

# INTRODUCTION TO DMR

## ARRL/TAPR DCC 2017 – ST. LOUIS

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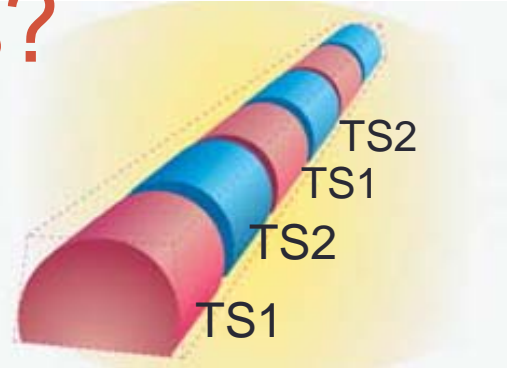
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# What is DMR?

- DMR stands for **D**igital **M**obile **R**adio
- Based on ETSI (European) Standard, developed for commercial mobile radio
- Also known as Motorola's Tradename, Mototrbo™
- ETSI standard includes three Tiers
  - Tier 1 – Simplex, for individual use such as FRS
  - Tier 2 – Two Slot TDMA for repeaters and user equipment, this is used by Amateurs
  - Tier 3 – Layers trunking upon Tier 2
- Brings in new terms for Amateurs
  - Time Slot
  - Color Code
  - Zones
  - Contacts or Talk Groups
  - DMR ID

# What is TDMA & Time Slots?



- Time Division Multiple Access
- Splits up the RF Data Stream into 30 ms Timeslots
- The radios access the proper timeslot based upon programming
- Repeaters provide the syncing for TS access
- Supports two simultaneous conversations on one RF channel
- Works on Simplex, but only one TS is used
- Portable radios use less battery power as they transmit for half the time
- Requires fast TX/RX switching times. Some add on HT RF amplifiers do not support TDMA

# Talkgroups, Color Code & DMR ID

- A Talkgroup is a logical group of users that can communicate with one another
  - All talk groups (TG) have a numerical ID
  - Use is set by the networks and repeater owners, i.e. WW, NA, USA MOsw, Ilsw, Parriot, TG9
  - Some TGs are full time (always on), some are User Access (PTT) check the repeater's website
  - Referred to as a "Contact" in most CPS (Customer Programming Software)
  - Someone can be on a Talkgroup, but if your not programmed to that talkgroup you will not hear anything.
  - Repeaters can have Talkgroups assigned to a particular Time Slot
- Color Code is like CTCSS and controls access to repeater/radio (0-15)
- DMR ID is a ID number assigned to you call sign

# Talk Groups vs Contacts

- The both refer to the same thing, all Talk Groups are a Contact, but not all Contacts are Talk Groups
- A Contact can also be the DMR ID for another amateur
- If permitted by the repeater and network owners, you can initiate a call between two individuals. This is know as an private call or individual call
- It is not really encourage, because it ties up a time slot and no one knows you are using it.
- A nice feature is that if you receive a call from someone in your contacts list, their name instead of the DMR ID will show up in your display. MD-380 Tools is this feature plus more

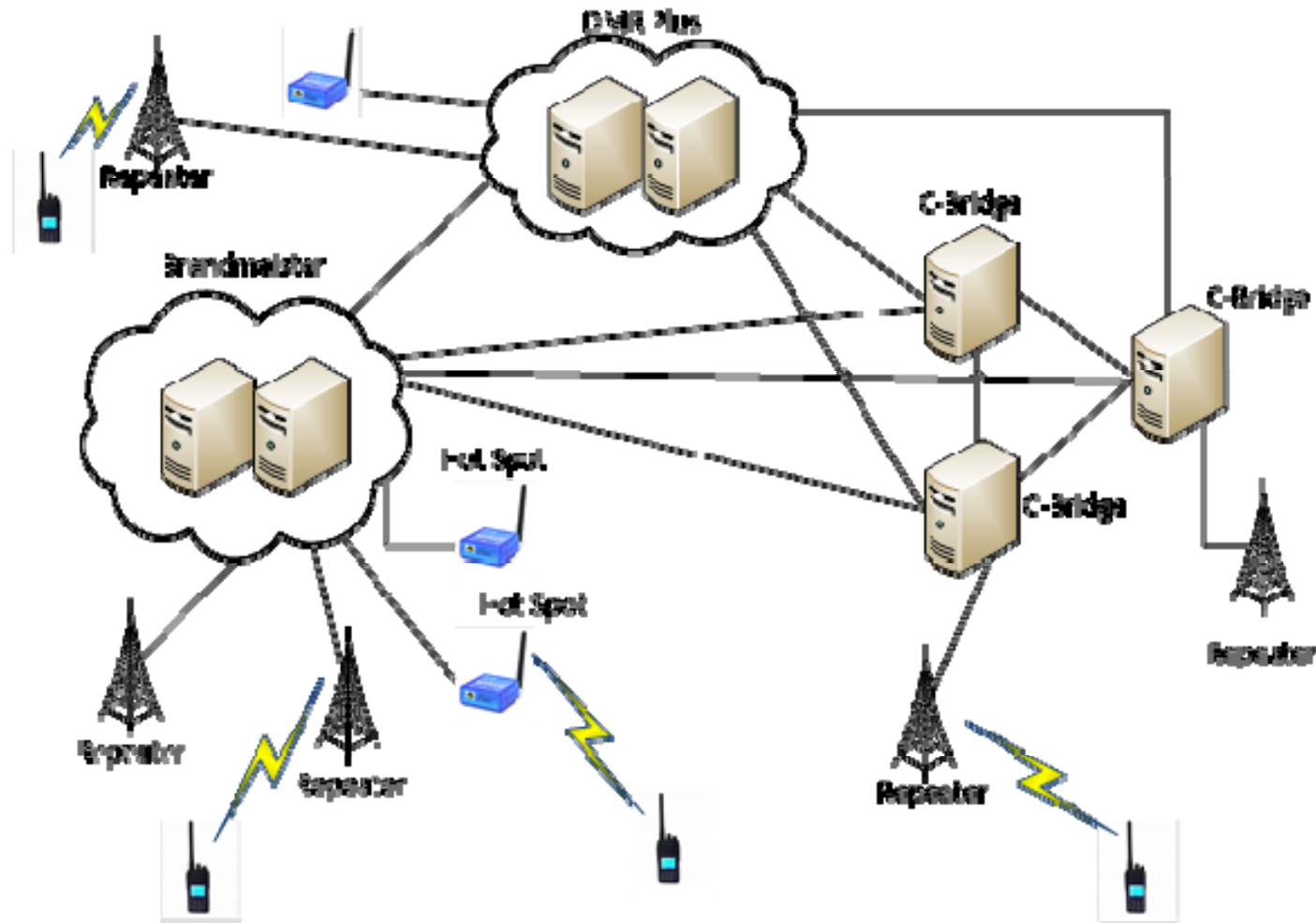
# What are Zones?

- Concept developed by commercial radio vendors such as Motorola.
- Logical Groups of Channels
  - Example – STL Zone is a group of channels/TG on the KM0MDG Repeater, KC Zone is a group of channels on a KC DMR repeater
- Allows a 16 position channel selector switch to move within 1000 channels programmed into a radio
- Most radios have a 16 channel per Zone limit. Some of the newer radios are eliminating this restriction.

# Amateur DMR Networks

- Without the networks, all you would have is a local repeater and hotspots would not function.
- When Amateur DMR got started, there was only one network, the C-Bridge Network that tied the repeaters together and made regional and world wide connectivity possible.
- Now there are three
  - C-Bridge Network (loosely referred to as DMR-MARC)
  - DMR Plus – Supports repeaters and hot spots
  - Brandmeister – Supports repeaters and hot spots
- C-Bridge networks do not support Hot Spots. They are supported by Brandmeister and DMR Plus

# Amateur DMR Networks



Networks Tie Repeaters and Hot Spots together to create Regional and World Wide connectivity via Talk Groups



# Programming a DMR Radio

- Need the following in addition to the frequency to create a Code Plug file
  - Your DMR ID
  - The repeater Color Code
  - The Timeslot to be used
  - The Talkgroup ID to be used
  - Any Talkgroup Scan lists
  - Any Channel Scan lists
- You have to program a channel for every timeslot/talkgroup combination you want to use
- Use Admit Criteria of “Color Code” and In Call Criteria of “Follow Admit”
- Don’t forget to assign the channel to a Zone



The screenshot shows the 'General Setting' window of the Tytera MD\_380 Radio Programming Software. The window is divided into several sections:

- Save:** Save Preamble ; Save Mode Receive
- Alert Tone:** Disable All Tone ; CH Free Indication Tone ; Talk Permit Tone: Digital; Call Alert Tone Duration[s]: Continue
- Scan:** Scan Digital Hang Time[ms]: 1000; Scan Analog Hang Time[ms]: 1000
- Lone Worker:** Lone Worker Response Time[min]: 1; Lone Worker Reminder Time[s]: 10
- Radio Name:** nocall (circled in red)
- Radio ID:** 1
- Monitor Type:** Open Squelch
- VOX Sensitivity:** 3
- TX Preamble Duration[ms]:** 300
- RX Low Battery Interval[s]:** 120
- PC Programming Password:** (empty)
- Radio Program Password:** 99999999
- Back Light Time[s]:** 15
- Set Keypad Lock Time[s]:** Manual
- Disable All LEDs:**
- Talkaround:** Group Call Hang Time[ms]: 3000; Private Call Hang Time[ms]: 4000
- Intro Screen:** (empty)

tytera CPS MD\_380 - [Digital Contacts]

File Edit Program Setting View Window Help

tytera CPS MD\_380

- Basic Information
- General Setting
- Menu Item
- Buttons Definitions
- Text Message
- Privacy Setting
- Digit Emergency System
- Digital Contacts
- Digital RX Group Lists
- Zone Information
  - STL
- Scan List
- Channels Information
  - MDG-WW
  - MDG-TG2
  - MDG-WWEng
  - MDG NA
  - MDG-UAE1
  - MDG-UAE2
  - MDG-TAC310
  - MDG-MWRReg
  - MDG-MOsw
  - MDG-TAC410

No.	Contact Name	Call Type	Call ID	Call Receive Tone
1	WorldWide	Group Call	1	No
2	TG2	Group Call	2	No
3	NorthAmerica	Group Call	3	No
4	TG9	Group Call	9	No
5	MidwestRegional	Group Call	3169	No
6	WWEnglish	Group Call	13	No
7	UAEnglish1	Group Call	113	No
8	UAEnglish2	Group Call	123	No
9	TAC310	Group Call	310	No
10	MOStateWide	Group Call	3129	No
11	TAC410	Group Call	410	No
12	USA	Group Call	133	No
13	ILStateWide	Group Call	3117	No
14	Simplex	Group Call	99	No
15	Parriot	Group Call	9998	No
16	K4CHS-MAC	Private Call	1	No

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CPS MD\_380 - [Channels Information]

File Edit Program Setting View Window Help

CPS MD\_380

- Basic Information
- General Setting
- Menu Item
- Buttons Definitions
- Text Message
- Privacy Setting
- Digit Emergency System
- Digital Contacts
- Digital RX Group Lists
  - STL-MDG
- Zone Information
  - STL
- Scan List
  - STL
- Channels Information
  - MDG-WW
  - MDG-TG2
  - MDG-WWEng
  - MDG NA
  - MDG-UAE1
  - MDG-UAE2
  - MDG-TAC310
  - MDG-MWReg
  - MDG-MOsw
  - MDG-TAC410
  - MDG-USA
  - MDG-TG9

Digital/Analog Data

Channel Mode: Digital Channel Name: MDG-MOsw

Band Width: 12.5kHz RX Frequency(MHz): 442.70000

Scan List: STL TX Frequency(MHz): 447.70000

Squelch: Normal Admit Criteria: Color Code

RX Ref Frequency: Low Auto Scan:

TX Ref Frequency: Low Rx Only:

TOT[s]: 180 Lone Worker:

TOT Rekey Delay[s]: 0 VOX:

Allow Talkaround:

Power: High

Digital Data

Private Call Confirmed:

Emergency Alarm Ack:

Data Call Confirmed:

Compressed UDP Data Header:

Emergency System: None

Contact Name: MDStateWid

Group List: STL-MDG

Color Code: 2

Repeater Slot: 2

Privacy: None

Privacy No.: 1

Analog Data

CTCSS/DCS Dec: None CTCSS/DCS Enc: None

QT Reverse: 180 Tx Signaling System: Off

Rx Signaling System: Off  Reverse Burst/Turn-off Code

Display PTT ID

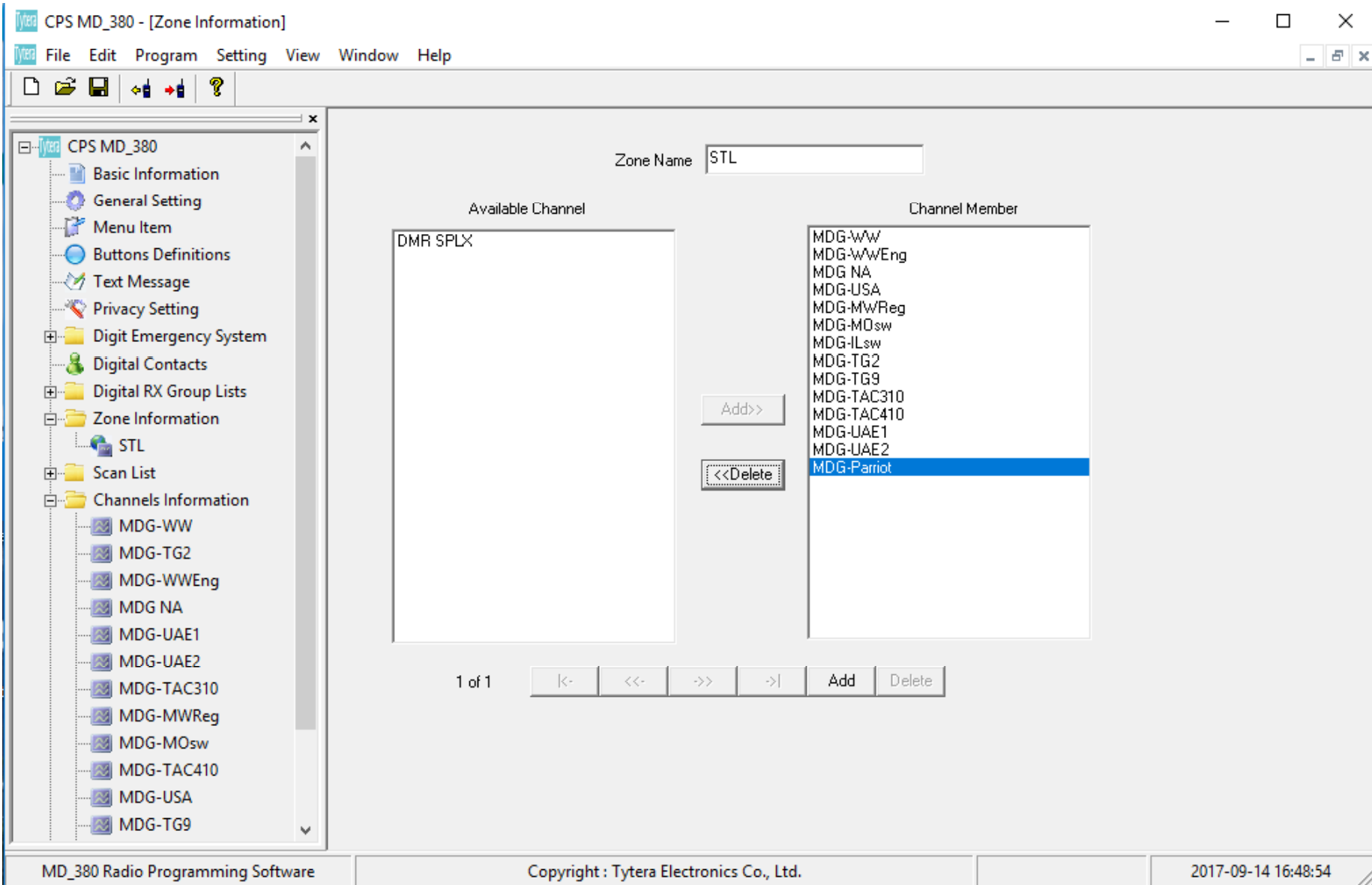
Decode 1  Decode 5

Decode 2  Decode 6

Decode 3  Decode 7

Decode 4  Decode 8

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- CPS MD\_380
  - Basic Information
  - General Setting
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  - Text Message
  - Privacy Setting
  - Digit Emergency System
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  - Zone Information
    - STL
    - NM-TX
    - IN
    - Indy
    - Dayton
    - KC BYRG
    - FL-1
    - OpnSpt
    - DV4
    - FL-2
    - STL2
    - Kettering
  - Scan List

Zone Name

Available Channel

- W0WJB-KC1
- W0WJB-KC2
- K0DAN-KC1
- K0DAN-KC2
- 446.000 SPX
- 448.325 SPX
- KU0G-M01
- KU0G-M02
- 441.0 DSplx
- 446.5 MWRRegL
- K0G0B 440
- ABQ-WW
- ABQ-Local
- ABQ-UAEng1
- ABQ-NorthAm
- Dallas-WW
- Dallas-Local
- ABQ-UAEng2
- ABQ Mega-Link
- 446.5 Simplx
- 441.0 SimplxL
- W0MDG-YF
- Muncie WW

Add>>

<<Delete

Channel Member

- KC-BYRG-WW
- KC-BYRG-NA
- KC-BYRG-USA
- KC-BYRG-M0
- KC-BYRG-BM
- KC-BYRG-L2
- KC-BYRG-L9
- KC-BYRG-KS
- KC-BYRG-US0
- KC-BYRG-310

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<- <<- ->> ->| Add Delete

# What is the best way to get Started?

- Get your DMR ID, <https://www.dmr-marc.net/cgi-bin/trbo-database/register.cgi>
- Start with someone else's Code Plug for your radio and enter your DMR ID
- Missouri Digital Group has a Code Plug for our repeater for the MD-380 and CS-800/CS-800D. Use that code plug as a starter and then modify from there.
- If you have a repeater in your area, get on the local Talk Groups and ask questions.
- See if a DMR programming class is available from a local club
- If you don't have a local repeater, get a hot spot.
- Remember, a DMR Code Plug is never done.

# For Fun and More Info

- Go the Brandmeister “Hoseline” to listen to DMR talkgroups on Brandmeister
  - <https://hose.brandmeister.network/>
  - Try TG 3100, that is the USA network, usually a lot of activity
- Websites to Explore
  - <https://www.dmr-marc.net/> DMR-MARC Website
  - <https://brandmeister.network/> Brandmeister Website
  - <http://ham-dmr.de/?lang=en> DMR Plus Website





# Thank-you

**Missouri Digital Group**  
**[www.modigitalgroup.org](http://www.modigitalgroup.org)**  
**[info@modigitalgroup.org](mailto:info@modigitalgroup.org)**

**D-Star – DMR - Fusion**