

# Amateur Radio Notes V

by Toshen, KE0FHS

[CQ](#) · [Base](#) · [D-STAR](#) · [DMR](#) · [Hotspots](#) · [Pi-Star](#)

## Discovering DMR notes

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As of Jan 1, 2024, this site is no longer being updated. It will remain available for some time for legacy reference.

1) What is DMR?

2) Choosing a way forward

3) Putting it all together

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## Links to helpful resources

These are some links to things I've found useful.











- a. [DMR: sites](#)
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## a) DMR: sites

- [BrandMeister Dashboard](#) 
- [BrandMeister News](#) 
- [BrandMeister Wiki](#) 
- [BrandMeister USA Help Docs](#) 
- [@BMMasterStatus](#)  – Status of BrandMeister servers on Twitter.
- [The DMR-MARC Network](#) 
- [Colorado Digital Multiprotocol](#) 
- [Parker Radio Association](#) 
- [eHam.net](#) – product reviews and more 
- [QRZ.com](#)  – look up info about hams by their callsign or name. Also news, forums, and a swap meet section.








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## b) DMR: forums

- [AnyTone AT-D868UV/AT-D878UV DMR Users Group](#) 
- [SharkRF community forums](#) 






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## c) DMR: articles

- [Helpful links to resources about DMR](#)  by Tom, W2XQ (including some valuable notes about the TYT MD-UV380 radio)
- [BrandMeister Support](#)  by Bud, WØRMT is a good article about how to find more information and support for BrandMeister U.S.A.
- [BrandMeister User API keys](#) , 2018, by Oliver, F4BWG
- [Using the BrandMeister API](#) , 2019, by Vladimir, AC2F
- [A Comparison of Digital Voice Modes of Amateur Radio](#) , 2016, by Andreas, OE8APR, founder of [SocialHams.net](#) 
- [The \\$400 World Wide Mobile Me](#) , 2017, by Barry, K0BSB, Minnesota DMR – some good resource info about a mobile DMR solution using Pi-Star, though the article is difficult to read because it scrolls over a very busy background image (*Hint*: If your browser supports it, use Reader view)

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#### d) DMR: presentations

- The [PAPA System](#)  provides its members with excellent guides and tutorials related to digital radio including a very good introduction: Digital Voice for Amateur Radio by Dave, KC6N, 2018 (the PAPA System, which is a 501(c)(3) organization, and operates for the benefit of the amateur radio community, offers trial guest memberships)
- [BrandMeister Network Intro \(PDF\)](#) , presented by Artem, R3ABM, and Denis, DL3OCK, at Ham Radio 2016 in Friedrichshafen
- [BrandMeister Internals \(PDF\)](#) , presented by Artem Prilutskiy, R3ABM, at Ham Radio 2016 in Friedrichshafen
- [Digital Voice Progress - 2016 \(PDF\)](#)  by Roland Kraatz, W9HPX, via [Charlotte D-STAR](#) 

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#### e) DMR: books

- [Amateur Radio Guide to DMR \(PDF\)](#) , 2015, by John Burningham, W2XAB

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#### f) DMR: videos

- [NoCO DMR](#), 2018, Bud, W0RMT
- [Anyone D868 Tutorial](#) by WoodburyMan
- [Anyone 868 from New to First DMR Contact](#) by Chris, 2E0UKH.
- [DMR Programming for Amateur Radio](#), 2015, by Mike, K0NGA, Rocky Mountain Ham Radio
- [SharkRF openSPOT Mobile Setup](#) (using a TP-LINK TL-WR802N router), 2017, by Jonathan, M0XXJ
- [DMR/MotoTRBO](#) presented by Andy Ruschak, KK7TR, at MicroHAMS Digital Conference 2015
- [DMR \(radio\) – The good, the bad, and the ugly](#), 2016, by Joe Lalumia, W1XWX
- [D Star XRF Reflectors – A Whole New D-Star Experience](#), 2017, Bob, K6UDA

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## g) DMR: hardware & software

- [Ham Radio Outlet \(HRO\)](#), hotspots and digital radios
- A good source for AnyTone and TYT radios is Lets Get Ready, which has an online store on eBay and provides good, friendly support: [Lets Get Ready](#)
- Let's Get Ready: [AnyTone AT-D878UV official release Firmware and CPS](#)
- [SharkRF openSPOT](#)

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## h) DMR: tools

- CCS7 ID registrations:
  - Registrations for everywhere—including North America, South America, Asia, and Oceania, Europe, and Africa—are now all handled by [RadioID.net](#).
- [BrandMeister Dashboard](#)

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## i) DMR: repeaters

- [DMR-MARC networked repeaters map](#)
- [DMR networked repeaters list](#)

- [RepeaterBook CO DMR repeaters](#) 

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## j) DMR: talkgroups & reflectors

- [U.S. BrandMeister Server User Guide \(PDF\)](#) 
- [BrandMeister talkgroups list](#) 
- [BrandMeister talkgroups list](#)  an easier to read list on the Pi-Star site that includes links to Hoseline
- [DMR-MARC talkgroups](#) 
- [Rocky Mtn Ham Radio](#) 

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## k) DMR: nets

What follow is some nets I've come across and enjoyed, but there's no guarantee that they're still active (please let me know if they aren't).

- **TUE: SNARS**  Digital Weekly Net: BM 31328, 8p Pacific
- **WED: SkyHub Link System's Digital Learning Net** : BM TG 310847, 7p MTN.  
An hour of Q&A about everything digital radio hosted by KE0DC & W0SUN.  
Related Telegram Group: [Digital Learning Net](#) 
- Some places to find lists of DMR nets:
  - Ham Radio DMR Nets Telegram Group: <https://t.me/HamRadioDMRNets> 
  - Michael, AF6FB: [DMR Nets](#) 
- *See also:* [D-STAR nets](#)

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## A few other notes

A few other interesting or helpful things.

1. Some repeater-based talkgroups
2. Some BrandMeister hotspot talkgroups
3. Some other hotspot talkgroups
4. All BrandMeister regional talkgroups
5. All BrandMeister state talkgroups
6. All DMR-MARC regional talkgroups
7. Northern Colorado BrandMeister talkgroups
8. Constellation reflectors
9. BrandMeister dynamic, static, and auto-static talkgroups
10. AnyTone firmware updates
11. DMR simplex frequencies

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## 1) Some repeater-based talkgroups

The display names are just what I use.

TLKGRP Frequency CC TS DISPLAY ONSCREEN

*Rocky Mtn Wide, Lee Hill Rptr (RMHAM Network)*

700 446.9875- 7 1 LEE RCKY MTN 700

*Northern CO Region, Lee Hill Rptr (RMHAM Network)*

721 446.9875- 7 2 LEE NO CO 721

*Rocky Mtn Wide, Horsetooth Mtn Rptr*

700 446.7500- 7 1 HRS RCKY MTN 700

*Northern CO Region, Horsetooth Mtn Rptr*

700 446.7500- 7 2 HRS NO CO 721

*Local, Parker Pinery Rptr*

2 445.0750- 1 2 PRA LCL 2

*CO STWD, Parker Pinery Rptr*

3108 445.0750- 1 1 PRA CO STWD 3108

## 2) Some BrandMeister hotspot talkgroups

*For hotspot-based setup:* These all use the same TX and RX simplex frequency (whatever your hotspot is set up to use), color code 1, and time slot 2. (Repeater-based time slots are shown in parentheses.)

Links are to the BrandMeister Hoseline service, so you can get an idea of the activity on the talkgroup. The display names are just what I use.

**Note:** Do not initiate calls on the TAC channels (310 - 319); they are meant only for moving calls over from other channels. Initiating calls on the TAC channels can get you banned.

TLKGRP DISPLAY ONSCREEN

*World Wide (TS1)*

91 WW 91

*North America (TS1)*

93 N AM 93

*N AM TAC 310*

310 TAC 310<sup>1</sup>

*N AM TAC 311*

311 TAC 311<sup>1</sup>

*N AM TAC 312*

312 TAC 312<sup>1</sup>

*Worldwide English (Dynamic)*

913 WW EN DYN 913

*US Nationwide (TS1)*

3100 US WIDE 3100<sup>1</sup>

*Colorado Statewide (TS2)*

3108 CO STWD 3108

*Parker Radio Association LCL (TS2)*

310844 PRA LCL 310844

*Calling Area 0: Midwest, incl CO (TS1)*

31090 MIDWST 31090

*Calling Areas 7: West (TS1)*

31097 WEST 31097

*Eastern Oklahoma*

31402 E OK 31402

*Parrot Private (TS1 & TS2)*

310997 PARR0T 310997

*Reg and Loc (APRS) Services (TS1 & TS2)*

310999 APRS 310999

[1] Talkgroups 3100, 310, 311, 312 are linked across BrandMeister and DMR-MARC.

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### 3) Some other hotspot talkgroups

***For hotspot-based setup:*** These all use the same TX and RX simplex frequency (whatever your hotspot is set up to use), color code 1, and time slot 2. (Repeater-based time slots are shown in parentheses.)

The display names are just what I use.

TLKGRP DISPLAY ONSCREEN

*DMR-MARC: World Wide (TS1)*

1 WW 1

*DMR-MARC: North America (TS1)*

3 N AM 3

*DMR-MARC: WW English (TS1)*

13 WW EN 13

*DMR-MARC: N AM TAC 310 (TS1)*

310 TAC 310

*DMR-MARC: N AM TAC 311 (TS1)*

311 TAC 311

*DMR-MARC: N AM TAC 312 (TS1)*

312 TAC 312

*DMR-MARC: Northern CO (TS2)*

3171 NO CO 3171

Note: cross-connected to BrandMeister

*DMR-MARC: Mountain Region (TS2)*

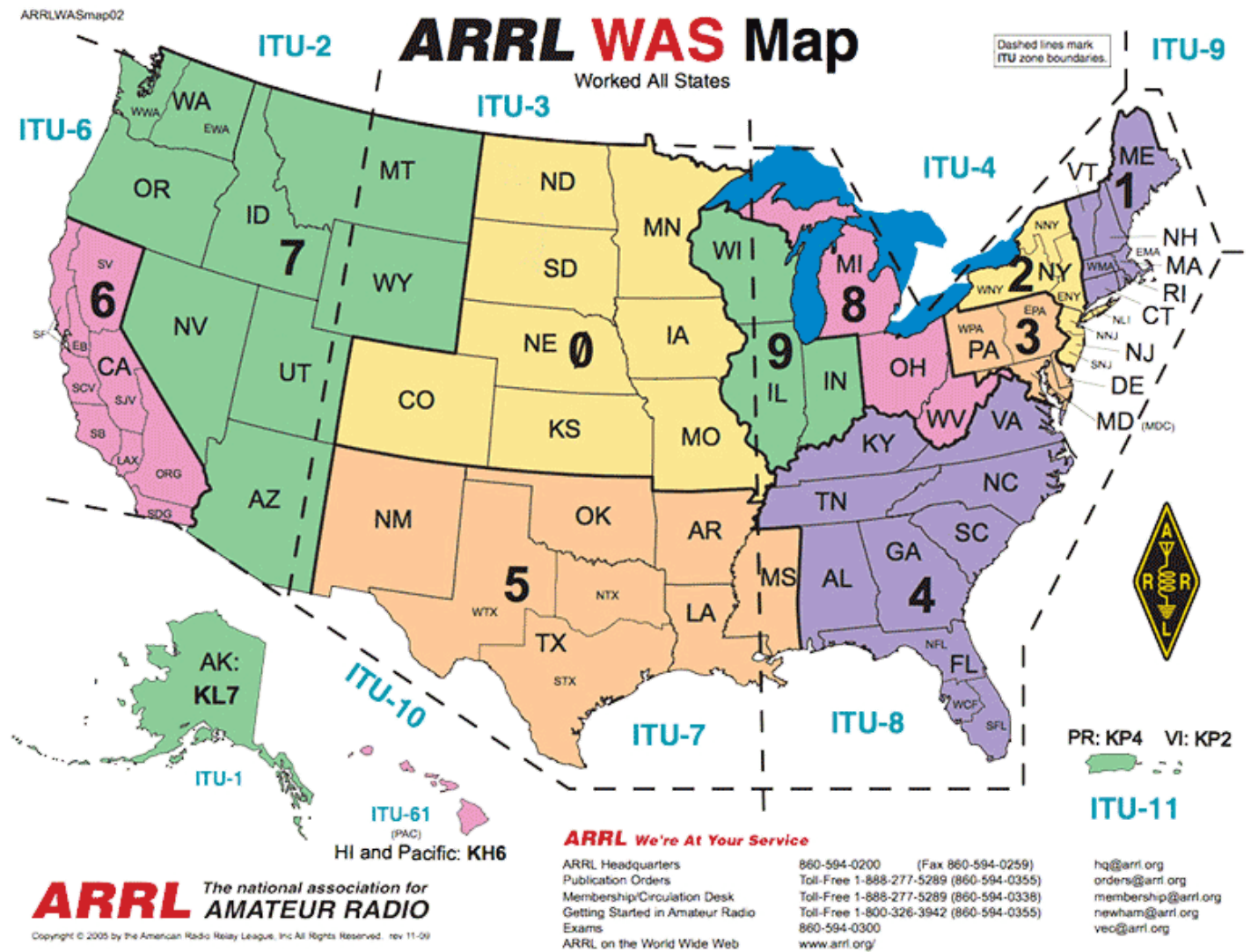
3177 MTN RGN 3177

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#### 4) All BrandMeister regional talkgroups

The BrandMeister U.S. regional talkgroups mirror the callsign assignment regions shown in this [ARRL WAS map \(PDF\)](#).



Links are to the BrandMeister Hoseline service, so you can get an idea of the activity on the talkgroups. On repeaters, these talkgroups typically are on time slot 1. The display names are just what I use.

TLKGRP	DISPLAY	ONSCREEN
31090	0 MIDWST	31090
31091	1 N EAST	31091
31092	2 NY NJ	31092
31093	3 MIDATLTC	31093
31094	4 S EAST	31094
31095	5 CENTRAL	31095

31096 6 CAL 31096

31097 7 WEST 31097

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## 5) All BrandMeister state talkgroups

Links are to the BrandMeister Hoseline service, so you can get an idea of the activity on the talkgroups. On repeaters, the home state talkgroup is typically on time slot 2. The display names are just what I use.

TLKGRP DISPLAY ONSCREEN

3101 AL STWD 3101

3102 AK STWD 3102

3104 AZ STWD 3104

3105 AR STWD 3105

3106 CA STWD 3106

3108 CO STWD 3108

3109 CT STWD 3109

3110 DE STWD 3110

3111 DC STWD 3111

3112 FL STWD 3112

3113 GA STWD 3113

3115 HI STWD 3115

3116 ID STWD 3116

3117 IL STWD 3117

3118 IN STWD 3118

3119 IA STWD 3119

3120 KS STWD 3120

3121 KY STWD 3121

3122 LA STWD 3122

3123 ME STWD 3123

3124 MD STWD 3124

3125 MA STWD 3125

3126 MI STWD 3126

3127 MN STWD 3127

3128 MS STWD 3128

3129 MO STWD 3129

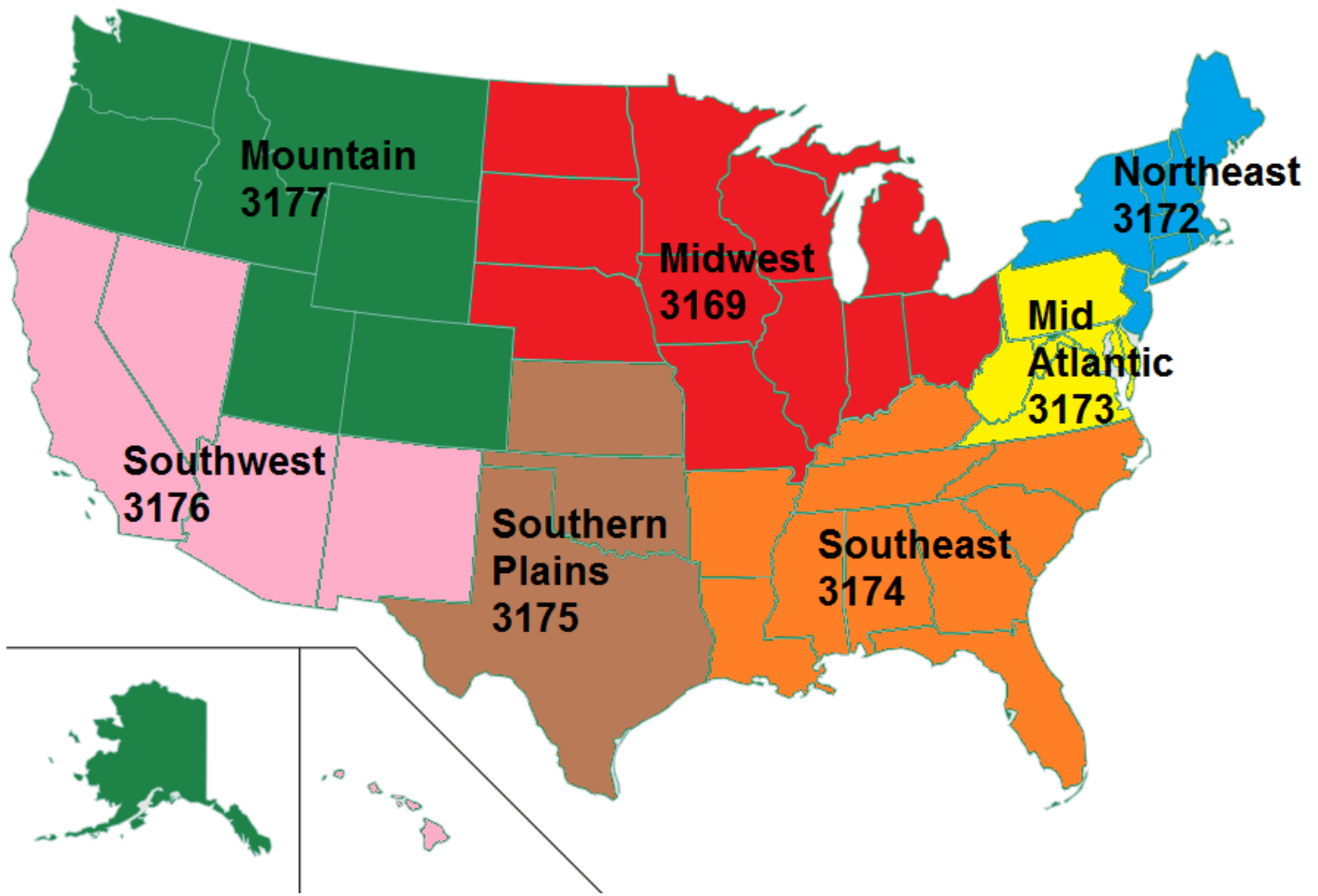
3130 MT STWD 3130  
3131 NE STWD 3131  
3132 NV STWD 3132  
3133 NH STWD 3133  
3134 NJ STWD 3134  
3135 NM STWD 3135  
3136 NY STWD 3136  
3137 NC STWD 3137  
3138 ND STWD 3138  
3139 OH STWD 3139  
3140 OK STWD 3140  
3141 OR STWD 3141  
3142 PA STWD 3142  
3144 RI STWD 3144  
3145 SC STWD 3145  
3146 SD STWD 3146  
3147 TN STWD 3147  
3148 TX STWD 3148<sup>1</sup>  
3149 UT STWD 3149  
3150 VT STWD 3150  
3151 VA STWD 3151  
3153 WA STWD 3153  
3154 WV STWD 3154  
3155 WI STWD 3155  
3156 WY STWD 3156

[1] BrandMeister 3148 (TX STWD) is crosslinked to DMR-MARC 9000.

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## 6) All DMR-MARC regional talkgroups

The seven DMR-MARC U.S. regional talkgroups have a different grouping.



The display names are just what I use.

TLKGRP	DISPLAY	ONSCREEN
3169	RG MIDWST	3169
3172	RG N EAST	3172
3173	RG MIDATLTC	3173
3174	RG S EAST	3174
3175	RG S PLAINS	3175
3176	RG S WEST	3176
3177	RG MOUNTAIN	3177

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## 7) Northern Colorado BrandMeister talkgroups

We have some good talkgroups in northern Colorado, including those associated with the Northern Colorado (NoCO) DM group's amateur radio DMR repeater network, as well as with the [Colorado Digital Multiprotocol](#) team.



The display names are just what I use:

```
TLKGRP  DISPLAY  ONSCREEN
 3171   NoCO (Northern Colorado)
31088   CO HD (Hotspot Discussion)
31083   CO Severe WX
31084   NoCO MTN (Front Range)
```

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## 8) Constellations: a big leap for digital voice?

*Important:* In DMR, the use of reflectors was an older solution that was implemented to accommodate an old and now long deprecated line of hotspots from DV4 that couldn't handle the newer solution of talkgroups. Because of issues that reflectors caused, BrandMeister deprecated the use of reflectors on its network, and is now focused on talkgroups. Some other networks still allow the use of reflectors, so I'm leaving the information in this note here for now for informational purposes.

There is work being done to include DMR into existing XLX reflectors, and by linking into the XRF/XLX infrastructure.

From the Kings of Digital Notify group: The Constellation reflectors are:

- D-STAR: XRF002, XRF310, XRF555, (all modules A-Z) and XLX313 (modules A-F).
- DMR: Use XLX313 as the master and select talk group 4001-4006.
  - XLX212 is DMR only with 26 talk groups 4001-4026.
  - XLX313 provides full time transcoding on all 6 modules.
- All nets are available on both D-STAR and DMR.
- Transcoded modules also available for QSOs.

### 8a) *The advantage of a constellation*

From the paper, "XLX and XRF Reflectors, DMR, and use with DMRGateway" by John Fields, K6KD, of the D-STAR Round Table Forum:

The advantage for existing DMR users are portals into current XLX/XRF infrastructure (individual reflectors or groups of linked reflectors) either using new DMR only Talk Groups or Talk Groups with transcoding. The advantage for existing D-STAR users is the ability to access the XLX/XRF infrastructure using many high quality, low cost DMR radios.

An example of a constellation net is the [D-STAR Round Table Net](#), which because of this new flexibility is joined by people using D-STAR, DMR, and even System Fusion radios:

D-STAR Round Table is on a constellation of XRF/XLX Reflectors. To participate, you may connect to any one of the linked Reflectors: XRF002A, XRF310A, XRF555A, XLX313A, DMR XLX313/TG 4001 OR connect to a repeater that is linked to one of the reflectors.



*Notes:*

- Bob, K6UDA, has a good video about this: [D Star XRF Reflectors – A Whole New D-Star Experience](#).
- See the [X Reflector Directory](#) for more constellation nets.
- *As of Aug 2017:* Private calls to 8001 - 8999 can be used to select XLX masters, for example, 8313 = XLX313.
- See also: [DMRGateway notes](#).

### *8b) Constellation setup*

***Follow-up note (Nov 2017)*** – Following the steps in a document written by Craig Jungers, K7EXJ, "Connecting your DMR radio to the D-STAR constellation", I configured the Pi-Star DMRGateway settings so that I was able to join into the [Kings of Digital](#) constellation with my DMR radio, listening to callers on both D-STAR and DMR radios. Sweet, this is progress! To summarize:

1. I enabled the Pi-Star DMR Configuration with the DMR Master set to DMRGateway, and then set up the XLX section as follows:
  - XLX Master = XLX\_313
  - XLX Startup TG = None [*Note:* This option is no longer available.]
  - XLX Master Enable = On
2. I added an XLX hotspot zone to my codeplug with the following channels:
  - XLX313 CQCQCQ = TG 6, Group Call

- XLX Unlink = TG 64000, Private Call
- XLX313 A Link = TG 64001, Private Call (XLX313 A is persistently linked to the [Kings of Digital reflector constellation](#) , which also includes XRF002 A, XRF310 A, XRF555 A, and XLX212 A)
- XLX313 B Link = TG 64002, Private Call (XLX313 B is persistently linked to XRF757 C and the [QuadNet](#) )
- XLX313 C Link = TG 64003, Private Call (XLX313 C is persistently linked to XRF555 C = good for multimode extended QSOs)
- XLX313 D Link = TG 64004, Private Call (XLX313 D is persistently linked to XRF310 D = good for multimode extended QSOs)
- XLX313 E Link = TG 64005, Private Call

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## 9) BrandMeister dynamic, static, and auto-static talkgroups


This is a somewhat complicated topic. For full details, see the [standalone article](#) .

### *Quick hint for simplex hotspot users*

Here are the two most important things you need to know:

1. If you key up a talkgroup, it will be activated as auto-static. As long as you don't key up a different talkgroup, the auto-static talkgroup will not time out and you'll remain linked to it until you manually disconnect from it (drop it).
2. To cleanly disconnect from an auto-static talkgroup, make a group call to TG 4000.

### *Advanced BrandMeister API use*

In Pi-Star, the BrandMeister API controls the Active BrandMeister Connections module. For additional information about advanced use of the BrandMeister API, see the article [Using the BrandMeister API by Vladimir, AC2F](#) .

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## 10) AnyTone firmware updates

The AnyTone AT-D878UV and T-D578UV firmware update processes are similar. Here are the steps.

1. **Download the updates from your vendor** – This step always means downloading the firmware update and the matching Customer Programming Software (CPS) upgrade, because the AnyTone requires both to be on the same version. In addition, it is sometimes necessary to also download a USB driver update. Some vendors package them altogether; others list them separately. Extract any files that are zipped.
2. **Optional: Download the latest digital contact list** – I figure if I'm going to go through the hassle of updating the CPS and firmware, I might as well bring my digital contact list up to date at the same time, especially given how quickly DMR registrations are growing.

A decent contact list download tool is made available by the DMR Team: [DMR Database](#) .

Another source is the ContactLists Telegram group: <https://t.me/contactlists> .

3. **Set the COM port** – Connect the radio to the computer, turn it on, open the **previous** CPS, set the COM port (on my computer, I have to set it every session). Make a note of the port.
4. **Read and save the radio's codeplug** – If a new digital contact list has been downloaded, don't bother reading the contact list, just the other data. Save the read data, then close the previous CPS and turn off the radio.

*Note:* If you have trouble with the USB driver (COM port not found), it might be due to Windows third-party signature verification. For a workaround, see the *Driver signature enforcement* note below.

5. **Install the new CPS** – If needed, also install the new USB driver (I install the X64 version for my 64-bit system; a 34-bit system should use the X86 version).
6. **If needed, perform the baseband upgrade** – If the current firmware upgrade includes a baseband upgrade (doesn't happen often, so read the Change Log to find out), then perform the baseband upgrade first:
  - a. If you haven't done so previously, install SetupSCT\_PORT.msi.
  - b. Put the radio into Baseband Programming Mode: While pressing and holding the radio's # key and the blue alarm key, power it on. It will display: "WARNING - This is Boot Mode for SCT!"
  - c. Open the SCT\_PORT Host Controller Software (SCT\_PORT.exe).
  - d. Select the SCT Port Platform: SCT3258.
  - e. In the Tools menu, select Config, and then select the COM port and baud rate (115200).



- f. In the SCT\_PORT menu, select Flash Update, and then Select the hex file for the current update, for example, SCT3258TD\_UpdateFlash\_V2\_01\_07BA\_20190822.hex.
  - g. To initialize the port, click the INIT PORT button. If the initialization is successful, " Init Port Successful" will be displayed.
  - h. To start the update, click Flash Update.
  - i. When the update is finished, "Download Flash Completed" will be displayed.
  - j. Exit the SCT\_PORT Host Controller Software.
  - k. Reset the radio: turn it off, and then back on.
7. **Open the saved codeplug** – In the new CPS, open the radio's codeplug that was saved from the previous CPS. Alternatively, you can read it from the radio. If you didn't download a new contact list, read that, too.
8. **Enable Startup Reset** – In Optional Settings > Power-On, make sure Startup Reset is On.
9. **Open the new contact list** – If a new digital contact list has been downloaded, import it (Tool > Import > Digital Contact List), and then save the codeplug with a new name.
10. **Set the COM port** – Connect the radio to the computer, turn it on. In the new CPS, set the COM port, and then turn the radio off.
11. **Open the Firmware Update tool** – In the CPS Tool menu, select Firmware and Icon Update, and then install the update:
  - a. **AT-D878UV**: Press and hold both the radio's PTT key and Alarm button (the blue or orange button on top), and then power the radio on. The LED Status Indicator will blink red.  
**AT-D578UV**: Power the radio on. Press and hold both the Menu and Exit keys, and then power the radio off. Keep holding all three buttons until you see the red light blinking.
  - b. In the Firmware Update tool, open the new firmware update file that you downloaded and extracted (it will have an .spi extension, for example, D878UV\_V1.16\_201901122.spi).
  - c. If necessary, choose the COM port, select Duplex, set the COM speed to the highest setting, and then click Write. The radio's LED Status Indicator will slowly blink red while the firmware is being updated.
  - d. A message is displayed in the CPS when the update is finished. Turn the radio off.
12. **Initialize the radio** – This was formerly called Reset the radio's Main Control Unit/MCU:
  - a. **AT-D878UV**: Press and hold the PTT key and PF1 button (the button with one bar just below the PTT key), and then power the radio on.

**AT-D578UV:** Press and hold the P2 button and the Channel Knob, and then power the radio on.

b. The radio will display: "Are you sure you want to Initialize radio?" (Formerly: MCU Reset.) Press Confirm. Do NOT turn the radio off while this is displayed. This process will wipe all the data stored in the radio, including the codeplug.

c. When the initialization/MCU reset process is finished, set the time zone, date, and time

**AT-D878UV:** Use the P1 button to move through the fields, and the UP/DOWN arrow buttons to change the values.


**AT-D578UV:** Push the Channel Knob to move through the field, and rotate the knob to change the values.

d. When finished, press the Confirm button to reboot the radio.

13. **Write the codeplug to the radio** – Turn the radio on. In the CPS, set the COM port, if necessary, and then click Write to Radio. Write both the Digital Contact List and the Other Data.

14. When the write is finished, turn off and disconnect the radio. Good to go!

### *Driver signature enforcement*

I use a 64-bit Windows 10 laptop for my amateur radio programming. In early 2018, Microsoft released an update that is much stricter in its handling of third-party driver signature verification. Since then, in order to read from and write to my radios, I have to use an Advanced Boot Option (option 2 in this [How-To Geek article](#) ) to temporarily disable driver signature enforcement.

1. To access advanced boot options: Shift + Restart.
2. Select the Troubleshoot option.
3. Select Advanced Options.
4. Select Startup Settings.
5. In Startup Settings, click Restart.
6. After clicking Restart, type 7 to select Disable driver signature enforcement.
7. The computer will restart with driver signature enforcement disabled until you restart again, and then you can read from and write to the TH-D74A via the MCP-D74 program.

For older versions of Windows, see this [WinTips.org article](#) .

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## 11) DMR simplex frequencies

Thanks to a robust discussion on the [Colorado Digital Multiprotocol](#) [Telegram group: Colorado Digital Multiprotocol](#), here's a list of commonly used North America DMR simplex frequencies:

- Admit criteria: Always or Channel Free
- Time slot: 1
- Color code: 1
- Talkgroup ID: 99
- UHF simplex channels:
  1. 441.0000 MHz
  2. 446.5000 MHz
  3. 446.0750 MHz
  4. 433.4500 MHz
- VHF simplex channels:
  1. 145.7900 MHz
  2. 145.5100 MHz

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8. [Constellations: a big leap for digital voice](#)
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