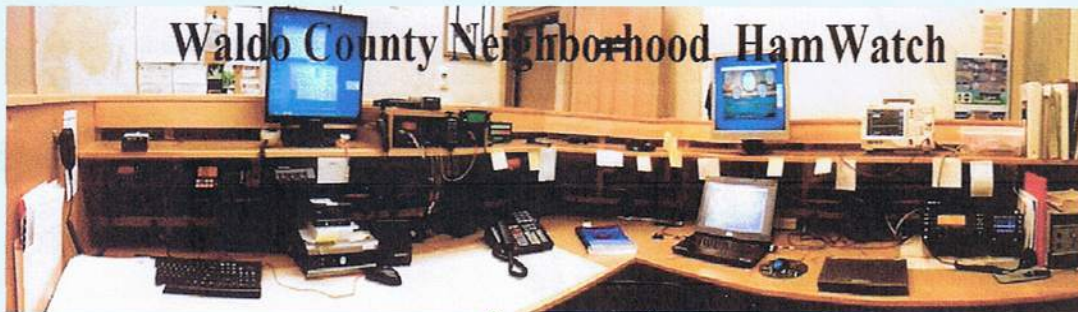


Waldo County Neighborhood HamWatch





In the event of an outage of normal internet and telephone service, radio is the proven way to communicate. Don't allow yourself to be isolated.

In Waldo County we are introducing a system where community members can interact over short and long distances using simple Personal Radio service (PRS) 2 way radios. These radios are most commonly exemplified by Family Radio (FRS) And General Mobile Radio Service (GMRS) Handie Talkies. While the range of these radios is relatively short (don't believe the advertising), our system is being augmented by incorporating amateur (ham) radio operators who can communicate using FRS or GMRS Radios and then relay messages locally as well as throughout the County, State and Country as needed using normal ham radio communications techniques.

This program follows the guidelines established by Radio Relay International (RRI), an organization that is dedicated to global messaging by amateur radio. The personal Radio service components include two national level efforts. The National SOS Radio Network, which is now under the umbrella of RRI, supports neighborhood emergency communications using FRS radios. Neighborhood HamWatch is RRI's officially endorsed community service program that formalizes links between FRS & GMRS users and the amateur radio service. Together, these programs provide a unique linkage of radio communications service.

How it Works - A Quick Overview

During significant storms and other events where conventional communications may be compromised, Waldo County ham radio operators have a system in place to provide on the ground information, from around the county, to each other, the county Emergency Management Agency and to the National Weather Service in Gray. Reports can include items such as:

- Damage reports
- Power outages
- Accidents
- Persons in need of assistance
- Ice or snow accumulation or dangerous wind conditions
- Other reportable hazards



At these time, area hams meet at the top of each hour on the county repeater system or by direct simplex' communication, if the repeater has failed. Anyone who has a scanner can monitor these transmissions. We are familiarizing a new dimension to this program by implementing a system for non-hams to participate in the process. Along with the above, a number of involved hams are equipping themselves with Personal Radio Service communications devices.

There are two services that are being supported using frequencies (channels) that are common to both. The first is the Family Radio Service or FRS. FRS is an unlicensed radio service but is limited to relatively short ranges due to radio power output and built-in antennas. Recent changes to the FCC regulations on FRS radios has increase the permitted power level substantially, from ½ watt to 2 wattts. The section about radios has more information on current radio models that have the best performance.

The second service is the General Mobile Radio Service or GMRS. GMRS permits higher power (up to 50 wattts) and improved or external antennas, but requires an FCC license. The individual who is licensed may also extend operating privileges to his/her immediate family. This is defined as the licensee's spouse, children, grandchildren, stepchildren, parents, grandparents, stepparents, brothers, sisters, aunts, uncles, nieces, nephews and in-laws. A GMRS lincens costs \$70 and is valid for 10 years. There is no test. All one needs to do is apply online. FRS radios include some of the GMRS channels but a true GMRS radio will perform much better. Adding an external antenna will add to that performance.

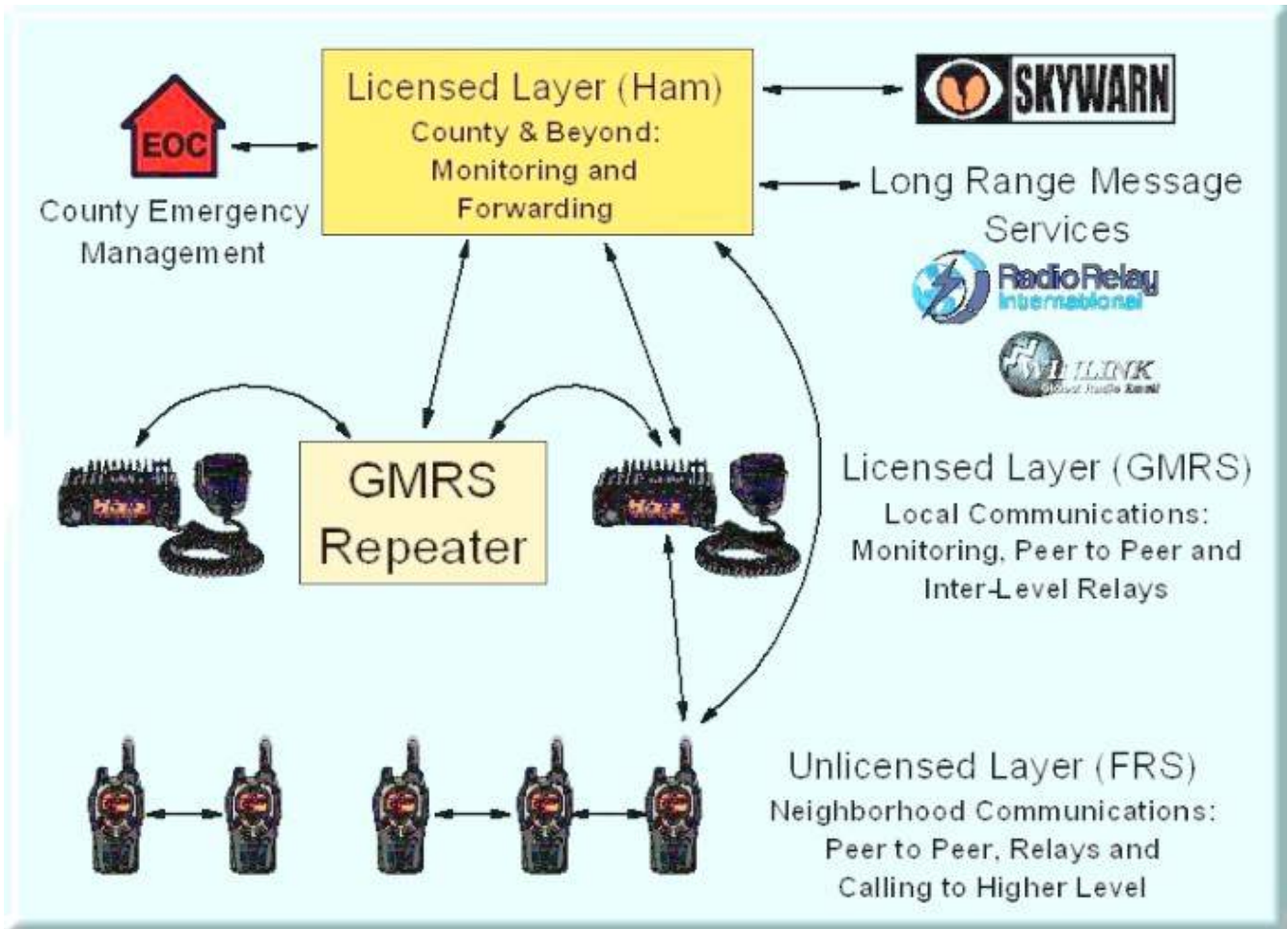
If you and your neighbors have FRS radios, you can communicate amongst yourselves should telephone and internet services be interrupted. If one of you has a GMRS radio you can communicate with the FRS units on a shared frequency and also communicate with a ham who is similarly equipped. The use of shared channels permits hams to monitor both FRS and GMRS using a single channel. The ham can relay messages to local agencies, the Weather Service, etc. Hams can also send personal messages to your friends or reletives who might be elsewhere in the state or country. This message relay system is exactly the same system that has been used to relay thousands or personal messages from Texas, Florida and Puerto Rico in the aftermath of the recent hurricanes.



Waldo County Neighborhood HamWatch



The following chart depicts how the network is structured.





Waldo County Amateur and FRS/GMRS Frequencies

Waldo County hams operators normally use the amateur repeaters that are located on Aborn Hill in Knox, Maine. The repeater extends radio communication ability greatly over point-to-point (simplex) method. If for some reason the repeaters are out of service (for example, from storm damage) the ham operators will rely on point-to-point (simplex) on the primary simplex channels. For those with scanners, useful information may be obtained during weather events, emergencies, etc.

Waldo County Frequencies

	RX (receive frequency)	TX (transmit frequency)	PL Tone
147.27 Aborn Hill	147.27	147.87	136.5
147.165 Belfast	147.165	147.765	136.5
Waldo Prim (simplex)	146.43	146.43	None
Waldo Sec (simplex)	147.465	147.465	None
Aborn Hill UHF	443.500	448.500	103.5

Knox County Frequencies

	RX	TX	PL
Washington, ME	147.06	147.66	91.5
Washington, ME	145.49	144.89	91.5
Knox Simplex	147.540	147.540	None

Waldo County Ham Radio Nets

Frequency	Net Name	Time	Purpose
147.27	Waldo County ARES/RACES	Monday @ 7:30pm	Group Net
145.42	DMR Eagle Net	Tuesday @ 7:30pm	Informal Net
147.27	Storm Net (Active During Weather)	Every Hour	Weather Info



While the Family Radio Service (FRS) and General Mobile Radio Service (GMRS) operate under different sets of FCC rules, they are unique in that many of the channels (frequencies) may be used by both services. This level of interoperability does not exist between other radio services such as Marine, Public Safety, CB or Amateur Radio.

FRS/GMRS Frequency Chart

Channel	Frequency MHz	Radio Service	Max Permitted Power		Detachable Antenna OK?	
			FRS	GMRS	FRS	GMRS
1	462.5625	FRS or GMRS	2 watts	5 watts	no	yes
2	462.5875	FRS or GMRS	2 watts	5 watts	no	yes
3	462.6125	FRS or GMRS	2 watts	5 watts	no	yes
4	462.6375	FRS or GMRS	2 watts	5 watts	no	yes
5	462.6625	FRS or GMRS	2 watts	5 watts	no	yes
6	462.6875	FRS or GMRS	2 watts	5 watts	no	yes
7	462.7125	FRS or GMRS	2 watts	5 watts	no	yes
8	467.5625	FRS or GMRS	.5 watts	.5 watts	no	no
9	467.5875	FRS or GMRS	.5 watts	.5 watts	no	no
10	467.6125	FRS or GMRS	.5 watts	.5 watts	no	no
11	467.6375	FRS or GMRS	.5 watts	.5 watts	no	no
12	467.6625	FRS or GMRS	.5 watts	.5 watts	no	no
13	467.6875	FRS or GMRS	.5 watts	.5 watts	no	no
14	467.7125	FRS or GMRS	.5 watts	.5 watts	no	no
15	462.5500	FRS or GMRS	2 watts	50 watts	no	yes
16	462.5750	FRS or GMRS	2 watts	50 watts	no	yes
17	462.6000	FRS or GMRS	2 watts	50 watts	no	yes
18	462.6250	FRS or GMRS	2 watts	50 watts	no	yes
19	462.6500	FRS or GMRS	2 watts	50 watts	no	yes
20	462.6750	FRS or GMRS	2 watts	50 watts	no	yes
21	462.7000	FRS or GMRS	2 watts	50 watts	no	yes
22	462.7250	FRS or GMRS	2 watts	50 watts	no	yes
15RP*	467.5500	GMRS	Prohibited	50 watts	Not Applicable	yes
16RP*	467.5750	GMRS	Prohibited	50 watts	Not Applicable	yes
17RP*	467.6000	GMRS	Prohibited	50 watts	Not Applicable	yes
18RP*	467.6250	GMRS	Prohibited	50 watts	Not Applicable	yes
19RP*	467.6500	GMRS	Prohibited	50 watts	Not Applicable	yes
20RP*	467.6750	GMRS	Prohibited	50 watts	Not Applicable	yes
21RP*	467.7000	GMRS	Prohibited	50 watts	Not Applicable	yes
22RP*	467.7250	GMRS	Prohibited	50 watts	Not Applicable	yes



General Considerations

There are a limited number of FRS and GMRS channels so it is important to make wise use of them. For use in emergencies, it is essential to have specific channels assigned for that purpose and to use other channels for more general, lower priority communications.

To ensure that you are receiving all calls in a given area, each radio in your network must have the privacy (PL) tones disabled.

Speak slowly and clearly. Spell out difficult words or names, preferably using standard phonetics. All communications should be brief so that others can use the channel. Pause frequently by releasing your PTT so that someone with a higher priority call can break in.

Always yield to a station that is making an emergency call.

Channel (Frequency) Usage Guidelines

Channel/Frequency	Use
1 (462.5625 MHz)	High priority/emergency calling between FRS radios or with GMRS radios in the same neighborhood. Use highest FRS power available. This is consistent with National SOS Radio Network practice.
2-7	General use between FRS and/or GMRS radios within a neighborhood.
8-14	General communications between closely positioned radios. Limited to 1/2 watt maximum.
19 (462.6500 MHz)	For communications with a full power GMRS hub station.

A Note on Privacy (PL) Codes

When a PL is enabled on a given channel on two or more radios, each of those radios will only hear the calls made by the radios with the specific PL. Any radio without a PL enabled will be able to hear the transmissions. If a call is made from a radio with no PL, radios with PLs enabled will not hear that call. Therefore it is important that radios that are set up for emergency communications not have PLs enabled for the emergency channels.

Channel Numbering

Channel numbers are not necessarily consistent from radio to radio. GMRS only radios cannot operate on the FRS only channels so those channels (e.g. 8-14) may actually be the next set of shared channels (e.g. 15-22). Also, the BTECH GMRS radio's channel assignments begin with channel 0, not 1. If your radio does not have a frequency display, refer to the manual for the actual frequencies to avoid confusion. Some radios also have channel numbers above 22. These aren't added channels as such but they permit special configurations (like a PL) for any of the standard channels.



Regulatory Information

New FCC rules for the Personal Radio Services are in effect as of 28 September 2017. The new rules permit higher powers for FRS radios and more shared channels between FRS and GMRS. The old rules restricted the shared FRS/GMRS channels 1-7 to 0.5 watt. The new rules permit 2 watts. Furthermore, channels 15-22 also allow 2 watts.

By way of contrast, GMRS radios may operate at 5 watts on channels 1-7 and 50 watts on channels 15-22 or on repeaters.

The combination FRS/GMRS radios will be phased out by late 2019 in favor of FRS or GMRS only radios. Thus far there are some good and relatively inexpensive GMRS radios on the market. Dedicated FRS radios will probably start appearing in 2018.

Lastly, any existing combination radio that exceeds 2 watts on any channel will require the operator to have a GMRS license.

Sound confusing? The situation is not helped by the fact that most of the FRS/GMRS user manuals don't have any power figures. They only have the relatively useless (and grossly inflated) range figures. A person can find the output power of any radio by digging into the FCC test documentation but that can require a considerable amount of effort. However, the folks at Buy Two Way Radios have made the process easier by providing a chart that lets you know if your radio will remain legal for license-free use.

Power

The above information still doesn't answer the question of which radios have the most legal power. With few exceptions you won't find that information in the manuals or other manufacturer documentation. You have to research the FCC test data to get a real answer.

The trick is to get the radio's FCC ID. If you have a radio, check the label on the back or inside the battery compartment and you will find the FCC ID. For example, the Uniden GMR5095-2CKHS has the ID AMWON5095. If you go to <http://fccid.io/AMWON5095> you will get a summary along with a collection of test reports and other information. This radio is 0.44 watts on the FRS channels and 1.9 watts on channels 15-22. Those figures are near the legal limit and make this radio an excellent candidate for unlicensed use.

The first three characters of the FCC ID are the manufacturer (grantee) code. If you go to <http://fccid.io/AMW> you will get a listing of all Uniden radios. (Note that some manufacturers have more than one code.) Some other codes include Midland (MMA) and Cobra (BBO) and Motorola (AZ4).



Is Power Everything?

No, it's only part of the equation for getting the most range. From a radio design standpoint, a poor antenna or a receiver that lacks sensitivity will compromise performance. Also, poor operating practice will also limit your range. Be sure to keep the antenna vertical and try to operate away from heavy foliage. If conditions are poor, try finding higher ground. Sometimes moving just a few feet will get you away from a "dead spot."

Getting a GMRS license

A GMRS license requires that you complete FCC form 159 and form 605. These forms can be found on the [FCC Forms Page](#). The license costs \$70, is valid for 10 years and covers the licensee's spouse, children, grandchildren, stepchildren, parents, grandparents, stepparents, brothers, sisters, aunts, uncles, nieces, nephews, and in-laws.

License Free FRS/GMRS Radios

When purchasing a FRS radio, be sure that it has channels 1-7 and 15-22. These are the channels that are shared with GMRS. Most of the available FRS/GMRS radios have power levels that are significantly below the new legal limits. However, the Uniden GMR5095-2CKHS (shown to the left) is and will remain fully legal at the maximum allowed power. The tested output is 0.44 watts for FRS low power and 1.9 watts on high power (channels 1-7, 15-22). This radio is also waterproof and submersible so it's ideal for general outdoors and sports use. A pair of radios with accessories may be purchased from [buywowayradios.com](#) for about \$115 + postage. Another good selection is the Motorola TalkAbout T460. High power is slightly less than that of the Uniden (1.7 vs 1.9 watts), FRS is essentially the same. The FCC page for this radio is at <https://fccid.io/AZ489FT4924> . Price for a pair of radios is about \$80 + postage.





GMRS Radios

Two companies are currently supplying hand held GMRS radios. The first is BTECH with their GMRS-V1 (approximately \$55 each) and Tera with their TR-505 (\$100-\$120 depending upon programming options).

The TERA is a dual service radio with the 5 MURS channels as well as GMRS. It is limited to a total of 16 channels so you have to be selective in your programming choices.

Both of these radios have 5 watts of power and the antennas are removable. They are repeater capable. The BTECH can be obtained from Amazon. A good source for the Tera is [Better Safe Radio](#). They have many options for programming your radio.

With either of the above radios you can increase your range by adding a more efficient antenna. One good and simple to use option is the so-called "roll-up j-pole." A kit usually includes the antenna, a length of extension cable and some adapters for use with different radios. Simply hang the antenna from a tree limb, fishing pole, or similar and you are in business. This antenna is supplied by Prof. Ed Fong. His graduate students make these to providing funding for projects. To purchase, do a search on ebay for Fong DBJ-2 antenna or purchase from [Better Safe Radio](#). The price is about \$35. Be sure to ask for the GMRS/MURS version, not the ham version. There is also a DBJ-1 base station antenna that is supplied as a kit for about the same price. You have to purchase a length of 3/4-inch PVC pipe to make the enclosure. This saves on shipping fees.

Midland manufactures a new line of GMRS mobile radios. For ease of use, an excellent option is the MXT115. It has a rated power of 15 watts and comes with a magnetic mount roof antenna. It can also be used with the Ed Fong antenna (with a UHF to BNC adapter). It comes with a power cord and plug that connects to your car's accessory socket (aka cigarette lighter socket). For home use, the radio can be powered with a 12 volt rechargeable battery or something like a Black & Decker or Stanley portable power source. Midland also has a 40 watt radio, the MXT400. This is an excellent GMRS radio but it will require more in the way of a power supply. The low end model, MXT105, is not repeater capable and only has a 5 watt output. The Midland radios may be purchased from [buytwowayradios.com](#) or Amazon.





Even if all communications is out of service in your area, ham radio operators can send personal messages by radio.

Hams make use of two primary systems for sending messages to distant locations: Radio Relay International and the Winlink radio-email service. Sometimes, both may be used.

RRI is comprised of a full-time network of operators who handle personal messages through what is termed a traffic network. There is also the National Traffic System (NTS) and both networks work cooperatively. RRI is radio only with no dependence on the internet. Routing through the network is by postal code.

Messages are routed to an operator who lives near to the addressee and may be delivered by a number of methods including telephone, postal service, email or in person. A special format is used by RRI operators and messages should be 25 words or less. Since RRI relies on manual processes for delivery, the time for a message to reach a recipient is about comparable to sending a letter through the Post Office.

Since the system is address based and humans are making the final delivery, the system is very forgiving of minor errors in addressing.

Personal messages that are sent from a disaster area are termed "Health & Welfare" (or simply "Welfare" messages. These have a higher priority through the system than do Routine messages. As an example, if someone in Knox County is sending a message to someone in Arizona, the first station in the network that has an operating telephone will usually call the party to deliver the message. This speeds up the delivery for higher priority messages.

The other method for sending messages by radio is the Winlink radio-email system. This consists of specially equipped client stations that send email-like messages to relay stations that have internet access. This is the fastest method of transmission and, to the recipient, it looks like a regular email. It requires that the recipient has a working email account and the sender knows the email address of the recipient.

You don't need to be concerned with how the message will be sent but you do need to provide the ham radio operator with a sufficient amount of information. Details include the addressee's name and address, phone number and, if known, an email address.

The message text should be limited to 25 words with no contractions. You should also provide your address and phone number. The radio operator may ask some other questions to ensure that the best route for the message will be used. Please note that messages sent by ham radio can not contain confidential information (Think of what you would put on a postcard) or be business related.

Waldo County Neighborhood Ham Watch



To become involved using a FRS radio, follow these steps:

- Read though the information that is presented on this site.
- If you don't have a radio, or your radio is lacking in power, procure a pair of FRS radios according to the recommendations on the Radios page.
- See who in your immediate neighborhood has an FRS radio and test using a channel in the 1-7 range.
- Find out if there is a ham radio operator close enough to you to receive your transmissions. In our area, the ham will operate on Channel 19. Check the Town Information page for known ham/FRS operators.
- You may wish to purchase a GMRS radio and license. If a neighborhood group is using FRS radios, it is advisable for at least one person to have a higher power GMRS radio.
- Take a SKYWARN training class and become a weather spotter. These sessions are 2 hours in length and are offered in this area by the Gray office of the National Weather Service. Locally, these are usually done through the Knox County Emergency Management Agency at their office in Rockland. You may also be able to find a session that better matches your schedule through another county.

