

Directed Net Operations on FRS/GMRS

I. General Principles

II. Activating the Net

III. Net Operations

IV. Pros, Cons, and Limitations

V. FRS/GMRS Frequency Chart

INTRO: When, why, and where a directed net is needed on FRS/GMRS frequencies.

A directed net is not needed when there are less than three stations present. A directed net is useful when there are many stations on the same frequency with emergency or priority traffic.

Nets will be demarcated depending upon the quantity of FRS/GMS operators, station locations, the terrain involved including distances, and the amount of traffic that is expected.

Considerations include the site locations of the area Incident Command Post (ICP), staging/gathering areas, blocks, triage, and whether they are purposed as to specialty, organized as centralized, or localized, portable or fixed units, etc.

General Principles

Have all operators meet on the prearranged FRS/GMRS designated channel when there is an emergency. Move Intra-block traffic (intra-block damage assessment, search and rescues, triage onto a separate channel). Maintain Inter-block and ICP intra-area comms on the central frequency. Avoid relays if possible. Allow for relays of weak signals by arranging at least one GMRS station with an outdoor gain antenna to arrange relays.

All FRS/GMRS operators should be skilled in operating their radios. If not, training and drills should be arranged beforehand. Spare battery packs and especially including at least one spare alkaline battery pack is basic.

Plan and test for realistic scenarios such as Richter scale 6.4, 6.6, 6.8, 7.0, and 7.2 earthquakes with epicenters at various locations and depths on the Hayward fault where cell, phone, power, and internet would be out and there is moderate to severe damage and injuries. Assume that everyone would have to rely on battery power. Utilize frequent Simulated Emergency Tests (SETs) while realizing that no two disasters are alike, and *no* disaster goes exactly to plan. Leave space for flexibility and expect to make changes on the fly. Any Modified Mercalli (MM) scale of 5 or more FRS operators should at the minimum turn on their radios to their designated Channel.

When a net begins, Net Control Station (NCS) must know who needs a relay, and how to prioritize messages if things get hot and heavy. Sending two stations off to an adjacent channel for relay might seem to be complicated or too advanced; but realistically it may well be necessary in order to effect flow. By all means avoid unnecessary relays on the same channel as it simply doubles the channel congestion.

It would help facilitate comms if we had at least 1 GMRS station onboard at all times at the area level in order to communicate with the block captain FRS radios. This advantage is due to the GMRS radio's ability to hear a much wider area because of its external gain antenna capability. With an efficient antenna transmit power levels may remain low or moderate.

Three tiers are identifiable. Tier 1 is within the block. Tier 2 is between the block captain and the area ICP. Tier 3 is via ham or high power GMRS to and from the EOC/IC and/or to and from other Area ICPs. CERT FRS operators only need to concern themselves with tier 1 and tier 2 comms. Tier 1 comms (intra block) normally does not require a net Control Station (NCS) or a directed net. The block captain can easily handle all traffic. Tier 2 Block to Area ICP will function best as a directed net because the AREA ICP will have to control traffic between many blocks at once. Tier 3 will always require a NCS and a directed net.

Net Operations Begin

Given the signs of an earthquake or other disaster, the area coordinator and or designated assistant, block captains, and CERT operators will check in on their designated channels.

At the discretion of the Area Coordinator, the net manager, or designated assistant an informal net can begin. If there are reports of destruction, impending safety hazards, and/or injuries a directed net should be initiated.

Example: This is Kensington Area K3 FRS/GMRS Net. Are there any block captains to check-in? Is there any emergency traffic? Is there any priority traffic?

Block Captains will check-in. If there are many talking over each other then call specifically for block captains 1-3 only. Block Captains 4-6 only etc. The designated net control or AC will have to wing it depending on how heavy the traffic. (If only a few captains are reporting in, then the NCS can call for blocks 1-10 -- blocks 11-22 etc. More than 25 blocks on one channel would be cause to open a secondary net. Comment: Limit blocks to less than 25 per area.

The block captains should be familiar the Modified Mercalli scale (see: <https://earthquake.usgs.gov/learn/topics/mercalli.php>)
Example: "This is block captain 3. MM 9 Over"

NCS: "Block 3 Copy"

NCS: "Block 4"

Block 4 captain: "Block 4, MM 7, Over"

NCS: "Block 4, copy"

Etc.

Reporting using the MM system throughout the area will give the Area IC, the NCS, and the AC a decent picture of possible damage and what to do next.

If the block captains are well trained they will also begin a windshield damage assessment and triage using their discretion.

It is very possible at this early stage that the EOC will not yet be staffed via ham radio and operational, at this stage ACs, are more informed of the situation than the EOC and should not wait for any official word from the EOC to activate.

NCS should frequently ask, "Are there any relays", ask some distant FRS operator to also make a call for those who can't hear NCS or are located on the fringes of the block or area. This is where a GMRS radio (higher power and an outside gain antenna) will help tremendously increasing coverage. Thus it would be preferable for a GMRS station to act as NCS, while using the minimum power necessary to maintain communications.

Next Steps

NCS: "All block captains please begin windshield damage assessment; and if manpower permits local triage and search and rescue operations. Then report back in." Some may be windshield damage assessments in EC-1 format. Most likely no ICS forms 213 will be generated on the block level. At the Area ICP the message center will convert these reports into a ICS-213 form to be sent to the EOC once authorized.

Other messages will be composed for common needs such as reports of fires, gas main breaks, water main breaks, downed power lines, requests for diabetic medication, blankets, dry clothing, potable water, tools, flashlights, batteries, medical supplies, skilled personnel, etc. These latter requests do not need to be on form 213; however they should be logged by NCS or a logger/scribe. The message center leader must titrate and route the traffic effectively.

Example:

"This is block captain 3"

NCS: Captain 3 go

Block Captain 3: "Need two heavy duty long crowbars"

NCS: Copy 3, stand by.

NCS: "Block Captain 4"

Block Captain 4: "Block 4 go"

NCS: "Do you have extra heavy duty long crowbars to lend to Block 3?"

Block 3: "negative"

NCS: "Does any block have any extra heavy duty long crowbars to lend to Block 3?"

And more of the kind.

Utilizing the above type scenario while combining it with test messages may be useful for a Simulated Emergency Test (SET) using comms.

Critique: Pros, Cons, and Limitations

Since FRS radios power output has a limited range from 1/2 to 2 watts maximum, they are inherently limited in distance. They are also limited by their small lossy integral antenna and crowded channels. Hence, their communications among themselves (FRS to FRS) is severely limited. However a GMRS station with an outdoor antenna may be required to hear them further than a few blocks, as GMRS stations can employ external gain antennas. If no GMRS station is available, then relays will have to be implemented, thus increasing the possibilities of error and decreasing timeliness.

The second FRS limitation are the limited available frequencies. Only channels 1-7 allow FRS 2 watts. Thus interference with neighboring blocks as well distant blocks who are in the hills may be a hindrance. Further difficulties due to location may occur because the Kensington/El Cerrito hills are in direct line of sight to parts of Oakland, Berkeley, Marin, San Francisco, Richmond, and San Pablo; which are potential sources of interference due the lack of available channels and coordination.

Remedy: Send INTRA-Block comms off to the low power channels 8-14 using 1/2 watt, thus lowering the possibility of interference. Then after the intra-block traffic is cleared, these stations should return to the Block's assigned main (2 watt) channel unless directed to otherwise by the block captain.

Tier 2 interference with other areas will most likely be a problem because of the limitation of only seven 2 watt FRS channels. Coordination is thus helpful to avoid interference.

It is noted that channels 15-22 allow FRS 2 watt operation; but they will be competing with 50 watt repeater outputs and/or 50 watt GMRS simplex operation, both. Therefore the effective usage of FRS channels 15-22 may be predictably poor.

Never-the-less FRS/GMRS are the only feasible intra and inter-block radio alternatives available at present.

FREQUENCY / CHANNEL CHART

FRS / GMRS TRANSCEIVERS in the United States as of September 28, 2017

Channel	Freq	Ch#	Max pwr	FRS	GMRS
---------	------	-----	---------	-----	------

Chan 1	462.5625	1	2 watts		5 watts
Chan 2	462.5875	2	2 watts		5 watts
Chan 3	462.6125	3	2 watts		5 watts
Chan 4	462.6375	4	2 watts		5 watts
Chan 5	462.6625	5	2 watts		5 watts
Chan 6	462.6875	6	2 watts		5 watts
Chan 7	462.7125	7	2 watts		5 watts
Chan 8	467.5625	8	.5 watt		0.5 watt
Chan 9	467.5875	9	.5 watt		0.5 watt
Chan10	467.6125	10	.5 watt		0.5 watt
Chan11	467.6375	11	.5 watt		0.5 watt
Chan12	467.6625	12	.5 watt		0.5 watt
Chan13	467.6875	13	.5 watt		0.5 watt
Chan14	467.7125	14	.5 watt		0.5 watt
Chan15	462.5500	15	2 watts		50 watts
Chan16	462.5750	16	2 watts		50 watts
Chan17	462.6000	17	2 watts		50 watts
Chan18	462.6250	18	2 watts		50 watts
Chan19	462.6500	19	2 watts		50 watts
Chan20	462.6750	20	2 watts		50 watts
Chan21	462.7000	21	2 watts		50 watts
Chan22	462.7250	22	2 watts		50 watts
GMRS	467.5500	15	Only GMRS Repeater Inputs 50 watts b		
GMRS	467.5750	16	Only GMRS Repeater Inputs 50 watts b		
GMRS	467.6000	17	Only GMRS Repeater Inputs 50 watts b		
GMRS	467.6250	18	Only GMRS Repeater Inputs 50 watts b		
GMRS	467.6500	19	Only GMRS Repeater Inputs 50 watts b		
GMRS	467.6750	20	Only GMRS Repeater Inputs 50 watts b		
GMRS	467.7000	21	Only GMRS Repeater Inputs 50 watts b		
GMRS	467.7250	22	Only GMRS Repeater Inputs 50 watts b		

(a) A FCC license is not required for FRS operations

(b) These are repeater input frequencies and may be used only by licensed GMRS users.

Operators with GMRS licenses transmitting in the GMRS (the General Mobile Radio Service) must comply with all applicable regulations. These requirements include: "The GMRS station call sign must be transmitted following a single transmission or a series of transmissions; and, after 15 minutes and at least once every 15 minutes thereafter during a series of transmissions lasting more than 15 minutes." (47 CFR 95.1751)

Note that the current channels 15-22 are the old GMRS channels designated as 1-8

Note that the current channels 1-7 are the old GMRS channels designated as 9-15. These nominal designators are no longer usable.

As of the revision date of this document, 47 CFR 95, the FCC rules governing the Personal Radio Services (including but not limited to the FRS and the GMRS), were on the US Government Publishing Office Web site at at <https://tinyurl.com/y7wj8s9w>

Rev. 2017-12-01