Emergency Communications 101

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Introduction

Maybe you want to be able to talk to your friends on a camping trip. Or maybe you want to be prepared for a natural disaster. No matter the reason, if you're interested in radio communications, this document is the place to start. Let's begin by looking at the two useful types of HT ("handie talkie") radios, GMRS and Ham:

GMRS, or "General Mobile Radio Service", radios are:
Simple to Use: They work just like walkie talkies.
License "Required": Anyone can buy a GMRS, but you're supposed to have a license to use one.

- The FCC seemingly never enforces this requirement. (Not legal advice.)
- The license is $35, there's no test, it lasts 10 years, and covers everyone in your family.
- Google "how to get a GMRS license" to find the link to get your license.

30+ Channels: Channels above 22 are used for repeaters (see below).
Pretty Cheap: GMRS radios start around $30. Find recs at www.genoak.org/radios

Amateur, or "Ham", radios are:
More Complex: Ham radios are more complicated to use than GMRS radios.
License Required: Anyone can buy a Ham radio, but to transmit, the FCC requires you to get a license, and that requires passing a test. More details on licensing below!
Frequencies, Not Channels: Ham radios can transmit and receive on a wide range of frequencies.

- Ham radios work on different frequencies than GMRS and can't talk to them.

Range of Prices: $20 for a passable HT, $100 for a good one, $350+ for a great one.

Range, Antennas and You

Your GMRS radio will have much less range than advertised – basically line of sight. You'll get the longest range from a high point ("Height is might") with no obstructions, and shortest when the path between you and the other person is blocked by metal or earth. In urban areas, that may be a few blocks or less. A Ham HT should perform better, but still won't go miles in normal conditions.

Whether you buy a GRMS or Ham HT, one of the first things you'll want to do is buy a new antenna for it. The antenna is the single piece of equipment that makes the biggest difference for range. Look online for recommendations – some are elastic and can be twisted in a circle to save space, some are simply longer than the stock "rubber duck" antenna that comes with your radio. (Check the antenna connector on your radio to make sure you buy one that's compatible.)

Finally, if you're having range trouble, try moving yourself. Go upstairs, walk around outside, and see if that doesn't help. Experimentation is part of the fun of radio!

Emergency Preparedness Considerations

If you are interested in emergency communications, here's more features to look for:

Ruggedness Ease of use Water resistance Built-in GPS
Ability to charge via USB-C Availability and price of extra batteries

Radio Etiquette
Communicating via radio is different from talking on the phone. You don't necessarily know if the person you want to talk to is within range to hear you, or for you to hear them. And two people can't talk at the same time on the same frequency. As a result, there's something called "radio etiquette" that helps people communicate effectively by radio. Here's one common variation:

1. Listen and wait for a pause in radio traffic before talking. (transmitting)
2. Hold down the push-to-talk (PTT) button and *wait 1 second* because your radio's transmitter may take that long to kick in.
    a. Hold down the PTT button firmly for as long as you are speaking.
    b. No one else can transmit while you are transmitting, so…
    c. Keep transmissions short and to the point. Say one thing only each time you transmit. *Don't ramble*.
    d. Say your callsign at the end of the transmission (or a series of transmissions), and again after 15 minutes, and every 15 minutes thereafter if still talking.
3. If you are calling a specific person, say their name 2-3 times, and then your own name and call sign. (if you have one)
4. When you are done, say "over" to indicate the other side can talk.
5. To break into a conversation, wait for a break and say "break" and then your name or callsign.
    a. Say "priority" if what you have to say is urgent, "emergency" if it's an emergency.
6. Acknowledge the other side's transmission with "Copy" or "Roger".
    a. Avoid jargon or code words (including CB lingo) until you know what they mean, and so does whoever you're talking to.
7. When your conversation is over, say your handle and then "clear" to indicate that you're leaving the channel open for others to use.

Example of Radio Etiquette
"*Luke, Luke, Luke – this is Leia Z9ABC – do you hear me? Over."*
"*Leia, this is Luke X7QRS. I hear you. Who is my father? Over."*
"*Luke, you don't really want to know. Leia, clear. Z9ABC."*
"*Copy, Leia. Luke, clear. X7QRS."*

Repeaters
A repeater is basically a radio that receives transmissions on one frequency and automatically retransmits them on another. They're usually installed on top of buildings or mountains (height is might!) or in other places that can extend your range from a few miles to tens, or even hundreds, of miles.

Both Ham and GMRS repeaters exist, but GMRS repeaters are considerably more limited in what they can do. But because it's so much easier to get a GMRS license, communities are setting up GMRS repeaters to support people in emergencies.

Some repeaters are specifically for emergency preparedness. In Oakland, GMRS radios can use the GENOAK (www.genoak.org) repeater. Hams can use the ORCA (www.ww6or.com) repeater. Most critical traffic will probably go through Ham repeaters.

With computer software like Chirp and www.Repeaterbook.com (for finding your local repeaters), you can set up your radio for repeater use in just a few minutes.

Why Bother Getting Your Ham License?
You're unlikely to be harassed for hot having a license in a crisis. So why get one?
1. Comms is hard to get right, especially when you're under pressure.
2. The only way to learn is by practicing with the Ham community.
3. Without a call sign, no one will talk to you, so you won't get any practice.
4. Finally, it's cheap, fast, easy, and the law. (if you care about such things)

Getting You Ham License
You must pass the first Ham exam to get your callsign and license.

- The exam has 35 multiple-choice questions out of 412 total questions.
- You pay about $10 to take it online, and $35 for your license if you pass.
- You get a 10-year license, call sign, and can legally transmit on most of the VHF/UHF bands, which is what handheld Ham radio use.
- You can also use a very limited portion of the HF (high frequency) band.
    - HF can transmit hundreds to thousands of miles without a repeater.
    - Take the second Ham exam to use basically all the HF band!

Study Tips for Your Ham License(s)
The single best resource for studying for your license may be www.hamstudy.org. And Craig Buck's "All Ham No Spam" is a great book series to study with. Remember, you're just studying to pass the test. You'll actually learn to use Ham radio by getting on the air. (more below)

Ham Radio Culture and Expectations

- Ham radio is primarily intended for individual amateur operators to talk to each other.
    - This is distinct from *broadcast* radio, which is intended for the general public. The FCC regulates both Ham and broadcast radio.
    - Hams therefore can't legally play music or broadcast news, etc.
- Encryption, including speaking in code, is forbidden
    - And if used during disasters, it can obscure what's happening.
- Ham radio is largely self-policing. Hams will tell you (on air!) when you break the rules.

More Licensing Considerations

- You must begin every transmission with your callsign – it's publicly searchable and ID's you.
- Your legal name and address are visible online via your callsign.
- Consider a PO Box or community center address on your FCC application
- If you have a felony conviction, you must explain it to get your license.
- About 80% of people who explain their conviction get their license.

Radio Clubs
Joining a radio club is perhaps the best way to learn more about radio. There are Ham clubs in practically every community. They typically meet about once a month and host workshops, license study sessions, exams and more. Members sell used equipment to each other at a discount. They also often have their own repeaters and host their own weekly on-air meetings ("nets") where you can practice transmitting on your radio in a structured environment.

Mobile Radios and Base Stations
This handout is focused on HTs, but there are other options out there, too. Mobile radios are designed to go in your car or boat. They look like car stereos and can transmit at higher power, usually up to 50 watts, and use external antennas mounted on your vehicle.

Base stations are installed more or less permanently in your home (or "shack"). They're usually reserved for HF (high frequency) Ham radios, which can transmit thousands of miles by bouncing their signals off the atmosphere. These go up to 100 watts of transmitting power or more, and can have huge external antennas. You can set up a GMRS radio in your base station, too.

Other Radio Technologies
There are many other types of comms that may be of interest to you. Here are a few:

- **Digital modes**: Send GPS coordinates, text messages, email, and even pictures and video over Ham frequencies
- **Meshtastic & Meshcore devices**: Send text messages over the air – no internet or license required.
- **SDR**: Software defined radio. Use a USB dongle to listen to transmissions all over the spectrum.
    - There are also SDR websites that let you listen to local transmissions around the world!
- **Business license**: Use encryption on the radio with this one! Only for incorporated entities.
- **AREDN ("are-den")**: A high speed data network over Ham frequencies for use in emergencies.

More Resources

ARRL Handbook
GENOAK / BeCERTAINN
Ham Radio Crash Course
UtahSDR
Pride Radio Group
Young Amateur Radio Club
YLRL (Young Ladies Radio League)
OMIK (historically Black radio association)

Satellite Comms

One of the best way to communicate in an emergency is via satellite. The only infrastructure you need is a line of sight with a satellite! Many cell phones offer emergency satellite text messaging. You can also explore using a dedicated satellite text messaging device like the Garmin InReach or similar. Finally, there's satellite internet through Starlink, or other companies not owned by a piece of human garbage.

Now Get on the Air!

The best way to learn radio is by doing. The easiest way to get on the air is to get a few cheap walkie talkies you have lying around, go to the park with some friends, and practice radio etiquette together. You could also buy some GMRS units to use on your next multi-car road trip.

If you're ready to take things to the next level, organize some of your neighbors to all get your technician license together. Then buy your first Ham HTs and schedule a weekly net so you can practice your skills. Whatever you do, you'll have fun and be better prepared for your next camping trip or natural disaster. Good luck!