

Montclair Organized Neighborhood (MON) Radio Communications Recommendations

Last Updated: Feb 23, 2011
Doug Mosher - MSIC

The following recommendations for radio usage and channel/frequency selection are made by the Montclair Safety and Improvement Council (MSIC) for emergency communications within and in-between our Montclair Organized Neighborhoods (MONs).

Note that these are recommendations and guidelines only, and that during an actual emergency we will need to be flexible—for example altering our channel/frequency usage as appropriate. Therefore it is always a good idea to know how to setup and configure your particular radio, and to understand what frequencies each channel corresponds to.

FRS and GMRS Radios

Note: The channel numbers noted in this document refer to the more common consumer dual-service FRS/GMRS radios, unless otherwise noted.

Family Radio Service (FRS):

Family Radios Service (FRS) radios are compact, handheld, wireless 2-way radios that provide very good clarity over a relatively short range. FRS radios operate on any of 14 specific channels (1 - 14) designated by the FCC (Federal Communications Commission) for FRS radio usage. In order to comply with FCC standards, FRS radios have a maximum allowable power of 1/2 watt. FRS radios and their antennas may not be modified to extend their range.

FRS radio range is typically stated as "up to 2 miles," but you should note that this manufacturer's stated range is a maximum that can be achieved usually only under optimal conditions (such as mountain-top to mountain-top or across water). A much more realistic range for FRS (low power) channels is 1/4 to 1 mile, depending upon conditions. Terrain and obstructions, such as hills and canyons, will reduce range.

General Mobile Radio Service (GMRS):

General Mobile Radio Service (GMRS) radios operate on any of up to 8 dedicated channels (15 - 22) designated by the FCC, as well as the 7 shared FRS/GMRS channels (1 - 7). Handheld GMRS radios typically have power ratings of up to 5 watts, with a maximum allowable power of 50 watts (typically base station models). GMRS radios may legally be outfitted or retrofitted with optional antennas (whip, car or base station antennas for example) to extend their range.

GMRS channels/radios generally achieve greater ranges than FRS channels/radios. GMRS range is typically specified by manufacturers as "up to 12 miles" (and occasionally much more). Again, this is a maximum range, likely achieved only under ideal conditions, such as mountain-top to mountain-top. Realistic range for GMRS radios under normal conditions is more likely 1 to 3 miles, depending upon the terrain inbetween the radios, the type of antenna used, weather conditions, etc.

FRS/GMRS dual-service or "hybrid" radios (FRS/GMRS):

Most consumer radios sold today in sporting good stores like Big 5 or REI, at Radio Shack and BestBuy, on amazon.com, etc. (brands such as Motorola, Midland, Uniden, Radio Shack, etc.) are hybrid FRS/GMRS radios. These are simply dual-service radios that provide access to both the FRS and GMRS bands. These typically provide for use of the shared FRS/GMRS channels 1 - 7 (low or high power setting), the FRS-only channels 8 - 14 (low power setting only), and the GMRS-only channels 15 - 22 (low or high power setting). These are usually low cost, in the \$40 - 80 range for a pair of radios.

GMRS-only radios:

Some radios, such as the Oakland CORE-supplied ICOM IC-F21GM, are GMRS-only. These types of radios are usually meant for more "professional" or demanding use, such as business and emergency communications. These radios, like the ICOM, are usually more rugged and have a larger battery capacity than the consumer dual-service FSR/GMRS radios. Plus they allow for removable and replaceable antennas. They are also usually much more expensive than consumer dual-service FRS/GMRS radios--typically costing \$125 and up for a single handheld radio.

A note on channels:

Channel numbers are just an artificial designation for a particular frequency being used for transmission and reception. For example, Channel 1 could designate the radio wave frequency of 462.5625 MHz on a particular radio. It is the frequency of the radio wave (in megahertz, or MHz) that determines if one radio can communicate with another. It is easier to use channel numbers (i.e. 1) than frequencies (i.e. 462.5625 MHz) when tuning a radio. Unfortunately, channel numbers are not standardized across the industry for all types of radios.

Most consumer dual-service FRS/GMRS radios (Motorola, Midland, Uniden, Radio Shack, etc.) use the same channel-to-frequency designations. That is, Channel 1 is 462.5625 MHz, Channel 2 is 462.5875 MHz, and so on. This is pretty much a "standard" that these manufacturers have adopted, although very early models of these radios (from 15 or more years ago) may not adhere to this "standard."

However, many GMRS-only radios, like the ICOM IC-F21GM, use completely different channel-to-frequency mappings than the consumer dual-service FRS/GMRS radios. Channel 1 on the ICOM IC-F21GM is actually the same frequency as Channel 15 on a Motorola FRS/GMRS radio, for example. If the ICOM is on Channel 1, and the Motorola on Channel 15, then the 2 radios can communicate (they are set to the same frequency). This can be confusing and is something to be aware of--2 radios can only communicate if they are using the same

frequency, not necessarily the same channel number. A cross-reference of the “standard” consumer dual-service FRS/GMRS radio vs. the ICOM IC-F21GM radio channels and frequencies is noted at the end of this document.

A note on antennas:

An antenna can make a big difference on the range and clarity of transmission of a radio. It is usually more of a factor than the power of the radio. Consumer FRS-only and dual-service FRS/GMRS radios have, by FCC law, fixed antennas that cannot be replaced. This is done intentionally to keep the range short in order to reduce interference in crowded areas.

GMRS-only radios, like the ICOM IC-F21GM, typically have removable antennas. You can connect a taller and/or more efficient antenna to allow much better range and clarity of transmission. The effect can be dramatic--in testing in the Montclair area between 2 locations blocked by terrain, the stock ICOM antenna resulted in no reception, but attaching a better and taller antenna to the same radios resulted in good reception.

A note on GMRS Licensing:

An FCC license is required to transmit on any GMRS-only channel (15 - 22), or to transmit on any shared FRS/GMRS channel (1 - 7) when using more than 1/2 watt in power. Dual-service radios may be used legally without an operator’s license only on the shared FRS/GMRS channels (1 - 7) on the low power setting, or on the FRS-only channels (8 - 14). Check with <http://www.fcc.gov/> or call 1-877-480-3201 for more information. Family members can share in the use of a GMRS license.

Oakland CORE is working on obtaining GMRS licenses for registered organized neighborhoods. In the meantime you should either purchase your own FCC license for GMRS operation (FCC Form 605 or file on-line, cost is currently \$85 for 5 years) or, as an unofficial suggestion, only use the higher-power FRS/GMRS and GMRS channels for very brief emergency preparedness tests, and only when no one else is using the channel. You can be fined by the FCC if you transmit on FRS/GMRS and GMRS channels at more than 1/2 watt without a license. In the event of an emergency or disaster though, this may not be a primary concern...

Credit: Some of the above text was taken from John Spooner’s radio guide FAQ on www.bestbuy.com.

MSIC Recommended Radio Types and Usage

Within Organized Neighborhoods (FRS):

The low-power (1/2 watt) FRS radios, such as consumer dual-service FRS/GMRS radios (Radio Shack, Midland, Motorola, etc.) and the ICOM IC-4088A FRS-only radio provided by CORE, are recommended to be used for communicating **within organized neighborhoods**. For example, for Damage Assessment, Search & Recovery, etc. teams to communicate with their Neighborhood Command Center.

Using the limited range, low-power FRS radio channels will lessen the chance of one neighborhood interfering with another neighborhood, as long as channels are coordinated appropriately (see below).

Typical FRS and FRS/GMRS radios for use within organized neighborhoods:



ICOM IC-4088A
FRS



Motorola FRS



Motorola FRS/GMRS



Midland FRS/GMRS

Between Neighborhoods/Fire Stations/Ham Radio Operators (GMRS):

The higher-power (4 or 5 watt) handheld GMRS radios, such as the ICOM IC-F21GM GMRS-only radio provided by CORE, are recommended to be used for communicating **between organized neighborhoods and with the local Fire Stations and Ham radio operators**. Consumer dual-service FRS/GMRS radios (Radio Shack, Midland, Motorola, etc.) can also be used on the higher-power GMRS channels. Using the higher-power GMRS channels will give the best range and won't interfere with the FRS channels used within each organized neighborhood.

Typical GMRS and FRS/GMRS radios for use between organized neighborhoods and Fire Stations/Ham radio operators:



ICOM IC-F21GM
GMRS



Motorola FRS/GMRS



Midland FRS/GMRS



Uniden FRS/GMRS

Standardizing Radio Channels

Within Organized Neighborhoods (FRS):

Each organized neighborhood should select its own internal-use FRS channel, ideally from 8 - 14 (467.5625 - 467.7125 MHz). You can also select from the shared FRS/GMRS channels 2 - 7 (462.5875 - 462.7125 MHz), but if you do, please try to make sure that everyone is transmitting on low power. Channel 1 (462.5625 MHz) is an unofficial National Call/Distress Channel and thus shouldn't be used as a neighborhood channel.

The MSIC will coordinate all Montclair Organized Neighborhood FRS channels so that, if possible, no adjacent neighborhoods are using the same channel. All selected and approved neighborhood channels will be noted in the MON Leaders Roster. For example, the following organized neighborhoods have selected these channels/frequencies:

Holyrood Dr/Manor:	FRS Channel 8 (467.5625 MHz)
Skyline/Moon Gate:	FRS Channel 9 (467.5875 MHz)
Upper Ascot:	FRS Channel 10 (467.6125 MHz)
Larry Ln/ Mastlands:	FRS Channel 11 (467.6375 MHz)

Between Neighborhoods/Fire Stations/Ham Radio Operators (GMRS):

GMRS-only channels 15 - 22 (channels 1 - 8 on the ICOM IC-F21GM radio) should be utilized for communicating between neighborhood groups, and from neighborhood groups to Fire Station/Ham radio sites and other "base" command center locations. The higher power of the GMRS channels and the ability to use better antennas on GMRS-only radios will allow a much better chance of radio communications between and outside neighborhoods.

Initial radio communications between and outside neighborhoods will usually start out on the GMRS Channel 15 (Channel 1 on the ICOM IC-F21GM radio). If there is already traffic on this channel then the next channel up may be used. In the event of an emergency, organized neighborhood groups should listen on Channel 15 (Channel 1 on the ICOM IC-F21GM radio) for any Montclair-wide or neighborhood-to-neighborhood communications.

If a neighborhood needs to request assistance from another neighborhood, or needs to pass a message to Oakland OES (Office of Emergency Services) via a Ham radio operator, then you should try to establish communications with these other groups on GMRS Channel 15 (Channel 1 on the ICOM IC-F21GM radio) first. If you can't raise the appropriate group or person, try the next higher GMRS channel. If you do establish communications with another group or person, you may want to switch to another GMRS channel not currently in use, so that Channel 15 (Channel 1 on the ICOM IC-F21GM radio) remains clear for initial contacts (as a "hailing" channel).

Use of “Privacy Codes”

Within Organized Neighborhoods (FRS):

It is recommended that you do not use “Privacy Codes” within organized neighborhoods, unless there is interference with another nearby neighborhood or group that is using the same channel. If a neighborhood decides to select and use a “Privacy Code” with their neighborhood FRS channel, then they should understand the caveats and implications noted below.

Between Neighborhoods/Fire Stations/Ham Radio Operators (GMRS):

“Privacy Codes” (CTCSS/PL tones) should not be used with the GMRS channels selected for communications between Montclair neighborhoods and with Fire Stations and Ham radio operators. Only the “base” GMRS-only radio channels 15 – 22 (channels 1 - 8 on the ICOM IC-F21GM radio) with frequencies between 462.5500 - 462.7125 MHz should be utilized.

Why not use “Privacy Codes”?

“Privacy Codes” (also called Interference Eliminator Codes or CTCSS or PL tone codes) are simply a designated frequency tone added to the transmission frequency. A corresponding radio set to the same “Privacy Code” (or to 0 or “off”) will filter out that tone and then “hear” the transmission, but a radio set to a different “Privacy Code” (other than 0 or “off”) squelches (ignores) the transmission. Some reasons that the MSIC recommends not using “Privacy Codes” are as follows:

- Some older FRS radios do not support “Privacy Codes”, and these radios may still be in use within neighborhoods.
- The default channel setting for FRS, GMRS and FRS/GMRS radios is typically to have the “Privacy Code” turned off (or set to 0). This makes it easier to take a new radio out of the box, set the main channel appropriately, and begin using it. This is especially true with the ICOM IC-F21GM GMRS-only radio provided by CORE. However some radios, for example some Motorola consumer FRS/GMRS radios, may default to a specific “Privacy Code” setting out-of-the-box—check your radio to be sure.
- Setting of “Privacy Codes” on different brands of radios is not a standard procedure. Some are easier to set than others. The GMRS-only ICOM IC-F21GM radio is very difficult to set the “Privacy Code” (CTCSS code), plus there is no way to visually see what it's been set to, and there's no way to perform a master (factory default) reset to reset all changed channel CTCSS codes back to 0.
- The 52 GMRS ICOM IC-F21GM radio CTCSS tone codes do not correspond directly with the 38 consumer FRS/GMRS radio “Privacy Codes”. This further confuses the situation. And, some newer FRS/GMRS radios have over 100 “Privacy Codes”, most of which aren't compatible with the older FRS/GMRS radio “Privacy Codes”. This lack of consistency could cause problems in the field.

If you do decide to use "Privacy Codes" for your neighborhood FRS radio communications, then you should be aware of the following caveats and implications:

- Some residents may have older FRS radios and may not be able to effectively communicate.
- "Privacy Codes" are not really private—anyone listening on the main channel ("Privacy Code" or CTCSS code set off or to 0) can hear all conversations on all "Privacy Codes" on that particular channel/frequency.
- "Privacy Codes" give the illusion that a private "sub-channel" is available, but this is not the case. If 2 or more radios on the same channel/frequency, but on different "Privacy Codes", try to transmit at the exact same time, then they may interfere or "double" (garble each other, or the stronger signal will "win"). This is a false sense of security that could cause communication problems in the field.

Summary of MSIC Radio Types and Channel Recommendations

Within Organized Neighborhoods (FRS):

- Use FRS or consumer dual-service FRS/GMRS radios only.
- Select an FRS channel for your organized neighborhood in the range of 2 – 14 inclusive (ideally FRS-only 8 - 14), and verify this selection with the MSIC.
- Refrain from using "Privacy Codes" with your selected channel unless there is interference with nearby neighborhoods (simplify).
- Test your FRS radios within your organized neighborhood in a variety of conditions (rain, fog, night, day...) and verify you can cover your neighborhood area.
- Practice, practice, practice! Set up weekly neighborhood radio tests, etc.

Between Neighborhoods/Fire Stations/Ham Radio Operators (GMRS):

- Use GMRS radio channels only. Ideally use the ICOM IC-F21GM GMRS-only radios provided by CORE. The consumer dual-service FRS/GMRS radios can also be used on the GMRS channels. Refer to the channel/frequency cross-reference below to make sure you are using the proper channel for your radio.
- Channel 15 (Channel 1 on the ICOM IC-F21GM radio) should be the channel where initial communications are established. Other GMRS channels can be switched to if Channel 15 is in use, or to continue communications between groups.
- "Privacy Codes" (CTCSS codes) should not be used (set to the default off or 0). The ICOM IC-F21GM GMRS-only radio has its CTCSS codes set to 0 ("off") by default, out-of-the-box.

Recommended Two-Way Radio Protocol

Unlike conventional land-line or cellular phones, two-way radios typically only work in one direction at a time. The technical term for this is “single-duplex”. This means only one person can speak at a time, and no one else can speak until that person has released the transmit button on his or her radio.

When transmitting on these FRS, FRS/GMRS and GMRS radios, first listen to hear if the channel is in use. If it is in use, then wait until the other conversation is finished. If the channel is open and unused then press the transmit button, wait a second or two, and announce the person you are trying to reach followed by your identifier, which generally consists of your neighborhood name and your function. For example:

“Montclair Base, this is Montclair Neighborhood Damage Assessment Team One, do you copy, over?”

“Montclair Neighborhood Damage Assessment Team One, this is Montclair Base. I copy you loud and clear. What can we do for you, over?”

Once you receive a reply to your initial request to establish a conversation, then begin each subsequent message you send with the name of the person you are calling and your own identifier, followed by the information you wish to convey, always ending each transmission with “over” (which means “over to you”). Keep all transmissions brief and to the point. Spell out numbers (i.e. one five two three, not fifteen twenty-three). For example:

“Montclair Base, this is Montclair Neighborhood Damage Assessment Team One, we have an injured person at 1 5 2 3 Oakland Drive, and request a First Aid Team. Do you copy, over?”

“Montclair Neighborhood Damage Assessment Team One, this is Montclair Base. Affirmative, I copy you. We will send a First Aid Team immediately to 1 5 2 3 Oakland Drive, over.”

When finished transmitting, say, “Out.” For example:

“Montclair Base, this is Montclair Neighborhood Damage Assessment Team One, I copy you, we will remain at 1 5 2 3 Oakland Drive and wait for the First Aid Team to arrive. Out.”

Use clear English in your communications. “Affirmative” and “Negative” are preferred over “Yes” and “No” as they are easier to understand. Do not use shortcuts like “10/4” or “Roger”, as they can be easily misunderstood. Be sure to release your transmit button after saying “Over” or “Out” so others can use the channel. Do not press the transmit button unless you are transmitting.

Note: If conducting a practice exercise in preparation for an actual emergency, every message that could cause someone listening on your channel, who is not familiar with the exercise, to be confused or alarmed should include the words “exercise” and/or “test”. For example:

“Montclair Base, this is Montclair Neighborhood Damage Assessment Team One. We have a major fire at 1 5 2 0 Oakland Drive. This is an exercise/test message, repeat, this is just an exercise, over.” ...

Consumer Dual-Service FRS/GMRS and ICOM IC-F21GM GMRS Radio Channel/Frequency Cross Reference

This table cross-references the consumer dual-service FRS/GMRS radio (Motorola, Midland, Radio Shack, etc.) channels/frequencies with the ICOM IC-F21GM GMRS radio. Use this table to set your ICOM IC-F21GM GMRS channel/frequency to match the specified consumer dual-service FRS/GMRS radio channel in use.

Consumer FRS/GMRS Channel	IC-F21GM GMRS Channel	Channel Freq. (MHz)	Consumer FRS/GMRS Channel	IC-F21GM GMRS Channel	Channel Freq. (MHz)
1 (FRS/GMRS)	9	462.5625	13 (FRS only)		467.6875
2 (FRS/GMRS)	10	462.5875	14 (FRS only)		467.7125
3 (FRS/GMRS)	11	462.6125	15 (GMRS only)	1	462.5500
4 (FRS/GMRS)	12	462.6375	16 (GMRS only)	2	462.5750
5 (FRS/GMRS)	13	462.6625	17 (GMRS only)	3	462.6000
6 (FRS/GMRS)	14	462.6875	18 (GMRS only)	4	462.6250
7 (FRS/GMRS)	15	462.7125	19 (GMRS only)	5	462.6500
8 (FRS only)		467.5625	20 (GMRS only)	6	462.6750
9 (FRS only)		467.5875	21 (GMRS only)	7	462.7000
10 (FRS only)		467.6125	22 (GMRS only)	8	462.7250
11 (FRS only)		467.6375			
12 (FRS only)		467.6625	n/a	16	Auto Scan

Note: These channels/frequencies were verified against the ICOM IC-F21GM specifications and current Motorola (T5000-T5550, T7100, T7200), Uniden (GMR1038) and Midland (GXT300/400/500/600) radio specifications. Older FRS/GMRS radio channels may not correspond to the channel list and frequencies noted in the above table. Check the specifications for your particular radio.