requesting backup, coordinating perimeter checks without an operator radio license requirement (the equipment must still be FCC-certified and operated within ISM-band power limits)
- **Medical response** - Locating medical personnel and communicating non-urgent triage status. **Caveat:** mesh is a best-effort, low-bandwidth text channel with seconds-to-minutes latency and no guaranteed delivery. It must **not** be the primary or sole channel for directing ambulances or relaying urgent triage in a life-safety situation - use it only to supplement licensed two-way voice radio and 911.
- **Stage and production crew** - Schedule changes, equipment issues, artist movements
- **Logistics and vendors** - Supply requests, restocking coordination, cash transport

Setting Up an Event Mesh

1. **Deploy temporary repeaters before the event** - Attach nodes to light poles, stage scaffolding, or temporary masts around the venue perimeter and center. As rough guidance, plan for roughly 200-300m spacing in a dense crowd, but tie spacing to line of sight (bodies and RF clutter cut 900 MHz range hard) and confirm by walk-test rather than relying on a fixed metric.
2. **Use a private channel** - Create a custom channel name + PSK for staff. Optionally have a separate public channel for attendees.
3. **Assign roles** - ROUTER nodes stay in fixed positions; staff carry CLIENT nodes.
4. **Test the day before** - Walk the venue with a node and verify coverage before the crowds arrive.
5. **Battery planning** - For a 2-day festival, size batteries for 60+ hours without charging, or bring charging capability on-site.

Amateur Radio Integration

Many large events already have amateur radio ARES/RACES teams providing communications. Mesh nodes can supplement licensed ham radio communications, filling gaps where simplex VHF/UHF doesn't reach inside structures or in RF-congested environments. Coordinate with the existing ham team before the event to ensure complementary rather than competing systems.

Revision #3
Created 2026-05-03 05:37:52 UTC by Mesh America Admin
Updated 2026-06-10 01:43:23 UTC by Mesh America Admin