

Rochester Amateur Radio Association, Inc.



DMR

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What is DMR?

Digital Mobile Radio is an open digital mobile radio standard. Often referred to as MOTOTRBO. MOTOTRBO is the Motorola implementation of the DMR protocol. Standard defined in the European Telecommunications Standards Institute Tier II DMR occupies 12.5 KHz of channel space and is a two "slot" TDMA system
Uses an AMBE+2 vocoder, same vocoder as Yaesu Fusion

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DMR Portable Radios



DMR Portables

- Motorola
- Radioddity
- Hytera
- Retevis
- TYT
- Baofeng
- Anysecu
- Connect Systems
- Kydera

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DMR Mobile Radios



DMR Mobiles

- Motorola
- Kenwood
- Kydera
- Connect Systems
- Vertex
- TYT

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DMR Definitions

DMR Definitions

- **Color Code** – A number that denotes a specific repeater when two or more repeaters have overlapping coverage areas. Normally “1”. This is somewhat like a repeater requiring PL.
- **Time Slot (TS)** – Any particular conversation will be on either TS1 or TS2. This is determined by the repeater owner/system operator. This allows two simultaneous conversations.
- **Talk Group (TG)** – A specific voice conduit or channel routed through the repeater and to the Internet. There are hundreds currently in use, based on geography or special interest.
- **Zone** – Think of these as banks of memory channels. Subscriber radios allow you to divide analog channels and digital TGs into groups for easier access. Most radios are limited to 16 channels/TGs per zone. In DMR, the terms “channels” and “TGs” are often used interchangeably.

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DMR Definitions cont.

- **Radio ID** – A unique decimal ID number allocated per user/radio and assigned by DMR-MARC.net. Unlike D-Star, you cannot use your callsign as your Radio ID so you must vocally ID as on any other analog channel.
- **Code Plug** – This is a generic term for the programming in the radio. Originally, code plugs were actual memory modules or chips that were programmed external to the radio and then inserted. Today you can program a code plug without opening the radio, generally using your computer USB port and a cable to the radio's microphone jack or accessory connector. Most area DMR groups provide a repository of code plug files or images for your use.

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DMR Definitions cont.

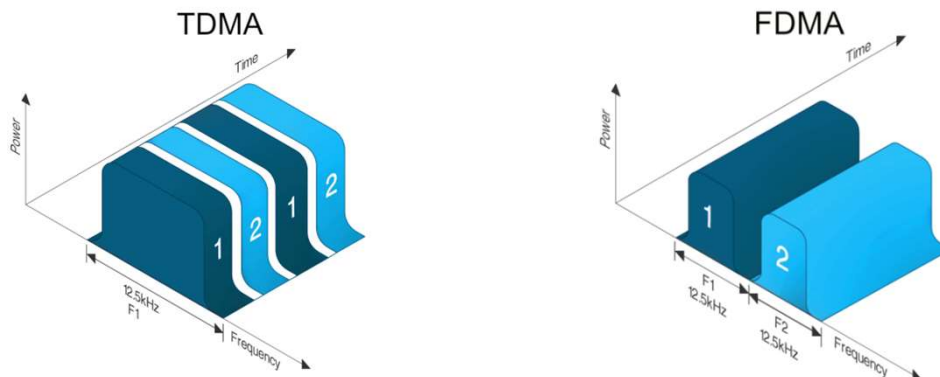
DMR Definitions cont.

- **TG Types** – A repeater owner has the ability to determine (through the system server) the priority and accessibility of TGs. There are two TG types: **Static** and **Dynamic**.
 - **Static** – A static TG is always enabled, available for use. If there is activity on that TG anywhere across the system, it will be transmitted out that repeater on its assigned TS. This type is also known as **Full-Time (FT)**.
 - **Dynamic** – Also known as **Part-Time (PT)**, it is only active if someone on the repeater has keyed up on that TG. These TGs will normally time-out, turning off after a defined period of no **local** activity. On some repeaters, they may also be commanded on/off with an MCT (Master Control Talk group).

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DMR Signal Bandwidth



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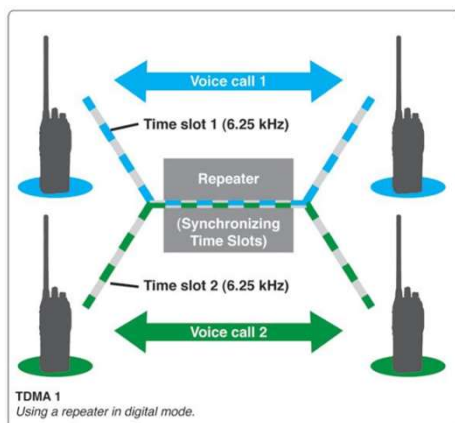
DMR Audio Sample

[This](#) is what a DMR signal sounds like on an analog radio when used in TDMA mode through a repeater. [Here](#) is an audio clip where the voice starts out in analog mode with a following phrase in decoded DMR for comparison of the voice quality

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DMR Connections



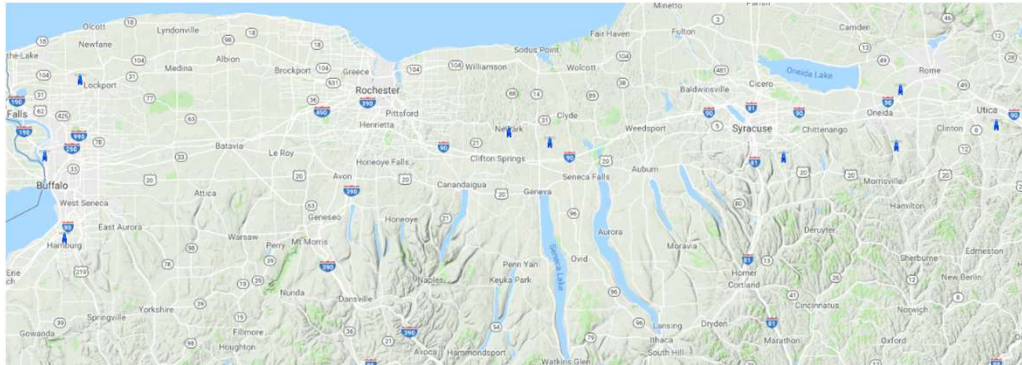
- With a 2-time slot TDMA system, 2 users can share the same frequency.
- Still uses 12.5 kHz RF channel bandwidth

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DMR Repeater Locations

Click the map for Worldwide DMR Repeater Locations



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DMR Reflectors

In addition to repeaters which allow connected users to talk to each other, Reflectors are computer programs which reside in data centers or in the cloud. DSTAR users connect to the reflectors through repeaters or hot spots. Reflectors are sometimes dedicated to specific types of communications such as Skywarn, Hamvention, Regional Repeater linking etc.

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How to get started

1. Purchase a radio
2. Obtain a radio ID from DMR-MARC.net
3. Program your radio for repeaters or hotspots using your ID
4. Help and more info at amateurradio.digital

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Brandmeister

The [Brandmeister Network](#) was born from several worldwide hams and software engineers who joined together to create a digital repeater network consisting of master servers and peer repeaters all over the world. Allows for DMR repeaters and hotspots to connect via the internet and link systems by using organized Talkgroups. [Last Heard](#) is an application which shows a history of signals heard on the network

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DMR Radio Programming

Program your DMR radios with programming software. DMR radios came from the commercial world and were supplied to clients already programmed from the radio shop. In areas where DMR has become prevalent there are pre-programmed “code plugs” which may be downloaded for common radios. [Here](#) is an example of a code plug store from Southern Ontario.

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DMR Code Plug

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[Here](#) is a youtube video which demonstrates creation of an MD-380 Codeplug

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DMR Code Plug General

Most DMR radios are programmed using software and a cable from the radio vendor. A code plug is generally specific to a particular radio or group of radios. Some software is available to export a code plug segment to a .csv for sharing and there are alternative firmware packages which allow a code plug to be shared.

When a new radio is purchased it needs to be configured with your callsign and DMR ID. Register at <https://register.ham-digital.org/> to obtain a DMR ID. In the general settings enter your Callsign and DMR ID

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DMR Code Plug Contacts

The Contacts list is where you enter the talkgroups and callsigns that you want to connect to. There are some talkgroups (WW, NA, TG310) which have very wide coverage. Best Practice is to select a talkgroup targeted to where you want to work someone. The list of talkgroups may be found [here](#).

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Local DMR Contacts

New York State Regional DMR Talk Groups

- 3136 NY Statewide
- 31360 NY-NJ-PA TriState
- 31361 Upstate NY Regional
- 31362 NY-Metro
- 31363 Adirondack Regional
- 31364 Lower Hudson Valley
- 31366 NY METRO ARES
- 31367 Southern Tier
- 31368 Mid-Hudson Valley
- 31369 Monroe County
- 313601 Madison County ARES/RACES
- 3136275 Albany Area Amateur Association Club

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DMR Contacts For My Zumspot

Contact Name	Monroe C	Call ID	31369
Call Type	Group Call	Call Receive Tone	No
Contact Name	KA1CNF	Call ID	313610
Call Type	Private Call	Call Receive Tone	No

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DMR Channel Information

With a few talkgroups defined it is time to define the channels which specify information such as frequency, power, time slot, talk group, color code. What I found most helpful for my radio was to download an example code plug for my radio MD-380 and clone channels for my needs. Once you configure one channel to work, you can clone it for other talk groups by copying the channel, adding a channel, pasting the copied information, and renaming the new channel.

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DMR Channel For My Zumspot

Channel Mode	Digital	Contact Name	Monroe C
Admit Criteria	Always	RX Freq.	446.125
Power	Low	TX Freq.	446.125
Channel Name	MC Zumspot	Color Code	1
		Repeater Slot	2

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DMR Zones For My MD-380

Zone Name	Zumspot	Zone Name	KD2FRD
Channel Member	MC Zumspot	Channel Member	MC KD2FRD

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DMR Zone Information

A Zone is a collection of DMR Channels which are selected using the rotary knob. From the front panel, a zone is selected and from the zones, channels

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DMR Channel For KD2FRD

Channel Mode	Digital	Contact Name	Monroe C
Admit Criteria	Always	RX Freq.	443.6
Power	Low	TX Freq.	448.6
Channel Name	KD2FRD MC	Color Code	1
		Repeater Slot	1

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