Digital Mobile (DMR) Fundamentals & Chicagoland Control Center

Patrick J. Brod

KB9ANL

Digital Mobile Radio (DMR) Fundamentals

- Presenter:
  - Patrick J. Brod – KB9ANL
  - 10 years in Wireless/Cellular Communications
  - 25 years with Telecom Core & Transport Communications
  - Ham Radio operator for 35 years working with analog and digital repeaters
  - Director of FishFar Radio Group
  - Advocate of DMR Chicagoland Control Center, Network Architected by Todd Miller – WB9PHK

Review of Analog Repeater Operations

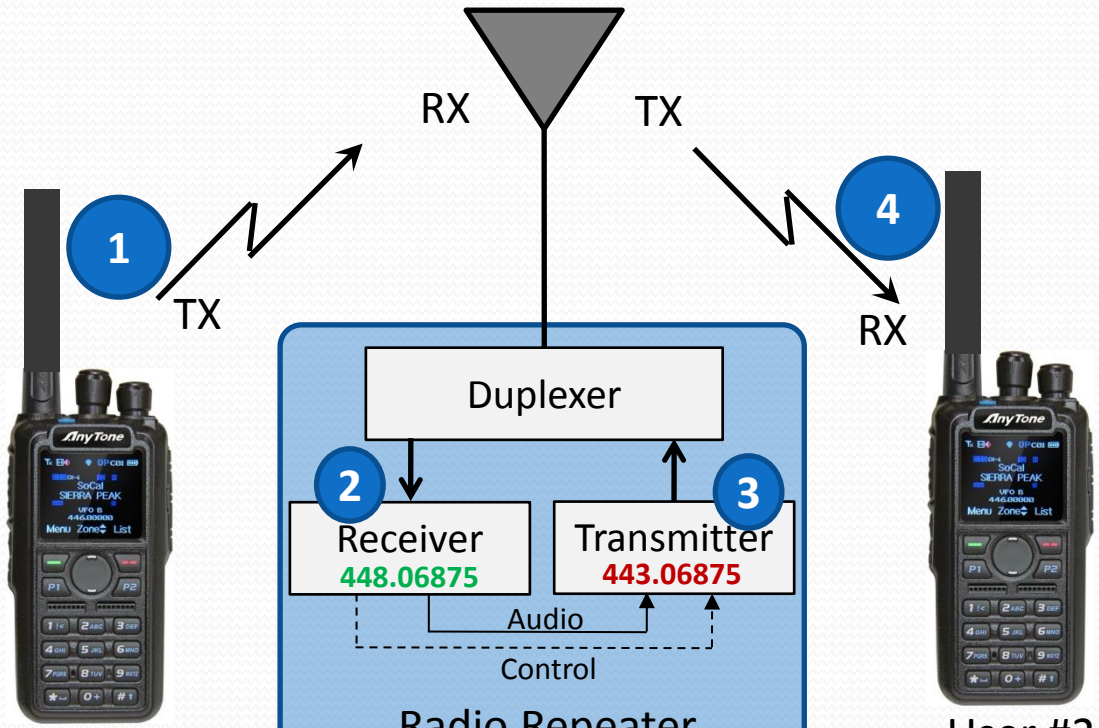
Analog Repeater Operations

- Repeater provides longer distance communications between radio operators than point-to-point simplex operation

- Repeater Offset
  - The different Transmit & Receive frequencies for repeater operation
  - The frequency difference or “Offset” has been standardized by ham radio repeater frequency coordinator (e.g., Illinois Repeater Association)

- CTCSS or PL Tone (Continuous Tone-Coded Squelch System / Private Line)
  - Prevent interference from neighboring repeater frequencies
  - Prevent repeaters in different geographic areas interfering with each other
  - Prevent other man-made noises from interfering with repeater operation

Analog Repeater Operations



User #1
RX = 443.06875
TX = 448.06875
PL=114.8

User #2
RX = 443.06875
PL=114.8
TX = 448.06875

- Example shows a single repeater being utilized by two radio operators.
- Notice the calling sequence from radio User #1 to User #2:
  1. Radio User #1 calls Radio User #2
  2. Repeater receives User #1 on RX 448.06875 Mhz
  3. Repeater transmits TX 443.06875 Mhz User #1 information
  4. User #2 receives the repeater information from User #1

PL Tone: Standard PL Tone is used from radio User #1 to the repeater and repeater uses PL Tone to radio User #2.

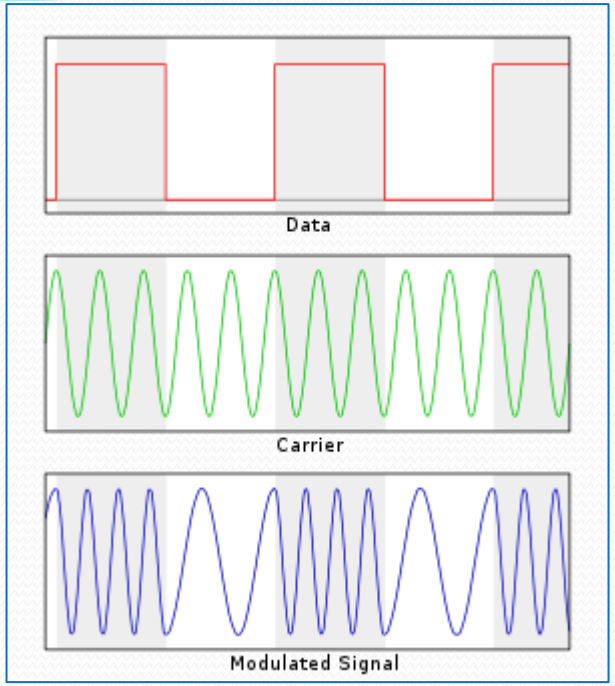
Digital Mobile Radio (DMR) Fundamentals

DMR Terminology

- Contact List
  - When the radio receives a DMR radio ID, the radio will try to find the DMR ID in the contact list
  - If the DMR ID is found, the Contact Name is displayed in place of the DMR ID
  - If the DMR ID is not in the contact list, the radio displays the seven-digit DMR ID
- Channel
  - Channels are specific frequencies assigned in radio memory. Each channel defines the radio parameters like modulation type (analog or digital), frequency, time-out-timer setting, power level settings, and scan lists. It ties together DMR specific settings like Color Code, time slot, digital contacts, and Talk Groups.
- Zone
  - A Zone is a way of organizing channels. Most radios allow a quantity of channels per zone. Channels not included in a zone cannot be selected on the radio. There can be one or many zones per repeater or hotspot. There is no limit to how channels are arranged within a zone.
  - Zones are selected through the radio's menu. When a new zone is selected, channels assigned to that zone become positions on the channel selection knob.
- Color Code
  - There are 16 possible Color Codes, 0-15. A DMR repeater cannot be Color Code-less. Like PL, the radio Color Code must match the repeater Color Code or the repeater cannot be accessed.

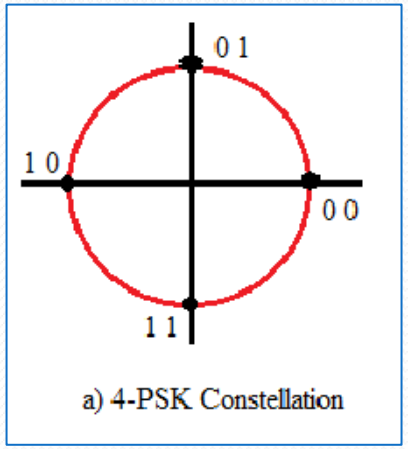
DMR Facts & Benefits

- Air interface specification for Land Mobile radio equipment
- 2 Time Slot – Time Division Multiple Access (TDMA)
- Channel bandwidth → 12.5 Khz [6.25Khz per Time Slot]
- Digital modulation scheme → 4FSK
- Frequency range 30Mhz – 1Ghz
- Amateur radio utilizes Tier II DMR AMBE+2 Vocoder

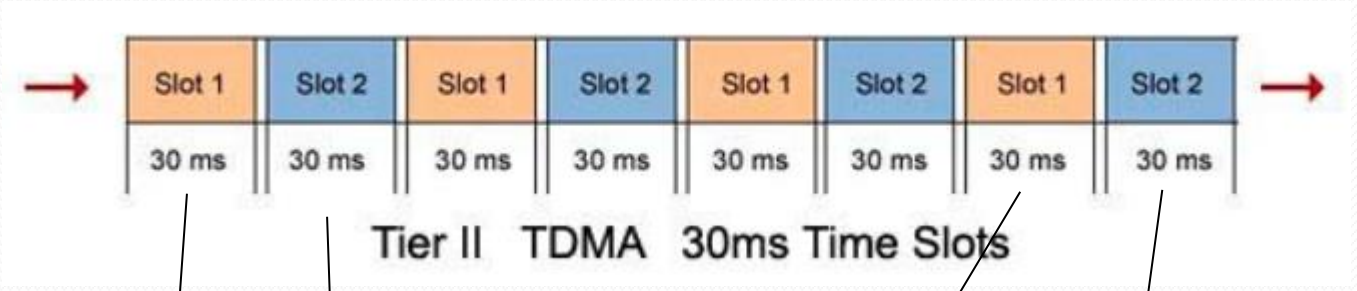


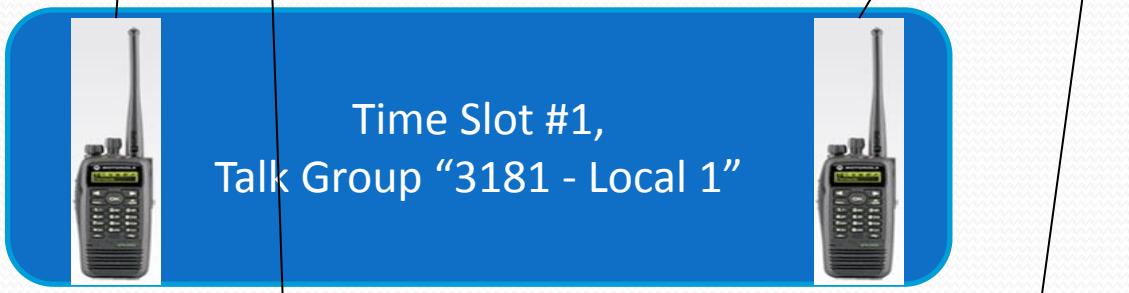
<u>Benefits</u>

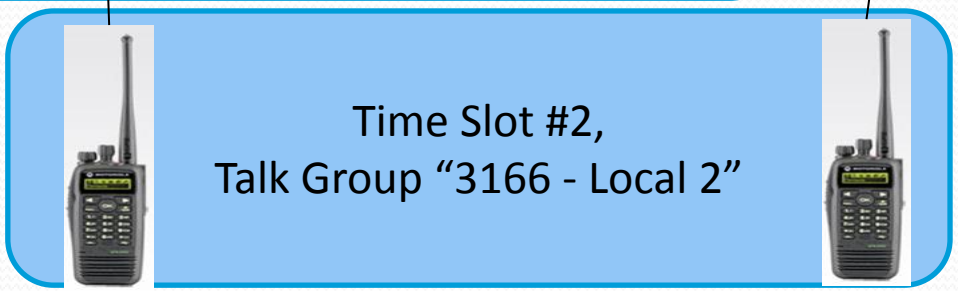
- Two (2) simultaneous conversations from single repeater
- Improved audio performance over FM analog
- More efficient use of RF spectrum
- Less power consumption than FM
- Allows easy integration into existing analog frequency band plans



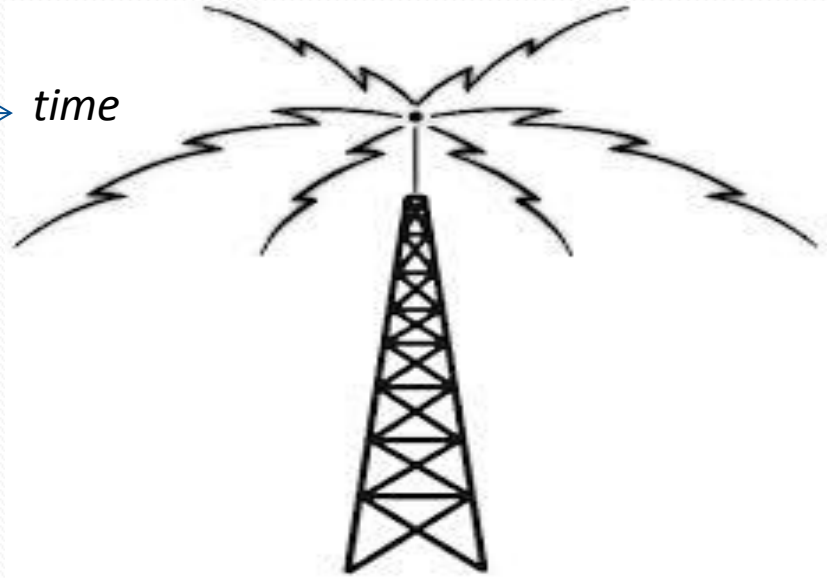
Two Conversations per One Transmitter



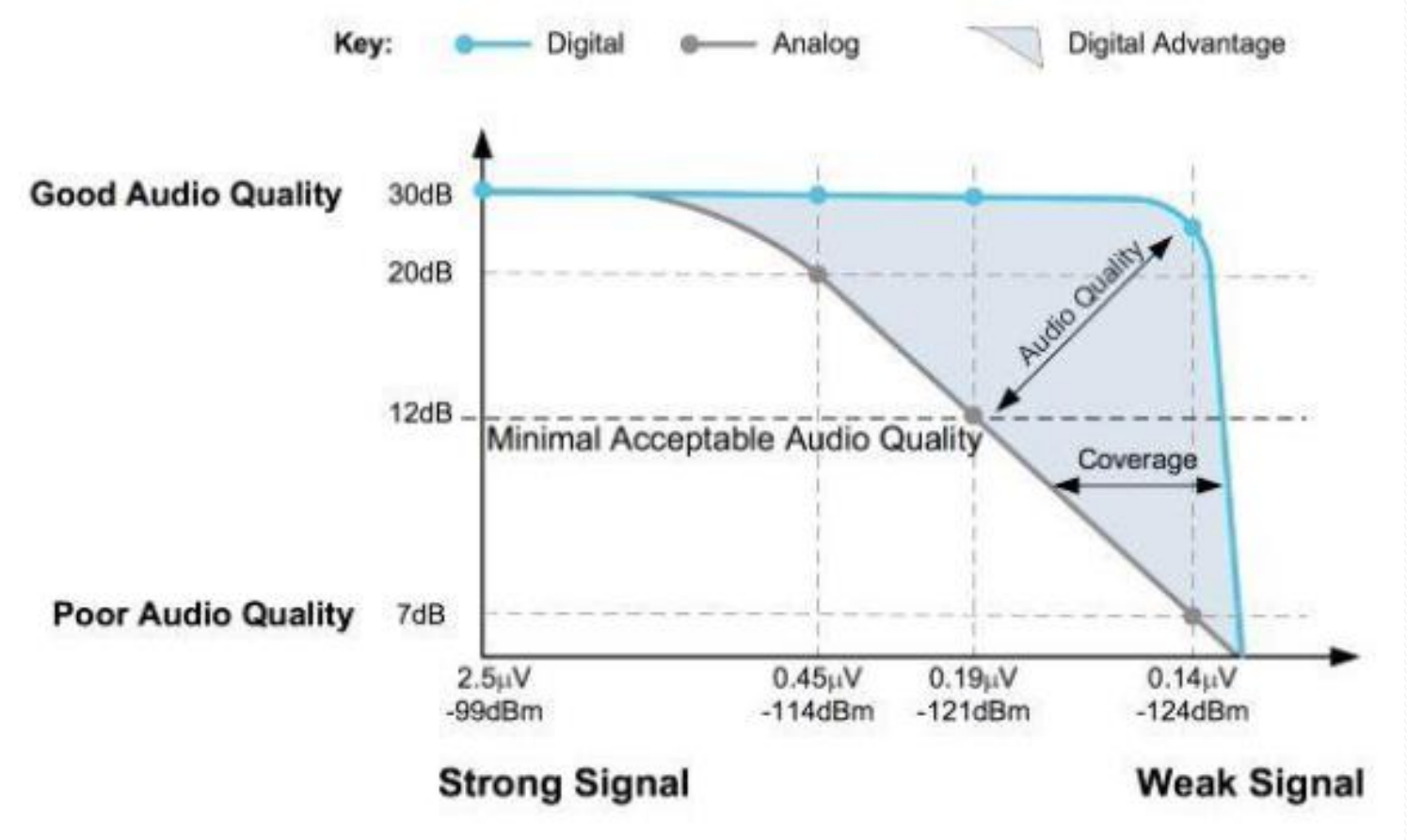




time

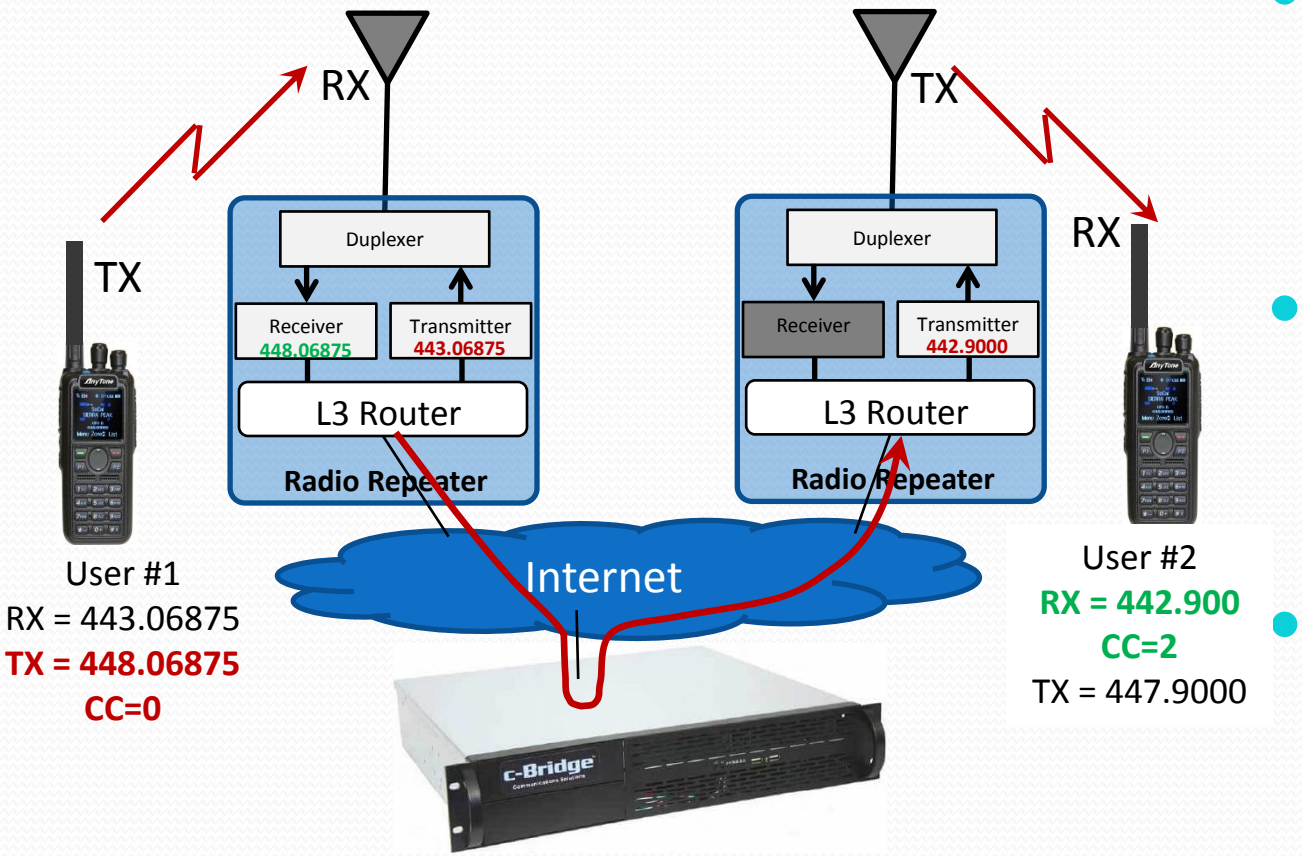


Improved Voice Performance



DMR Repeater Networks
How Do They Work?

DMR Repeater Networks



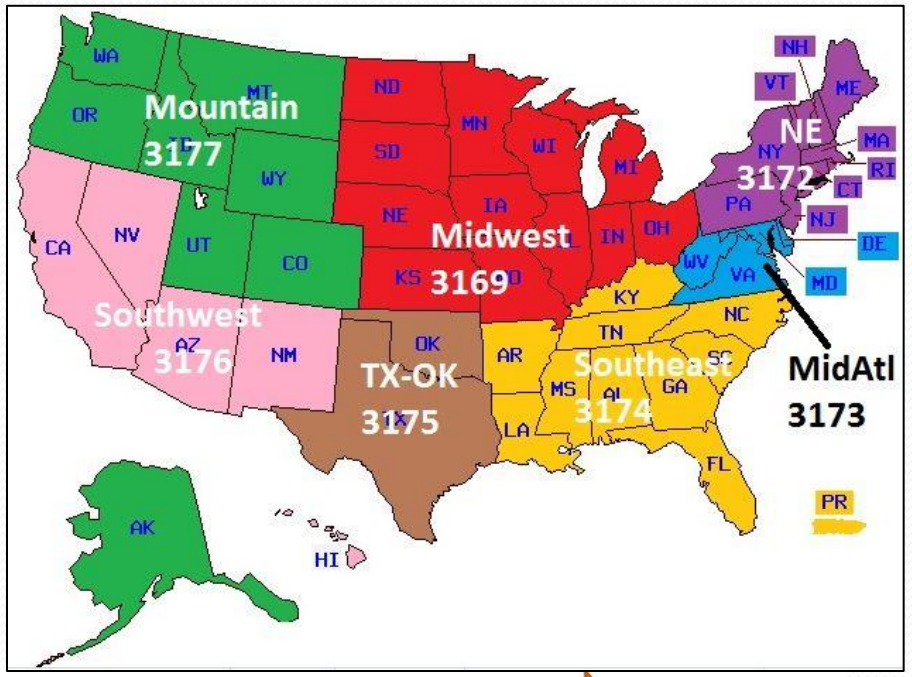
- DMR repeaters do not need separate radio dedicated back-bone networks to communicate between each other.
- The “C-Bridge” provides repeater call routing between all repeaters connected to it.
- Network C-Bridges interconnect between other networks (e.g., MARC, Brandmeister, others)

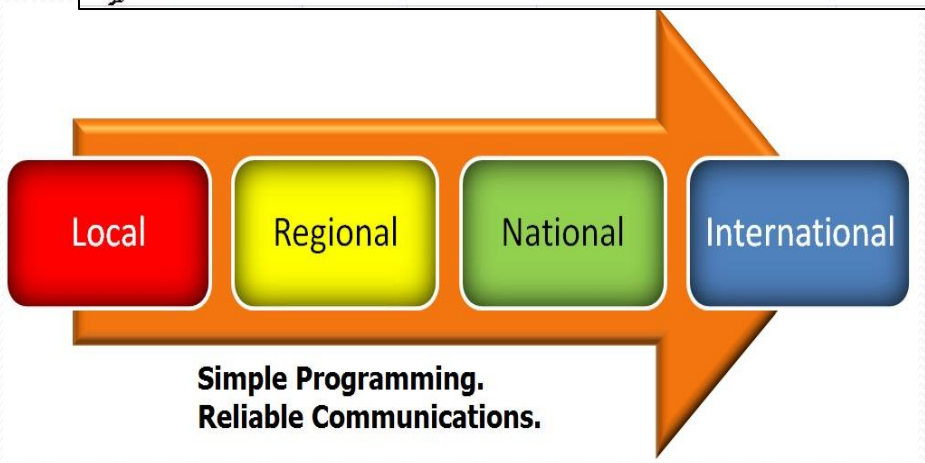
DMR Repeater Networks

- So the possibilities on how many repeaters becomes only limited to the number of C-Bridge ports.

- "**Talk Groups**" are used on both Time Slots 1 & 2.
  - Local geographic (e.g. Chicago) metro
  - Metro to Metro (e.g. Chicago to Wisconsin)
  - Metro to other USA cities
  - Cities to other countries

- Also see web sites for more details:
  - http://chicagoland-cc.org
  - http://www.dmr-marc.net
  - https://brandmeister.network/





Talk Groups

- Each “Talk Group” is given a unique identifier to separate a group of users from others using the same or different Time Slot.

Example [Chicagoland]

- If a ham radio user was in Chicago and only wanted to talk to people in Chicago metro, they would use TG = 3166 (Local 2).

- And while people in Chicago are using TG=3166 (Local 2), others could use a different Talk Groups, for example TG=3106 (California 1), to communicate from Chicago to California.

- Simultaneous conversations are on different Time Slot #1 & #2

NOTE

- Users can operate on the same Time Slot using different Talk Groups but will have to wait for one group to pause or stop before the other group can use the Time Slot. When the Time Slot is busy and a user tries to access the network, their radio will provide an audible tone indicating the channel is busy.

Talk Group 3166 (Local 2)

Talk Group 3106
(California 1)

Push To Talk (PTT) Timers

- What are Push To Talk Timers?
  - A way to limit the amount of time a Talk Group will be active to specific set of repeaters controlled by a C-Bridge.

- How do I activate a PTT?
  - Select the Talk Group, press the Push to Talk on your radio (prefer you identify yourself), and the Timer for that Talk Group will begin.
  - The TG will become active for the remaining time (e.g. 15 minutes) from last PTT conversation.
  - When time expires, the connection to the group of repeaters is turned off.

Chicagoland Talk Group Chart

https://wp.chicagoland-cc.org/wp-content/uploads/2023/01/ChicagoLand-Updates-01-16-23_publish.pdf

on	Always on
15	15 min PTT
2	2 min PTT
5	5 min PTT
na	Not available
	No connection to c-bridge
	No connection available for cbridge

Timeslot #1	Local 1 (3181) -- ChicagoLand	Illinois 1 (3117) -- ChicagoLand	Wisconsin 1 (3155) -- ChicagoLand	Comm 1 (3777215) -- DMRX	Arizona 1 (3104) -- BM	California 1 (3106) -- BM	Florida (3112) -- BM	Georgia 1 (3113) -- K4USD	Indiana (3118) -- BM	Iowa (3119) -- BM	Kentucky 1 (3121) -- K4USD	Maryland (3124) -- BM	Massachusetts 1 (3125) -- DMRX	Michigan 1 (3126) -- MotoDMR	Missouri 1 (3129) -- BM	Minnesota 1 (3127) -- K4USD	Ohio 1 (3139) -- K4USD	Oklahoma 1 (3140) -- BM	Pennsylvania 1 (3142) -- DMRX	Tennessee 1 (3147) -- BM	Dallas Local 1 (2) -- LoneStar	Texas 1 (3148) -- LoneStar	Virginia (3151) -- BM	Washington 1 (3153) -- DMRX	Washington DC (3111) -- BM	West Central Florida (2) -- MotoDMR	Mid Atlantic Region (3173) -- MARC	Mountain Region (3177) -- MARC	Northeast Region (3172) -- MARC	Southern Region (3175) -- MARC	Southeast Region (3174) -- MARC	Southwest Region (3176) -- MARC	UA English 1 (113) -- MARC	TAC 312 1 (312) -- BM	TAC 317 1 (317) -- K4USD	Allstar 1 (3167) -- Chi-DMR	EchoLink-IRLP 1 (63951) -- CR	Fusion - Illinois 1 (31171) -- BM	Fusion - Wisconsin 1 (31551) -- BM
Schaumburg IL (VHF)	5	5	15	on	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	na	15	15	15	15	15	15	5	5	5	15	15	15	15
Schaumburg IL (UHF)	on	on	15	on	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	na	15	15	15	15	15	15	5	5	5	15	15	15	15
Schaumburg IL (900)	5	5	15	on	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	na	15	15	15	15	15	15	5	5	5	15	15	15	15
Mundelein IL	on	on	15	on	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	na	15	15	15	15	na	15	15	15	15	15	15	15	15	15	15	15	15	15
Batavia IL	on	on	15	on	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	na	15	15	15	15	na	15	15	15	15	15	15	15	15	15	15	15	15	15
Mobile Repeater	on	on	on	on	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	na	15	15	15	15	15	15	15	15	15	15	15	15	15
Aurora IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Belvidere IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Winnebago IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Chicago IL (Loop)	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Algonquin IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Bolingbrook	on	15	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Wauconda IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Plato Center IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Lockport IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	on	na	na	na	na
New Lenox IL	na	na	na	na	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	on	na	na	na	na
McCook IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	15	na
Rockford IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	15	na
Elburn IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Plano IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Greenville IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	on	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Coloma WI	on	15	on	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	15
Fond du Lac WI	on	15	on	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Sturtevant (900)	12 hr	15	on	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Milwaukee WI	on	15	on	on	15	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	15
Waterford WI	15	15	on	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Walworth WI	on	15	on	on	15	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	15
Racine WI (900)	12 hr	15	on	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Racine WI (UHF)	on	15	on	on	15	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	15	15	15	na	15	15	15	15	15	15	15	15	15	15	15	na	15
Kenosha, WI (900)	12 hr	15	on	on	15	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	15
Wausau WI	15	15	on	on	15	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Madison WI	on	15	on	on	15	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	15

Timeslot #2	Local 2 (3166) -- ChicagoLand	MidWest 2 (3169) -- MARC	Comm 2 (3777216) -- DMRX	Bridge 2 (3100) -- BM	TAC1 2 (8951) -- DMRX	TAC310 2 (310) -- BM	TAC311 2 (311) -- BM	Parrot 2 (9998) -- DMRX	Audio Test 2 (9999) -- DMRX	UA English 2 (123) -- MARC	1776 (1776) -- MIT	NA 2 (3) --- MARC	WWe 2 (13) --- MARC	WW 2 (1) --- MARC
Schaumburg IL (VHF)	on	on	on	5	5	2	2	2	2	5	15	5	5	5
Schaumburg IL (UHF)	on	on	on	2	5	2	2	2	2	5	15	5	5	5
Schaumburg IL (900)	on	on	on	5	5	2	2	2	2	5	15	5	5	5
Mundelein IL	on	on	on	15	15	15	15	2	2	15	15	5	15	15
Batavia IL	on	on	on	15	15	15	15	2	2	15	15	5	15	15
Mobile Repeater	on	on	on	15	15	15	15	2	2	15	15	5	15	15
Aurora IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Belvidere IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Winnebago IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Chicago IL (Loop)	on	15	on	15	15	15	2	2	2	15	15	15	15	15
Algonquin IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Bolingbrook	on	on	on	15	15	15	2	2	2	15	15	15	15	15
Wauconda IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Plato Center IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Lockport IL	on	on	on	15	15	2	15	2	2	15	15	15	15	15
New Lenox IL	on	15	na	15	15	5	15	2	2	15	na	15	15	15
McCook IL	on	on	on	15	15	3	15	2	2	15	15	15	15	15
Rockford IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Elburn IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Plano IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Greenville IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Coloma WI	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Fond du Lac WI	15	on	on	15	15	15	15	2	2	15	15	15	15	15
Sturtevant (900)	12 hr	on	on	15	15	15	15	2	2	15	15	15	15	15
Milwaukee WI	on	on	on	15	15	2	2	2	2	15	15	15	15	15
Waterford WI	15	on	on	15	15	15	15	2	2	15	15	15	15	15
Walworth WI	15	on	on	15	15	2	2	2	2	15	15	15	15	15
Racine WI (900)	12 hr	on	on	15	15	15	15	2	2	15	15	15	15	15
Racine WI (UHF)	on	on	on	15	15	10	10	2	2	15	15	15	15	15
Kenosha, WI (900)	12 hr	on	on	15	15	15	15	2	2	15	15	15	15	15
Wausau WI	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Madison WI	on	on	on	15	15	15	15	2	2	15	15	15	15	15

Chicagoland Talk Group Chart

	on	Always on					15	15 min PTT				2	2 min PTT				5	5 min PTT			na	Not available					No connection to c-bridge									No connection ava		
Timeslot #1	Local 1 (3181) -- ChicagoLand	Illinois 1 (3117) -- ChicagoLand	Wisconsin 1 (3155) -- ChicagoLand	Comm 1 (3772215) -- DMRX	Arizona 1 (3104) -- BM	California 1 (3106) -- BM	Florida (3112) -- BM	Georgia 1 (3113) -- K4USD	Indiana (3118) -- BM	Iowa (3119) -- BM	Kentucky 1 (3121) -- K4USD	Maryland (3124) -- BM	Massachusetts 1 (3125) -- DMRX	Michigan 1 (3126) -- MotoDMR	Missouri 1 (3129) -- BM	Minnesota 1 (3127) -- K4USD	Ohio 1 (3139) -- K4USD	Oklahoma 1 (3140) -- BM	Pennsylvania 1 (3142) -- DMRX	Tennessee 1 (3147) -- BM	Dallas Local 1 (2) -- LoneStar	Texas 1 (3148) -- LoneStar	Virginia (3151) -- BM	Washington 1 (3153) -- DMRX	Washington DC (3111) -- BM	West Central Florida (2) -- MotoDMR	Mid Atlantic Region (3173) -- MARC	Mountain Region (3177) -- MARC	Northeast Region (3172) -- MARC	Southern Region (3175) -- MARC	Southeast Region (3174) -- MARC	Southwest Region (3176) -- MARC	UA English 1 (113) -- MARC	TAC 312 1 (312) -- BM	TAC 317 1 (317) -- K4USD	Allstar 1 (3167) -- Chi-DMR	EchoLink-IRLP 1 (63951) -- CR	Fusion - Illinois 1 (31171) -- BM	Fusion - Wisconsin 1 (31551) -- BM
Schaumburg IL (VHF)	5	5	15	on	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	na	15	15	15	15	15	15	5	5	5	15	15	15	15
Schaumburg IL (UHF)	on	on	15	on	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	na	15	15	15	15	15	15	5	5	5	15	15	15	15
Schaumburg IL (900)	5	5	15	on	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	na	15	15	15	15	15	15	5	5	5	15	15	15	15
Mundelein IL	on	on	15	on	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	na	15	15	15	15	15	na	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Batavia IL	on	on	15	on	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	na	15	15	15	15	15	na	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Mobile Repeater	on	on	on	on	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	na	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Aurora IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Belvidere IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Winnebago IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Chicago IL (Loop)	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Algonquin IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Bolingbrook	on	15	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Wauconda IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Plato Center IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	na	na
Lockport IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	on	na	na	na	na
New Lenox IL	na	na	na	na	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	on	na	na	na	na
McCook IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	15	na
Rockford IL	on	on	15	on	na	15	15	15	15	15	15	na	15	15	na	15	15	na	15	15	na	15	na	15	na	na	15	15	15	15	15	15	15	15	15	15	15	15	na

Chicagoland Talk Group Chart

vailable for cbridge

Timeslot #2	Local 2 (3166) -- ChicagoLand	MidWest 2 (3169) -- MARC	Comm 2 (3777216) -- DMRX	Bridge 2 (3100) -- BM	TAC1 2 (8951) -- DMRX	TAC310 2 (310) -- BM	TAC311 2 (311) -- BM	Parrot 2 (9998) -- DMRX	Audio Test 2 (9999) -- DMRX	UA English 2 (123) -- MARC	1776 (1776) -- MIT	NA 2 (3) --- MARC	WWe 2 (13) --- MARC	WW 2 (1) --- MARC
Schaumburg IL (VHF)	on	on	on	5	5	2	2	2	2	5	15	5	5	5
Schaumburg IL (UHF)	on	on	on	2	5	2	2	2	2	5	15	5	5	5
Schaumburg IL (900)	on	on	on	5	5	2	2	2	2	5	15	5	5	5
Mundelein IL	on	on	on	15	15	15	15	2	2	15	15	5	15	15
Batavia IL	on	on	on	15	15	15	15	2	2	15	15	5	15	15
Mobile Repeater	on	on	on	15	15	15	15	2	2	15	15	5	15	15
Aurora IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Belvidere IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Winnebago IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Chicago IL (Loop)	on	15	on	15	15	15	2	2	2	15	15	15	15	15
Algonquin IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Bolingbrook	on	on	on	15	15	15	2	2	2	15	15	15	15	15
Wauconda IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Plato Center IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Lockport IL	on	on	on	15	15	2	15	2	2	15	15	15	15	15
New Lenox IL	on	15	na	15	15	5	15	2	2	15	na	15	15	15
McCook IL	on	on	on	15	15	3	15	2	2	15	15	15	15	15
Rockford IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15

Elburn IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Plano IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Greenville IL	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Coloma WI	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Fond du Lac WI	15	on	on	15	15	15	15	2	2	15	15	15	15	15
Sturtevant (900)	12 hr	on	on	15	15	15	15	2	2	15	15	15	15	15
Milwaukee WI	on	on	on	15	15	2	2	2	2	15	15	15	15	15
Waterford WI	15	on	on	15	15	15	15	2	2	15	15	15	15	15
Walworth WI	15	on	on	15	15	2	2	2	2	15	15	15	15	15
Racine WI (900)	12 hr	on	on	15	15	15	15	2	2	15	15	15	15	15
Racine WI (UHF)	on	on	on	15	15	10	10	2	2	15	15	15	15	15
Kenosha, WI (900)	12 hr	on	on	15	15	15	15	2	2	15	15	15	15	15
Wausau WI	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Madison WI	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Allenton WI	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Baraboo WI	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Menomonee Falls WI	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Oshkosh WI	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Punta Gorda FL	on	15	on	15	15	15	15	2	2	15	15	15	15	15
Gary IN (UHF)	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Dayton MN	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Gary IN (VHF)	on	on	on	15	15	15	15	2	2	15	15	15	15	15
Floyds Knobs	on	15	on	15	15	15	15	2	2	15	15	15	15	15
Sioux Falls SD	on	on	on	2	5	2	2	2	2	5	15	5	5	5
Hurst TX	on	15	on	15	15	15	15	2	2	15	15	15	15	15
Bessemer MI	on	15	on	15	15	15	15	2	2	15	15	15	15	15
Bastrop TX	on	15	on	15	15	15	15	2	2	15	15	15	15	15
RDAC Reserved														

Local FRRL Repeaters

C-Bridge Name	ID	City	State/Prov	Country	Tx Freq	Color	Offset	Timeslot	Trustee	Network
Aurora IL	**311719**	Aurora	Illinois	United States	**443.42500**	**1**	+5	TS1 TS2	W9LSL	ChicagoLand
Batavia IL	**311713**	Batavia	Illinois	United States	**443.08125**	**1**	+5	TS1 TS2	WB9PHK	ChicagoLand
Dundee IL	**2**	East Dundee	Illinois	United States	**443.06875**	**0**	+5	TS1 TS2	WB9PHK	ChicagoLand - RX site
Elburn IL	**311759**	Elburn	Illinois	United States	**443.64375**	**6**	+5	TS1 TS2	W9XA	ChicagoLand
Lockport IL	**311737**	Lockport	Illinois	United States	**443.22500**	**2**	+5	TS1 TS2	N2BJ	ChicagoLand
New Lenox IL	**311738**	New Lenox	Illinois	United States	**444.40000**	**2**	+5	TS1 TS2	N2BJ	ChicagoLand
Plano IL	**311760**	Plano	Illinois	United States	**443.65625**	**6**	+5	TS1 TS2	W9XA	ChicagoLand
Plato Center IL	**311728**	Plato Center	Illinois	United States	**444.97500**	**1**	+5	TS1 TS2	WR9ABQ	ChicagoLand
West Chicago IL	**6**	West Chicago	Illinois	United States	**443.06875**	**0**	+5	TS1 TS2	WB9PHK	ChicagoLand - RX site-2

Chicagoland Control Center Coverage Maps

https://wp.chicagoland-cc.org/?page_id=107

NOTE – Chicagoland CC Specifics

- TS2 typically local communications within Chicago Metro area.
- TS1 typically broader communications anywhere.
- Local repeater operation only with TG 9, TS 1

Radio Verification with DMR Chicagoland C.C. Network

Verification of DMR Radio Programming

- Connect to Chicagoland Control Center – Call Watch website
  - http://Chicagoland**.dyndns.org:42420/CallWatch**
  - Transmit and what for your Name, Call Sign and other DMR information
  - Verify everything looks as your radio display name states & observe your signal strength into the repeater

- Use DMR Radio Promiscuous Mode
  - Useful if you want to receive all Time Slot #1 & #2 communications
  - Talk Group ID's are ignored but shown separately on radio display

Chicagoland C.C. Call Watch

http://Chicagoland.dyndns.org:42420/CallWatch

Rayfield Communications

Control Center ChicagoLand

19:12:05 Ma

Accept text | Reject text

start time	duration	source peer alias	source radio alias	dest. bridge group	RSSI (dBm)	site name	loss rate
19:11:54.4 Mar 5	9.659	BM3102 - -- 393102	VE3RVV - Rick - Pictou Landing Nova Scotia Canada -- 3024374	BM-WW CC BM	0.000	BM-US-3102	0.0%
19:11:59.2 Mar 5	4.784	KA0JSW - Newport Pennsylvania United States -- 312484	N3CMY - Larry A - Millerstown Pennsylvania United States -- 3131697	TAC 314 CC Interstate	0.000	Interstate Network	0.0%

start time	duration	source peer alias	source radio alias	dest. bridge group	RSSI (dBm)	site name	loss rate
19:11:44.7 Mar 5	8.993	N3TWT - Landisburg Pennsylvania United States -- 314264	KC3OXD - Michael - Carlisle Pennsylvania United States -- 3167563	TAC 314 CC Interstate	-86.4	Interstate Network	0.0%
19:09:35.8 Mar 5	9.799	BM3102 - -- 393102	AA4GH - Gus - Punta Gorda Florida United States -- 3191794	BM-WW CC BM	0.000	BM-US-3102	0.0%
19:09:36.4 Mar 5	3.617	N3TWT - Landisburg Pennsylvania United States -- 314264	KC3OXD - Michael - Carlisle Pennsylvania United States -- 3167563	TAC 314 CC Interstate	-88.8	Interstate Network	0.0%
19:09:28.0 Mar 5	4.313	BM3102 - -- 393102	VE3RVV - Rick - Pictou Landing Nova Scotia Canada -- 3024374	BM-WW CC BM	0.000	BM-US-3102	0.0%
19:09:12.8 Mar 5	5.78	BM3102 - -- 393102	AA4GH - Gus - Punta Gorda Florida United States -- 3191794	BM-WW CC BM	0.000	BM-US-3102	0.0%
19:09:03.5 Mar 5	6.170	WB9PHK - Batavia Illinois United States -- 311713	KB9ANL - Patrick - West Chicago Illinois United States -- 3117314	Site Local-9 1-9	-110.0	ChicagoLand	0.0%

Radio ID	CALLSIGN	Name	City	State/Prov	Country	Last Heard	Last TG
3117314	KB9ANL	Patrick Brod	West Chicago	Illinois	United States	2023-02-28 22:12:32	310

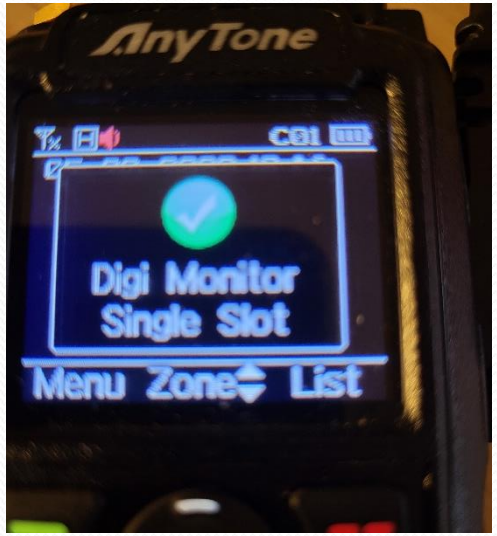
Call Watch / Traffic Monitoring

Description	Web Address
Call Watch	http://chicagoland.dyndns.org:42420/CallWatch
CHI-DMR	http://99.117.13.13:42420/CallWatch
PEER WATCH	http://chicagoland.dyndns.org:42420/PeerWatchFrame
MOTODMR	http://primary.motodmr.net:42420/CallWatch
MARK DMR +	http://44.48.48.20/ipsc/
BrandMeister Monitoring (hoseline)	https://hose.brandmeister.network/

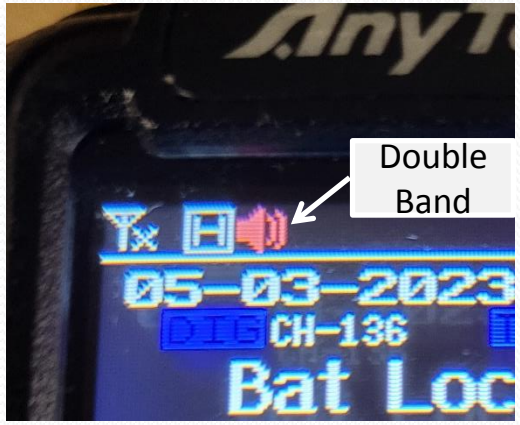
Chicagoland CC
https://wp.chicagoland-cc.org/?page_id=52

Promiscuous Modes w/AT-878 or 578

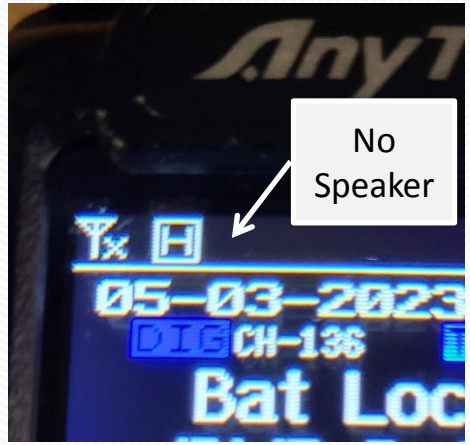
Single Slot Monitor



Double Slot Monitor



Normal RX



Thank You for attending

the Chicagoland DMR

Fox River Radio League

Program March 16th, 2023

Presentation Outline

DMR Fundamentals & Chicagoland Network

- Introduction of myself
- Review of analog repeaters
  - Uplink/Downlink Frequencies & Offset
  - PL/CTCSS Tone
- DMR Fundamentals
  - Contact List – What is contact list?
  - Channel – What is it?
  - Zone – Why do radios have a “zone” and what is it?
  - Color Code – What is it important?
- How DMR Repeaters & Inter-connect Networks Work
  - Repeater Comms via C-Bridge
  - Talk Groups
  - Push To-Talk Timers (PTTs)
  - Chicagoland Control Center Charts
    - Repeater Freqs, Talk Groups, PTTs, other
  - Chicagoland area repeaters
  - Verifying Your DMR Radio Communications in Chicagoland network