

# ARES, RACES, and Served Agency Integration

Integrating LoRa mesh with amateur radio emergency service organizations and their served agencies.

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# Mesh Networking in Amateur Radio Emergency Service (ARES)

**Operational Note:** This page may be consulted during active emergency operations. Regulatory points on this page cite the specific FCC rule (47 CFR Part 15 or Part 97); verify against the current eCFR text and your local ARES group policies before deployment.

## What Is ARES?

The **Amateur Radio Emergency Service (ARES)** is a program of the American Radio Relay League (ARRL) that organizes licensed amateur radio operators to provide emergency communication support to government agencies, relief organizations, and other served agencies when normal communications infrastructure fails or is overloaded. The ARRL ARES field organization has **four levels**: national (ARRL HQ), section (Section Emergency Coordinator, SEC), district (District Emergency Coordinator, DEC), and local (Emergency Coordinator, EC, managing groups at the county or city level). Note that an ARRL "Section" is an administrative region, not necessarily a single state.

ARES members hold FCC amateur radio licenses (Technician, General, or Extra class) and participate in regular nets, exercises, and deployments. ARES groups typically operate on designated VHF/UHF repeater frequencies for voice communications and may also operate HF stations for long-range traffic handling. The National Traffic System (NTS) provides formal written message traffic capability via radiogram.

## How LoRa Mesh Complements VHF/UHF ARES Operations

Traditional ARES operations are voice-centric: operators check into nets, relay verbal messages, and pass formal radiograms by voice or digital modes like Winlink. LoRa mesh (particularly Meshtastic) adds a complementary *data layer* that addresses specific gaps in traditional ARES

capabilities:

Capability	Traditional ARES (VHF/UHF Voice)	LoRa Mesh Addition
Short text messaging	Voice relay only; requires operator attention	Asynchronous best-effort relay - intermediate nodes rebroadcast in real time; no operator attention needed. This is not guaranteed store-and-forward (Meshtastic's optional store-and-forward module is limited), so a message with no live path at send time is generally lost, not held.
Position reporting	Verbal position reports; APRS on separate system	Automatic GPS position sharing on mesh; visible to all nodes
Net congestion	Single voice channel; traffic serialized	Parallel data channel; does not compete for voice net time
Message logging	Manual logging by net control	Automatic message log on all receiving nodes
No-license users	Not applicable (licensed only)	On 915 MHz under Part 15 (unlicensed ISM), non-licensed served-agency staff may use the mesh. This is a separate legal regime from Part 97 amateur operation - it is not amateur radio and confers no amateur privileges.
Infrastructure requirement	Repeater or simplex range	No fixed infrastructure required to self-form, but coverage depends on powered relay nodes being in range

# LoRa Mesh as a Supplemental Data Layer

In ARES deployments, LoRa mesh is most valuable as a **supplemental data layer** running alongside, not replacing, the primary voice net. LoRa mesh is best-effort with no guaranteed delivery, so it supplements but never replaces the voice net for time-critical or life-safety traffic. Common use cases include:

- **Position tracking:** Each ARES operator with a Meshtastic node automatically broadcasts GPS position. A Meshtastic client running on a laptop at net control can display all operator positions on a map without consuming voice net time for position reports.
- **Short message traffic:** Operators in the field can send short status messages ("shelter at Lincoln School now at 47 occupants") without requiring net control to be available to receive a voice transmission.

- **Pre-positioned relay nodes:** ARES groups can deploy solar-powered mesh relay nodes at elevated sites (hilltops, water towers, repeater sites) to extend mesh coverage across the operating area.
- **Served agency liaison:** A mesh node at the served agency (Red Cross shelter, hospital, EOC), with the entire mesh segment running under Part 15 on 915 MHz ISM, allows served-agency staff to text ARES operators without a ham license. Both the licensed amateurs and the unlicensed staff are operating that mesh under Part 15; the amateur license is irrelevant to the 915 MHz mesh and grants no extra power or encryption privileges there. There is no regulatory mechanism for a Part 15 device to feed traffic into Part 97 amateur operation across the same RF link.

# How to Introduce Mesh to Your Local ARES Group

1. **Start with the EC (Emergency Coordinator).** Schedule a 15-minute briefing. Lead with the problem mesh solves: "We can't track field operator positions without using net time." Avoid jargon. Bring a working demo node.
2. **Run a small demo at a regular meeting.** Set up two or three Meshtastic nodes in the room. Demonstrate position sharing on a phone screen. Let skeptical operators handle the hardware.
3. **Propose a parallel track at the next exercise.** Ask permission to run mesh alongside the normal voice exercise - not as a replacement. Offer to provide equipment for participants who want to try it.
4. **Document results.** After the exercise, provide a written after-action report comparing mesh message delivery vs. voice net efficiency. Numbers matter: "Mesh delivered 23 position updates automatically while voice net handled 8 formal messages."
5. **Propose group endorsement.** After successful exercises, request the EC formally endorse mesh as an ARES supplemental tool and add mesh node operation to the local ARES training curriculum.

# FCC Part 15 vs. Part 97: Regulatory Considerations for ARES

## Critical Regulatory Distinction

Meshtastic devices operating in [the 915 MHz ISM band](#) (US) operate under **FCC Part 15** - the same rules as Wi-Fi and Bluetooth. Part 15 operation:

- Requires **no license** to operate (with the conditions below)
- Limits conducted output power to **1 W (30 dBm) at the antenna port - not EIRP** (47 CFR 15.247). EIRP may be higher with antenna gain up to 6 dBi (about 36 dBm / 4 W EIRP); beyond 6 dBi the conducted power must be reduced dB-for-dB (47 CFR 15.247(b)(4)). Note this when using high-gain 8-13 dBi Yagis in go-kits.
- Prohibits causing harmful interference to licensed services
- Requires accepting interference from other Part 15 devices
- Does **not** allow power increases beyond Part 15 limits, even by licensed amateurs

**Part 97 (Amateur Radio)** allows licensed amateurs to operate in the 33 cm (902 - 928 MHz) band. However, for **spread-spectrum (SS) emissions - which LoRa is** - 47 CFR 97.313(j) caps transmitter output at **10 W PEP**. The 1.5 kW general Part 97 ceiling does **not** apply to LoRa/SS and must never be cited in this context. Part 97 operation also **prohibits**:

- Messages encoded for the purpose of obscuring their meaning, i.e. content encryption (47 CFR 97.113(a)(4))
- Commercial use or pecuniary interest
- Communications in which the licensee has a pecuniary interest

**Meshtastic encrypts by default** using **AES256-CTR**. (The default public channel uses a publicly known PSK, so default traffic is not actually confidential despite being encrypted.) Because Part 97 prohibits messages encoded to obscure meaning, **default-encrypted Meshtastic cannot lawfully transmit on amateur (Part 97) frequencies**. There is no Part 97 "mode" for encrypted traffic. To operate on amateur frequencies you must disable message encryption entirely. If you need encryption, keep the network on the 915 MHz ISM band under Part 15, where there is no license requirement and no encryption prohibition.

**Practical guidance:** Run ARES mesh on 915 MHz under Part 15 at Part 15 power levels. Amateur (Part 97) transmissions may **not** be encrypted to obscure meaning (47 CFR 97.113(a)(4)) - **no Section Manager, local coordinator, or other authority can waive this FCC rule**, and there is no jurisdiction in which a ham may encrypt amateur traffic. A mesh-to-Winlink or mesh-to-APRS bridge is lawful only if a licensed amateur keys the amateur leg and the content is plaintext (decrypted at the gateway). For questions about lawful operation, consult the FCC rules (47 CFR Part 97) directly and, if needed, an attorney or the ARRL regulatory information service.

# Getting ARES Group Endorsement for Mesh Infrastructure

Formal ARES group endorsement provides several benefits: shared deployment of pre-positioned nodes, group funding or donations for equipment, and integration into official exercise planning. To pursue endorsement:

1. Write a one-page proposal for the EC describing: (a) the problem mesh solves, (b) equipment required and cost, (c) regulatory compliance (Part 15), (d) maintenance plan, (e) training requirements.
2. Present the proposal at a group meeting and invite questions.
3. Offer a formal training session covering Meshtastic setup, channel configuration, and emergency protocols.
4. Request inclusion in the group's Standard Operating Procedures (SOPs) as "Supplemental Mesh Data Layer."
5. Coordinate with the Section Emergency Coordinator (SEC) if seeking section-level endorsement or cross-group interoperability.

# Quick Reference: ARES + Mesh Checklist

- EC briefed and supports mesh integration
- At least one mesh exercise conducted alongside voice net
- After-action report documenting mesh performance documented
- Channel plan documented and distributed to all mesh operators
- Part 15 power compliance verified on all deployed nodes
- Encryption policy documented: mesh runs unencrypted on any Part 97 leg; encryption only on the Part 15 ISM mesh
- Mesh roles assigned in ARES activation plan (mesh coordinator, relay node operators)
- At least two operators trained on mesh node setup and troubleshooting
- Mesh node inventory maintained with deployment locations
- Mesh SOP incorporated into ARES local plan

# Integrating with Served Agencies

**Operational Note:** This page provides guidance for ARES operators and mesh advocates working with served agencies including Red Cross, hospitals, EOCs, and fire/EMS. Establish relationships before an emergency - these conversations are far harder during an active event.

**Reliability disclaimer:** Mesh is a **supplemental, best-effort** system with **no guaranteed delivery** — messages can silently fail to arrive. No served agency should rely on it as a primary, sole, or life-safety communications channel. All guidance below assumes mesh runs in parallel with the agency's established primary systems at all times, never in place of them.

## Understanding Served Agency Communication Requirements

Served agencies have specific, often rigid communication requirements driven by their own SOPs, legal obligations, and incident command structures. Understanding these requirements is essential before proposing mesh integration.

### Red Cross / American Red Cross

- Needs: shelter population counts, resource requests (cots, meals, water), staff check-ins
- Message traffic: typically short, structured (ICS-213 equivalent), not conversational
- Key concern: accountability - messages must be logged (note mesh delivery is best-effort, so logging cannot assume a message was delivered)
- Staffing: mix of trained volunteers and paid staff; not all are technically sophisticated
- Integration point: mesh node at each shelter feeding position/status to EOC

### Hospitals

- Needs: patient counts by severity (START triage), resource status (available beds, O2, blood), evacuation coordination
- Message traffic: mesh is unencrypted by default and best-effort - never transmit protected health information (PHI), including any individually identifiable patient data, over mesh
- Key concern: HIPAA obligations rest with the hospital (the covered entity) and its business associates, **not** with volunteer mesh operators relaying traffic. Following this page does not make a volunteer's mesh use "HIPAA-compliant." Defer entirely to the hospital's own communications and privacy policies on what, if anything, may be transmitted; this page does not constitute HIPAA compliance guidance.
- Integration point: hospital HAM radio operator or communications officer; mesh for non-PHI status only

## Emergency Operations Center (EOC)

- Needs: comprehensive situational awareness; resource tracking; inter-agency coordination
- Message traffic: high volume, multi-agency, documented
- Key concern: integration with existing systems (WebEOC, ICS forms, CAD)
- Integration point: MQTT bridge connecting mesh to EOC dashboard; mesh coordinator assigned at EOC

## Fire and EMS

- Needs: incident position, resource status, casualty counts, scene perimeter
- Message traffic: tactical and time-critical; concise
- Key concern: interoperability with CAD and dispatch; not adding cognitive load to incident commanders
- Integration point: mesh as supplemental position tracking, not primary tactical comms

# Mesh in the ICS Communications Hierarchy

The Incident Command System (ICS) defines a strict communications structure. Mesh fits into this structure as a **supplemental tactical channel**, not a command channel.

ICS Traffic Type	Primary Channel	Mesh Role
<b>Command</b> (incident command decisions)	Voice (P25, VHF/UHF)	NOT appropriate for mesh - use designated voice channels
<b>Tactical</b> (field team coordination)	Voice (simplex or repeater)	Supplemental: short status messages, position updates

ICS Traffic Type	Primary Channel	Mesh Role
<b>Logistics</b> (resource requests, supply)	Voice or Winlink email	Supplemental: structured request messages via mesh
<b>Situation Awareness</b> (mapping, tracking)	Manual boards, GIS	Primary supplement: GPS position sharing is a natural mesh strength
<b>Public Information</b>	Designated PIOs only	NOT appropriate - no public-facing mesh traffic

**Warning:** Never use mesh as a primary command channel during active incidents. Mesh has variable latency (seconds to minutes), no guaranteed delivery, and no acknowledgment in basic operation. Life-safety commands must use primary voice channels with confirmed receipt.

# What Served Agencies Actually Need

When pitching mesh to served agency coordinators, focus on what they actually want - not the technology:

- **Short status messages:** "Is the shelter at Lincoln School open and how many people are there?" Mesh can deliver roughly a 230-character answer (~228-237 byte payload; fewer characters if Unicode/emoji are used) without consuming repeater air time. Delivery is best-effort, so confirm anything critical.
- **Position data:** "Where are my teams right now?" Meshtastic's automatic GPS position broadcast answers this continuously without any operator action.
- **No additional training burden:** Served agency staff should be able to use mesh with minimal training. A Meshtastic node with a preconfigured channel and a simple phone app meets this bar.
- **Continues to function without infrastructure:** Mesh keeps working without cellular, internet, or repeaters - but coverage and delivery depend on node density and line of sight, and delivery is best-effort (not guaranteed). Treat this as a useful fallback, not a guarantee of communication.

# How to Pitch Mesh to an OES or EOC Coordinator

# The Three-Minute Pitch

1. **Open with their problem:** "During the [local event] last year, your shelter coordinators couldn't reach EOC for 4 hours because the repeater was down. LoRa mesh works without repeaters or cell service."
2. **Show one capability:** Hand them a Meshtastic device. Send a message from across the room. Show the position on the map. "This runs on battery for around 3 days depending on configuration."
3. **Make the ask small:** "I'm not asking you to replace anything. I'm asking to run this in parallel at your next exercise so you can see how it works."

*Be honest about limits in the pitch:* mesh is provided as a supplemental, best-effort capability with no warranty of availability or fitness for any purpose. The served agency remains solely responsible for verifying suitability and must not rely on mesh as a primary or life-safety path. Any installation on agency property should be governed by a written agreement (see below).

## Common Objections and Responses

Objection	Response
"We already have radios."	"Absolutely - and mesh doesn't replace them. It adds a text and position data layer so your voice channels stay clear for important calls."
"What if it breaks?"	"Mesh is decentralized and can route around a failed node <i>when</i> alternate RF paths exist. In a sparse mesh there can still be effective single points of failure - for example a sole bridging relay - so we keep your existing radio systems as the primary comms and treat mesh as a supplement."
"Our staff can't learn new technology during a disaster."	"The basic interface is a phone app most people can learn in 5 minutes. We train before the disaster, not during it. We can include it in your next tabletop exercise."
"Is it secure/encrypted?"	"Meshtastic uses AES-256 channel encryption. Note that the default public channel uses a publicly-known key, so it is not confidential out of the box. For served agency use over Part 15, we configure a private channel with a strong, custom key shared only with authorized nodes."

Objection	Response
"Who maintains it?"	"The ARES group maintains the infrastructure nodes. Each served agency location needs a low-cost device; where it runs unattended on solar power, the solar must be sized to local sunlight and the node's duty cycle, and we follow Meshtastic's guidance against placing private channel keys on unattended nodes (physical key-extraction risk)."
"We don't have budget."	"A complete node costs roughly \$30 - 80. The ARES group can supply and help maintain pre-positioned nodes - but mesh is provided as a supplemental, best-effort capability with no warranty of availability or fitness, and any installation on your facilities should be covered by a written agreement that allocates maintenance responsibility and liability (see below)."

# Training and Exercise Requirements

The milestones below build familiarity with mesh as a supplemental channel. Mesh is best-effort with no guaranteed delivery; no served agency should rely on it as a primary, sole, or life-safety channel even after completing this training:

1. **Initial orientation (30 - 60 min):** Demonstrate mesh hardware, install [Meshtastic app](#) on agency-designated device, configure pre-set channel, send and receive test messages.
2. **Tabletop exercise integration:** Include mesh message traffic in a tabletop exercise scenario. Evaluate whether served agency staff can successfully send and receive mesh messages during a simulated event.
3. **Field exercise:** Deploy mesh nodes at served agency locations during a full field exercise. Test coverage, message delivery, and integration with EOC display systems.
4. **SOP integration:** Served agency communications SOP should reference mesh as a supplemental channel, identify who is responsible for the node at each location, and document how to initiate mesh use during an activation.
5. **Written agreement / MOU:** Before installing nodes on agency property, put a written agreement (MOU) in place that allocates maintenance responsibility and includes **limitation-of-liability, indemnification, insurance, and non-reliance** clauses (the agency acknowledges mesh is supplemental and best-effort and that it will not rely on it as a primary or life-safety channel). Installation on third-party property requires the owner's authorization, and any AC/mains, grounding (NEC 810), or mast/tower work should be done by a qualified professional following local code.
6. **Annual verification:** Test each served agency node annually. Replace batteries, update firmware, verify channel configuration is current.

# Served Agency Integration Checklist

- Met with served agency communications officer or OES coordinator
- Demonstrated mesh capability during non-emergency visit
- Identified served agency mesh liaison (person responsible for the node)
- Written agreement / MOU in place with liability, indemnification, insurance, and non-reliance clauses; property-owner authorization obtained for any installation
- Installed and configured mesh node at served agency location (AC/grounding/mast work by a qualified professional per local code)
- Trained served agency liaison on basic operation (send/receive messages, check battery)
- Conducted tabletop or field exercise with mesh integration
- Documented served agency location in ARES mesh node inventory
- Integrated mesh into served agency communication SOP as a supplemental (not primary) channel
- Annual maintenance schedule established
- Backup/spare node available if primary fails

# Running a Mesh-Enabled EMCOMM Exercise

**Planning Note:** This page is a planning and evaluation guide for emergency communications exercises that incorporate LoRa mesh alongside traditional voice operations. Use this as a template and adapt to your local group's capabilities, geography, and served agency relationships. Note that the voice-net portion of a combined exercise typically operates under FCC Part 97 (amateur radio) and requires licensed operators with call-sign identification (47 CFR 97.119), while the LoRa mesh portion operates unlicensed under Part 15. Mesh delivery is best-effort with no delivery guarantee; the exercise should validate, not assume, that life-safety traffic gets through.

## Why Combined Voice + Mesh Exercises?

Training separately on voice and mesh produces operators who can use each system independently. Combined exercises reveal how the systems interact, where they complement each other, and - critically - where operators might accidentally rely on mesh when they should use voice or vice versa. Combined exercises also let you measure mesh performance in realistic field conditions before relying on it in an actual emergency.

## Scenario Design

### Scenario Elements That Benefit from Mesh

- Multiple geographically dispersed field teams that need to track each other's positions
- Served agency location (shelter, hospital, EOC staging area) that needs to report resource status periodically
- Net control station that needs to track field team positions without consuming voice net time for position reports

- A simulated infrastructure failure (repeater "goes down" at a pre-planned time mid-exercise) to test mesh as a fallback

# Sample Scenario: [Earthquake Response](#), Day 1

SCENARIO: 6.2 magnitude earthquake, 0730 local time.

Infrastructure status: Cell towers out, internet out, primary repeater unknown (simulate partial coverage).

ARES activation: County EC activates all available operators.

Objectives: - Establish EOC comms link (primary: voice on simplex; supplemental: mesh) - Assess four pre-designated shelter sites (teams of 2 per site) - Report shelter status (capacity, occupancy, needs) every 30 minutes - Track all field team positions continuously - Pass a minimum of 10 formal ICS-213 messages via mesh

Inject at T+60 min: Primary simplex frequency congested; shift mesh position reporting to free up voice channel for priority traffic.

Inject at T+90 min: Shelter #3 reports mass casualty event; all traffic deprioritized except medical coordination. Because mesh is best-effort, the MCI report and the medical-coordination traffic that follows are life-safety messages and the life-safety channel is voice with confirmed receipt - mesh is supplementary only.

Inject at T+95 min (mesh failure test): The Shelter #3 MCI report sent over mesh is NOT acknowledged within 2 minutes. Evaluate whether the operator detects the non-delivery and escalates to voice. The exercise must validate the confirmed-receipt voice fallback for life-safety traffic, not assume the mesh delivers it.

## Pre-Positioning Infrastructure

### Infrastructure Checklist (T-7 days before exercise)

- Identify all exercise areas and map expected operating locations
- Identify elevated relay sites within exercise area (hilltops, buildings, repeater sites)
- Deploy solar relay nodes at 1 - 3 elevated sites at least 24 hours before exercise
- Verify relay node solar charging is functioning (check battery voltage)
- Test message delivery from all expected field team operating areas to EOC node
- Configure all nodes with exercise channel (separate from operational channel)

- Assign node names following naming convention (e.g., RELAY-HILLTOP-1, FIELD-TEAM-A)
- Verify all field team nodes have GPS lock in outdoor test
- Brief all participants on channel configuration before exercise day
- Assign backup power (charged batteries or power banks) to all deployed nodes

# Assigning Mesh Roles to Participants

Role	Responsibilities	Equipment
<b>Mesh Coordinator (EOC)</b>	Monitors mesh map at EOC; logs all mesh message traffic; escalates time-sensitive messages to voice net control; manages mesh channel discipline	Laptop running Meshtastic web client with map view; dedicated EOC mesh node with antenna
<b>Field Team Leader</b> (per team)	Sends periodic status reports via mesh; monitors team position on <a href="#">Meshtastic app</a> ; escalates voice if mesh delivery fails	Meshtastic handheld node; phone running Meshtastic app (BLE connected)
<b>Relay Node Monitor</b>	Checks relay node status periodically; adjusts or repositions if coverage is inadequate; troubleshoots connectivity issues	Laptop or phone with access to relay node; spare node and hardware
<b>Served Agency Liaison</b> (if applicable)	Operates mesh node at served agency location; sends structured status reports; reports mesh problems to field team leader	Pre-configured Meshtastic node; phone or tablet with Meshtastic app
<b>Exercise Evaluator</b>	Records all mesh message delivery data (sent time, received time, recipient); tracks voice net traffic for comparison; notes any mesh failures or anomalies	Log sheet or tablet; Meshtastic client with message log visible

# Evaluating Performance: Key Metrics

## Message Delivery Rate

The primary mesh performance metric is the percentage of sent messages that were received by the intended recipient within an acceptable latency window. Calculate separately for:

- Direct node-to-node (single hop) delivery rate
- Multi-hop delivery rate (messages relayed through 2+ hops)
- Delivery rate under different field conditions (urban, rural, elevated)

## Latency Measurement

Record the timestamp when each message is sent and the timestamp when it is confirmed received at the destination. Meshtastic's message log provides send time; the receiving node's log provides receive time. The figures below are **suggested local benchmarks, not standards** - they are not sourced from a published specification. LoRa airtime and therefore latency depend heavily on the modem preset (spreading factor / bandwidth) and on load, so tie any benchmark to a stated preset. The values below assume a fast/medium preset and a lightly loaded mesh; long-range (high spreading factor) presets and congestion legitimately increase latency:

Hop Count	Suggested Target (light load)	Investigate If
Direct (0 hops)	< 2 seconds	> 5 seconds
1 hop	< 5 seconds	> 15 seconds
2 - 3 hops	< 15 seconds	> 30 seconds
4 - 7 hops (max)	< 30 seconds	> 60 seconds

**These targets apply to a lightly loaded mesh.** Under disaster-level traffic, airtime saturation and retries can push latency far higher and reduce delivery. Treat the table as best-case illustrative benchmarks tied to your stated preset - not pass/fail standards. A slow message has not necessarily failed (it may still arrive), and a fast one is not proof of delivery, so confirm critical messages explicitly rather than inferring delivery from expected latency. When scoring an exercise, do not flag a normal long-range or congested link as "failing" just because it exceeds these numbers.

## Net Efficiency Comparison

Record the number of voice net transmissions consumed for position reports and status updates before mesh was deployed vs. after. A well-integrated mesh can meaningfully reduce voice net traffic for routine status/position reporting by offloading it from the voice channel - but the actual reduction depends entirely on your traffic mix, operators, and coverage. Measure it for your own group from this exercise rather than relying on a generic percentage; any figure you cite should come from your own documented after-action data.

# Post-Exercise Debrief Template

## Exercise After-Action Report: Mesh Component

**Exercise Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_ **Duration:** \_\_\_\_\_

**Participants:** \_\_\_\_\_ **Mesh Nodes Deployed:** \_\_\_\_\_

### Quantitative Metrics

- Total mesh messages sent: \_\_\_\_\_
- Total mesh messages received at intended destination: \_\_\_\_\_
- Message delivery rate: \_\_\_\_\_%
- Average delivery latency (single hop): \_\_\_\_\_ sec
- Average delivery latency (multi-hop): \_\_\_\_\_ sec
- Voice net transmissions for position/status BEFORE mesh: \_\_\_\_\_
- Voice net transmissions for position/status WITH mesh: \_\_\_\_\_
- Voice net efficiency improvement: \_\_\_\_\_%
- Infrastructure node failures or outages: \_\_\_\_\_

### Qualitative Assessment

- What worked well with mesh integration?
- What failed or caused confusion?
- Were there coverage gaps? Where?
- Did any operators misuse mesh (sent life-safety traffic that should have been voice)?
- Did the operator detect the simulated mesh non-delivery of life-safety traffic and escalate to voice?
- Was the Mesh Coordinator role effectively staffed?
- Were served agency liaisons able to use mesh without difficulty?

### Corrective Actions

#	Issue Identified	Corrective Action	Owner	Due Date
1				
2				

#	Issue Identified	Corrective Action	Owner	Due Date
3				

## Recommendations for Next Exercise

- Additional relay nodes needed at: \_\_\_\_\_
- Training improvements needed: \_\_\_\_\_
- Equipment changes recommended: \_\_\_\_\_
- SOP changes recommended: \_\_\_\_\_