



DMR: Beyond the Basics

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We've come a long way

- When I gave the DMR talk three years ago, there were about 44,000 registered DMR users
- Today there are over 130,000 registered users with over 151,000 DMR IDs
- A good selection of quality DMR transceivers are now available at attractive prices
- Hotspots have grown extremely popular, providing coverage even when a repeater is unavailable



Why use DMR?

- Low cost of entry – new radios available for about \$100
- Easy to use (REALLY!)– logical talkgroup layout
- Work the world from your handheld
- Great voice quality
- Spectrum efficiency – about 1/3 the bandwidth of traditional analog FM
- Long battery life – talk time is about 40% more compared to an analog radio of the same power rating



But I hate “Newfangled” or “Proprietary” Modes

- Consider the move from Spark to CW
- Again for the move from AM to SSB
- Amateur Radio is all about experimentation
- DMR is a well-accepted standard developed by the European Telecommunications Standards Institute (ETSI) and is used worldwide in professional mobile radio services



DMR Networks

- DMR-MARC (dmr-marc.net)
- K4USD (k4usd.org)
- ChicagoLand (chicagoland-cc.org)
- Brandmeister (brandmeister.network)
- DMR+ (dmr-marc.net/FAQ/dmrplus-america.html)
- TGIF (tgif.network)
- Others

DMR-MARC

- Only Motorola repeaters can connect
- Set many of the talkgroup standards
- Reliable, commercial equipment
- Consistent Programming



Brandmeister

- Repeaters and hotspots can connect
- Talker Alias
- Dynamic talkgroups
- Connections are anywhere from stable to challenging



DMR+

- Original network
- Repeaters and hotspots can connect
- Popular in Europe
- Experimentation encouraged
- Reflectors (“1000 talkgroups”)



TGIF

- Repeaters and hotspots can connect
- Growing in popularity
- Ragchews encouraged
- Limited bridging to other networks



OK, Let's talk to somebody

- **Request a DMR ID from Radioid.net**
- Purchase a radio (and maybe a Hotspot)
- Install programming software
- Determine your access method (Repeater and/or Hotspot)
- Determine your desired talkgroups
- Download a codeplug (from fmarc.net / others) to modify/build upon
- Tweak or build your codeplug and program radio **(Change the DMR ID to yours)**

Hotspots

- Low power access point
- Not a repeater
- Connect to the Internet via Wi-Fi
- DIY or fully-built/assembled
- Avoid satellite frequencies! (435-438 MHz)

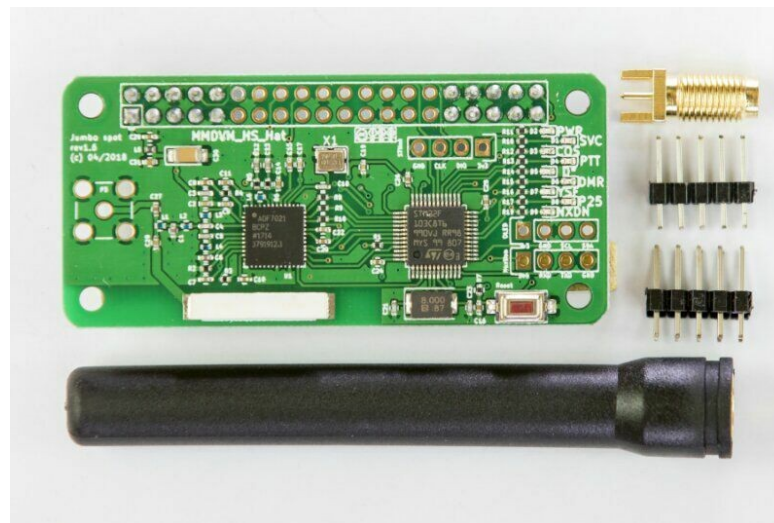
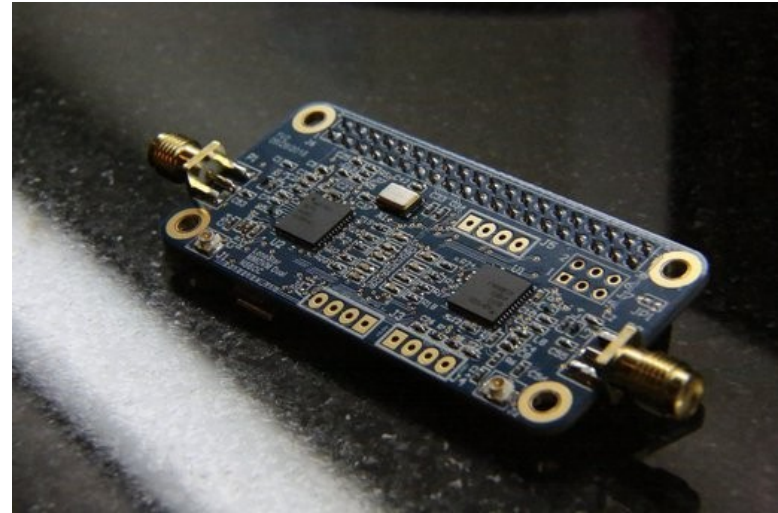
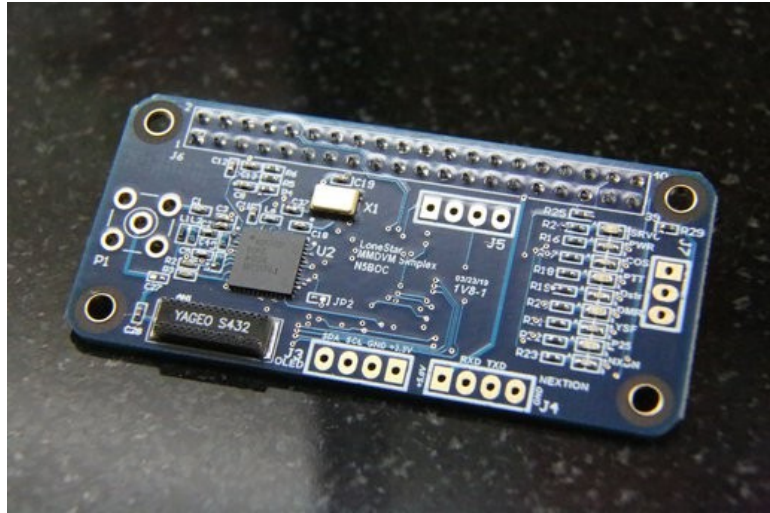




Hotspot Vendors

- Amazon, BridgeCom, Radioddity, HRO
- Ebay, AliExpress
- N5BOC (Tindie)
- SharkRF

Hotspot Boards



Hotspot Software

- **pistar.uk**
- Setup instructions:
amateurradionotes.com/pi-star.htm

Dashboard Admin Configuration									
Modes Enabled		Gateway Activity							
D-Star	DMR	Time (MDT)	Mode	Callsign	Target	Src	Dur(s)	Loss	BER
YSF	P25	09:20:35 Oct 21st	DMR Slot 2	W1RIV	TG 310	Net	1.7	0%	0.0%
YSF XMode	NXDN	09:20:11 Oct 21st	DMR Slot 2	KA3LNC	TG 310	Net	1.6	0%	0.0%
DMR XMode	POCSAG	09:20:04 Oct 21st	DMR Slot 2	VE7JEN	TG 310	Net	1.9	0%	0.0%
Network Status		09:19:51 Oct 21st	DMR Slot 2	W2DAR	TG 310	Net	1.2	0%	0.0%
D-Star Net	DMR Net	09:18:37 Oct 21st	DMR Slot 2	VE3PV	TG 310	Net	1.2	0%	0.0%
YSF Net	P25 Net	09:17:50 Oct 21st	DMR Slot 2	W1KTV	TG 310	Net	0.5	0%	0.0%
YSF2DMR	NXDN Net	09:17:44 Oct 21st	DMR Slot 2	N3MC	TG 310	Net	0.8	0%	0.0%
YSF2NXDN	YSF2P25	09:17:41 Oct 21st	DMR Slot 2	W8BJS	TG 310	Net	0.5	0%	2.5%
DMR2NXDN	DMR2YSF	09:16:56 Oct 21st	DMR Slot 2	VE3JC	TG 310	Net	0.5	0%	0.0%
Radio Info		09:16:27 Oct 21st	DMR Slot 2	K7SAVS	TG 310	Net	10.6	0%	0.0%
Trx	Listening DMR	09:16:01 Oct 21st	DMR Slot 2	VE7JED	TG 310	Net	2.7	48%	2.5%
		09:15:01 Oct 21st	DMR Slot 2	W1KRX	TG 310	Net	31.1	0%	0.1%
		09:11:45 Oct 21st	DMR Slot 2	W1PJJ	TG 310	Net	1.6	0%	0.0%
		09:09:16 Oct 21st	DMR Slot 2	W1RIV	TG 310	Net	0.5	0%	0.0%

Who to talk to?



Other Talkgroups to consider	
Common name	TG#
BM Worldwide	91
BM NA	93
TAC	310-319
BM Bridge	3100
Other Regions	31xx
Other States	31xx
QuadNet	31012
TGIF	31665



Sources of Talkgroup Lists

- Your local repeater's website
- KF5IW.com
- DMR-MARC.net
- Brandmeister.network

Sources of Talkgroup Lists

- Partial talkgroup list from KF5IW.com

KF5IW DMR

Connecting Southwest Florida to the world

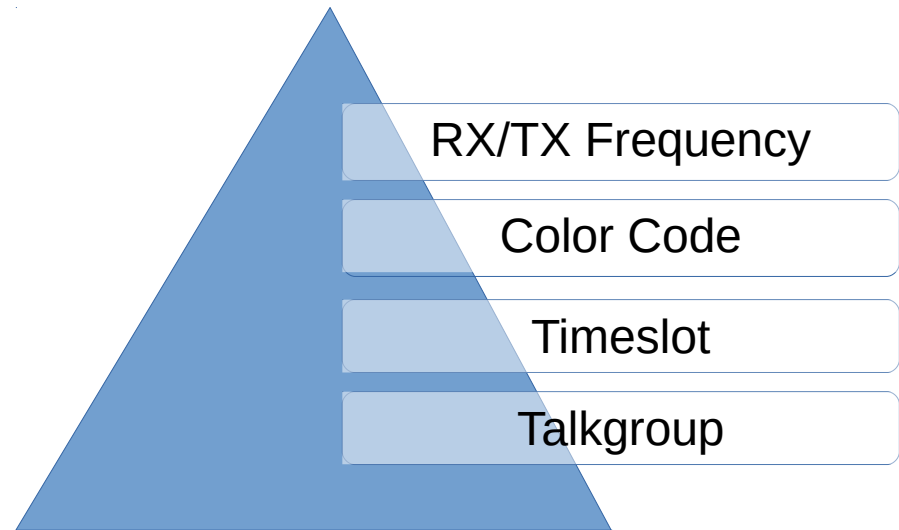


KF5IW DMR Talkgroups

TS	TG #	Talkgroup	FT/PTT	Notes
1	1	Worldwide	PTT*	
1	10	Worldwide German	PTT	
1	13	Worldwide English	PTT	
1	14	Worldwide Spanish	PTT	
1	91	Brandmeister WW	PTT	
1	3	North America	FT	
1	93	Brandmeister NA	PTT	
2	3100	Bridge	PTT	
2	1776	USA	PTT	
1	133	DMR+ USA	PTT	
2	31012	QuadNet	PTT	QuadNet website
2	31665	TGIF	PTT	TGIF website
2	3169	Midwest Regional	PTT	IA IL IN KS MI MN MO ND NE OH SD WI
2	3172	Northeast Regional	PTT	CT MA ME NH NJ NY RI VT
2	3173	MidAtlantic Regional	PTT	DC DE MD PA VA WV
2	3174	Southeast Regional	FT	AL AR FL GA KY LA MS NC SC TN

Programming the radio

- Frequency
- Color Codes
- Time Slots
- Talk Groups
- Zones



Make copies of each iteration of codeplugs. I append the date to each new codeplug I create.

Set up Talkgroup List

D868UVE[D868UVE:UHF(400 - 480 MHz) VHF(136 - 174 MHz)][C:\Users\jim\codeplugins\KF5IW_20180313.rdt]

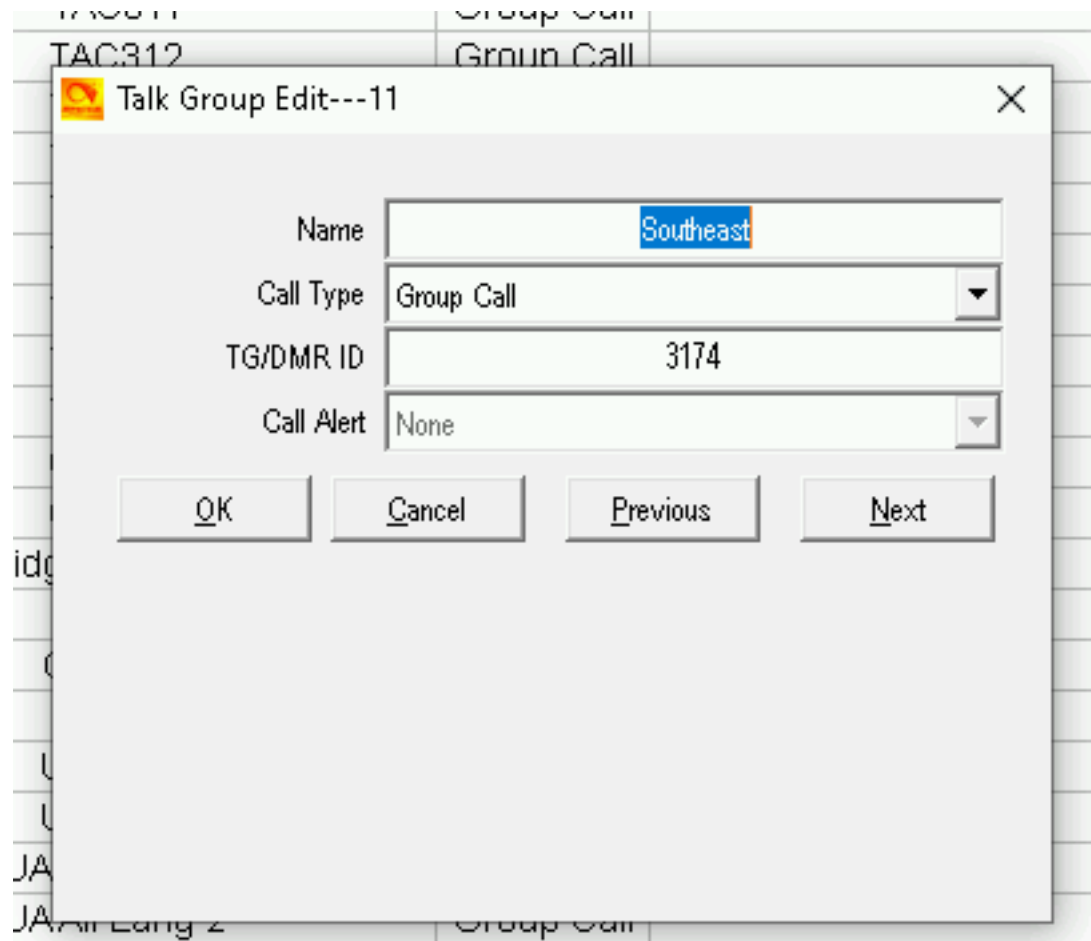
File Model Set Program Tool View Help

No.	TG/DMR ID	Call Alert	Name	Call Type
8	3169	None	Midwest	Group Call
9	3172	None	Northeast	Group Call
10	3173	None	Mid Atlantic	Group Call
11	3174	None	Southeast	Group Call
12	3175	None	Southern Plains	Group Call
13	3176	None	Southwest	Group Call
14	3177	None	Mountain	Group Call
15	3189	None	TriSt IL, IN, WI	Group Call
16	31121	None	First Coast NEFL	Group Call
17	8951	None	TAC1	Group Call
18	310	None	TAC310	Group Call
19	311	None	TAC311	Group Call
20	312	None	TAC312	Group Call
21	313	None	TAC313	Group Call
22	314	None	TAC314	Group Call
23	315	None	TAC315	Group Call
24	316	None	TAC316	Group Call
25	317	None	TAC317	Group Call
26	318	None	TAC318	Group Call
27	319	None	TAC319	Group Call
28	3777215	None	COMM1	Group Call
29	3777216	None	COMM2	Group Call
30	3100	None	Bridge (BM USA)	Group Call
31	1776	None	USA	Group Call
32	3185	None	CACTUS	Group Call
33	8484	None	DILLO	Group Call
34	113	None	UA Eng 1	Group Call
35	123	None	UA Eng 2	Group Call
36	119	None	UA.All Lang 1	Group Call
37	129	None	UA.All Lang 2	Group Call

D868UVE
 - Public
 Channel
 Zone
 Scan List
 FM
 Auto Repeater Off
 Basic information
 Optional Setting
 Alarm Setting
 Local Information
 Hot Key
 - Digital
 Radio ID List
 Talk Groups
 Prefabricated SMS
 Receive Group Ca
 Encryption Code
 Digital Contact List
 1---20000
 20001---40000
 40001---60000
 60001---80000
 80001---100000
 100001---120000
 120001---140000
 140001---160000
 160001---180000
 180001---200000
 Friends List
 Digital APRS Infor
 - Analog

Individual Talkgroup

- Maps name to TG number



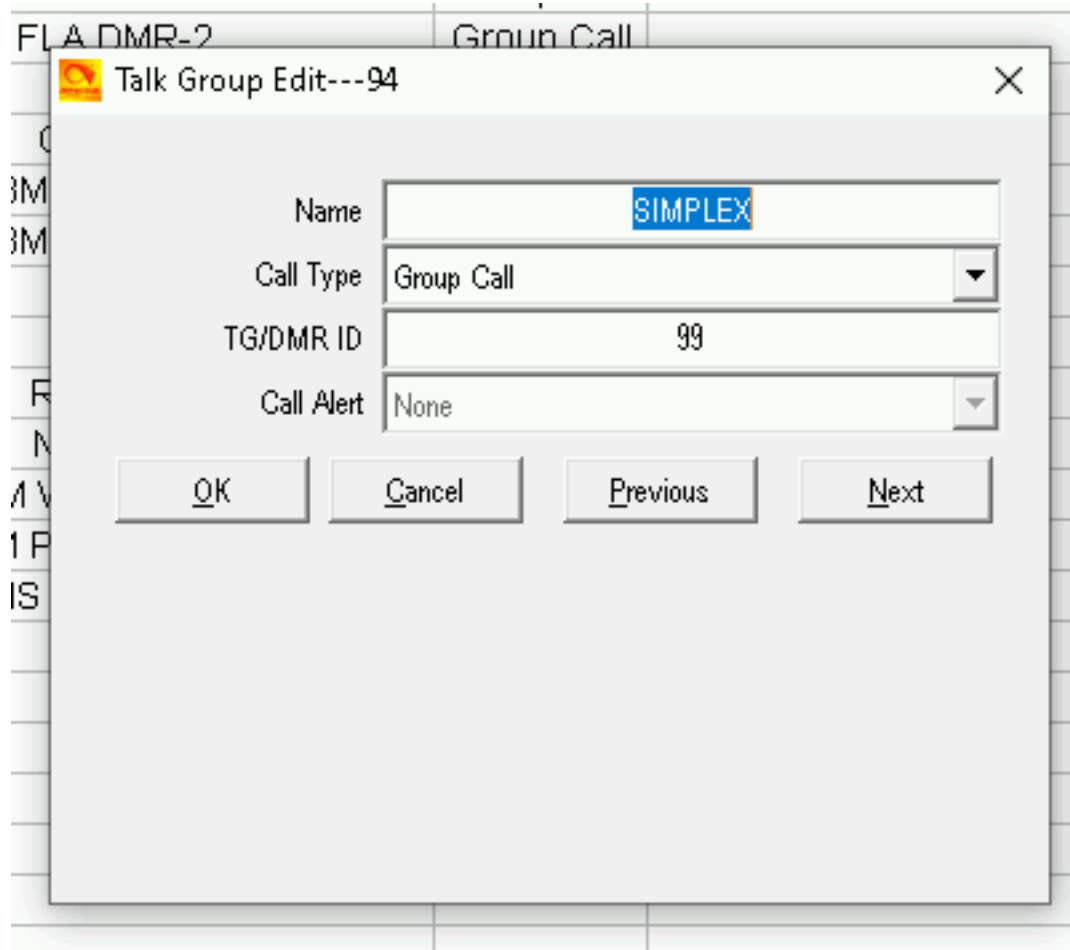
The image shows a screenshot of a software interface with a dialog box titled "Talk Group Edit---11". The dialog box contains the following fields and controls:

- Name:** A text input field containing the word "Southeast".
- Call Type:** A dropdown menu currently showing "Group Call".
- TG/DMR ID:** A text input field containing the number "3174".
- Call Alert:** A dropdown menu currently showing "None".

At the bottom of the dialog box, there are four buttons: "OK", "Cancel", "Previous", and "Next".

Simplex Talkgroup

- Standard: Talkgroup 99



FLA DMR-2 Group Call

Talk Group Edit---94

Name: SIMPLEX

Call Type: Group Call

TG/DMR ID: 99

Call Alert: None

OK Cancel Previous Next

Set up Channel List

- Many radios will require each channel name to be unique
- Prepend repeater callsign, city or unique code to channel name

D868UVE[D868UVE:UHF[400 - 480 MHz] VHF[136 - 174 MHz]][:C:\Users\jim\codeplug\KF5IW_20180313.rdt]

File Model Set Program Tool View Help

	No.	Receive Frequency	Transmit Frequency	Channel Type	Power	Band Width	TCSS/DC Decode	TCSS/DC Encode	Channel Name	Contact	Radio ID	Optional Signal
D868UVE Public	41	147.28500	147.88500	A-Analog	Turbo	25K	Off	136.5	W1RP 147.285	WW	KF5IW	
	42	147.34500	147.94500	A-Analog	Turbo	25K	Off	136.5	NT4TS 147.345	WW	KF5IW	
	43	442.45000	447.45000	A-Analog	Turbo	25K	Off	136.5	WB2FAU 442.450	WW	KF5IW	
	44	443.42500	448.42500	A-Analog	Turbo	25K	Off	136.5	Sanibel 443.425	WW	KF5IW	
	45	444.22500	449.22500	A-Analog	Turbo	25K	Off	136.5	SAR Net 444.225	WW	KF5IW	
	46	444.67500	449.67500	A-Analog	Turbo	25K	Off	136.5	W4LCO 444.675	WW	KF5IW	
	47	444.72500	449.72500	A-Analog	Turbo	25K	Off	136.5	KN2R 444.725	WW	KF5IW	
	48	444.77500	449.77500	A-Analog	Turbo	25K	Off	136.5	WT4T 444.775	WW	KF5IW	
	49	444.95000	449.95000	A-Analog	Turbo	25K	Off	100.0	NX4Y 444.950	WW	KF5IW	
	50	433.45000	433.45000	D-Digital	Turbo	12.5K	Off	Off	D SIM 433.450	SIMPLEX	KF5IW	
Digital	51	441.00000	441.00000	D-Digital	Turbo	12.5K	Off	Off	D SIM 441.000	SIMPLEX	KF5IW	
	52	446.07500	446.07500	D-Digital	Turbo	12.5K	Off	Off	D SIM 446.075	SIMPLEX	KF5IW	
	53	446.50000	446.50000	D-Digital	Turbo	12.5K	Off	Off	D SIM 446.500	SIMPLEX	KF5IW	
	54	446.00000	446.00000	A-Analog	Turbo	25K	Off	Off	A SIM 446.000	SIMPLEX	KF5IW	
	55	446.50000	446.50000	A-Analog	Turbo	25K	Off	Off	A SIM 446.500	SIMPLEX	KF5IW	
	56	447.00000	447.00000	A-Analog	Turbo	25K	Off	Off	A SIM 447.000	SIMPLEX	KF5IW	
	57	146.40000	146.40000	A-Analog	Turbo	25K	Off	Off	A SIM 146.400	SIMPLEX	KF5IW	
	58	146.43000	146.43000	A-Analog	Turbo	25K	Off	Off	A SIM 146.430	SIMPLEX	KF5IW	
	59	146.46000	146.46000	A-Analog	Turbo	25K	Off	Off	A SIM 146.460	SIMPLEX	KF5IW	
	60	146.49000	146.49000	A-Analog	Turbo	25K	Off	Off	A SIM 146.490	SIMPLEX	KF5IW	

Simplex Channels

- In professional radio services, Talk-Around refers to operating simplex on a repeater output channel. This facilitates communications when out of range of a repeater. This is frowned upon in the Amateur community as it can interfere with repeater operations.
- Do not use 146.520 or 446.000 as these are the standard analog frequencies.

Recommended DMR Simplex Frequencies				
70cm	441.000	446.500	446.075	433.450
2m	145.790	145.510		
TG99 / CC1 / TS1 / Admit Criteria: Always / In Call Criteria: TX or Always				

DMR Simplex Channel

Channel Information Edit---50

Channel Name: D SIM 433.450

Receive Frequency: 433.45000
Transmit Frequency: 433.45000

Channel Type: D-Digital
Transmit Power: Turbo
Band Width: 12.5K
TX Permit: Always
CH Scan List: None
APRS Report: Off
APRS Report Channel: 1

☐ TX Prohibit ☒ Talk Around
☐ Work Alone ☐ Through Mode

Digital

Contact: SIMPLEX
Radio ID: KF5NW
Color Code: 1
Slot: Slot1
Receive Group List: None
Digital Encryption: Off
Encryption Type: Normal Encryption

☐ Simplex TDMA
☐ TDMA Adaptive
☐ Call Confirmation
☐ Ranging

Analog

CTCSS/DCS Decode: Off
CTCSS/DCS Encode: Off
Squelch Mode: Carrier
Optional Signal: Off
DTMF ID:
2Tone ID: 1
5Tone ID: 1
PTT ID: Off

☐ Reverse
2TONE Decode: 1
Custom CTCSS: 251.1

OK Cancel Previous Next

17500 D-Digital Turbo 12.5K Off Off Mid Atlantic

DMR Repeater Channel

Channel Information Edit---80

Channel Name

Receive Frequency
Transmit Frequency

Channel Type
Transmit Power
Band Width
TX Permit
CH Scan List
APRS Report
APRS Report Channel

☐ TX Prohibit ☐ Talk Around
☐ Work Alone ☐ Through Mode

Analog
CTCSS/DCS Decode
CTCSS/DCS Encode
Squelch Mode
Optional Signal
DTMF ID
2Tone ID
5Tone ID
PTT ID

Digital
Contact
Radio ID
Color Code
Slot
Receive Group List
Digital Encryption
Encryption Type
☐ Simplex TDMA
☐ TDMA Adaptive
☐ Call Confirmation
☐ Ranging

Reverse ☐
2TONE Decode
Custom CTCSS

OK Cancel Previous Next

Important "Color Code Free" on other radios

Useful

Analog Channel

Channel Information Edit---39

Channel Name: W4LCO 147.165

Receive Frequency: 147.16500
Transmit Frequency: 147.76500

Channel Type: A-Analog
Transmit Power: Turbo
Band Width: 25K
Busy Lock: Off
CH Scan List: None
APRS Report: Off
APRS Report Channel: 1

☐ TX Prohibit
☐ Work Alone

☐ Talk Around
☐ Through Mode

Digital

Contact: W4LCO
Radio ID: KF5IWW
Color Code: 1
Slot: Slot1
Receive Group List: None
Digital Encryption: Off
Encryption Type: Normal Encryption

☐ Simplex TDMA
☐ TDMA Adaptive
☐ Call Confirmation
☐ Ranging

Analog

CTCSS/DCS Decode: Off
CTCSS/DCS Encode: CTCSS 127.3
Squelch Mode: Carrier
Optional Signal: Off
DTMF ID:
2Tone ID: 1
5Tone ID: 1
PTT ID: Off

☐ Reverse
2TONE Decode: 1
Custom CTCSS: 251.1

OK Cancel Previous Next

Digital Receive Group

- Allows you to receive a set of talkgroups that are on the same timeslot
- Not to be confused with “digital monitor” or “promiscuous mode”

D868UVE[D868UVE:UHF{400 - 480 MHz} VHF{136 - 174 MHz}][C:\Users\jim\codeplugins\KF5IW_20180313.rdt]

File Model Set Program Tool View Help

Icons: [New] [Open] [Save] [Print] [Help] [?] [Other]

No.	Group Name	Group Contacts	Contact
1	KF5IW TS2	4	Florida LOCAL 2 LOCAL 9 Southeast
2			
3			

D868UVE

- Public
 - Channel
 - Zone
 - Scan List

Digital Receive Group

- Add as many talkgroups as you wish
- Must be on the same timeslot

Receive Group Call List Edit---1

Receive Group Name:

Available Receive Group Call Contact

Alabama	3101
Alaska	3102
AllStar	3167
Arizona	3104
Arkansas	3105
Audio Test	9999
Bayern	2628
Berlin	2621
BM DStar	31210
BM Hytera DMRp	31089
BM NA	93
BM Parrot	9990
BM PI-STAR Chat	31672
BM US Zone 4	31094

Receive Group Call List Member

Florida	3112
LOCAL 2	2
LOCAL 9	9
Southeast	3174

Navigation: >> << OK Cancel Previous Next

Zones

- Logical grouping of channels
- Many transceivers are limited to 16 channels per zone

D868UVE[D868UVE:UHF{400 - 480 MHz} VHF{136 - 174 MHz}][C:\Users\jim\codeplugins\KF5IW_20180313.rdt]

File Model Set Program Tool View Help

Icons: [File] [Folder] [Save] [Print] [Help] [Up] [Down]

D868UVE	No.	Name	Zone Channels	A Channel	B Channel	
Public	1	KF5IW	23	North America	LOCAL 2	
Channel	2	KF5IW All	88	North America	LOCAL 2	
Zone	3	Hotspot	10	Bridge 3100	Southeast	
Scan List	4	FMY Analog	18	W4LCO 147.165	W4LCO 444.675	
FM	5	Simplex	20	D SIM 433.450	D SIM 441.000	
Auto Repeater Off	6					
Basic information	7					
Optional Setting						



Zone Strategy

- Think of how you'll use your radio
- Recommend one repeater per zone
- Have a “most popular” zone
- Other zones dedicated to TAC, regions, states
- Analog zones
- Simplex zone(s)

Zone Strategy (Common)

Chan	TG		Chan	TG
1	Worldwide		7	Florida
2	BM Worldwide		8	Local 2
3	North America		9	Local 9
4	BM North America		10	TAC 310
5	Bridge		11	TAC 311
6	Southeast		12	TAC 312

Zone Strategy (Regions)

Chan	TG		Chan	TG
1	Midwest		8	Florida
2	Northeast		9	Local 2
3	Mid-Atlantic		10	Local 9
4	Southeast		11	TAC 310
5	TX/OK Regional		12	TAC 311
6	Southwest		13	TAC 312
7	Mountain			

Setting up a Zone

mplex 20 D SIM 433.450 D SIM 441.000

Zone Edit---2

Zone Name

A Channel

B Channel

Available Channel

23	HS Disconnect
24	Bridge 3100
25	Southeast
26	Florida
27	Pi-STAR Chat
28	TAC 310
29	TAC 311
30	TAC 312
31	Parrot
32	KG4VDS 145.170
33	KN2R 146.610
34	KF4QWC 146.685
35	WX4E 146.745
36	W4SBL 146.790
37	AC4TM 146.820
38	KI4ODC 146.880
39	W4LCO 147.165
40	W4LWZ 147.225
41	W1RP 147.285
42	NT4TS 147.345
43	WB2FAU 442.450
44	Sanibel 443.425

>>

<<

Zone Channel Member

77	Midwest
78	Northeast
79	Mid Atlantic
80	Southeast
81	Southern Plains
82	Southwest
83	Mountain
84	TriSt IL, IN, WI
85	First Coast NEFL
86	TAC1
87	TAC310
88	TAC311
89	TAC312
90	TAC313
91	TAC314
92	TAC315
93	TAC316
94	TAC317
95	TAC318
96	TAC319
97	COMM1
98	COMM2

Order By

ID

Name

Up

Down

OK Cancel Previous Next



Contact List

- Not necessary, but really nice to have
- Provides mapping from DMR ID to callsign, name and location data
- Available from KF5IW.com and Radioid.net

Contact List

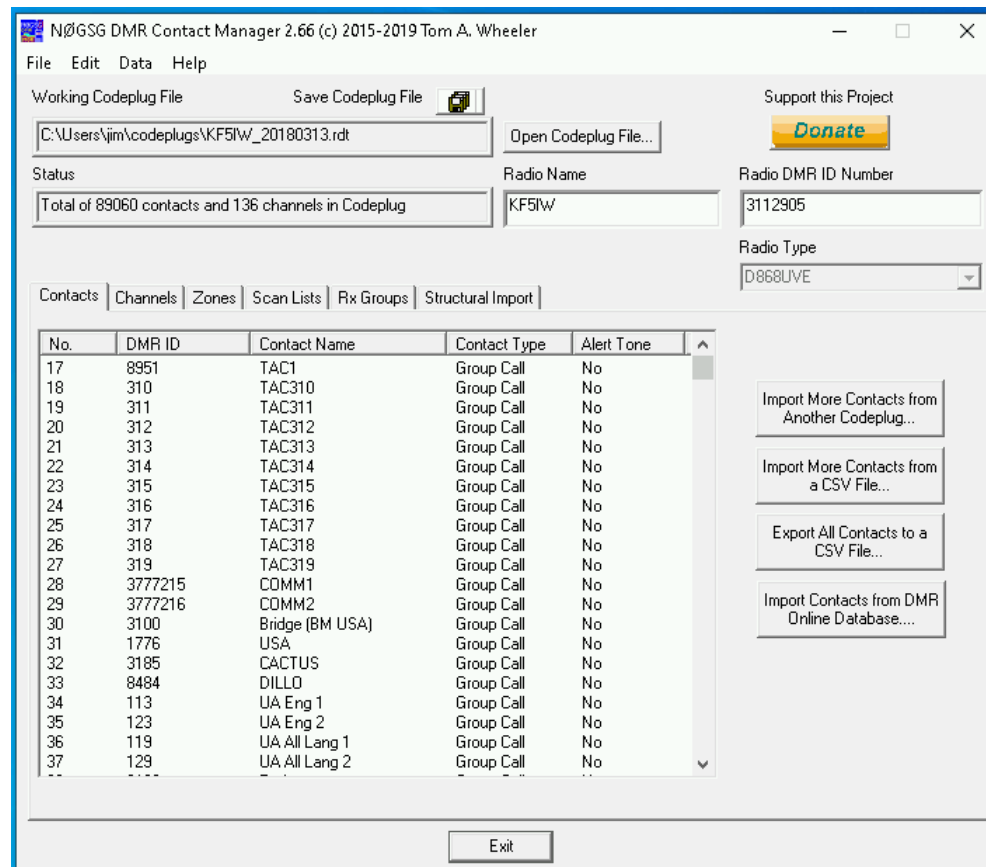
D868UVE[D868UVE:UHF(400 - 480 MHz) VHF(136 - 174 MHz)][C:\Users\jim\codeplugs\KF5IW_20180313.rdt]

File Model Set Program Tool View Help

	No.	TG/DMR ID	Call Alert	Name	City	Call Type	Repeater Number	State/Prov	Country	Remarks
D868UVE										
Public										
Channel	60001	3119092	None	David S Fenderso	Le Mars	Private Call	KB0STE	Iowa	United States	
Zone	60002	3119093	None	Daniel K Bonjour	Fayette	Private Call	KD0BJ	Iowa	United States	
Scan List	60003	3119094	None	Daniel K Bonjour	Fayette	Private Call	KD0BJ	Iowa	United States	
FM	60004	3119095	None	Tim C Sylvester	Webb	Private Call	KG0CK	Iowa	United States	
Auto Repeater Offset F	60005	3119096	None	Joseph H Hoepfne	Clarksville	Private Call	AE5EI	Iowa	United States	
Basic Information	60006	3119097	None	Troy Duff	Marshalltown	Private Call	AD0TD	Iowa	United States	
Optional Setting	60007	3119098	None	Bob Trettin	Waterloo	Private Call	W00TD	Iowa	United States	
Alarm Setting	60008	3119099	None	Kenneth S Yeoman	Grundy Center	Private Call	KE0KK	Iowa	United States	
Local Information	60009	3119100	None	Randy Nelson	Mt. Union	Private Call	WB0VHB	Iowa	United States	
Hot Key	60010	3119101	None	Timothy Kilbride	Victor	Private Call	K0TSK	Iowa	United States	
Digital	60011	3119102	None	Paul McCoy	Davenport	Private Call	K7PEM	Iowa	United States	
Radio ID List	60012	3119103	None	Paul McCoy	Davenport	Private Call	K7PEM	Iowa	United States	
Talk Groups	60013	3119104	None	Alessandro Achil	Calmar	Private Call	KE0ADU	Iowa	United States	
Prefabricated SMS	60014	3119105	None	Larry Klodt	Waterloo	Private Call	N0AKF	Iowa	United States	
Receive Group Call Lis	60015	3119106	None	Derek Hawk	Oskaloosa	Private Call	N0NO	Iowa	United States	
Encryption Code	60016	3119107	None	Marshall Dias	Ottumwa	Private Call	W00TM	Iowa	United States	
Digital Contact List	60017	3119108	None	Tom Bicket	Reinbeck	Private Call	AE0TB	Iowa	United States	
1---20000	60018	3119109	None	Scott Lowe	Reinbeck	Private Call	WA0TPN	Iowa	United States	
20001---40000	60019	3119110	None	Randy Nelson	Mt. Union	Private Call	WB0VHB	Iowa	United States	
40001---60000	60020	3119111	None	Randy Nelson	Mt. Union	Private Call	WB0VHB	Iowa	United States	
60001---80000	60021	3119112	None	Randy Nelson	Mt. Union	Private Call	WB0VHB	Iowa	United States	
80001---100000	60022	3119113	None	Richie Thompson	Humboldt	Private Call	K0HU	Iowa	United States	
100001---120000	60023	3119114	None	Daniel Mcglone	Council Bluffs	Private Call	KB0TDW	Iowa	United States	
120001---140000	60024	3119115	None	Don Fiala	Thurman	Private Call	WB0YLA	Iowa	United States	
140001---160000	60025	3119116	None	Larry Vandewater	Greenfield	Private Call	N0BKB	Iowa	United States	
160001---180000	60026	3119117	None	Les Blanchard	Altoona	Private Call	WA0C	Iowa	United States	
180001---200000	60027	3119118	None	Joel Myers	Dallas Center	Private Call	AJ0EL	Iowa	United States	
Friends List	60028	3119119	None	Don Fiala	Thurman	Private Call	WB0YLA	Iowa	United States	
Digital APRS Informati	60029	3119120	None	Nick Verootis	Council Bluffs	Private Call	K0NHV	Iowa	United States	
Analog										

Other Tools

- N0GSG Contact Manager





For More Information

- KF5IW.com
- K4USD.org
- DMR-MARC.net
- RadioID.net
- N0GSG.com
- BridgecomSystems.com
- [Google](https://www.google.com)
- [Facebook](https://www.facebook.com)

Questions?

