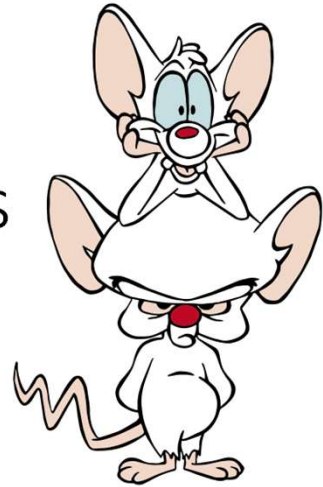# DMR for Beginners

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What Are We Going to Cover?

- What is DMR?
- A Little Technomumbojumbo
- DMR Network
- Competitors to DMR
- How to DMR
- Equipment
- How to Program a Radio
- Help and Resources

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What Is DMR?

Digital mobile radio

🈂 10 languages ∨

Article   Talk

Read   Edit   View history   Tools ∨

From Wikipedia, the free encyclopedia

This article **needs additional citations for verification**. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.
Find sources: "Digital mobile radio" – news · newspapers · books · scholar · JSTOR *(April 2011)* *(Learn how and when to remove this template message)*

Digital mobile radio (DMR) is a digital radio standard for voice and data transmission in non-public radio networks. It was created by the European Telecommunications Standards Institute (ETSI),[1] and is designed to be low-cost and easy to use. DMR, along with P25 phase II and NXDN are the main competitor technologies in achieving 6.25 kHz equivalent bandwidth using the proprietary AMBE+2 vocoder. DMR and P25 II both use two-slot TDMA in a 12.5 kHz channel, while NXDN uses discrete 6.25 kHz channels using frequency division and TETRA uses a four-slot TDMA in a 25 kHz channel.

DMR was designed with three tiers. DMR tiers I and II (conventional) were first published in 2005, and DMR III (Trunked version) was published in 2012, with manufacturers producing products within a few years of each publication.

The primary goal of the standard is to specify a digital system with low complexity, low cost and interoperability across brands, so radio communications purchasers are not locked into a proprietary solution. In practice, given the current limited scope of the DMR standard, many vendors have introduced proprietary features that make their product offerings non-interoperable with other brands.

Source: https://en.wikipedia.org/wiki/Digital_mobile_radio

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Common Terms

- Talk Groups
- Digital Contacts
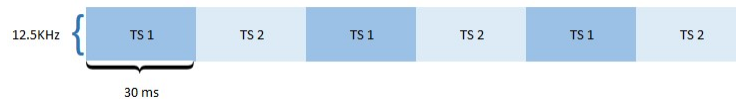- Tier I, II, III
- Zones
- Color Codes
- Channels
- Code Plugs

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Tier I, II and III

DMR
DIGITAL MOBILE RADIO ASSOCIATION

- DMR Tier 1
  - Short Range Simplex Communication
- DMR Tier 2
  - Two Slot TDMA on 12.5KHz Channels
  - Simple Messaging / GPS Data

| 12.5KHz { | TS 1 | TS 2 | TS 1 | TS 2 | TS 1 | TS 2 |

30 ms

- DMR Tier 3
  - Two Slot TDMA on 12.5KHz Channels
  - Simple Messaging / GPS Data
  - Trunked Systems

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What is a DMR Network?

- A collection of Repeaters and Hotspots that are networked together over TCP/IP and pass traffic from one device to another.
  - Can use private network(s) or public network(s) (Internet)
- Networks can be stand-alone or cross connected to other networks
- Networks can be cross connected to other Digital Mode networks
  - DMR-Marc can cross connect Talk Groups to Brandmeister Talk Groups
  - Brandmeister Talk Groups can cross connect to Yaesu System Fusion Rooms
- A network can be a single repeater and an HT
  - You can still use DMR if there is no Internet!

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DMR Networks

- DMR-MARC
  - Largest DMR Network Worldwide
- DMR+
- Brandmeister
  - Largest DMR Network in US
- TGIF
  - Started in Florida, growing fast
- QuadNet, FreeDMR
- … there are more, the list keeps growing

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What are Some Other Digital Modes?

- D-Star
- System Fusion (C4FM)
- NXDN
- M-17
- Project 25 (P25 or APCO-25)

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Digital Mode Comparison Chart

Mode	Analog	D-Star	DMR	YSF
Networks	IRLP, EchoLink, All-Star	REF, XLX, DCS	Brandmeister, DMR-MARC, TGIF, DMR+, many others	Wires-X, YSF, FCS
Server Nomenclature	Reflector	Reflector	Talk Group	Room, Reflector
Signal Validation	CTCSS, Tone, Tone-Squelch	RPT 1	Color Code	N/A
Modulation	FM	GMSK	4-State FSK with TDMA	C4FM
Creator	N/A	JARL	ETSI	Yaesu
Verbal ID Required?	Yes	No	Yes	No

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How Do I 'DMR'?

Things you will need:

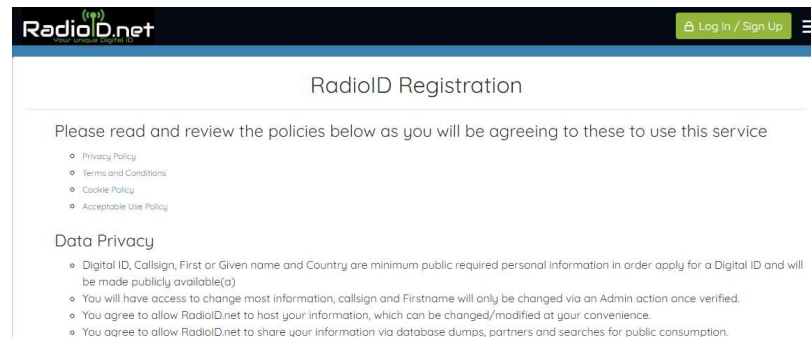- DMR ID
- Radio with an AMBE+2 Vo-coder
- Connect to a DMR Network
  - Repeater Network or via MMDVM Hotspot
  - Stand-alone Repeater or Simplex

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DMR ID

- Be a Licensed Amateur Radio Operator
- https://www.radioid.net

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What DMR Equipment Should I Buy?

- What features are you looking for?
  - Memories (Contacts & Channels)
  - Availability of Programming Software

- What's your budget?

Manufacturer	Model	Price
Baofeng	DM-1702	$ 69.99
TYT	MD-380	$ 99.00
Retevis	RT3S	$ 119.99
Radioddity	GD-88	$ 219.99
Btech	DMR-6X2 Pro	$ 299.99
AnyTone	AT-D878UVII Plus	$ 349.99
Rfinder	B1-Plus	$1,099.95
Rfinder	P10	$1,499.95

- HT vs Mobile
  - Hotspot?
  - Repeater?

- USB Dongle

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Hotspots?

- [ZUMradio](#) ZUMspot Mini ($175)
- [ZUMradio](#) ZUMspot Elite ($250)
- AMBE+2 Board or USB Dongle * [BlueDV Software](#) ($140)
- [Bridgecom](#) SkyBridge ($425+++)
- [Hamspot 4](#) ($150)
- [SharkRF](#) OpenSpot 4 (Pro) ($340 US)
  - The "Pro" version has transcoding
- Generic, Cloned and Custom MMDVM Boards

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What is Pi-Star?

- https://www.pistar.uk
  - First update in 3 years, January 2024

PI-STAR
Pi-Star Digital Voice Software

Home

Home
Information
Pi-Star Tools
Multi Reflector
D-Star Mode

Home

Pi-Star is a software image built initially for the Raspberry Pi (produced by the Raspberry Pi Foundation). The design concept is simple, provide the complex services and configuration for Digial Voice on Amateur radio in a way that makes it easily accessable to anyone just starting out, but make it configurable enough to be interesting for those of us who cant help but tinker.

Pi-Star would not be here today, were it not for the software made by Jonathan Naylor (G4KLX), we started with his DStarRepeater and ircDDBGateway and now support the full G4KLX MMDVM suite, including the extra cross-mode gateways added on by Andy (CA6JAU), I cannot thank these guys for the vast amount of time and effort that they continue to put into their projects.

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The WPSD Project

- https://w0chp.radio/wpsd/
  - Updates almost every week

W0CHP.radio

THE WPSD PROJECT

Welcome to the *official* web page of the WPSD Project.

WPSD is a **next-generation** digital voice software suite for amateur radio use, enjoyed by many thousands of hams around the globe. It is used for personal hotspots and repeaters alike. It supports M17, DMR, D-Star, Yaesu System Fusion (YSF/C4FM), P25, NXDN digital voice modes & POCSAG data/paging.

WPSD is available as installable disk images, and multiple platforms & devices are supported. The WPSD Project is free and open-source software (FOSS).

Table of Contents:
- Getting Help/Support
- Download WPSD
- Installing WPSD
- Updating WPSD

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What's the Frequency Kenneth?

Hot Spot

- Ever heard of Southeastern Repeater Association?
- They are the frequency coordinator for the State of Mississippi.

- Avoid 432.0000 to 433.0000

- Hot Spots qualify as Link and Control
- 441.1875 – 446.1875
- 441.2625 – 446.2625

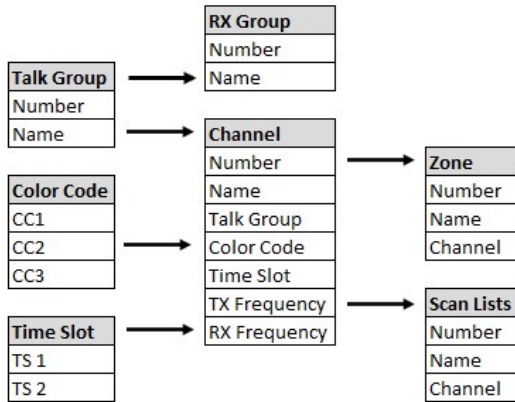- to

- 441.6500 – 446.6500
- 441.7250 – 446.7250

Simplex

- Remember Southeastern Repeater Association?
- They also recommend simplex frequencies for digital

440.9125	441.0375	441.1625
440.9250	441.0500	441.1750
440.9375	441.0625	
440.9500	441.0750	
440.9625	441.0875	
440.9750	441.1000	
440.9875	441.1125	
441.0000	441.1250	
441.0125	441.1375	
441.0250	441.1500	

Remember: You are responsible for not causing interference to other stations. Especially on coordinated frequencies!

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How Do I Program My Radio?

- Create your talk groups
- Create your channels
- Create zone(s)
- Add your channels to zones
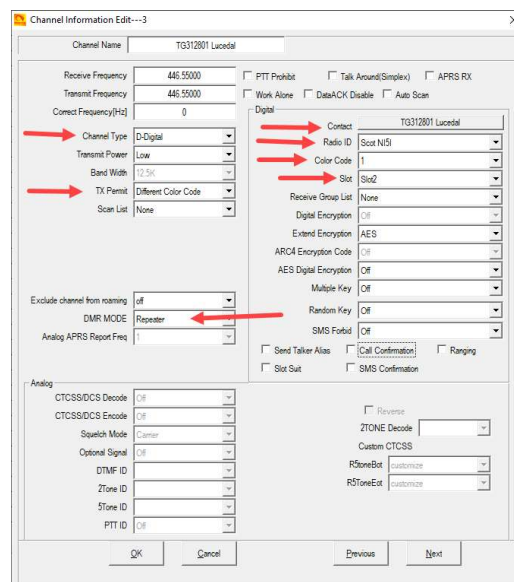
Putting the pieces together…

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Programming Your Channel(s)

The Important Things:

Channel Type
Transmit Power
TX Permit

Contact
Radio ID
Color Code
Slot

DMR Mode

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Programming/Operating Tips

- Programming Lucedale Talk group 312801
  - Using the talk group:
    - For the repeater is one channel
    - For your hot spot, it is another channel
- Use Zones to your advantage.
  - Create a Zone for the Lucedale Repeater or (George County) (Stone County)
  - Create a Zone for your hot spot
- Create Disconnect and Parrot channels in each zone.
- Remember to ID!
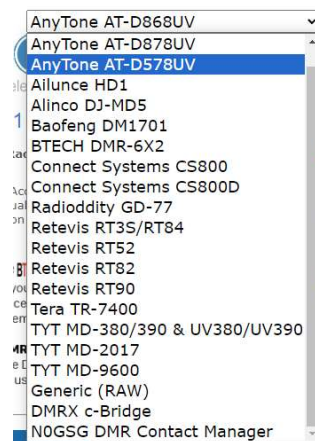 - Your Brandmiester ID is not ID'ing.

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Programming Made Easier

Make Your Own Lists (Excel, Google Sheets, etc)
- Contacts List
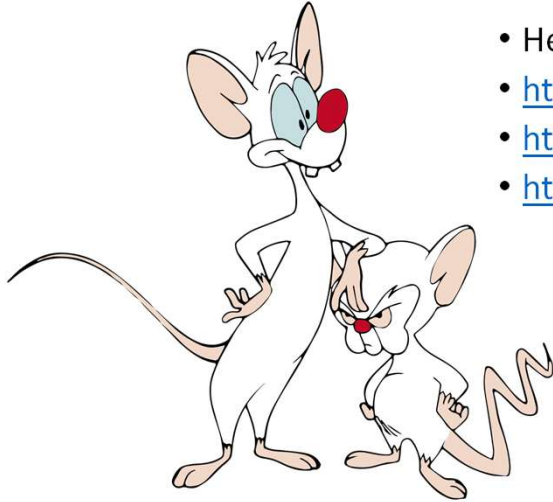- Talk Group List
- Zone List
- Scan Lists

Saving Time

- https://www.pistar.uk/downloads/anytone/
- http://www.dmrcontacts.com/
- https://amateurradio.digital/ ($12/year)
  - Picture to right →

Digital Contacts Wizard

AnyTone AT-D868UV
- AnyTone AT-D878UV
- AnyTone AT-D578UV
- Ailunce HD1
- Alinco DJ-MD5
- Baofeng DM1701
- BTECH DMR-6X2
- Connect Systems CS800
- Connect Systems CS800D
- Radioddity GD-77
- Retevis RT3S/RT84
- Retevis RT52
- Retevis RT82
- Retevis RT90
- Tera TR-7400
- TYT MD-380/390 & UV380/UV390
- TYT MD-2017
- TYT MD-9600
- Generic (RAW)
- DMRX c-Bridge
- N0GSG DMR Contact Manager

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Where Can I Get Info / Help?

- Here at our meeting!
- https://amateurradionotes.com/pi-star.htm *
- https://www.dmrfordummies.com
- https://sera.org

* Good information, but is no longer being updated.

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A Few Good Resources:

- https://dmr-marc.net
  - https://dmr-marc.net/media/Amateur_Radio_Guide_to_DMR_Rev_I_20150510.pdf
  - https://dmr-marc.net/media/DMR_MARC_Best_Practice_Guide_Rev_BB.pdf
- https://n5amd.com
- https://pistar.uk
- https://radioid.net
- https://w0chp.radio/wpsd

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