

Mesh and Amateur Radio (ARES/RACES)

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LoRa mesh and traditional amateur radio serve complementary roles in emergency communications. Understanding how they fit together helps you deploy each where it is most effective.

What ARES and RACES Are

ARES (Amateur Radio Emergency Service) is an ARRL program where licensed amateur radio operators provide emergency communications for served agencies (Red Cross, hospitals, government agencies). **RACES (Radio Amateur Civil Emergency Service)** is authorized under 47 CFR §97.407, sponsored by FEMA, and activated only by the responsible state or local emergency-management (civil-defense) authority.

Both programs have established protocols, training requirements, and communication plans. They operate on licensed amateur radio frequencies with trained operators. Note: the LoRa mesh described on this page operates on the 915 MHz ISM band under FCC Part 15, **not** on the amateur frequencies used by ARES and RACES. Default-encrypted Meshtastic traffic cannot lawfully be moved onto amateur bands — 47 CFR §97.113(a)(4) prohibits messages encoded to obscure their meaning — so mesh does not simply join the amateur allocation.

Where Mesh Fits In

Capability	Amateur Radio	LoRa Mesh
Voice communications	Yes - primary strength	No - text/data only

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License required	Yes - FCC license required	No, when operated under Part 15 on the 915 MHz ISM band — using FCC-certified equipment at up to 1 W (30 dBm) conducted, on a non-interference, must-accept-interference basis*
Served agencies	Hospitals, Red Cross, EOC	Neighborhoods, community groups
Long-range links	HF (worldwide), VHF/UHF regional	LoRa: up to ~20 - 50+ km only in ideal hilltop-to-hilltop line of sight; typically far less (often <5 km) between handhelds in real terrain†
Text messaging	Winlink, APRS, packet	Native; all nodes capable
Deployment cost	\$100 - \$1,000+ per station	\$20 - \$60 per node
Deployment speed	Requires trained operator	Any community member, once the network and presets are pre-configured

*915 MHz mesh is unlicensed under Part 15 (1 W conducted, EIRP-capped, FCC-certified equipment). Running mesh on amateur bands instead requires a license and caps spread spectrum at 10 W PEP with no encryption.

†The 20-50+ km figure is a best-case clear-line-of-sight hilltop-to-hilltop direct link, not typical operational coverage; all delivery is best-effort. Treat these as ceilings, not planning numbers — see Realistic Range and Coverage Expectations.

Practical Integration Model

A realistic combined deployment:

- **Neighborhood layer (LoRa mesh):** Blocks to ~1-3 miles, more with elevated repeaters - coordination among neighbors, location sharing, welfare checks. No amateur license required when operated under Part 15 (FCC-certified equipment, 1 W conducted, EIRP-capped); any resident can deploy a node.
- **Regional layer (VHF/UHF amateur):** Repeater-linked coverage across a county or metro area. Requires licensed operators; handles voice coordination between neighborhoods and EOC.
- **State/national layer (HF amateur):** Winlink gateways and HF nets for long-distance traffic when regional infrastructure is compromised.

For Amateur Radio Operators

If you hold an amateur radio license, consider:

- Deploying LoRa mesh alongside your existing radio setup to provide text/data capability for neighbors who don't have radio licenses. **Keep LoRa mesh on unlicensed Part 15 (902-928 MHz) frequencies. Do NOT run encrypted Meshtastic/MeshCore traffic on amateur bands** — 47 CFR §97.113(a)(4) prohibits messages encoded to obscure their meaning, and unlicensed neighbors may not transmit on amateur spectrum at all.
 - Using LoRa mesh for neighborhood coordination while using your radio for ARES/RACES served agency traffic
 - Advocating for LoRa mesh within your ARES group as a force multiplier for neighborhood-level coverage
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