DMR RADIO SETUP & DEMO :

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AGENDA

DMR Background TalkGroups Creating a Code Plug OpenSpot3 Demo

DMR Background

DMR was developed in Europe by ETSI, European Telecomm Standards Institute and was adopted as Commercial Standard 20 years ago. Initially, commercial business equipment was the only source of DMR handhelds and mobiles. Several ham radio vendors have since entered the DMR market with radios that are a bit more affordable and designed more for ham radio use.



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Time Slots (TDMA)

Where the bandwidth of an Analog FM signal is 25.0 kHz, the DMR (TDMA) bandwidth is only 12.5 kHz. Not only does it occupy half of the required bandwidth, but it has the ability to transmit two separate conversations at the same time. This is accomplished by digitally splitting a transmitted signal into alternating 30 millisecond slices referred to as Time Slots.

TDMA = Time-Division Multiple Access



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There are currently over 1500 Talk Groups, ranging from:

- Local Repeater Only
- Local Network Repeaters
- Statewide Groups
- Regional Groups
- Country Specific Groups
- Worldwide Groups
- Special Interest Groups

TALK GROUPS

Examples of these groups include:

- AmericaLink to YSF
- State by State, ex: NJ, CNJ HAM
- JOTA
- EmComm
- Handi-Hams

3/11/2023

TALK'GROUPS CONT'D

Not all repeaters carry all Talk Groups (TG) depending on their network connection. The repeater's owner assigns the TG and TS structure most beneficial for your area. This is to permit the most activity with the least amount of interference.

A 'typical' configuration might be:

	IG	Time Slot
Local 2 Local Cluster of Repeaters	2	2
Local 9 Local Repeater Only	9	2
 TAC 310, 311 Secondary Chat Groups 	310, 311	2
 Nationwide National Calling Channel 	3100	1
PA State PA Statewide	3142	1
MD State MD Statewide	3124	1
NE Reg'l Northeast Regional	3172	1

Full Time vs Part Time (Repeater)

A Full Time (FT) group is one that is always available for monitoring. If the TG becomes active, you will hear the traffic immediately. These are normally Local and State groups.

A Push-to-Talk TG is one that requires activation and only stays active for a predefined amount of time. These would be high traffic groups, such as Nationwide, Worldwide, etc. The TG remains active for a given amount of time after your last PTT. It will then release the TS for other potential users. Only one TG can be active for each TS.

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	IG Time Slot	
Local 2 Local Cluster of Repeaters	2 2	FT
Local 9 Local Repeater Only	9 2	FT
TAC 310 Secondary Groups	310 2	PTT (5 min)
TAC 311, 312 Chat Groups	311, 312 2	PTT (15 min)
 Nationwide National Calling Channel 	3100 1	PTT (5 min)
PA State PA Statewide	3142 1	FT
MD State MD State	3124 1	PTT (15 min)

CREATING A CODEPLUG



STEPS TO MAKE A CODE PLUG

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- Step 1: RadioID from radioid.net
- Step 2: Download & Import TalkGroups
 - Download from pi-star.uk
- Step 3: Download & Import Contacts
 - Download from pi-star.uk
- Step 4: Channel, created by you.
- Step 5: Create a Zone and place the channel in the zone.

PI-STAR.UK/DOWNLOADS/ANYTONE

PI-STAR Pi-Star Digital Voice Software

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AnyTone DMR Downloads Information If you own an AnyTone DMR Radio, you may find these links handy. After I purchased my AnyTone AT-D878UV (HT) and my Anytone AT-D578UV-Pro. I found that while there are ready-made code plugs out Pi-Star Tools there to find, download and use as a starting point, they all lacked various things. Since this website already has most of the tools available to compile lists of TalkGroups and DMR Multi Reflector Users, it seems like a great idea to make those available for everyone to use (since I need to make them for me anyway). D-Star Mode Download the full DMR User List Here This is the full user list (data provided by radioid.net), import this as your digital contacts list DMR Mode Download the full BrandMeister TalkGroup List Here YSF Mode This is a full list of all available BrandMeister Talkgroups and Reflectors, pre-formatted for easy import into your "TalkGroups" list on your AnyTone Radio. (Data sourced directly from BrandMeister API) P25 Mode Download the full DMR+ TalkGroup List Here NXDN Mode

This is a full list of all available DMR+ Talkgroups and Reflectors, pre-formatted for easy import into your "TalkGroups" list on your AnyTone Radio. (Data sourced directly from DMR+) Download the full TGIF TalkGroup List Here Downloads This is a full list of all available TGIF Talkgroups, pre-formatted for easy import into your "TalkGroups" list on your AnyTone Radio. (Data sourced directly from TGIF) Download the full FreeDMR TalkGroup List Here This is a full list of all available FreeDMR Talkgroups, pre-formatted for easy import into your "TalkGroups" list on your AnyTone Radio. (Data sourced directly from FreeDMR.uk) -

Download the UK DMR Repeater List Here

This repeater list is created from www.ukrepeaters.net, and filtered to provide only the DMR enabled repeaters. Use this with the "Roaming Channel" section to provide you a good starting point for setting up your Roaming Zone.

Note

Home

Links

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These files are generated when you press the link, they are not stored on this server, this means they are never out of date, since the data comes directly from the network(s).

DMRGateway Overlay Testing

This is a new concept I am working on, this should download all of the TalkGroup list(s) and arrange them such that they match the new DMRGateway overlay that I am working on (see the forum post here). The idea is that BrandMeister TGs are in their correct place, 1-999999 etc., DMR+ has the "8" prefix, and stretched to 5 digits, finally TGIF is expected to live on DMRGateway slot 4, and has the "4" prefix (and stretched to 7 digits total).

All of the prefixes etc. are not shown on the radio, it looks like you can just magically use any TG from any network without having to figure out where it lives.

I make no appology for the fact that this is complex, it *IS* complex, but this happens to be how I run my setup, so I figure that sharing this might help you, or might give you a new thing to play with. You can download the whole overlay Here, import this to your "TalkGroups" as before.

• Step 1: Create an account at www.radioid.net/account/register



STEP 2 & 3: DOWNLOAD TALKGROUPS AND CONTACTS

 Touay 			
🔊 AnyTone_DigitalContactList.csv	3/10/2023 6:53 PM	Microsoft Excel C	11,545 KB
🔊 AnyTone_BM_TalkGroups(1).csv	3/10/2023 6:48 PM	Microsoft Excel C	86 KB
AnyTone_FreeDMR_TalkGroups.csv	3/10/2023 6:48 PM	Microsoft Excel C	43 KB

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CREATING AN ANALOG CHANNEL

Channel Name	W2ZQ - Trenton		
Receive Frequency	146.67000	🗖 PTT Prohibit 🔲 Talk	Around(Simplex)
Transmit Frequency	146.07000	🗆 Work Alone 🔲 DataACK Di	sable 🔲 Auto Scan
Correct Frequency[Hz]	0	_ Digital	
Channel Type	A-Analog 🔹	Contact	Local/Cluster
Transmit Power	High 💌	Radio ID	KD2SCR 💌
Band Width	25К 💌	Color Code	1
Busy Lock	Off 🔽	Slot	Slot1
Scan List	Home Area 💌	Receive Group List	None
		Digital Encryption	Off 👻
		AES Divital Exercition	<u></u>
		Mulfala Kay	
Evolute eksend from respire		Random Key	
DMR MODE	Percenter V	SMS Earlind	
Analog APRS Report Even		OMOTODA	
, and g / a no report roq		Send Talker Alias	Call Confirmation 🗖 Ranging
		Slot Suit	SMS Confirmation
Analog	[]		
CTCSS/DCS Decode		131.8	Reverse
CICSS/DCS Encode		131.8	
Squeich Mode			2TONE Decode
Optional Signal	Off <u>▼</u>		Custom CTCSS 251.1
		R	toneBot customize
Zione ID		R5	ToneEot customize
11.000 11.1			

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INPUT YOUR RADIOID

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File Model Set Program T	ool View	Help		
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D878UV	No.	Radio ID	Name	
Channel	1	3143176	KD2SCR	
- Tone	2			
Scan List	3			
Roaming Channel	4			
- Roaming Zone	5			
- FM	6			
Auto Repeater Offset Frec	7			
Device Information	8			
··· Optional Setting	9			
Alarm Setting	10			
- Local Information	11			
- Hot Key	12			
APRS	13			<u> </u>
GPS Roaming	14			<u> </u>
⊡. Digital	15			<u> </u>
Radio ID List	16			<u> </u>
Contact/Talk Group	17			<u> </u>
Prefabricated SMS	18			<u> </u>
Receive Group Call List	19			
AES Encryption Code	20			<u> </u>
⊟. Digital Contact List	21			<u> </u>

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IMPORT TALK GROUPS

t.				
	Import From File List			
Channel		DTMF Encode		
Radio ID List		HotKey_QuickCall		
Zone		HotKey_State		
Scan List		HotKey_HotKey		
Analog Address Book		Auto Repeater Offset Frequencys		
Talk Groups	Z:\Ham Radio\Anytone 878\AnyTone_BM_TalkGroups	Roaming Channel		
Digital Contact List		Roaming Zone		
Prefabricated SMS		APRS		
FM		GPS Roaming		
Receive Group Call List		AES Encryption Code		
5Tone Encode				
2Tone Encode				
	Import	Close		

IMPORT DIGITAL CONTACT LIST

		Import From File List	
Channel		DTMF Encode	
Radio ID List		HotKey_QuickCall	
Zone		HotKey_State	
Scan List		HotKey_HotKey	
Analog Address Book		Auto Repeater Offset Frequencys	
Talk Groups		Roaming Channel	
Digital Contact List	Z:\Ham Radio\Anytone 878\AnyTone_DigitalContactList	Roaming Zone	
Prefabricated SMS		APRS	
FM		GPS Roaming	
Receive Group Call List		AES Encryption Code	
5Tone Encode			
2Tone Encode			

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CREATE A DIGITAL CHANNEL

San Channel Information Edit	:36		+
Channel Name	CNJ HAM		
Receive Frequency	432.07500	🗆 PTT Prohibit 📃 Talk	Around(Simplex)
Transmit Frequency	432.07500	🗆 Work Alone 🔲 DataACK Di	sable 🔲 Auto Scan
Correct Frequency[Hz]	0	- Digital	
Channel Type	D-Digital 💌	Contact	TG31340 CNJHAM
Transmit Power	Low	Radio ID	KD2SCR 💌
Band Width	12.5K 💌	Color Code	1
TX Permit	Always 💌	Slot	Slot2
Scan List	Home Area 💌	Receive Group List	None
		Digital Encryption	Off 💌
		AES Digital Encryption	Off
		Multiple Key	Off
. Exclude channel from roaming	off 🗨	Random Key	Off
DMR MODE	Repeater 💌	SMS Forbid	Off 💌
Analog APRS Report Freq	1 -	Send Talker Alias	Call Confirmation 🔲 Ranging
		Slot Suit	SMS Confirmation
- Analog			
CTCSS/DCS Decode	Off		
CTCSS/DCS Encode	Off 💌		Reverse
Squelch Mode	Carrier 💌		2TONE Decode
. Optional Signal	Off 💌		Custom CTCSS 251.1
DTMF ID	_	R	
2Tone ID	-	R5	
5Tone ID	-	10	
PTT ID	Off 💌		
	<u>O</u> K <u>C</u> ancel	Pre	rvious <u>N</u> ext

WHAT IS A COLOR CODE?

What is a Color Code? A color code for a DMR repeater is **akin to a PL tone for an analog repeater**. There 15 color codes (0-15). A radio must be programmed with the correct color code to access the repeater.

CREATE A ZONE PLACE CHANNELS IN THE ZONE



WRRIETOTORADIO



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SharkRf Openspot3 Hotspot

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Repeater vs. Hotspot

There are two main pieces of equipment used to access the DMR (or System Fusion or D-STAR or other digital voice) network. One is a <u>Repeater</u> which is normally located at a high elevation with wide area coverage. The repeater is then linked to the internet allowing it to access one or more DMR network server

Note: Not all repeaters share the same Talk Groups. This is determined by the repeater's owner.

The other is known as a <u>Hot Spot</u>. These were developed for local range access to a network when no repeater is available. These low power devices receive a users digital signal and passes it to a DMR network (or other network) via the internet.





Source: John 'Miklor' K3NXU 2018-2023 If you find this useful, drop him a "cup of coffee"





"Personal Hotspot"

-Operates Simplex on the 70cm (440 MHz) band

- OpenSpot3 needs to be located within ~300 feet of your 70cm transceiver

- Requires a WiFi connection to the internet.

- You can operate Mobile by tethering "hotspot to hotspot". sharing your SmartPhone's cellular data by making <u>it</u> a cellular data hotspot, if your phone's data plan allows data sharing that way (some carriers allow, some don't). This allows you to take a long car trip and stay connected to DMR (or other popular digital voice modes) without needing to find a new repeater every 20 or 30 miles C https://manuals.sharkrf.com/openspot3/en/cross-modes.html#page-top

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Local echo service

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- Configuration profile query
- Change configuration profile
- Connector status query
- Active IP address query
- Battery status query
- Time query
- Cross modes
 - DMR transceiver
 - D-STAR® transceiver
 - C4FM transceiver
 - NXDN® transceiver
 - P25 transceiver
- USB serial console

Cross modes

The openSPOT3 has a very powerful, yet easy to use cross mode system. It supports the following cross modes:

- You can use your DMR transceiver to access D-STAR®, C4FM, NXDN® networks
- You can use your **D-STAR**® transceiver to access **DMR**, **C4FM**, **NXDN**® networks
- You can use your C4FM transceiver to access DMR, D-STAR®, NXDN®, P25 networks
- You can use your NXDN® transceiver to access DMR, C4FM, D-STAR® networks
- You can use your P25 transceiver to access C4FM networks

Hardware transcoding is done automatically by the built-in **AMBE® vocoder chip**.

A software-based conversion method is used for the following cross modes:

- C4FM transceiver to access P25 networks
- P25 transceiver to access C4FM networks

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C b https://manuals.sharkrf.com/openspot3/en/cross-modes-dmr.html#page-top

openSPOT•3 user manual Local echo service **Cross modes using a DMR transceiver** Configuration profile query Change configuration profile Using a D-STAR® network Connector status query After you've set up and activated the D-STAR® connector, switch the modem to DMR mode. Active IP address query Battery status query Your outgoing callsign will be the callsign associated with the DMR source ID. If there's no callsign Time query associated to the ID, then the callsign will be the Default callsign for cross mode calls. If this is not set, your Cross modes outgoing callsign will be your radio's DMR ID as text. DMR transceiver An incoming call's source DMR ID will be set to the ID associated with the source callsign. If there's no ID D-STAR® transceiver associated, and the source callsign can be parsed into a number, it will be used as the source DMR ID. C4FM transceiver Otherwise the Default cross mode source DMR ID will be used. NXDN® transceiver All calls coming from the D-STAR® network will be sent as a group call to DMR ID 9 (TG9). Make sure TG9 P25 transceiver is the TX contact of your DMR radio's current channel, or it's in an RX group list which is assigned to the USB serial console current channel in the radio, otherwise the squelch won't open and you won't hear the calls.

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https://manuals.sharkrf.com/openspot3/en/cross-modes-dmr.html#page-top C

openSPOT•3 user manual Using a C4FM network Local echo service Configuration profile query After you've set up and activated the C4FM connector, switch the modem to DMR mode. Only calls in DN Change configuration profile (Digital Narrow) mode will be converted to your DMR radio. If someone transmits in other modes on the Connector status query C4FM network, you will hear silence on your DMR radio. Active IP address query Your outgoing callsign will be the callsign associated with the DMR source ID. If there's no callsign Battery status query associated to the ID, then the callsign will be the Default callsign for cross mode calls. If this is not set, your Time query outgoing callsign will be your radio's DMR ID as text. Cross modes An incoming call's source DMR ID will be set to the ID associated with the source callsign. If there's no ID DMR transceiver associated, and the source callsign can be parsed into a number, it will be used as the source DMR ID. D-STAR® transceiver Otherwise the Default cross mode source DMR ID will be used. C4FM transceiver All calls coming from the C4FM network will be sent as a group call to DMR ID 9 (TG9). Make sure TG9 is NXDN® transceiver the TX contact of your DMR radio's current channel, or it's in an RX group list which is assigned to the P25 transceiver current channel in the radio, otherwise the squelch won't open and you won't hear the calls. USB serial console

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openSPOT•3 user manual Local echo service Configuration profile query Change configuration profile Using a DMR network Connector status query Active IP address query Battery status query Time query Cross modes DMR transceiver D-STAR® transceiver will be used. You can set this to your DMR ID. C4FM transceiver NXDN® transceiver P25 transceiver the callsign will be the source DMR ID as text. USB serial console



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Cross modes using a C4FM transceiver

After you've set up and activated the DMR connector, switch the modem to C4FM mode (or C4FM Half Deviation mode, if your radio needs that). Only calls in DN (Digital Narrow) mode will be converted, if you transmit in other modes, DMR users will only hear silence.

The source DMR ID of your calls from the C4FM radio will be set to the ID associated with the source callsign. If there's no ID associated, then the source callsign will be parsed into a number and this will be used as the source DMR ID. If it can't be parsed into a number, then the Default cross mode source DMR ID

The callsign of incoming DMR calls will be set to the callsign associated with the DMR ID. If there's no callsign associated in the database, then the Default callsign for cross mode calls will be used. If it's not set,

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	Pro	duct pag	e »
Local echo service	Using a D-STAR® network		
Change configuration profile Connector status query Active IP address query Battery status query Time query Cross modes	After you've set up and activated the D-STAR® connector, switch the modem to C4FM mode (or C4FM Half Deviation mode, if your radio needs that). Only calls in DN (Digital Narrow) mode will be converted, if you transmit in other modes, D-STAR® users will only hear silence. Note that some (classic) REF and XRF servers need a valid D-STAR® registration. You can read more about this here. Make sure you've set the callsign in your C4FM transceiver to the exact same callsign that you have registered, otherwise servers which require a registered callsign won't accept the connection, or won't let the openSPOT3 to transmit data.		



Time for a "Live Demo"!

SharkRF OpenSpot3



THANK YOU

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