

# **DMR Notes and Tricks**

## **by Ralph Boyd KK4GUB**

### **Introduction**

This document contains some features for DMR Radios, Hotspots, and DMR Networks. The following sections describe some little known and unused functions on DMR by Amateur Radio Hams. Most users only use voice communications and they neglect the digital data functionality of DMR. In addition, Hotspots are used only as Gateways to DMR Networks and not used as connections between Hotspots. The document is a work in progress as each of the features are discovered by trial and error experimentation.

It should be noted that some of the DMR radios used by Hams are not fully compatible with the DMR Standards. Some of these radios have proprietary protocols for passing Digital Data. For Voice most radios use the standard TDMA technology, but for Data some Manufacturers make radios with different compression and packet protocols that are not the Motorola standard. Therefore, different radios may or may not be able to send Text Data from radio to radio. However, the BrandMeister DMR Network does support a Crossover feature for sending Text between incompatible radios. In addition, the BrandMeister DMR network can route Text Data to an external partner, SMSGTE.org, which will send an SMS Message to a Cell Phone (described later). As for other technologies such as Fusion, DSTAR, P25, etc, the BrandMeister Network provides a crossover ability.

The author only has DMR and Fusion radios for experimentation. Therefore, this document will not cover the other technologies. Never the less, users with such radios may be able to follow functional descriptions in this document to get their radios working for these features.

What follows are Sections for each feature. As new functionality is discovered, the document will be expanded. Depending on your type of radio, some of these features may or may not work. In such cases, maybe a work-around can be discovered with trial and error. There is not guarantee that all radios will be able to use the features.

### **Disclaimer**

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**Be advised that any modification to your Codeplug and/or equipment settings may result in damage. Therefore it is wise to make any backups necessary so that you can make a recovery in the unlikely event of a mistake or inaccurate information in this document. If you do make and changes or additions to this document, please add your name and Callsign in the Section Heading.**

# Hotspot1 to Hotspot2 Private Call on BrandMeister

## by Ralph Boyd KK4GUB

### Introduction

This document will explain how to configure two DMR Radios and Hotspots to connect a Private Call between the Hotspots using the Brandmeister DMR Gateway Network. This example will be for Pi-Star hotspots but should also work of other hotspots like the Open Spot. Any two DMR radios need to have their Codeplugs programmed with the “remote user’s” DMR ID and a Channel needs to be set up on the radios to connect to their respective Hotspot Frequency (typically Simplex), Color Code, Time Slot, and Access Permission. In addition, the Pi-Star Hotspots should also use the same DMR ID of their respective DMR Radio with their respective Brandmeister Password.

The document will be a step-by-step description on how to create a Hotspot on Brandmeister for users who have not already done so. Advanced users may want to skip the following section if they have already established a Hotspot on Brandmeister. The sections that follow will show how to configure the radio’s Codeplug for the Private Channels and the Pi-Star Hotspot.

### Creating a Brandmeister Hotspot

This step is rather simple. It is assumed that the user has already got a DMR ID from RadioID Net. If not go to this link: [RadioID Net](#), register and get a DMR ID. You will only need a single DMR ID as the DMR Radio, your Hotspot, and Brandmeister all use the same DMR ID.

Now either create or login to your Brandmeister Account. Once you have login’ed, click on your ID in the upper right corner of the Brandmeister Webpage and select the SelfCare. Go down to the Hotspot Security section and enter your “Hotspot Security Password”. You may want to use the same password you use for your Brandmeister Login Password or create a different one if you wish. Just remember this password as you will need to enter it into the Pi-Star Hotspot Security section later. This Hotspot Password is required on Brandmeister to enable your Hotspot, otherwise your Hotspot will not work.

At this point, Brandmeister will wait until you have updated your Hotspot (see below) with this password and saved it in your Hotspot. Once you have reconnected to Brandmeister, your Hotspot should be displayed with a **green** Icon under My Hotspots in the left-side bottom menu on the Brandmeister User Dashboard. If it is **red**, then recheck or reenter your password on Brandmeister and/or your Hotspot. Be sure to save them too.

### Configure the Pi-Star Hotspot

Now login to your Pi-Star Hotspot. If this is the first time you are logging into your Pi-Star, follow the example below, otherwise skip ahead to the next paragraph:

Most Pi-Star Hotspots have a built-in AP Access Point. On your PC, click on your Wifi Icon and connect to the “Pi-star” AP. Open your Internet Browser and enter:

<http://pi-star> or <http://pi-star.local>

Then enter the User Name: **pi-star** and the default password: **raspberry**.

If either of these links don’t work, go to this Website: [Amateur Radio Notes](#).

This document will assume you have connected to your **Pi-Star Dashboard**. If so, click on **Configuration**. Now go to the following YouTube link and configure your Pi-Star (click below):

[YouTube How to configure a Pi-Star Hotspot](#)

Configure your Pi-Star Hotspot for modes (be sure to enable DMR) you desire as described in the YouTube video. This document will only explain the changes needed for setting up Hotspot-Hotspot Private Calls for DMR.

### Setup the Private Call on Pi-Star

In the Pi-Star **General Configuration** Section you should have already setup your Node Call Sign, DMR ID, and Frequency. It is wise to use different Frequencies if you have more than one Hotspot. Doing so, will avoid making Private Calls which will loop. In addition, you should use the same DMR ID that is assigned into your DMR Radio (see later). This will only allow your radio to connect to your Hotspot and no other “near-by” DMR radios. **BE SURE TO SET THE RADIO NODE TYPE TO PRIVATE.** Once this is done, your DMR radio and Hotspot DMR ID’s must be the same or the Private Call will not work. Now click on **Apply Changes**. Wait until the Pi-Star Configuration screen re-appears before performing the next step.

Now in the Pi-Star **DMR Configuration** section select your BrandMeister Master, if not already done so and enter the **same Hotspot Security Password** you entered into BrandMeister in the **BM Hotspot Security** textbox. Check to be sure the **BrandMeister Network ESSID** is the same DMR ID entered in the previous paragraph (normally this done automatically when you enter and Apply the DMR ID in Pi-Star General Configuration). If you have more than one Hotspot, be sure to add to it the **ESSID ext** by selecting the appropriate extension from the drop-down box (for example: xxxxxxxx.01).

Be sure to enable the **BrandMeister Network Enable**. All other settings should be OK. Click on **Apply Changes** to save the changes. Once these changes are made and saved to your Pi-Star Hotspot, BrandMeister should enable your Hotspot . You can check on your BrandMeister Dashboard. Be patient as this may take a few minutes. Normally, it won’t be too long once the Icon turns from **red** to **green**. You are now done setting;up your Hotspot and next you need to setup your DMR Radio. If you will be using different Hotspots, just be sure to use different Frequencies.

### Setting up your DMR Radio

This section will describe how to set up your DMR Radio for a Private Call to another DMR ID user via your Hotspot to the other user’s Hotspot using the BrandMeister Network. This will depend on your specific manufacturer’s radio, so the following example will be for a Radioddity GD-77 and an AnyTone D686UV. The methodology should be the same or similar on other DMR radios.

The point is to use the same DMR ID assigned to the DMR radio and the Pi-Star Hotspot with the Hotspot Node configured as Private. This will only allow the user’s DMR radio to “pass-through” the Hotspot to BrandMeister which has the same DMR ID as the user’s Hotspot. The target for the initiated DMR Call is the “other user’s” DMR ID which is also the same DMR ID on his/her Hotspot. Thus, the two Hotspots can enter a Private Call across the BrandMeister Network.

Let's assume we have two Ham users, Alex and Bob. Each user has a DMR ID and Hotspot enabled on BrandMeister. Alex will set up a Private Call pointing in his radio's Codeplug to Bob's DMR ID and likewise Bob will point his Private Call to Alex's DMR ID in his own Codeplug. In addition, assume Alex has a Radioddity GD-77 radio and Bob has an AnyTone D686UV radio which he has set up two **Call Signs** for himself and his wife Connie (more on this AnyTone feature later).

In the first example we will setup Bob's Radioddity GD-77. This radio, like most, is set up for a "single" DMR ID unlike the AnyTone D686UV (or D868UV) which can have multiple DMR IDs installed. The first step on all DMR Radios is to add the remote Ham's DMR ID as a Private Call (not a Group Call). On the GD-77 this is done in the "Digital Contacts" section. For testing purposes, you should also add BrandMeister's **Parrot (DMR ID 9990)** as a Private Call. Thus, Alex enters Bob's DMR ID and Parrot's DMR ID as Private Call Contacts.

Next Alex creates two "Channels" for Bob's and Parrot's Contacts. The TX-RX Frequencies should be the same Simplex value for Alex's Hotspot. Alex sets his Hotspot for Color Code 1 and Time Slot 2 (the Pi-Star defaults). Since this is a Private Call there is no need for a "RX Group List", so Alex sets it to "None" (default). Lastly, Alex sets the "Contact Name" to the Bob's Channel and the Admit Criteria to "Always".

Similarly, Alex does the same for the Parrot Contact, but uses the 9990 Parrot Private DMR ID. As the final step, Alex adds these two Contacts into a Zone of his choice. You may want to create a new Zone for all your Private Calls, but that is up to you. Now, you can select and make a Call to the Parrot. Push the PTT and make a short voice call (i.e. "[Your Call Sign] This is test on Parrot"). If you receive back your test voice, everything is working. If not, then recheck the previous steps. If your Hotspot display "lights up" but you don't hear your voice test, recheck your BrandMeister's Password and the status of your Hotspot on BrandMeister.

In the same fashion, Bob performs the same steps above but uses Alex's Digital Contact DMR ID. Bob enters his parameters on his Hotspot. If you are using 2 or more Hotspots which may be within RF range of each other, be sure to use different Simplex Frequencies so you won't cause a TX-RX Loop. Since Bob's radio is the AnyTone D686UV the "Channel" screen also has a field to assign the Channel to a specific user's Call Sign. Normally this is assigned to Bob's Call Sign, but he can select another Ham's Call Sign if he has already entered it into the **Radio ID** List on his radio. He can do this by selecting the **Radio ID** drop down box on the "Channel" screen.

Now Alex and Bob can make Private Calls to each other. But Bob has another option and that is to set up Connie's Private Call parameters since they both share the same AnyTone D686UV radio. Bob just creates another "Channel" for Connie and sets it to her Radio ID Call Sign. Of course he must also enter her DMR ID in the "Contact List", her Call Sign in the Radio ID List and add the channel to the proper Zone. So when Connie wants to use the "shared" AnyTone D686UV to make a Private Call, she needs to change the Radio ID to her Call Sign using the Radio's Menu button. She then goes to the "**Settings\Chan Set\Radio ID**" screen and selects her Call Sign from the list. Since the Hotspot is setup for "Private" only, her **Radio ID Call Sign** and her **Channel Radio ID** must match or her Private Call will pass-through to BrandMeister. When Bob wants to use the shared radio, he needs to select his own **Radio ID Call Sign** in the reverse manner as described above using the radio's Menu.

## Summery

This completes the basic setup for Private Call between Hotspots via BrandMeister. These same steps need to be repeated to make Private Calls to other Remote Ham users. You can setup as many such Channels as you wish for each Target User's DMR ID. Just be sure to use different Hotspot Frequencies if you have more than one so you won't cause Looping. And remember, your Call Sign must match on your Radio, Hotspot and BrandMeister.

This procedure has been tested only for a Private Call. But you may want to see if it can work for a Group Call between multiple Hotspots and Ham users. I'm not sure how to do this as it may require a special Group ID for all the users in the Group and the Pi-Star Hotspot may need to be Public so any near-by radios can Pass-Through to the Hotspot. I think this is how it works on a DMR Repeater since it has its own DMR ID (6 digits). But how it may work on a Hotspot DMR ID using 7-digits with a potential ISSID 2-digit extension is unknown. With a little experimentation, maybe someone can figure this out.

Have fun! And 73!

# Sending SMS Message on BrandMeister

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### Introduction

There is a free service by a group of developers at [SMSGTE](#) that will send an SMS Text Message to a Cell Phone. They do this by “bridging” APRS and SMS. A DMR user sends a specially formatted DMR Text Message to BrandMeister’s APRS Talkgroup. BrandMeister then passes the Text part of the Data Packet to SMSGTE which in turns forwards the SMS Message to the target’s Cell Phone Number. The Cell Phone user can then reply back to the DMR radio user by applying the same special formatted message containing his/her Text. What follows is a description on the changes required to make this happen either through a DMR repeater or a Hotspot over the BrandMeister Network. This will be shown using a Radiodity GD-77, an AnyTone D686UV, and a Pi-Star Hotspot. Furthermore, this Section assumes you have already set up the Pi-Star (or some other) Hotspot (see previous Section).

There is an excellent YouTube video created by BridgeCom which gets the credit for showing how to make all the codeplug changes. To view this video click on this link: [How to send an SMS Message on BrandMeister](#). What follows is a step-wise description on setting up the codeplugs for the two radios above and the BrandMeister Selfcare requirements for radio type and APRS.

For more DMR information, check out the BridgeCom YouTube Channel: [BridgeCom Videos](#).

### Setup the Selfcare on BrandMeister

As explained earlier, some DMR radios are incompatible for Text Messaging due to Manufacturers using non-Standard protocols. BrandMeister is able to crossover these incompatible protocols, but you must select the correct Brand for your radio in the BrandMeister Selfcare text box. For the following example, we will be using a Radiodity GD-77 which is compatible with the Motorola Brand protocol. **(Special Note: AnyTone radios are also Motorola branded.)** Since this example will be using a Hotspot, the user Alex will set his radio’s Brand to Motorola on respective Hotspot BrandMeister Account. What is necessary is that a user needs to inform (i.e. select the Brand) BrandMeister what “type” of radio they are using on their respective radio’s DMR ID. So, if you have more than one radio/Hotspot with different protocol Brands, you will need different DMR ID’s which are properly setup as their correct Brand under their respective Selfcare. **Setting the correct Brand is mandatory.**

The next setting in Selfcare is for the APRS callsign (i.e. SSID). Normally, you will be using an HT radio. The APRS standard for such radios is to append a “-7” to the end of your callsign. The “-7” indicates the you are using an HT. If you are using some other device, such as a mobile radio or fixed station, you should append a different suffix. Refer to the following document: [APRS SSID Suffixes](#). And remember, be sure to do this for each radio or device that have a different DMR IDs.

In our example Alex will be using his respective Hotspot which has the same DMR ID as his HT radio, so he will set the Brand to Motorola and the APRS Callsign to his “Callsign-7”. This is all that BrandMeister requires.

## Setting up the Codeplug for SMSGTE

Since BrandMeister will use APRS to route the Message to SMSGTE you need to send the message to the APRS Talkgroup (999) on BrandMeister. To do this create a specially formatted Digital Contact that BrandMeister will identify as a Text Message that should be send to the SMSGTE Service. The format involves setting a prefix on the 999 Talkgroup. The prefix should be the BrandMeister Master that you are using. In our example below, we will assume the Alex is in the USA and will be using the 310 Talkgroup. Therefore, he will create a Private Call Digital Contact naming it **SMSGTE** equal to **310999**. Be sure you use a Private Call and not a Group Call or it won't work.

Next he sets up a Channel named, let's say, **SMSGTE** with the proper Frequency, Time Slot, and Color Code for either a Repeater or in this example his Hotspot. Since this is a Private Call, there is no need to use a RX List so Alex sets it to None. And lastly, Alex needs to create a new Zone for this Channel or add it to one of his available Zones. The following example assumes Alex will use a new Zone named **HS SMSGTE** which stands for his Hotspot Channel. If he will also be using a Repeater, he needs to set up another Channel for the Repeater's parameters as well with a different name.

This is all the Codeplug needs to send SMS Messages to a Cell Phone. The Text Message will contain the target's Phone Number that will be used by the **SMSGTE** Service to route the SMS Message (see below). The front of the Message acts as a pre-amble that BrandMeister and SMSGTE use to send the SMS Message to the target Cell Phone. Optionally you can enter this pre-amble (described below) omitting the phone number as one of your Radio's Saved Text Messages so it will easier to send a Text message to different phone numbers.

## Connecting to the Channel

You need to first make sure you are connected to the SMSGTE Channel. You can do this by KerChunking using your PTT. This will disconnect you from some other Talkgroup and register your Radio with the APRS Talkgroup on the SMSGTE Channel. If you fail to do this and are not on the APRS Talkgroup, your message will not be accepted by BrandMeister. So in our example, Alex selects his SMSGTE Channel and presses his PTT to insure he is registered on his Hotspot.

## Sending the SMS Message to SMSGTE

BrandMeister does not actually send the SMS Message to the target's Cell Phone. This service is done by a third party at SMSGTE over a dedicated phone line. To do this, you need to set a "pre-amble" at the front of your message's text. The following "pre-amble" text must be at the beginning of the message:

SMSGTE @phonenumber

Replace "phonenumber" with the phone number of the target user's Cell Phone and follow it with a "space". Then enter your SMS Text Message. Next you need to "Send" the message. Refer to your radio's User Manual to select the "Send" button. You will be asked to select the "Talkgroup" that you wish to send the message to. Once you do that, the message will be sent and you will receive feedback as to its success or failure (depending on your radio of course). Sometimes the SMSGTE Service is slow and may take up to about 3 minutes or less. Eventually, the message will arrive on the target Cell Phone. The cell phone user can then use the same "pre-amble" method without the "@phonenumber" part to send back his/her reply text. It will be routed to the SMSGTE dedicated phone line back to BrandMeister which will format the message and send it back to the user's DMR radio.

BrandMeister is actually using APRS to “route” the SMS Message between the DMR radio and the Cell Phone via the SMSGTE “free” Service”. The key point to remember is that BrandMeister needs to check the “pre-amble” for how to pass-thru the Text and phone number to SMSGTE. If this “pre-amble” is omitted, then BrandMeister will route the Text Message by either APRS or DMR Text.

Now let’s get to the example. Alex wants to send an SMS message to his wife’s cell phone. He selects the **Menu** key on his GD-77 radio and scrolls down to select the **New Message** key. Using the keypad he enters the following text:

SMSGTE @wife’s phonenumber Let’s go out tonight for dinner.

Alex hits the GD-77’s **Green** key to accept the Text and selects the **Send** key followed by the **Contact** key. He now can scroll down to select the **SMSGTE** Digital Contact Talkgroup. Notice that this is the **310999** Talkgroup and not the SMSGTE Channel. This is different than sending a voice over a Channel. That is why Alex has to KerChunk the SMSGTE Channel to register on his Hotspot (see above). The message will then be sent to his wife’s Cell Phone. When she receives this SMS Message it will look like this:

@Alex’s Callsign-7 Let’s go out tonight for dinner.

Notice that the @ sign shows Alex’ APRS Callsign with the dash -7 appended. Her phone will also show the SMSGTE phone number that was used to send her the SMS Message. She can reply to this phone number by copying and pasting this message into Message Text Box on her phone removing and replacing Alex’s text part and enter her own reply text. So her reply may look like this on her Cell Phone:

@ Alex’s Callsign-7 OK! Let’s go to our favorite place.

When she sends her reply it will be sent to the SMSGTE phone number SMSGTE sends it back to BrandMeister which in turns routes it back to Alex’s DMR Radio into his New Message Text Box.

### Summery

This completes the basic setup for sending a Private Call SMS Message via BrandMeister and SMSGTE to a Cell Phone. It is also possible for a Cell Phone user to initiate a Message to a DMR user using the SMSGTE Service as long as the DMR user has registered with SMSGTE.

For more information on sending messages from SMS to APRS, check out the: [SMSGTE Website](#).

Enjoy and have fun. 73!