Introduction to DMR

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Today’s Session – DMR

- What Is DMR
- How Does It Work
- Configuration
- Amateur Radio Use

What Is DMR

What Is DMR

- Digital Mobile Radio
- Standard Defined by European Telecommunications Standards Institute
  - Digital System
    - Improved Audio Quality
    - Improved Battery Performance
    - Better Range
  - Open Standard
  - Low Complexity / Low Cost

What is DMR - Continued

- DMR Association
  - AnyTone
  - EF Johnson
  - ICOM
  - Kenwood
  - Motorola
  - NOT Yaesu

How Does It Work

How Does It Work

- Tiers
  - Tier I
    - Non-Professional
    - Europe Only
    - License Free
    - 446 MHz
    - 12.5 kHz (Narrow FM)
    - Low Power (0.5W)

How Does It Work - Continued

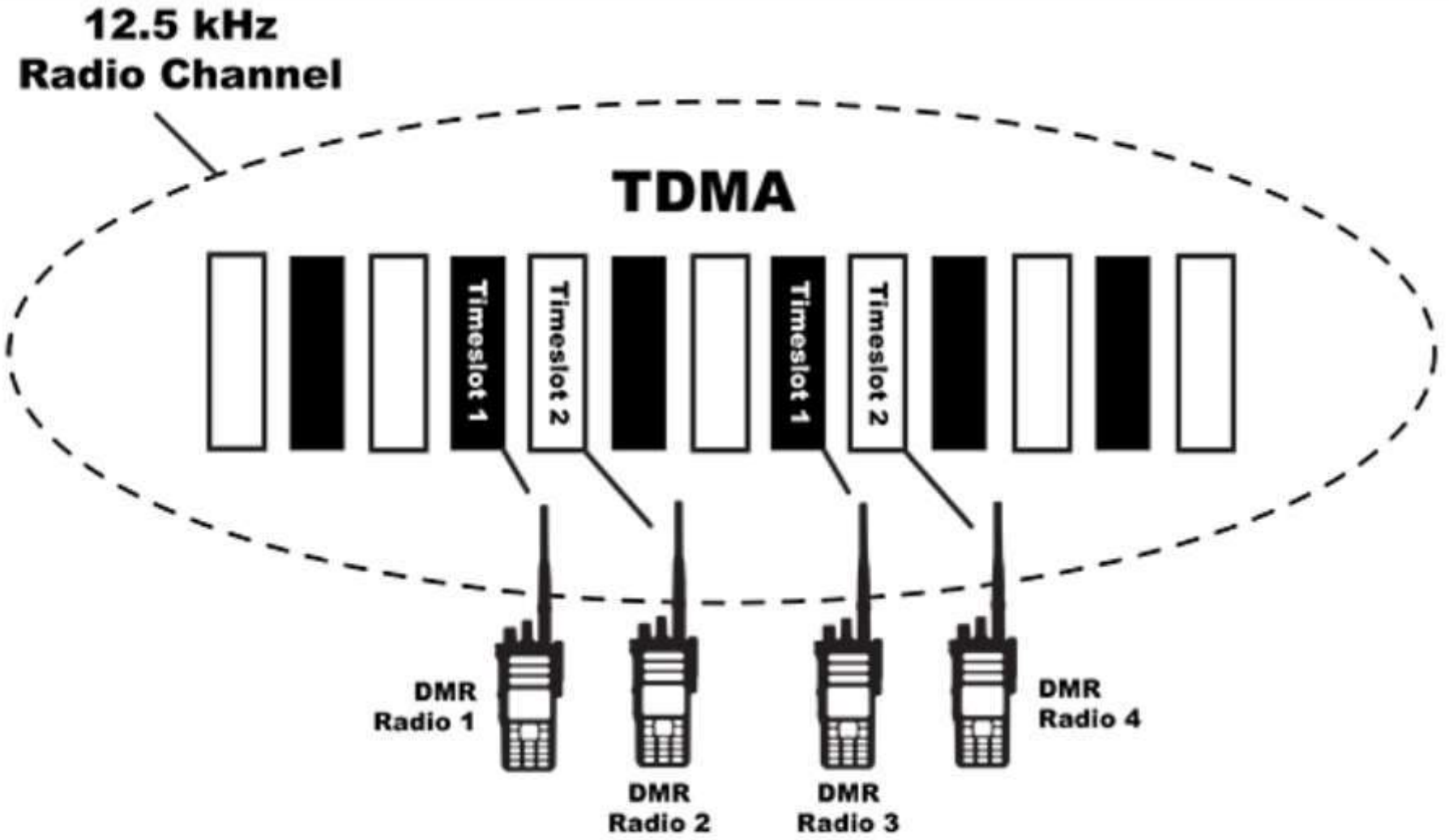
- Tier II
  - Professional
  - Licensed
  - 66 MHz to 960 MHz
  - 2-Slot TDMA (6.25 kHz each)
    - 2 x Simplex
    - 1 x Duplex

How Does It Work - Continued

- Tier III
  - Professional
  - Trunking
  - Text Messaging
  - Packet
  - IPv4 & IPv6

How Does It Work - Continued

- TDMA
  - Time Division Multiple Access
  - 2 Time Slots
    - 6.25 kHz Each
    - 30ms
- Compression
  - AMBE+2 CODEC
- Talk Groups
  - Virtual Channels



In the above graphic the 12.5 kHz Bandwidth of a channel is subdivided into 2 TS's. DMR Radio one and three use TS1 and DMR Radio two and four are using TS2 simultaneous on one channel frequency without disturbing each other.

DEMO


AnyTone
2021-07-01 03:42
SKY Parrot
SkyBridge Zone
SKY TG Disc
SkyBridge Zone
Menu
Zone
List
P1
P2

Demo

- Common
  - Frequency 146.400MHz
  - Color Code 1
  - Mode Simplex
- Time Slot 1
  - Talk Group 101
  - Talk Group 102
- Time Slot 2
  - Talk Group 201
  - Talk Group 202

Configuration

Configuration

- CPS
  - Customer Program Software
  - Old Motorola Term
- Code Plug
  - Configuration file
  - Old Motorola Term

D878UVII[D878UVII:UHF{400 - 480 MHz} VHF{136 - 174 MHz}][:D:\Users\Lenny\OneDrive\Documents\Ham Radio\AnyTone 878 Backups\Backup 12-11-2022.rdt] Version 2.04

File Model Set Program Tool View Help

- D878UVII
  - Common Setting
    - Channel
    - Zone
    - Scan List
    - Roaming Channel
    - Roaming Zone
    - FM
    - Auto Repeater Offset Frec
    - Device information
    - Optional Setting
    - Alarm Setting
    - Local Information
    - Hot Key
    - APRS
    - GPS Roaming
  - Digital
    - Radio ID List
    - Contact/Talk Group
    - Prefabricated SMS
    - Receive Group Call List
    - AES Encryption Code
    - Digital Contact List
      - 1---20000
      - 20001---40000
      - 40001---60000
      - 60001---80000
      - 80001---100000
      - 100001---120000
      - 120001---140000
      - 140001---160000

No.	Receive Frequency	Transmit Frequency	Channel Type	Power	Band Width	CTCSS/DCS Decode	CTCSS/DCS Encode	Channel Name	Contact	Radio ID	Optional Signal
1	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	USA 3100	USA Nationwide	Len W2LJR	Off
2	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	North America	North America	Len W2LJR	Off
3	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	New Jersey	New Jersey	Len W2LJR	Off
4	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	South Jersey	South Jersey	Len W2LJR	Off
5	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	TAC 310	TAC 310 USA	Len W2LJR	Off
6	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	TAC 311	TAC 311 USA	Len W2LJR	Off
7	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	TAC 312	TAC 312 USA	Len W2LJR	Off
8	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	TAC 313	TAC 313 USA	Len W2LJR	Off
9	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	TAC 314	TAC 314 USA	Len W2LJR	Off
10	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	TAC 315	TAC 315 USA	Len W2LJR	Off
11	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	TAC 316	TAC 316 USA	Len W2LJR	Off
12	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	TAC 317	TAC 317 USA	Len W2LJR	Off
13	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	TAC 318	TAC 318 USA	Len W2LJR	Off
14	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	TAC 319	TAC 319 USA	Len W2LJR	Off
15	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	World Wide	World Wide	Len W2LJR	Off
16	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	WW TAC 901	WW TAC 901	Len W2LJR	Off
17	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	WW TAC 902	WW TAC 902	Len W2LJR	Off
18	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	WW TAC 903	WW TAC 903	Len W2LJR	Off
19	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	Parrot	Parrot	Len W2LJR	Off
20	446.52500	446.52500	D-Digital	Low	12.5K	Off	Off	Disconnect	Disconnect	Len W2LJR	Off
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

Configuration - Continued

- DMR Number
  - Unique User ID
  - radioid.net
- Channel
  - Memory Location
- Frequency
  - Simplex / Repeater
  - Power

Configuration - Continued

- Talk Group
  - Virtual Channel / Room
- Color Code
  - 1 to 16
  - Similar to PL Tone (Sort of)
- Time Slot
  - 1 or 2
- Zone
  - Grouping of Channels

Configuration - Continued

- Contact List
  - List of All DMR Users
    - DMR #
    - Name
    - Callsign
    - City
    - State
    - Country
  - Updated Daily
  - Currently Over 200,000 Entries
    - 234,313 as of 03/03/2023
    - AnyTone AT D878UVII Plus Supports 500,000 Contacts

Configuration - Continued

- Configuration Sequence
  1. Obtain and Configure DMR ID
     1. https://www.radioid.net/
  2. Download Contact List
     - http://www.dmrcontacts.com
  3. Identify Repeater or Hotspot
     - https://www.repeaterbook.com/
  4. Define Talk Groups
     - Numerical ID
     - Text Name
     - https://brandmeister.network/?page=talkgroups

Configuration - Continued

5. Create Channel
    - Select Number
    - Assign Name
    - Select DMR ID
    - Assign Frequency
        - Transmit
        - Receive
        - Bandwidth
        - Power
        - DMR Mode (Simplex/Repeater)
        - TX Permit (Channel Free)
    - Assign Talk Group
    - Assign Color Code
        - Agreed Upon with Other Users
    - Assign Time Slot
        - Agreed Upon with Other Users

Configuration - Continued

6. Create Zone
7. Add Channels to Zones
8. Configure Features
9. Upload Code Plug
10. Upload Contact List

Amateur Radio Usage

Amateur Radio Usage

- FCC Approved 2014
- Coordinated DMR ID (RadioID)
- Repeaters

Amateur Radio Usage - Continued

- Settings
  - Frequency
    - Transmit
    - Receive
  - Time Slot
  - Color Code
  - Network
- RepeaterBook

Hoboken, NJ

K2XDX

Repeater ID: 34-9151

Downlink:	446.52500
Uplink:	441.52500[a]
Offset:	-5.0 MHz[b]

DMR Enabled

Color Code:	8
DMR ID:	313439
County:	Hudson
Call:	K2XDX
Use:	OPEN
Op Status:	On-Air
Sponsor:	Hoboken CERT team
Features:	TS1 is private TS2 is linked to Brandmeister.
Notes:	Time slot 1 talk group 313439 is private. All brandmeister traffic should use Time slot 2. TS2 is open.
Web links:	K2XDX Repeater System on Facebook

Last updated: 2019-12-08

Last reviewed: 2019-12-08

Amateur Radio Usage - Continued

- Hotspots
  - Raspberry Pi (Computer)
    - Pi Zero W
    - Pi 3 B
  - MMDVM (Radio)
  - Pi-Star (Software)

Raspberry Pi Zero

Raspberry Pi 3

Pi-Star Digital Voice Dashboard for W2LJR

Modes Enabled	
D-Star	DMR
YSF	P25
YSF XMode	NXDN
DMR XMode	POCSAG

Network Status	
D-Star Net	DMR Net
YSF Net	P25 Net
YSF2DMR	NXDN Net
YSF2NXDN	YSF2P25
DMR2NXDN	DMR2YSF

Radio Info	
Trx	Listening
Tx	446.525000 MHz
Rx	446.525000 MHz
FW	HS_Hat:v1.4.17
TCXO	14.7456 MHz

DMR Repeater	
DMR ID	3186225
DMR CC	1
TS1	disabled
TS2	enabled
DMR Master	
BM 3104 United St..	

Gateway Activity

Time (EST)	Mode	Callsign	Target	Src	Dur(s)	Loss	BER
12:08:52 Dec 23rd	DMR TS2	W2LJR (GPS)	TG 319	RF	4.7	0%	0.3%
12:08:37 Dec 23rd	DMR TS2	K2LJR (GPS)	TG 319	RF	4.0	0%	0.2%
11:16:57 Dec 23rd	DMR TS2	NE7BO (GPS)	TG 318	Net	2.6	2%	0.0%
09:42:02 Dec 23rd	DMR TS2	ER1CW (GPS)	TG 91	Net	1.2	0%	0.0%
09:41:45 Dec 23rd	DMR TS2	HJ5ZQM (GPS)	TG 91	Net	3.0	8%	0.4%
09:41:25 Dec 23rd	DMR TS2	PS8AJR (GPS)	TG 91	Net	0.8	0%	0.0%
09:41:21 Dec 23rd	DMR TS2	HB3YPG (GPS)	TG 91	Net	0.5	0%	0.0%
09:40:56 Dec 23rd	DMR TS2	PD4BLM (GPS)	TG 91	Net	0.8	0%	0.0%
09:40:28 Dec 23rd	DMR TS2	YD3CII (GPS)	TG 91	Net	0.8	0%	0.0%
09:39:24 Dec 23rd	DMR TS2	N0BPM (GPS)	TG 91	Net	0.5	0%	0.0%
09:38:45 Dec 23rd	DMR TS2	F0FPZ (GPS)	TG 91	Net	2.6	0%	12.2%
09:38:33 Dec 23rd	DMR TS2	TA2NOR (GPS)	TG 91	Net	2.3	0%	0.0%
09:37:36 Dec 23rd	DMR TS2	BG0DLR (GPS)	TG 91	Net	2.0	54%	3.6%
09:37:27 Dec 23rd	DMR TS2	KB5BUN (GPS)	TG 91	Net	0.8	0%	0.7%
09:36:07 Dec 23rd	DMR TS2	DL6FK (GPS)	TG 91	Net	0.5	0%	0.0%
09:35:45 Dec 23rd	DMR TS2	N6PC (GPS)	TG 91	Net	0.5	0%	0.0%
09:34:19 Dec 23rd	DMR TS2	YD6VXO (GPS)	TG 91	Net	13.1	4%	0.1%
09:33:44 Dec 23rd	DMR TS2	YD5NPC (GPS)	TG 91	Net	0.5	0%	5.3%
09:33:33 Dec 23rd	DMR TS2	DS5KZB (GPS)	TG 91	Net	0.5	0%	0.0%
09:33:25 Dec 23rd	DMR TS2	KK7GUR (GPS)	TG 91	Net	0.5	0%	0.0%

Local RF Activity

Time (EST)	Mode	Callsign	Target	Src	Dur(s)	BER	RSSI
12:08:52 Dec 23rd	DMR TS2	W2LJR (GPS)	TG 319	RF	4.7	0.3%	S9+46dB (-47 dBm)
12:08:37 Dec 23rd	DMR TS2	K2LJR (GPS)	TG 319	RF	4.0	0.2%	S9+46dB (-47 dBm)

General Configuration

Setting	Value
Hostname:	pi-star — Do not add suffixes such as .local
Node Callsign:	W2LJR
CCS7/DMR ID:	3186225
Radio Frequency:	446.525.000 MHz
Latitude:	39.7292 degrees (positive value for North, negative for South)
Longitude:	-75.0688 degrees (positive value for East, negative for West)
Town:	Sewell, NJ
Country:	USA
URL:	https://www.qrz.com/db/W2LJR — (•) Auto ( ) Manual
Radio/Modem Type:	STM32-DVM / MMDVM_HS - Raspberry Pi Hat (GPIO)
Node Type:	( ) Private (•) Public
DMR Access List:	3186225,3196243
APRS Host Enable:	
APRS Host:	noam.aprs2.net
System Time Zone:	America/New_York
Dashboard Language:	english_us

Apply Changes

DMR Configuration

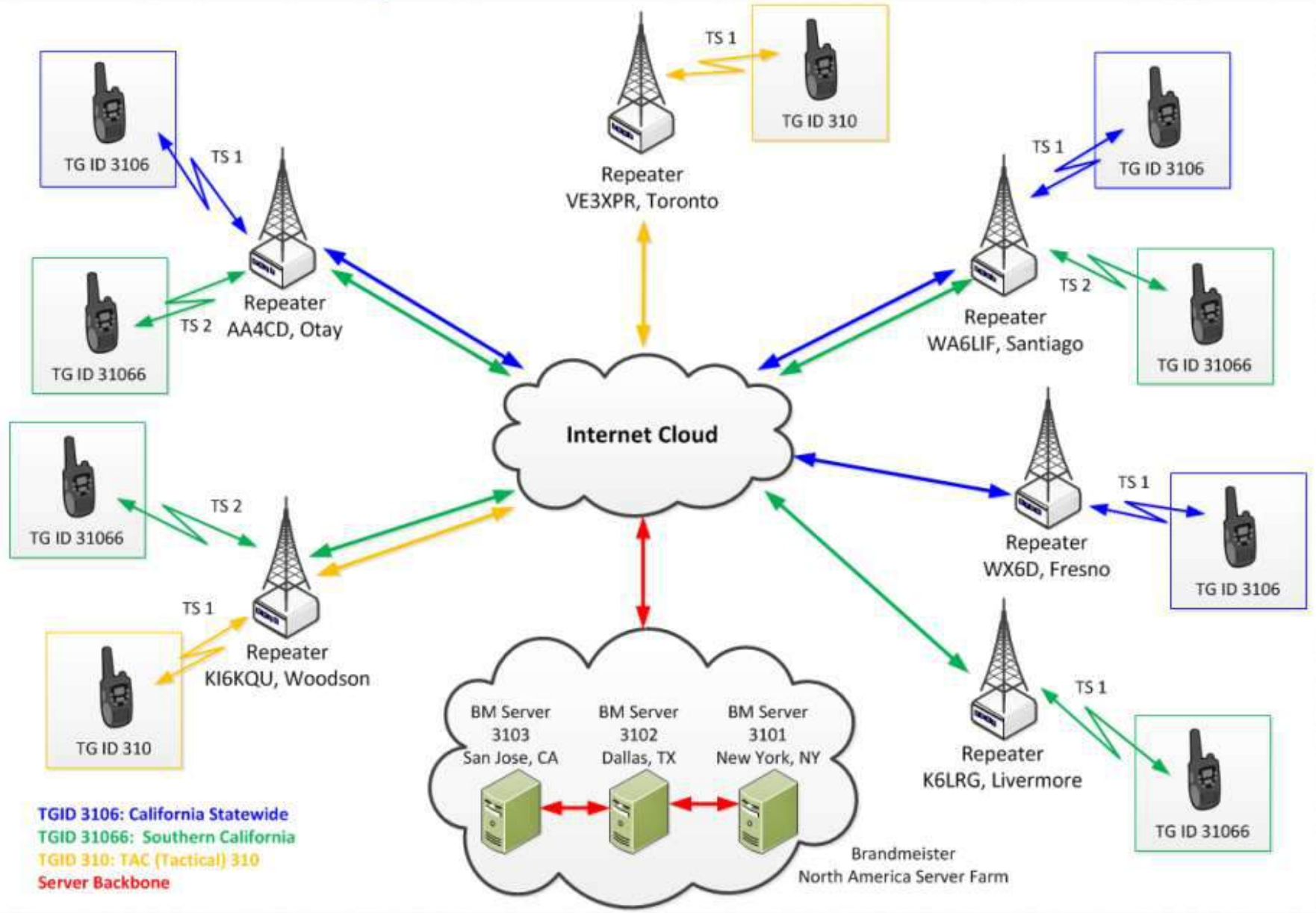
Setting	Value
DMR Master:	BM_3104_United_States
Hotspot Security:	••••••••••
BrandMeister Network:	Device Information | Edit Device (BrandMeister Selfcare)
DMR ESSID:	3186225 None
DMR Color Code:	1
DMR EmbeddedLCOnly:	
DMR DumpTAData:	

Apply Changes

Amateur Radio Usage - Continued

- Networks
  - Brandmeister
    - Hose
  - TGIF

Talk Groups in the DMR world



Questions?

73 de Len W2LJR

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