

# CONNECTING YOUR DMR RADIO TO THE D-STAR “CONSTELLATION”

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There are two major considerations in this process.

The first is that you will almost certainly need a “hotspot” device. The alternative would be to find a DMR repeater which can connect to XLS313 as a DMR master. Since almost all DMR repeaters are tightly controlled in terms of the talk groups you can connect to across them (generally 16 channels selected from a few hundred) and the demand for D-STAR is not, at this particular time, in high demand among DMR users.

Right now there are several “hotspots” on the market. The DVmega and the ZUMspot work in conjunction with the Raspberry Pi devices and are very popular with the D-STAR crowd. When used with the Pi-Star image they can be set to connect DMR radios to the D-STAR XLX313 reflector. I will be explaining this process in this document.

The SharkRF product, OPENspot, is very popular with the DMR folks and is a stand-alone device (not using any “image”) and can also be configured to connect DMR radios to the XLX313 reflector. The process has been described by John Fields, K6KD, and can be found on <http://xrefl.boards.net/>. Because the OPENspot can also connect SystemFusion to DMR it can also be setup to connect SystemFusion to the XLX313 reflector via the DMR connection process; although there are some issues involving a difference in modulation settings between SystemFusion and DMR which John Fields has said complicate the matter somewhat.

The ZUMspot is the least expensive (as far as I know). It is sold with a Raspberry Pi Zero “W” for about US\$120 and is normally used with the Pi-Star image flashed onto a 16gb SDchip. This unit is in very high demand and there can be a waiting list.

The DVmega is, by far, the most popular of the open source hotspots. Cost of the 70cm (single band) version is about US\$150 and it is usually paired with a Raspberry Pi 3 (although a B2 will also work - and is what I use). The Pi-Star image is also used with the DVmega. The mega is well supported and has thousands of units out in use. Units are available on eBay and individual sellers like Amazon and DXengineering. Cases are available and BluRay decks also..

Both the DVmega and the ZUMspot are in a form which has to be assembled and configured by the user. An “image” has to be copied to an SDchip and inserted into a Raspberry Pi, the RF deck has to be connected to the Raspberry Pi, the user has to find his/her own “case” (although they can be used without a case) and the configuration is done by the user.

The OPENspot is more of a “turn-key” device; the user simply makes connections, uses a web browser to configure the appropriate settings, and that’s pretty much it. The October, 2017 issue of the ARRL publication “QST” has a review of the OPENspot which better explains its operation.

The rest of this document deals with the DVmega and ZUMspot and other devices which can work with the Pi-star image. The configurations between the various “modems” for the Pi-star

may be identical but I have only configured a DVmega working with a Raspberry Pi 2B and there may be differences (certainly in the choice of the “modem” in the Pi-Star configuration screen).

The second key to this is the choice of radio and the configuration of the radio. The most popular DMR HT is probably the Tyt MD-380; followed by the DFCS-580. I have both radios and I’ll attempt to explain how to configure first the Pi-star and then the radio.

Once the pi-star image has been created on a 16gb SDchip you need to boot the device and find it on your LAN with your computer’s web browser and log in: username pi-star and password “Raspberry”.

Select “MMDVMhost” and “simplex” mode in the “control software” section and click on “apply changes”.

In the “MMDVMhost” section select “DMR” to ON and apply changes.

In the “General Configuration” section fill out your callsign, then your DMR registration number, frequency of operation (which you may want to set to something already on your radio or, if there is another hotspot in the area so it doesn’t interfere), your approximate latitude and longitude, your town and country, your link on QRZ.com (or other) for personal details and “manual”, then set the radio/modem (DVmega or ZUMspot or whatever) using the selection window, set “mode type” to private unless someone else will be using the hotspot (then set it to “public”). Finally, set the time zone and the language and click on “apply changes”.

In the “DMR CONFIGURATION” section select “DMR Gateway” as the DMR master, set the “Brandmeister Master” to something near to you, leave the “Brandmeister Network” blank, Set the “DMR+ Master” to something near to you, leave the “DMR+ Network” Options empty, set the “XLX Master” to “XLX313” (VERY IMPORTANT), leave the “XLX Startup TG” to “None”, set the “XLX Master Enable” to “ON (VERY IMPORTANT), Set “DMR Color Code” to “1” (until you know more about what you are doing), Set the “DMR EmbeddedLConly” to “off”, and set the “DMR DumpTAdata” to “on”. Now click on apply changes.

In the “Firewall Configuration” set as you like. I set “dashboard access” to public and the others to private).

Change the password. Write it down somewhere.

Now reboot your Pi-Star; click on “power” (at the top of the screen) and then click on “reboot”.

Your hotspot should now be configured. Now you have to set your radio up. You will do this by editing the “codeplug” Turn off your radio, connect the programming cable to the radio and to the computer’s USB connection, select your radio’s programming software (which you will already have installed on your computer), wait for it to boot up, turn on the radio and find the selection for “read” the codeplug that is already on your radio. On the CS-580 it will be a big “R”, on the MD-380 is it a tiny arrow pointing away from an icon representing the radio. You will need to read the codeplug before you can edit it and you should SAVE THAT CODEPLUG to your computer’s hard drive before you do anything more!!!

Both radios use the word “contacts” to refer to define talk groups. This is not intuitive. You will have to create three contacts (talk groups) using the programming software for your radio (MD-380 or CS-580).. Usually you click on “contacts”, right click on it and then click on “ADD”. Add three of them.

Now scroll to the bottom of the “contacts” listing and you’ll see the three contacts you added (probably “contact 1“, “contact 2“ and “contact 3“. Click on the first one, select “private call” and an editing screen will open up. The name of the first one is “XLX Unlink” and the contact number is “64000“. Enter this and click on the next contact (the first one will magically change its name). Contact 2 will be be another “private call” and named “XLX313 link” and the number is “64001“ (for XLX313A; if you want to also connect to mode “B” or “C” or “D” or “E” then the number would be, respectively, “64002“, “64003“, “64004“ and/or “64005“.)

Now select the third contact, this will be a “group call”, and name it “TG6“ and the number will be, simply, “6“/

If you already have a hotspot “zone” you can just add TG6 to the existing zone. You may have to delete one existing talk group to add TG6 but you must add TG6.

If you do not have a zone for your hotspot you will have to create one. Right click on “zone”, click on “add” and somewhere in there you will be able to select up to 16 talk groups (usually by name not TG number) and one of them will be TG6. You have to make sure to include TG6. Add others as you think you might want them but make sure you include TG6. Change the name to something appropriate (“DVmega”, “ZUMspot1“, etc.).

At this point you need to configure the channels in your zone. So in the “channels” section you should see your hotspot name; click on it. If you are editing an existing hotspot entry make sure you have room to add your TG6 talk group to the mix. If it’s a new zone you just add it. If it’s an edit zone you may have to edit one of them to allow TG6 to fit into the allowed 16 channels.

Now write the new codeplug to the radio and SAVE IT UNDER A NEW NAME to your computer.

To connect to the XLX313A reflector you will first have to select “contacts” from your radio’s menu, go to “XLX313 Link” and highlight it and key up for 3 seconds. You should see this on your pi-star dashboard. Don’t forget to identify by call sign when you key up.

Now select “TG6“ in your new hotspot zone and listen for activity... if you hear nothing key up and announce your call and add “testing” and hold it for 3 seconds. Check the XLX313 dashboard (<http://xlx313.openstd.net/index.php>) to see if your callsign appears in the list; the list automatically refreshes every 10 seconds or so).

If you do not see your call sign, check all your settings in the codeplug and in the radio. If you have added other talk groups switch to them and see if you hear anything. Ask for help on the pi-star Facebook page.

