Ham Radio and LoRa Mesh

The intersection of amateur radio and LoRa mesh networking: licensing, identification, APRS integration, and why hams make natural mesh builders.

- Ham Radio Operators and Mesh Networking
- Callsign and Identification in Mesh Networks
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- Getting Your Ham Radio License for Mesh Networking

Ham Radio Operators and Mesh Networking

Amateur radio operators - "hams" - have been among the earliest and most enthusiastic adopters of LoRa mesh networking. The overlap is no accident. Decades of experience with emergency communications, antenna theory, radio propagation, and community-oriented operating makes licensed amateur operators uniquely well-suited to deploy, maintain, and extend mesh networks. This page explores that overlap in depth.

Why Ham Operators Gravitate Toward LoRa Mesh

Emergency Communications Experience

Many amateur radio operators are active in ARES (Amateur Radio Emergency Service), RACES (Radio Amateur Civil Emergency Service), CERT teams, Red Cross communications units, or local emergency management organizations. These groups train to provide communications when conventional infrastructure fails - exactly the scenario where a decentralized, infrastructure-free mesh network excels. Ham operators already think in terms of off-grid radio links, battery backup, portable deployments, and redundant paths. LoRa mesh extends that capability to long-range digital data - text messages, GPS positions, sensor readings - without requiring any centralized infrastructure.

Antenna Knowledge

Antenna performance is perhaps the single largest variable in LoRa mesh link quality. A node with a well-built, properly tuned, and correctly mounted antenna can dramatically extend its effective range - often by multiples - compared to the same hardware with a stock stub antenna mounted poorly; actual gains vary widely with terrain and antenna height. Ham operators understand antenna gain, feed-line loss, polarization, ground plane effects, and the value of height above average terrain (HAAT). This knowledge translates directly: a licensed ham who has built a 2-meter J-pole already understands why mounting a 5.8 dBi 915 MHz collinear on a roof peak outperforms leaving the device on a windowsill.

License-Free Operation Is Not a Barrier

A counterintuitive point: LoRa mesh on the 915 MHz ISM band operates under FCC Part 15, meaning *no license is required at all*. Some hams initially assume that radio experimentation requires a license. In the case of LoRa mesh, it doesn't - and this is a feature, not a limitation. A licensed ham can share mesh networking with family members, neighbors, or community organizations without any licensing barrier. The technical expertise that comes with a license is an advantage; the license itself is simply not required for ISM-band operation.

Alignment with Ham Radio Values

The FCC's basis-and-purpose rule (47 CFR 97.1) lists five principles for the amateur radio service - including its value to emergency communications, advancing the radio art, and training a pool of skilled operators - which align well with mesh networking. Several of those principles map directly onto LoRa mesh:

- **Self-sufficiency:** A mesh network functions with zero internet infrastructure. Nodes relay messages peer-to-peer across potentially miles of terrain.
- **Community service:** Mesh networks are designed for use in disaster zones, underserved communities, and rural areas lacking cellular coverage, to provide basic text communication and position reporting.
- **Technical experimentation:** LoRa is a genuinely interesting radio technology - spread-spectrum chirp modulation, link budgets exceeding 150 dB, and receive sensitivity around -130 to -148 dBm. It rewards the kind of technical curiosity that drives amateur radio licensing in the first place.

FCC Part 15 vs Part 97: How the Rules Interact

Part 15 - Unlicensed ISM Band Operation

LoRa mesh (Meshtastic, MeshCore, and similar systems) operates in the 902 - 928 MHz ISM (Industrial, Scientific, and Medical) band in the United States, regulated under FCC Part 15. Key characteristics of Part 15 operation:

- No license required for any operator
- Maximum transmit power limits apply: up to 1 watt (30 dBm) conducted output for digitally-modulated or ≥50-channel frequency-hopping systems under 15.247, with

antenna gain up to 6 dBi. Above 6 dBi you must reduce conducted power dB-for-dB by the amount the gain exceeds 6 dBi. (The relaxed point-to-point antenna allowance in 15.247(c) applies only to the 2.4 GHz and 5.7 GHz bands - there is no point-to-point exception in the 902-928 MHz band.)
- Devices must not cause harmful interference and must accept any interference received
- No station identification requirement
- No third-party traffic restrictions
- No prohibited content rules beyond general FCC regulations (no obscenity, etc.)

Your amateur license does not change any of these rules when you operate on Part 15. You are operating as an unlicensed Part 15 user, the same as anyone else.

Part 97 - The Amateur Radio Service

Part 97 governs licensed amateur radio operation. It allows much higher power levels, operation on exclusive amateur frequencies, limited one-way transmissions such as beacons and telecommand (broadcasting to the public is prohibited under 47 CFR 97.113(b)), and a range of other privileges - in exchange for stricter rules. Key Part 97 requirements include:

- Station identification: every 10 minutes during operation and at the end of a communication, using your callsign
- Restrictions on pecuniary interest: with narrow exceptions, you may not transmit communications in which you or your employer has a pecuniary interest (47 CFR 97.113(a)(3)) - organizations with paid staff should review this rule before assigning amateur-radio duties to employees
- No music, obscenity, or intentional interference
- Third-party traffic restrictions apply to some countries
- Encryption rules: messages may not be encoded to obscure meaning (though there is a narrow exception for control of remote stations)

Important: Meshtastic channels use AES256-CTR encryption; MeshCore channels use AES-128. Both also use public-key cryptography for direct messages. This encryption is used for confidentiality and channel separation. With its default encryption enabled, LoRa mesh *cannot run under Part 97*, because Part 97 prohibits encoding transmissions to obscure their meaning. This is not a problem for everyday use: a standard encrypted mesh simply operates under Part 15 instead, where encryption is perfectly legal. Note, however, that Meshtastic offers a documented "ham mode" for licensed operators - enable the licensed setting, use your callsign as the node name, and clear the PSK to disable encryption - under which the node can operate within Part 97 rules. That mode steps outside the normal community mesh.

The Licensed Ham Running Mesh: Practical Implications

When a licensed amateur operates a standard (encrypted) LoRa mesh node:

- Their mesh operation is entirely under Part 15 - their license is not implicated
- They do not need to identify their mesh node with their callsign (though many choose to as a courtesy)
- Running the standard encrypted mesh, they cannot claim Part 97 power privileges for their mesh transmissions. (A ham who disables encryption and identifies per Part 97 - see Meshtastic's ham mode above - may operate under amateur rules, but is then outside the standard community mesh.)
- If they simultaneously run APRS or other Part 97 modes (e.g., a dual-radio node with a separate VHF radio for APRS), those Part 97 transmissions must comply fully with Part 97 identification requirements

The practical takeaway: operate your mesh on Part 15 ISM band, and the presence or absence of your ham license changes nothing about what you can do. Your license brings knowledge and community - not additional rights on the ISM band.

Common Ham Radio + Mesh Scenarios

ARES Supplemental Mesh Deployment

ARES teams increasingly deploy LoRa mesh alongside their traditional VHF/UHF voice infrastructure during activations and exercises. The mesh provides:

- A persistent digital channel for text messages, freeing voice channels for coordination traffic
- GPS position reporting for all team members visible in real-time on the map
- Sensor data (weather, power status) from fixed sites
- A redundant path that works even if repeaters fail (mesh is peer-to-peer, not repeater-dependent)

Typical ARES mesh deployments use Router-role nodes at high elevation (repeater sites, hilltops, tall buildings) to provide backbone coverage, with Client nodes carried by operators. The mesh coexists with VHF/UHF voice and does not interfere with it.

Mesh as APRS Supplement

APRS (Automatic Packet Reporting System) on 144.390 MHz has been the primary vehicle tracking and position reporting tool for hams since the 1990s. It works well but has limitations: digipeater coverage is incomplete in rural and mountainous areas, and the 1200-baud AX.25 channel can be congested in urban areas during events. LoRa mesh with APRS bridging provides a complementary system:

- Mesh nodes can relay position reports to APRS-IS via an internet-connected gateway node
- In areas where APRS digipeaters don't reach, mesh extends position reporting capability
- Position reports from unlicensed mesh participants stay on Part 15 within the mesh. But if a gateway bridges those reports onto APRS (whether onto RF directly, or into APRS-IS where an IGate may gate them back to RF), they become third-party traffic transmitted under the gateway operator's callsign - the licensed operator is responsible for that traffic under 47 CFR 97.103 and 97.115, and should decide deliberately whether to gate non-licensed participants' positions.

For the APRS bridging component specifically (the Part 97 radio side of the gateway), a Technician class license or higher is required. See the page on APRS and Meshtastic Integration for technical details.

Portable/SOTA/POTA Operations

Some Summits on the Air (SOTA) and Parks on the Air (POTA) activators carry small LoRa mesh nodes alongside their HF or VHF equipment. The mesh node allows family members or chasers to see real-time position while the operator focuses on radio operation. nRF52-based nodes can run for days per charge, and small trackers (for example the Seeed T1000-E) weigh only tens of grams - bare boards are lighter, while complete nodes with battery and case weigh more - which makes them practical for backpacking activations.

Summary

Licensed amateur radio operators bring a unique combination of technical knowledge, operational experience, and community orientation to LoRa mesh. The regulatory framework is simple: a standard encrypted mesh runs on Part 15 ISM band regardless of whether the operator holds an amateur license. The license brings expertise, community, the ability to run complementary Part 97 systems alongside the mesh, and - via ham mode - the option to run an unencrypted, identified node under Part 97. But the standard mesh itself needs no license at all.

Callsign and Identification in Mesh Networks

One of the most common questions from licensed amateur radio operators entering the LoRa mesh world is: *do I need to identify my mesh node with my callsign?* The short answer is no - but the longer answer involves understanding why, when identification is still a good practice, and the one important exception.

The Legal Framework: Part 15 and Identification

No Callsign Requirement Under Part 15

LoRa mesh networks operating on the 902 - 928 MHz ISM band in the United States are regulated under FCC Part 15. Part 15 governs unlicensed intentional radiators - devices that intentionally transmit radio frequency energy. Part 15 imposes no station identification requirement whatsoever. There is no rule requiring an ISM band device to identify itself with any callsign, serial number, or other identifier.

This is in contrast to Part 97 (amateur radio), which requires identification every 10 minutes during transmission and at the end of each communication. But because LoRa mesh is not operating under Part 97, Part 97's identification rules do not apply.

Why This Matters for Operators

Many licensed hams instinctively reach for their callsign when configuring any radio transmitter. For LoRa mesh, this habit is not legally required. You can name your node anything - your name, a location, a handle - and be fully compliant with FCC rules. Operators who are not licensed radio amateurs face no different standard: they also have no identification requirement.

Best Practices: Using Your Callsign Anyway

The Courtesy Tradition

While not legally required, many licensed amateur operators choose to include their callsign in their mesh node name as a matter of courtesy and community norms. This practice:

- Makes it easy for others to identify who operates a node and contact them through normal ham radio channels if needed
- Contributes to accountability in shared community networks
- Aligns with the general ham radio culture of identification and transparency
- Makes it easier to coordinate with ARES, RACES, or other ham radio emergency groups who maintain contact lists by callsign

Recommended Naming Formats

If you choose to use your callsign in your node name, common formats in the Meshtastic and MeshCore community include:

Format	Example	Use Case
`CALLSIGN`	`W6ABC`	Simple, short - best for node short name display
`CALLSIGN-location`	`K5XYZ-rooftop`	When operator has multiple nodes in different locations
`CALLSIGN-mesh`	`W6ABC-mesh`	Distinguishes mesh node from other callsign uses (APRS, etc.)
`CALLSIGN-type`	`N7QRT-router`	Indicates node role to other operators

Meshtastic's long name field (up to 39 characters) accommodates descriptive names well. The short name field (4 characters) is typically used for a short identifier - many operators use the suffix of their callsign (e.g., "ABC" for W6ABC) or a regional code.

When Operators Choose Not to Use Callsigns

There are legitimate reasons an operator might not include their callsign in their node name:

- **Privacy:** A callsign is a public record linked to your name and address in the FCC ULS database. Operators who prefer not to be identified by strangers on a community mesh may use a handle or location-based name instead.
- **Non-ham participants:** Mesh networks often include participants who are not licensed amateurs. A community mesh might have nodes named after locations, businesses, or personal handles rather than callsigns. There is no requirement for consistency.
- **Organizational nodes:** Nodes deployed by ARES groups, public safety auxiliaries, or businesses may use organizational identifiers rather than individual callsigns.

When Identification *Is* Required: The APRS Exception

APRS Operates Under Part 97

APRS (Automatic Packet Reporting System) on 144.390 MHz is a Part 97 amateur radio system. When a Meshtastic node acts as an APRS gateway - bridging position reports from the mesh onto the APRS network via a VHF radio transmitter - that VHF transmission is Part 97 operation and **full Part 97 identification requirements apply**.

This means:

- The APRS gateway must transmit under a valid amateur callsign
- The operator must hold at least a Technician class license (APRS on 144.390 MHz is a VHF system; the Technician class includes full privileges on 144 MHz)
- The station must identify every 10 minutes of transmission and at the end of each communication sequence
- APRS position packets automatically include the source callsign as part of the AX.25 packet format, so identification is inherent in the protocol

Practical Guidance for APRS Gateway Operators

If you run an APRS gateway node that bridges your mesh to APRS-IS (the internet-based APRS backbone) rather than directly transmitting on 144.390 MHz, the rules are different from RF, but obligations still apply. Connecting to APRS-IS requires a valid amateur callsign and passcode - this

is a condition of access, not merely a courtesy. Also note that data you inject into APRS-IS may be retransmitted on RF (Part 97) by third-party IGates, so only inject traffic you could lawfully originate on amateur frequencies under your own callsign. Improperly identified or unlicensed injections can result in Part 97 transmissions under other stations' callsigns, creating compliance exposure for both you and the gating stations.

The Question of Mesh Encryption and Part 97

A related identification question sometimes arises around encryption. Part 97 §97.113(a)(4) prohibits transmissions in which the meaning is obscured to others. Meshtastic uses AES256-CTR encryption on channels (the channel PSK can be 128- or 256-bit); direct messages use public-key cryptography since firmware 2.5.0. Because Meshtastic operates under Part 15 (not Part 97), this prohibition does not apply. However, it does mean that *you cannot claim to be operating under Part 97* while running standard encrypted Meshtastic channels - the two regulatory frameworks are separate and you must stay in Part 15 for encrypted mesh operation.

The practical upshot: stay on the ISM band, operate under Part 15, and identification is entirely optional. Run APRS bridging? Full Part 97 compliance required for that component.

Summary

- LoRa mesh on 902 - 928 MHz ISM band operates under FCC Part 15 - no callsign or identification required
- Many licensed hams use their callsign in node names as a courtesy - this is a good practice but not a legal obligation
- Common formats: `W6ABC`, `K5XYZ-rooftop`, `N7QRT-router`
- Privacy concerns and non-ham participants are valid reasons to use names other than callsigns
- APRS gateway operation (the VHF radio side) is Part 97 and requires a valid callsign and full identification

APRS and Meshtastic Integration

APRS (Automatic Packet Reporting System) and Meshtastic are complementary systems that serve overlapping but distinct communities and use cases. Bridging them extends the reach of both networks and gives mesh operators access to decades of ham radio infrastructure. This page explains what APRS is, how Meshtastic can bridge to it, the licensing requirements, and the practical benefits for both communities.

What Is APRS?

Overview

APRS is an amateur radio protocol developed by Bob Bruninga (WB4APR) in the late 1980s and early 1990s. It provides real-time tactical digital communications over amateur radio frequencies, with a particular focus on position reporting and short messaging. In the United States, the primary APRS frequency is **144.390 MHz** - a nationwide coordinated frequency where virtually all APRS-capable radios monitor and transmit.

What APRS Does

APRS carries several types of packets:

- **Position reports:** GPS coordinates, optionally with speed, heading, altitude, and a symbol icon. This is what most people think of as "APRS" - dots on a map showing vehicles, fixed stations, and mobile operators.
- **Messages:** Short text messages (67 characters maximum) addressed to specific callsigns. APRS messages support acknowledgment.
- **Objects and items:** Fixed or moving landmarks placed on the map by any station - useful for event waypoints, severe weather markers, or infrastructure locations.
- **Weather data:** Temperature, wind speed, rain accumulation, and other meteorological data from amateur weather stations.
- **Telemetry:** Numeric values from sensors, reported on the APRS network.
- **Status and announcements:** Text broadcasts not addressed to a specific station.

APRS Infrastructure

APRS on 144.390 MHz uses a network of **digipeaters** (digital repeaters) that receive packets and retransmit them, extending range. It also uses **I-gates** (internet gateways) that bridge the RF network to **APRS-IS** (APRS Internet Service), a real-time internet backbone that aggregates all APRS traffic globally. The website **aprs.fi** provides a real-time map of all APRS traffic visible on APRS-IS, widely used by hams worldwide for tracking vehicles, events, and emergency operations.

Licensing

APRS operates on 144.390 MHz, which is in the 2-meter amateur band. A **Technician class license or higher** is required to transmit on this frequency. Reception requires no license. The APRS protocol uses AX.25 packet radio, which is legal under Part 97 (APRS is an unencrypted, meaning-clear protocol - every packet is readable by anyone with an APRS receiver).

Meshtastic APRS Gateway: How It Works

The Bridge Concept

A Meshtastic node that is connected to the internet (via WiFi or Ethernet) can act as an APRS gateway, forwarding position reports from the mesh network to APRS-IS. The gateway receives Meshtastic position packets (sent by any node on the mesh channel), converts them to APRS format, and uploads them to APRS-IS using the gateway operator's callsign.

The result: any Meshtastic node on the mesh appears as a dot on aprs.fi, visible to anyone in the world tracking that area. **Be aware this makes the location of every bridged node public on the worldwide internet.** Do not bridge nodes whose owners have not agreed to have their position published.

Gateway Architecture Options

There are two main approaches to Meshtastic-APRS bridging:

Option 1: APRS-IS Software Gateway (Internet Only)

A Meshtastic node with WiFi/Ethernet connects to APRS-IS directly, without any VHF radio. Position packets from the mesh are forwarded to APRS-IS over the internet. This approach:

- Requires an APRS-IS login (which requires a valid callsign)
- Does *not* transmit on 144.390 MHz - no VHF radio needed
- Does not transmit on RF, so no FCC license is legally required for the IS-only software path itself. However, APRS-IS terms of service require a valid amateur callsign and passcode to upload packets, so in practice you need a licensed callsign to participate.
- Best practice: use your own callsign and hold at least a Technician license

Option 2: RF Gateway (Direct VHF Transmission)

A gateway node is paired with a VHF radio (such as a Baofeng or dedicated TNC) that actually transmits on 144.390 MHz. This is full Part 97 operation:

- Requires a Technician class license or higher
- Must comply with all Part 97 rules including identification (APRS packets carry the source callsign automatically)
- Provides true RF presence on the APRS network, so even operators without internet access on that frequency can receive the bridged position

Python Bridge Software

Community projects provide ready-made bridge software - for example **aprstastic** (`pip install aprstastic`) and **meshtastic-bridge** (jaredquinn/meshtastic-bridge on GitHub). Check each project's repository for current setup instructions. A typical software-only gateway setup:

Warning: the block below is illustrative pseudocode, NOT a runnable script. The callsign `W6ABC` and the passcode `12345` are placeholders. Replace `W6ABC` with your own callsign and `12345` with the real passcode generated from your callsign, or it will fail authentication.

```
# Install dependencies
pip install meshtastic aprslib


# Example bridge concept (simplified)
import meshtastic
import meshtastic.serial_interface
import aprslib


# Connect to local Meshtastic node via USB
iface = meshtastic.serial_interface.SerialInterface()


# Connect to APRS-IS
```

```
AIS = aprslib.IS("W6ABC", passwd="12345", host="rotate.aprs2.net", port=14580)
AIS.connect()

# Subscribe to position packets from the mesh
def on_receive(packet, interface):
 if packet.get("decoded", {}).get("portnum") == "POSITION_APP":
 pos = packet["decoded"]["position"]
 lat = pos.get("latitude")
 lon = pos.get("longitude")
 node_id = packet.get("fromId", "UNKNOWN")
 # Format and send APRS position packet
 aprs_packet = f"W6ABC-GW>APRS,TCPIP*:={lat:.2f}N/{lon:.2f}W> Mesh node {node_id}"
 AIS.sendall(aprs_packet)

iface.localNode.setOwner("W6ABC-mesh")
pub.subscribe(on_receive, "meshtastic.receive")
```

Note: This is a simplified illustration. Production bridge software handles coordinate formatting (APRS uses DDmm.mm format), SSID assignment, symbol codes, and duplicate suppression.

Requirements Summary

Gateway Type	License Required	VHF Radio Required	Internet Required
APRS-IS software gateway	Technician (best practice)	No	Yes
RF gateway (direct 144.390 TX)	Technician (required)	Yes	Optional

What the Mesh Gains from APRS Bridging

- **Global visibility:** Meshtastic node positions appear on aprs.fi, accessible to anyone without needing the Meshtastic app or a mesh node
- **Integration with existing SAR systems:** Search and rescue teams, ARES groups, and emergency managers who already monitor APRS gain visibility into mesh operator positions automatically

- **Long-distance tracking:** A vehicle traveling through an area with no local mesh coverage but good APRS digipeater coverage can still be tracked via APRS, and the APRS track history provides continuity with the mesh position data
- **APRS message integration:** Some bridge implementations allow APRS messages addressed to the gateway callsign to be forwarded back into the mesh as text messages

What APRS Gains from Mesh Bridging

- **Extended coverage:** LoRa mesh reaches into areas where APRS digipeaters don't - deep valleys, buildings with poor RF penetration, areas without active ham infrastructure
- **Non-ham participants:** Mesh nodes can be operated by unlicensed users whose positions still appear on APRS via the gateway's callsign (the gateway operator is responsible for the transmission)
- **Resilience:** In a disaster scenario where VHF repeaters and digipeaters may fail, mesh + APRS-IS provides a fallback path for position reporting if internet connectivity survives

Operational Considerations

APRS-IS Passcode

APRS-IS requires a numeric passcode generated from your callsign to upload packets. The passcode is not secret - it is generated by a well-known algorithm - but it does require a valid amateur callsign. Receive-only connections do not require a passcode.

SSID Assignment

APRS uses SSIDs (suffix numbers after the callsign, e.g., W6ABC-9) to distinguish different stations operated by the same callsign. Per the official APRS SSID recommendations (aprs.org/aprs11/SSIDs.txt):

- W6ABC-9: mobile (vehicle)
- W6ABC-10: internet, I-gates, EchoLink, Winlink, etc.
- W6ABC-15: generic additional station (digi, mobile, weather, etc.)

For a Meshtastic-APRS internet gateway, **W6ABC-10** (the recommended SSID for I-gates and internet stations) or a custom SSID is appropriate. Individual mesh nodes forwarded through the

gateway might use their node short name as a display name within the APRS comment field.

Avoiding APRS Channel Congestion

APRS 144.390 MHz is a shared channel used nationwide. A Meshtastic gateway should implement smart beaconing or rate limiting to avoid flooding the APRS channel with high-frequency position updates from many mesh nodes. A beacon interval of 2 - 5 minutes per node is generally appropriate; fixed nodes may beacon less frequently (10 - 30 minutes).

Summary

APRS and Meshtastic are natural partners. Meshtastic nodes can be bridged to APRS via a gateway node with internet connectivity, making mesh positions visible on aprs.fi and integrating with decades of amateur radio emergency infrastructure. The APRS-IS software gateway approach requires a valid callsign (Technician recommended); direct RF transmission on 144.390 MHz requires a Technician or higher license. The bridge extends coverage in both directions: mesh reaches where APRS doesn't, and APRS provides global visibility that mesh alone cannot offer.

Getting Your Ham Radio License for Mesh Networking

You do not need a ham radio license to use Meshtastic or MeshCore - both operate on the FCC Part 15 ISM band, which is license-free. However, getting your Technician license opens up significant advantages for mesh network operators.

Why a License Helps (But Isn't Required)

- **Higher power:** 902-928 MHz is also the amateur 33 cm band, so licensed operators may run LoRa mesh under Part 97 at higher power than Part 15 ISM allows - but only with encryption disabled and full callsign identification (this is Meshtastic's "licensed ham mode"). Most mesh users stay on Part 15 instead so they can keep encryption, in which case a license does not raise your allowed power.
- **Community credibility:** Many emergency management agencies, ARES, and CERT programs prefer working with licensed operators
- **Broader skill set:** The license exam covers RF propagation, antenna theory, and electrical safety - directly applicable to mesh network work
- **Club liability insurance:** ARRL-affiliated radio clubs can purchase liability insurance (commonly around $1M per occurrence) through the ARRL-sponsored club insurance program - useful for club-run community network infrastructure installations. Individual ARRL membership does NOT by itself include liability coverage; the coverage is a policy that affiliated clubs buy.
- **Community:** Ham radio clubs are natural partners for mesh network expansion; a license makes you a full member of that community

The Technician License

The entry-level FCC amateur radio license requires passing a 35-question written exam. No Morse code is required (the code requirement was eliminated in 2007). The exam covers:

- Basic radio regulations (FCC Part 97)
- Basic electronics and RF theory

- Antenna fundamentals
- Operating practices and safety

Study time to pass: 10-20 hours for most people with basic electronics background. Mesh network operators often find they already know much of the RF theory content from their practical experience.

Study Resources

- **HamStudy.org** - Free to use on the web, with adaptive learning that tracks what you've gotten wrong and focuses practice there. The companion iOS/Android mobile app is a small paid purchase. Highly recommended.
- **The ARRL Ham Radio License Manual** - The official Technician study guide; roughly $25-33 in print (check arrl.org for current pricing). Very thorough.
- **KB6NU's "No-Nonsense" Technician Study Guide** - Free PDF download; 50 pages, focused and practical.
- **HamWhisperer YouTube channel** - Video explanations of exam questions.

Finding an Exam Session

Technician exams are administered by Volunteer Examiner (VE) teams. Find a session:

- **arrl.org/find-an-amateur-radio-license-exam-session** - ARRL exam session database by zip code
- **hamstudy.org/sessions** - Searchable list of upcoming in-person and online exam sessions
- **Local amateur radio clubs** - Most clubs hold regular exam sessions, often free or low-cost

Exam session fees are set by the coordinating VEC (Volunteer Examiner Coordinator), not by each VE team - typically $0-15 (the ARRL VEC charges $15; some coordinators such as GLAARG charge little or nothing). The FCC charges an additional $35 for processing your license application (as of 2022).

After You Pass

Your license will be issued within 1-10 days of passing. Your callsign will be assigned automatically. Use your callsign:

- As your Meshtastic node long name (e.g., "KG7XYZ-Mobile")

- For identification when operating on ham bands
- For joining ARES or other emergency communications programs (ARES participation requires an amateur license but not ARRL membership) and, if you wish, ARRL membership