

DMR Primer

Rick Lee, N6PSP

Talking around the world is a common aspiration of most new hams. High Frequency equipment with a large antenna use to be the only way to accomplish that with a substantial outlay of cash to do it. Digital Voice (DV) provides the opportunity to talk around the globe with a five watt handheld radio with crystal clear audio. DMR: Digital Mobile Radio has been around since 2005 when it was used in commercial radio products around the world. European Telecommunications Standards Institute (ETSI) developed the standard that is “open” meaning specifications are available to anyone to use, modify, add to and remove features as needed. D-Star and Fusion are also digital voice (DV) radio technologies that were specifically designed for amateur radio. DMR was adopted to ham radio from the commercial radio world as commercial radio technologies moved into other more robust systems that allow the transmissions to be encrypted for privacy as done by many law enforcement agencies today. Because DMR is an open and former commercial system, many radio manufacturers are able to develop radios at various price points depending on available bands, and features. As with any radio, you get what you pay for.

Some don't think the digital voice modes are “real radio” however DMR is recognized by the FCC in Part 97 in a decision from June 9, 2014 of docket FCC-14-74. To operate in these modes, the operator must have a valid Amateur Radio Operators License. In both cases, a licensed amateur radio operator must register separately before using either D-Star or DMR. Although D-Star and DMR both transmit a licensee's information electronically every time you key the mic, all the same rules apply for stating out-loud your callsign. DMR is operated on the VHF and UHF frequencies and delivered to the internet either by a repeater or hotspot. The DMR repeaters and hotspots are connected to each other through the internet to allow your transmission in the Coachella Valley to be heard in England or anywhere else in the world. D-Stars system works in a similar way.

Most of us are familiar with how weak signals sound going into a repeater or from a weak simplex transmission. It can get noisy and hard to understand and can vary widely due to obstructions and terrain. DMR has better range and clearer sound than analog because it is digital. When you transmit on DMR your analog voice is converted to a digital signal, transmitted as a digital alternating transmission every 27.5 milliseconds thereby allowing two transmissions at the sometime on the same frequency. It's then decoded back to analog as it received by another DMR radio on the same talk group. Because it's digital, it only needs to be 12.5MHz wide as opposed to the the usual 25MHz that analog transmissions use. This allows for four DMR talk groups in the same space as one standard UHF or VHF ham frequency.

There are several terms used in the DMR dictionary which can be confusing:

Time Slot: TDMA (Time Division Multiple Access) gives us two conversations on the same space on the same frequency at the same time.

Color Code: Think of this as the PL (Private Line tone) on a repeater.

Talk Group: Allow you to talk to a local area, a region, statewide or even globally. It's the meeting places on DMR. On D-Star this would be called a reflector.

Digital Contacts: Is a list of users, call signs and other information so you know who you are talking to and how to contact them.

Channels: Are the details like frequency, color code and time slot that are programmed to allow the user to speak to others. Analog as well as digital channels can be created and used.

Zones: This is an organizational tool to group talk groups for a given geographical area or purpose (Coachella Valley Ham, PAPA DMR, Local Fire Departments...etc.)

Codeplugs: This is the data that DMR radios use to connect to other radios using all the above listed information.

Hotspots: It's like having your own repeater at home or in your car. It provides you access to the internet for your radio via Wi-Fi or internet router to let you select talk groups that are or are not available on your local repeater. In the Coachella Valley, we have access to PAPA Radio System repeaters through repeaters on Edom Hill or Toro Peak. The PAPA System is a membership driven system that links repeaters throughout Southern California together in groupings including analog, DMR, D-Star and in limited areas Fusion and P25. They provide weekly nets where they take questions and solutions for all areas of expertise on DMR and these other modes.

Some clubs like ours (Desert RATS) have their own DMR systems which enables members to check-in from both the local repeater and worldwide via DMR and the internet! A member with a DMR radio and a hotspot could listen to and participate in a net from anywhere they have access to the internet.

Disaster coordination by agencies like ARES, RACES and Red Cross are increasingly using DMR. The PAPA System is in an agreement with American Red Cross in Southern California Region.

DMR can provide a low-cost way to do worldwide voice contacts on ham radio and is available to every ham from Technician on up.

This article is intended only to be a brief introduction to DMR and is not comprehensive. The links below can provide more context and a deeper understanding of the technology.

References:

[Discovering DMR](#)

[RadioID DMR Information Page](#)

[DMR Account Registration](#)

[PAPA System DMR Page](#)

[Listing of DMR Nets](#)

[Brandmeister Network USA Information](#)

[Brandmeister Network Search Page](#)

[DMR-MARC Master Listing of Group Call ID's](#)

[Red Cross Article](#)

