

DMR OPERATING BASICS & BEST PRACTICES

KØNGA MIKE

ROCKY MOUNTAIN HAM RADIO



MIKE'S DMR DOCTRINE

DMR was created for commercial use.

It was never designed nor intended for Amateur Radio use.

Some things about DMR are not going to make sense.

Accept this. It will make your life easier.



WHAT IS DMR/TRBO?

- DMR (Digital Mobile Radio) is an international commercial digital radio standard that originated in Europe
- TRBO refers to MotoTRBO which is Motorola's implementation of the DMR standard
- Many Amateur Radio repeater networks use MotoTRBO equipment, which is why they are commonly referred to as "TRBO" networks
- You do not need to use a Motorola MotoTRBO radio to use these networks



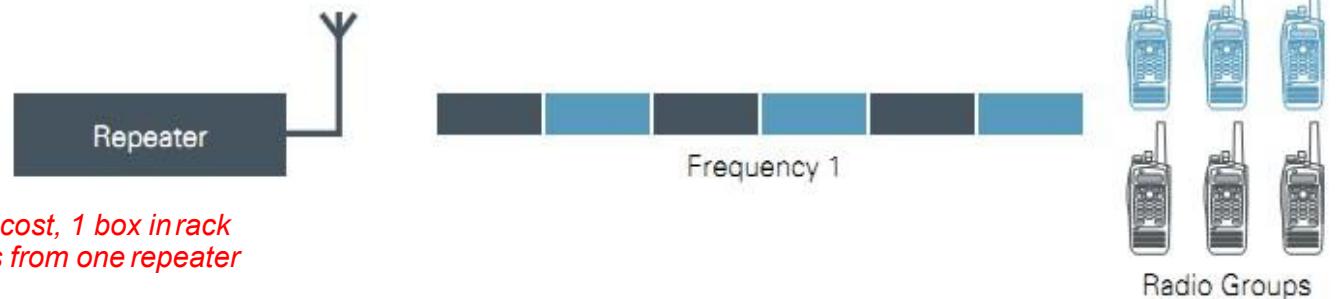
TWO REPEATERS IN ONE!

TDMA saves licensing and equipment costs by enabling the equivalent of two 6.25 kHz channels within a single licensed 12.5 kHz channel

Two-channel Analog or Digital FDMA System



Two-channel Digital TDMA System



*Lower infrastructure cost, 1 box in rack
TWO voice channels from one repeater*



NEW CONCEPTS

- Frequency Pair – not new
- Color Code – Functions similar to a CTCSS or DCS access tone
- Repeater Slot – Each DMR Repeater has two, you must specify which one to use
- Talk Group – Each repeater slot can be logically segmented further into talk groups
- Receive Group – List of talk groups to monitor on the channel's assigned repeater slot



GET A RADIO

- You must have a Tier 2 DMR Radio (very common)
- You get what you pay for
 - Low cost radios on the market are not created equal
 - Ask around about user experience
 - Newest radios take the longest to achieve broad support
- Feature sets can vary widely among manufacturers
- Choice of radio is mainly a matter of what is important to you. I'm a contact list junkie.
- Recommendation: Get a radio that has a sample codeplug available or is supported by the NOGSG utility.



GET A RADIO ID

- <https://www.radioid.net/> -> Register ID -> User Registration (at the bottom of the page)
- Everything works best when each radio has a unique ID
- Put your Radio ID in the codeplug and upload to the radio
- Radio ID is NOT a replacement for ID'ing. You must still ID vocally every 10 minutes per FCC regulations.



RADIO ID

Customer Programming Software - HAM2000 [Untitled.rdb] - [Setting]

File Edit Program Option View Tools Window Help

Setting

CS750

- Radio Information
- General Settings
 - Setting
 - Menu
 - Microphone/VOX
 - Buttons
 - One Touch Call
 - User Defined Tone
 - UI Indication
 - Conventional

Basic

Radio Alias [P.O.M Line 1] -> KONGA Mike <-

Power On Message Line 2 HELLO HAMCON!

Unique Radio ID 3108111

Squelch Normal Level 3

Squelch Tight Level 9

Radio Language English

Monitor Type Open Squelch

Tx Preamble Duration [ms] 960

Digital RX Voice Gain Level 6

Scan

Analog Hang Time [ms] 500

Digital Hang Time [ms] 500

Channel Display Mode

Auto Lock Keypad ☐

Auto Lock Delay Time [s] 5

Battery Save

Save Preamble ☒

Save Mode Receive ☒

Power-On Screen

Channel Display Mode Alias

Power Up Designated Zone Zone 1

Designated Home Zone Zone 1

TalkAround

Group Call Hang Time [ms] 3000

Private Call Hang Time [ms] 4000

Close Print Help

Edit - General settings - Setting - Basic Setting - Radio ID

Ready CS750 400-470 MHz USB 2016-04-04 08:45:06



LEVERAGE THE SAMPLE CODEPLUGS

- Available on the RMHAM Website
 - www.rmham.org
 - MotoTRBO/DMR -> Sample Codeplugs
- All RMHAM TRBO repeaters programmed in
- Quickest way to get on the air
- Use as a foundation for your own codeplug
- Use as a starting point for the N0GSG utility



TALK GROUPS AND REPEATER SLOTS

- Each repeater has 2 repeater slots (time slots)
- Each slot can handle 1 conversation at a time. Thus, each repeater can handle 2 simultaneous separate conversations
- Some networks allow multiple talk groups on the same repeater slot
- Only one talk group can be transmitting at a time on a single repeater slot
- It may be necessary to monitor the other talk groups on a repeater slot to determine if the slot is free to operate on



ID YOUR TALK GROUP

- When calling, identify which talk group you are transmitting on.
- “This is K-0-N-G-A on Rocky Mountain”
- Many Hams scan various channels and may want or need to turn scan off and tune to your channel to respond.
- If you don’t ID the talk group, the responding ham may not know which channel to tune to.



REPEATER NETWORKS

One of these things is not like the other...



WHAT IS A REPEATER NETWORK

A repeater network is comprised of two or more repeaters connected together in such a way that when one repeater receives a transmission, it is broadcast by the other connected repeaters to achieve a larger area of coverage

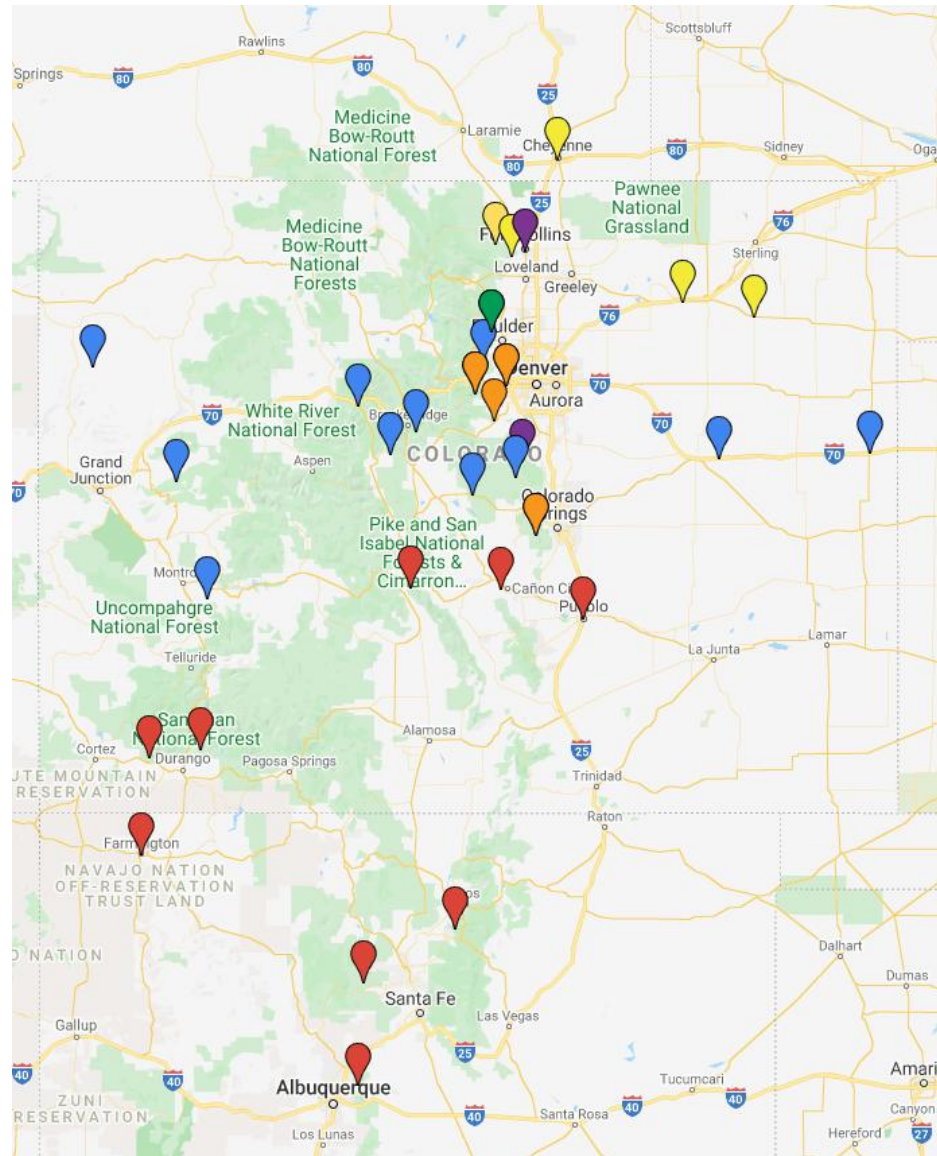


KNOW YOUR NETWORK

- Three most well-known DMR networks in Colorado:
 - Rocky Mountain Ham Radio (RMHAM)
 - DMR-MARC*
 - Brandmeister
- Each network works a little differently in how the repeaters interact with each other
- Read up on each network's website
- Know the difference between static and dynamic (user-activated) talk groups



RMHAM DMR MAP



RMHAM DMR NETWORK

- Five Original Talk Groups: Rocky Mountain (wide), North, South, Central, and Lookout Local
- Newer Talk Groups: Other “Local” TGs, Eastern (mostly VHF today), Four Corners, New Mexico, Southeast
- Use the smallest area coverage talk group necessary for contact
- For example: In Denver, the smallest talk group coverage is “Lookout Local” or “Devilshead Local” (one repeater each)
- Use Rocky Mountain to initiate contact, then move to a “smaller” talk group if possible
 - This leaves Rocky Mountain open for other Hams to make contact



BRANDMEISTER

- World Wide, MANY talk groups
- All Talk Groups are dynamic; A Talk Group can be made static on a repeater by the repeater operator
- All Talk Groups (unless made static on a repeater) are user activated
- Remote users cannot activate a Talk Group on a remote repeater
- Desired Talk Group must be programmed into the radio channel (with
 - some advanced exceptions)



BRANDMEISTER

- Two ways to access the Brandmeister network:
 - Traditional Repeater
 - Brandmeister site has a map of all repeaters
 - Work mostly like any other DMR repeater
 - Hotspot
 - Different types available
 - Short-range, only practical for personal use
 - OpenSpot currently to most widely used



NETWORKS OUTSIDE COLORADO

- Shameless plug for my Hotspot session
- Hotspots enable you to connect to repeater networks around the world
- Many, MANY networks available
- Secret: Other digital radio protocols exist, and the networks that support them
 - D-Star
 - C4FM/System Fusion
 - NXDN
 - P25
 - M17*



STUFF AND THINGS

- RMHAM Website – <http://www.rmham.org>
- Interactive DMR repeater map: <http://bit.ly/rmham-trbo-map>
- Radio ID – <https://www.radioid.net/>
- DMR-MARC Website – <http://www.dmr-marc.net>
- Brandmeister
 - Dashboard: <https://brandmeister.network/>
 - Audio Feeds: <http://hose.brandmeister.network/>
 - Wiki: <https://wiki.brandmeister.network>
- RMHAM DMR Tech Net
 - First Saturday of the Month, 7:00 PM, Rocky Mountain talk group
- Contact Me: K0NGA@arrl.net

