STARTER GUIDE

DMR BASICS: TALKGROUPS, NETWORKS AND HOTSPOTS

DMR is a digital voice mode whose repeaters and hotspots are often linked over the internet, so a Technician with a handheld can talk across the state or around the world. It takes more setup than FM and comes with new words. Here's what they mean, in the order you'll meet them.

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THE SHORT VERSION

- DMR is digital voice on 2 meters and 70 centimeters, so Technicians can use it.
- You need a DMR radio, a free DMR ID from RadioID.net, and a DMR repeater or a hotspot at home.
- Networks like BrandMeister link repeaters and hotspots over the internet, and talkgroups sort the traffic. On BrandMeister, 3100 reaches the whole US.
- Your DMR ID doesn't replace your call sign. Say it at the end of each contact and at least every 10 minutes.

What DMR is

DMR, short for Digital Mobile Radio, started as a business radio standard. Hams use it on 2 meters and 70 centimeters, often through repeaters linked to a worldwide network.

- Your voice travels as digital data. It stays clear until the signal gets too weak, then drops out instead of getting noisy like FM.
- Each repeater frequency carries two conversations at once, one on each time slot.
- Networks like BrandMeister link thousands of repeaters and personal hotspots, and sort the traffic into talkgroups.
- Most DMR handhelds also do regular FM, so one radio covers both.

YOU NEED	A DMR radio (roughly $60 to $250 for a dual-band handheld), a DMR ID, and a DMR repeater or hotspot.
TECHNICIANS	Yes. DMR repeaters and hotspots are on 2 meters and 70 centimeters.

Get your DMR ID

Every DMR radio sends a seven-digit ID with each transmission. It's how the network and other radios know who's talking. RadioID.net issues them for free.

1. Wait until your call sign shows up in the FCC database.
2. In the FCC's License Manager, choose Download Electronic Authorizations and save the official PDF of your license. RadioID doesn't accept screenshots or reference copies.
3. Create an account at RadioID.net, request a DMR ID and upload the PDF.
4. Once it's approved, enter the ID in your radio's settings.

> Your DMR ID doesn't count as station identification. Say your call sign at the end of each contact and at least every 10 minutes, just as on FM.

TRY IT **RadioID.net** https://radioid.net/

Talkgroups, time slots and color codes

These three settings decide who hears you. Each repeater lists its own, on its website or on the network's dashboard.

The three settings

SETTING	WHAT IT IS	CLOSEST THING ON FM
Color code	A number from 0 to 15 your radio must match to use a repeater	A repeater's tone
Time slot	Slot 1 or 2: the two conversations sharing a repeater frequency	Two channels on one frequency
Talkgroup	A shared channel on the network, such as 3100 for the whole US or your state's four-digit talkgroup	A linked repeater system

- A static talkgroup is always on a repeater. A dynamic one turns on when you key up on it, and on BrandMeister's US servers it turns off after 15 minutes without local traffic.

- The repeater owner decides which talkgroups use which time slot. Check the repeater's page, and ask which slot to use for dynamic talkgroups. It's usually slot 1.
- You talk to a talkgroup with a group call. A private call goes to a single ID, like the network's test service.

DMR networks: BrandMeister, TGIF and others

A DMR network is a set of internet servers that links repeaters and hotspots. A call on a talkgroup goes out on every repeater and hotspot that has that talkgroup on. Each repeater joins one network, chosen by its owner.

- BrandMeister is the biggest network and the usual place to start. Its main talkgroup for the US is 3100.
- TGIF and FreeDMR are other volunteer-run networks. You reach them through a hotspot, or a repeater that joins them.
- Talkgroup numbers belong to each network, and the networks mostly don't link to each other. BrandMeister isn't adding new bridges to networks like FreeDMR. Check which network a repeater uses before you program its talkgroups.
- Your DMR ID works on every network. A hotspot connects to the network you pick in its settings.
- DMR also works radio to radio, with no network at all. A common choice for DMR simplex is `441.000` MHz with color code 1, time slot 1 and talkgroup 99. Check your area's band plan first, since some areas use that part of 70 centimeters for repeaters.

TRY IT **BrandMeister** https://brandmeister.network/ **TGIF Network** https://tgif.network/

Program the radio: the codeplug

A DMR radio's settings file is its codeplug. It holds your ID, your channels and your talkgroups, and it takes longer to build than an FM channel list.

- A channel pairs a frequency, color code and time slot with the talkgroup you'll talk on. Its receive group list sets which other talkgroups it lets you hear.
- Zones are folders of channels, such as one zone per repeater.

- Contacts are the talkgroups and IDs you can call. Many radios can also load RadioID's user list, so the screen shows the call sign and name of whoever is talking.
- CHIRP doesn't program DMR radios. Use the maker's programming software, often called CPS.
- Ask your local club or repeater owner for a codeplug to start from. Many share one, and it saves hours.
- Leave encryption, sometimes called privacy, turned off. It isn't allowed on ham frequencies.

No DMR repeater nearby? Use a hotspot

A hotspot is a tiny, low-power station in your home that links your radio to the network over the internet. It covers a room or a yard, not the neighborhood.

- Many run free software like Pi-Star on a Raspberry Pi with a small radio board. Ready-made ones like the openSPOT need less setup.
- It's still an amateur station. Set it to a 70 centimeter simplex frequency your local band plan allows, and stay out of 435 to 438 MHz, which is for satellites.
- Most hotspots work on one time slot. On BrandMeister, the talkgroup you last keyed up on stays on until you pick another.
- BrandMeister asks you to set a hotspot password in its SelfCare dashboard, then enter the same password in your hotspot.

YOU NEED	A hotspot, home internet, a free BrandMeister account and your DMR ID.
TECHNICIANS	Yes. Most hotspots run on 70 centimeters.

Your first DMR contact

1. Listen first. BrandMeister's Hose plays any talkgroup in your browser, and on the air your radio shows who's talking.
2. Test your setup with a private call to 9990, BrandMeister's parrot. It plays your transmission back to you.

3. Pause a moment after pressing the button before you speak, and leave 2 to 5 seconds between transmissions so others can join in.
4. Make a short call on your state's talkgroup or 3100. Statewide talkgroups are for calls and short chats, under about 10 minutes.
5. If the chat will run long, move to a TAC talkgroup (310 to 319) or a local one. They exist so busy talkgroups stay free.

TRY IT **Listen on the BrandMeister Hose** https://hose.brandmeister.network/

BrandMeister dashboard https://brandmeister.network/

An example contact

A short first contact on the US nationwide talkgroup, ending with a move to a TAC talkgroup.

YOU	N0CALL, listening on 3100.
W1DEMO	N0CALL, this is W1DEMO. Welcome! I'm Pat, near Riverton.
YOU	W1DEMO, thanks, Pat. I'm Sam, on a handheld through my hotspot. It's my first DMR contact. How's my audio?
W1DEMO	Clear and easy to understand, Sam. Congratulations! Let's move to TAC 310 so we don't tie up 3100.
YOU	Sounds good. See you on 310. N0CALL.

DMR, D-STAR and System Fusion

Hams use three main digital voice systems. They can't talk to each other directly, so start with

the one your local repeaters use.

The three main digital voice systems

	DMR	D-STAR	SYSTEM FUSION
Radios	Many brands, often the least expensive	Mostly Icom	Yaesu
How you connect	Talkgroups on networks like BrandMeister	Reflectors	WIRES-X rooms and reflectors
Setup	A codeplug and a DMR ID	Your call sign in the radio	Your call sign in the radio

TRY IT **Find digital repeaters on RepeaterBook** https://www.repeaterbook.com/

Sources

BrandMeister USA: dynamic and static talkgroups https://help.brandmeister.us/talk-groups/dynamic-vs-static

BrandMeister USA: operating etiquette https://help.brandmeister.us/operating/operating-etiquette

BrandMeister USA: statewide talkgroups https://help.brandmeister.us/operating/statewide-talk-groups

BrandMeister USA: TAC channels https://help.brandmeister.us/operating/tac-channels

BrandMeister USA: talkgroup 3100 https://help.brandmeister.us/operating/talk-group-3100

BrandMeister USA: bridging to other networks https://help.brandmeister.us/bridges/bridging-to-brandmeister

BrandMeister USA: hotspot questions https://help.brandmeister.us/hotspots/common-connection-issues/frequency-asked-questions

BrandMeister wiki: Parrot https://wiki.brandmeister.network/index.php/Parrot

ARRL band plan https://www.arrl.org/band-plan

FCC rule 97.113: prohibited transmissions https://www.ecfr.gov/current/title-47/chapter-I/subchapter-D/part-97/subpart-B/section-97.113

FCC rule 97.119: station identification https://www.ecfr.gov/current/title-47/chapter-I/subchapter-D/part-97/subpart-B/section-97.119