

Configure a Pi-Star Hotspot for Multi-Networks (BM, DMR+ & TGIF) & Much More

VE3RRD - 7 December 2020

Multi-Network Configuration

First, go to the Pi-Star hotspot “Configuration” and select “DMRGateway” under “DMR Master”.

After you apply changes, additional fields will appear. Configure them as shown below.

Setting	Value
DMR Master:	DMRGateway
BrandMeister Master:	BM_Canada_3021
BM Hotspot Security:	*****
BrandMeister Network ESSID:	3021918 01
BrandMeister Network Enable:	<input checked="" type="checkbox"/>
BrandMeister Network:	Repeater Information Edit Repeater (BrandMeister Selfcare)
DMR+ Master:	DMR+ IPSC2-Canada
DMR+ Network:	Options=
DMR+ Network ESSID:	3021918 01
DMR+ Network Enable:	<input checked="" type="checkbox"/>
XLX Master:	XLX_950
XLX Startup Module:	Default
XLX Master Enable:	<input type="checkbox"/>
DMR Color Code:	1
DMR EmbeddedLCOnly:	<input type="checkbox"/>
DMR DumpTAData:	<input checked="" type="checkbox"/>

If you have more than one pistar hotspot, enter a different 2-digit ESSID from the pull-down menu for each one. See the section on “Adding a BM Password To Your Hotspot” for using BM Hotspot Security (now required by BM). After selecting/filling the fields as shown above, click on “Apply Changes” and wait for the pistar to reboot.

Second, click on “Expert” near the top of the page; then near the left side on the second line click on “DMR GW” (beside “Full Edit:”).

Scroll down to find the sections called [DMR Network 1], [DMR Network 2], etc. Delete all of the {DMR Network x} entries.

Copy and paste the [DMR Network x] entries (1 through 4) from the next pages.

Change the entries as necessary for your ID etc., but leave the default passwords as they are (except Network 1) Networks 1 and 2 will have your DMR radio ID number with a 01 (or 02) added to it, Network 4 just has your ID number (Network 3 is currently disabled).

Third, click on “Apply Changes” and wait 15 seconds or so. Then click on “Admin” near the top of the page and on the Admin page click on “Power” and then click the green “Reboot” button.

The Pi-Star will take a while to reboot.

[DMR Network 1]

Enabled=1

Address=158.69.203.89

Port=62031

TGRewrite0=2,9,2,9,1
TypeRewrite1=1,9990,1,9990
TypeRewrite2=2,9990,2,9990
SrcRewrite0=2,4000,2,9,1001
PassAllPC1=1
PassAllPC2=2
PassAllTG1=1
PassAllTG2=2
Password="Enter your BM Hotspot Security Password here"
Debug=0
Name=BM_Canada_3021
Id=302191801

[DMR Network 2]
Enabled=1
Address=168.235.109.210
Port=55555
TGRewrite0=2,8,2,9,1
TGRewrite1=2,80505,2,505,1
TGRewrite2=2,80800,2,800,100
TGRewrite3=2,83801,2,3801,8
TGRewrite4=2,89990,2,9990,1
TGRewrite5=2,80001,1,1,9999
TGRewrite6=2,80001,2,1,9999
PCRewrite0=2,84000,2,4000,1001
Password="PASSWORD"
Debug=0
Id=302191801
Name=DMR+_IPSC2-QUADNET

[DMR Network 3]
Enabled=0
Name=HBLink
Address=1.2.3.4
Port=5555
TGRewrite=2,11,2,11,1
Password=
Location=0
Debug=0
TGRewrite0=2,11,2,11,1

[DMR Network 4]
Enabled=1
Name=TGIF_Network
PCRewrite1=1,4009990,1,9990,1
PCRewrite2=2,4009990,2,9990,1
TypeRewrite1=1,4009990,1,9990
TypeRewrite2=2,4009990,2,9990
TGRewrite1=1,4000001,1,1,999999
TGRewrite2=2,4000001,2,1,999999

SrcRewrite1=1,9990,1,4009990,1
 SrcRewrite2=2,9990,2,4009990,1
 SrcRewrite3=1,1,1,4000001,999999
 SrcRewrite4=2,1,2,4000001,999999
 Address=tgif.network
 Password=password
 Port=62031
 Location=0
 Debug=0
 Id=3021918

After it has rebooted, the Dashboard should look like the following with the three networks listed on the bottom left under “DMR Master”. Also refer to Jeff VE6DV webpage <https://www.amateurradio.com/author/ve6dv/> .

Hostname: pi-star2
Pi-Star:4.1.2 / Dashboard: 20201117

Pi-Star Digital Voice Dashboard for VE3RRD

Dashboard | Admin | Configuration

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 DMR
Tx	446.675000 MHz
Rx	446.675000 MHz
FW	HS_Hat:v1.5.2
TCXO	14.7456 MHz

DMR Repeater	
DMR ID	3021918
DMR CC	1
TS1	disabled
TS2	enabled

DMR Master	
BM Canada 3021	
DMR+ IPSC2-Canada	
TGIF Network	

Gateway Activity								
Time (EST)	Mode	Callsign	Target	Src	Dur(s)	Loss	BER	
09:02:59 Nov 28th	DMR Slot 2	VE3RRD	TG 3023	RF	1.1	0%	0.1%	
09:02:36 Nov 28th	DMR Slot 2	4000	TG 9	Net	1.0	0%	0.0%	
00:41:03 Nov 28th	DMR Slot 2	VA3XFE	TG VE3XNS	Net	1.6	0%	0.0%	
00:32:24 Nov 28th	DMR Slot 2	VE3THR	TG VE3XNS	Net	0.5	0%	0.0%	

Local RF Activity								
Time (EST)	Mode	Callsign	Target	Src	Dur(s)	BER	RSSI	
09:02:59 Nov 28th	DMR Slot 2	VE3RRD	TG 3023	RF	1.1	0.1%	S9+46dB (-47 dBm)	

Pi-Star / Pi-Star Dashboard, © Andy Taylor (MW0MWZ) 2014-2020.
 ircDDBGateway Dashboard by Hans-J. Barthen (DL5DI),
 MMDVMDash developed by Kim Huebel (DG9VH),
 Need help? Click here for the Facebook Group
 or Click here to join the Support Forum
 Get your copy of Pi-Star from here.

On your radio, BM talk groups are programmed as normal (no added prefix).

DMR+ talk groups start with the prefix 8 plus a 4 digit TG for a total of 5 digits. Use zeros for padding – example: for the DMR+ Canada Wide TG 302, enter 80302.

TGIF talk groups start with the prefix 4 plus a 6 digit TG for a total of 7 digits. Use zeros for padding – example: for the TGIF Ontario TG 3023, enter 4003023.

Parrot testing can be done on the BM network as a private call to 9990. On the DMR+ network it is a group call to 89990. On the TGIF network it is a private call to 4009990.

Visit the TGIF network page at <http://tgif.network/> and you can check if your hotspot is connected to it after transmitting by checking the “Self Care” tab. You can also disconnect from a TG by entering 4000 and clicking the “Update” button.

DMR+ activity can be checked at <https://dmr.openquad.net/>

How to add the BrandMeister Manager to your Pi-Star hotspot dashboard

The BrandMeister Manager is added to the “Admin” dashboard page and allows you to quickly add or delete static talk groups that you want to monitor on the BM network. It can also be used to terminate the connection to a (dynamic) talk group that is very busy by clicking “Drop QSO” or “Drop All Dynamic”.

Active BrandMeister Connections					
BrandMeister Master	Default Ref	Timeout(s)	Active Ref	Static TGs	Dynamic TGs
BM United States 3101	REF0	0(s)	None	TG1023213	None

BrandMeister Manager			
Tools	Active Ref	Link / Unlink	Action
<input type="button" value="Drop QSO"/> <input type="button" value="Drop All Dynamic"/>	None ▾	<input type="radio"/> Link <input checked="" type="radio"/> UnLink	<input type="button" value="Modify Reflector"/>
Static Talkgroup	Slot	Add / Remove	Action
<input type="text"/>	<input type="radio"/> TS1 <input checked="" type="radio"/> TS2	<input checked="" type="radio"/> Add <input type="radio"/> Delete	<input type="button" value="Modify Static"/>

Use a browser to log into your Pi-Star hotspot’s “Configuration” screen, and click on “Expert” near the top. On the lower line, click “BM API” and an empty box will appear. Leave this tab the way it is and continue below.

Open a second tab in your browser and log into your BrandMeister account at <https://brandmeister.network/> and click on your call sign near the top right of the screen.

Select “Profile Settings”, and part way down the page on the right side is a box called “API Keys” (with a little picture of a key). Click API Keys, and on the page that opens, click the small square button on the right called “Add”.

In the small box that opens saying “Enter a name for this key” you can call it anything you want, such as “pistar hotspot” for example and click OK.

Another box will appear, and near the top is an area with a long sequence of random characters which is your unique key for your hotspot. Copy this block of characters and paste into a text file that you can save somewhere in case you need to enter it again in the future.

Go back to your first browser tab that you left open on the “BM API” and paste the API character sequence into the empty box on your Pi-Star. Click “Apply Changes”. You should now reboot the Pi-Star and by selecting the “Admin” screen you will see the newly added information.

When you have everything working properly, be sure to do a Backup (Configuration / Backup/Restore).

Some common BM talk groups are (BM TG requires no prefix):

- 302 Canada wide
- 3023 Ontario wide
- 30231 ON1 – rag chew / discussion
- 302310 Canada's TAC 302310
- 9990 BM Parrot (private call)

A current list of Canadian talk groups issued by BrandMeister Canada can be found at

<https://wiki.brandmeister.network/index.php/Canada>

The current world wide list of BrandMeister talk groups can be found at

https://www.pistar.uk/dmr_bm_talkgroups.php

Some DMR+ talk groups are:

- 80001 – World Wide (All languages)
- 80002 – Europe
- 80003 – North America
- 80013 – World Wide English
- 80113 – UAE 1 (User Accessible English 1)
- 80123 – UAE 2 (User Accessible English 2)
- 80133 – USA Wide
- 80235 – United Kingdom
- 80302 – Canada Wide
- 80315 – QuadNet Technical (Linked to D-STAR)
- 80320 – QuadNet Array (linked to D-STAR, Brandmeister DMR, Yaesu System Fusion & Wires X)
- 80505 – Australia Wide
- 89990 – DMR+ Parrot. This needs to be setup as a group call.

A current list of DMR+ talk groups can be found at:

https://www.pistar.uk/dmr_dmr+_talkgroups.php

Some TGIF talk groups are:

- 4000302 – Canada
- 4003022 – CQ Canada
- 4003023 – Ontario
- 4009990 – TGIF Parrot (private call)

A current list of TGIF network talk groups can be found at:

<http://tgif.network/talkgroups.php> and https://www.pistar.uk/dmr_tgif_talkgroups.php

Power-Down or Reboot Your Pi-Star Remotely From Your Radio

Using a browser, log in to your pi-star hotspot and click on “Configuration”. Click on “Expert” and then “PiStar-Remote”. You will see the following displayed – make the changes noted below and click “Apply Changes”.
Reboot your Pi-Star hotspot (under Admin / Power).

[banner]

```
# Pi-Star Remote config file
# This config file is designed for the Pi-Star Keeper remote control
# The remote control system is designed to give repeater keepers an
# RF KillSwitch for their repeaters.
```

[enable]

```
# Is the Pi-Star Remote Enabled? (true|false)
enabled=true <<== change the “false” to “true” (if there is a # in front, remove it)
```

[keeper]

```
# Keepers Information
callsign=VE3RRD <<== change to your call sign (if there is a # in front, remove it)
```

[d-star]

```
# UR fields
svckill=SVCKILL
svcrestart=SVCRSTRT
reboot=REBOOTPI
#shutdown=SHUTDOWN
getip=GETIP
#hostfiles=HOSTFILE
#8Ball=8BALL
```

[dmr]

```
# TG commands
svckill=9999999
svcrestart=9999998
reboot=9999997 <<== (if there is a # in front, remove it)
shutdown=9999996 <<== remove the # from in front of “shutdown”
#hostfiles=9999995
```

Now you can remotely reboot your Pi-Star by making a private call to 9999997, or shut it down by making a private call to 9999996. Wait 30 seconds or so after issuing a shutdown command before pulling the power plug. This is very useful when you temporarily set up your pi-star in your vehicle to “go mobile”; when you want to take it back into the house just send it the 9999996 command.

The pi-star hotspot only uses about 100-200 KB per minute, so isn't too hard on your cellular data plan.

How to Upgrade the Firmware on a Pi-Star Hat

The firmware version appears on the pi-star dashboard under “Radio Info”. In the examples below, at left the firmware is version 1.4.17 before upgrade and version 1.5.2 on the right after the upgrade.

Radio Info	
Trx	Listening
Tx	445.175000 MHz
Rx	445.175000 MHz
FW	HS_Hat:v1.4.17
TCXO	14.7456 MHz

Radio Info	
Trx	Listening
Tx	445.175000 MHz
Rx	445.175000 MHz
FW	HS_Hat:v1.5.2
TCXO	14.7456 MHz

To upgrade the regular simplex frequency MMDVM pi-star hat, go to “Configuration” and click on “Expert”. Next click on “SSH Access” (near the right side of the screen). You must log in with the user name (default is “pi-star”) and your password (default is “raspberry”).

Enter the following commands and press “Enter” after each:

```
rpi-rw
sudo su
sudo pistar-mmdvmhshatflash hs_hat
```

Wait for the message saying that the flash is complete, then press any key to reboot. Verify the firmware version on the Dashboard.

If you are upgrading a duplex pi-star hat, change the last command line to:

```
sudo pistar-mmdvmhshatflash hs_dual_hat
```

But some older duplex boards require that JP1 be shorted to do a firmware upgrade.

BrandMeister Messaging

DMR has the ability to send and receive SMS messages. This also includes sending SMS messages to a cellphone.

Information on how to configure your DMR radio for this function can be found at:

<https://coloradodigital.net/2020/05/10/brandmeister-messaging/>

Although this is primarily aimed at AnyTone radio users.

Here are the SMS service numbers (private calls) and associated functions available through BrandMeister:

- 262993 – GPS and weather
- 262994 – Repeater query / POCSAG / dapnet
- 262995 – SMSC

Adding a BM Password to Your Hotspot

The BrandMeister network now requires that hotspots use a password to connect to their servers.

First, log into <https://brandmeister.network/> and click on your call sign on the top bar. Select “SelfCare” and turn “Hotspot Security” ON. It will ask you for a password, then click “Save”.

Next, log into your hotspot “Configuration” screen and enter the same password under “DMR Configuration” in the box beside “BM Hotspot Security”. Click on “Apply Changes” and wait for your hotspot to reboot. Check the Dashboard display to ensure that “DMR Net” under “Network Status” is green, and the 3 networks still appear under “DMR Master”.

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	446.675000 MHz
Rx	446.675000 MHz
FW	HS_Hat:v1.5.2
TCXO	14.7456 MHz

DMR Repeater	
DMR ID	3021918
DMR CC	1
TS1	disabled
TS2	enabled

DMR Master	
BM Canada 3021	
DMR+ IPSC2-Canada	
TGIF Network	

Upgrading Pi-Star Software

If you are using an older version such as v3.4.17, then you will have to re-image the SD card to upgrade to version 4.1.2 which can be downloaded from <https://www.pistar.uk/downloads/>

To upgrade from v4.1.2 to the latest v4.1.3, first go to “Configuration” and click on “Update”. Once this has finished, select “Expert” and click on “Upgrade”. On your Dashboard, the top right should read “Pi-Star: 4.1.3”.

Adding Multiple WiFi Entries to the Pi-Star

Often you want to be able to use more than one WiFi source for your Pi-Star hotspot such as a home router and also using your cellphone when mobile. An easy way to do this is to use the “Pi-Star WiFi Builder” at https://www.pistar.uk/wifi_builder.php to generate the files.

Enter your info into the form: Country (CA for Canada), WiFi broadcast ident, and password, and click “Submit”. A text file called “wpa_supplicant.conf” will be downloaded to your computer. You can open it with any text reader such as Windows Notepad. Example:

```
ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
update_config=1
ap_scan=1
fast_reauth=1
country=CA

network={
    #ssid="house"
    ssid=686f757365
    #psk="12345"
    psk=2d7013031717a87662512a52043fbb4fcb079343cea2f464278e89a0b640ba01
    id_str="0"
    priority=100
}
```

If you have just imaged a new version of Pi-Star, you can copy the wpa_supplicant.conf file onto the SD card (in the root directory). Then when you boot your Pi-Star for the first time, the WiFi information will be read and the hotspot will automatically connect to your router so you can finish the programming.

If you are adding another WiFi entry, just copy the “network” portion from the conf file and paste below the existing entry, example:

```
network={
    #ssid="cellphone"
    ssid=63656c6c
    #psk="12345"
    psk=4098b03f2a8b64991c1fda021fc6357cae20361a68b3a1e7127d160f7bdd02a7
    id_str="0"
    priority=90
}
```

The entry with the larger priority number will be connected to first, so set your cellphone to a lower number if you only want it used when the house router is not found.

You can add this information manually by going to “Configuration”, “Expert”, “WiFi” and pasting it into the window. Then click on “Apply Changes”.

Connecting an Ethernet adapter (to the left-most micro-USB on the Pi-Zero) takes priority over the WiFi entries. Unplugging the Ethernet cable makes the Pi-Star default to the active WiFi with the highest priority.