

Having Fun With Digital Voice (D-Star)

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“But what if, I thought, I could have a local D-Star-capable repeater that only had to provide reliable HT coverage in and around my house.”

A VHF or UHF handheld portable is useful not only out in the field, but at home as well. I live about 25 miles south of Manhattan in the urban sprawl of New Jersey. My location is elevated enough that I have HT coverage into many of the New York City amateur repeaters and a good selection of local ones. The HT gives me the freedom to enjoy the patio or just lounge on the couch in the den, listen to whatever might be going on, and join conversations of interest without being restricted to the shack upstairs on the second floor. To enhance my coverage, I replaced the rubber duck on my analog Yaesu HTs with one of the Diamond SR-320H antennas with higher gain.

I also like to play around with D-Star and have both an ICOM IC-2820H mobile, which I use as a base rig, and an IC-91AD analog/digital HT. The two best D-Star repeaters at my location are K2DIG in the Empire State Building and NJ2DG in Martinsville, New Jersey. I have no problem reaching these and other digital machines when using the 2820H on the chimney-mounted antenna, but I noticed that HT coverage from the first floor is spotty. Spotty coverage on D-Star results in a choppy robotic effect, often called “R2D2” by D-Star users.

A lot of D-Star activity takes place over Internet-based links. These links, called reflectors, allow connection of repeater gateways, DV (digital voice) Hotspots, and other DV devices, such as the DV Dongle. I have a decent-quality Internet connection from Optimum Online. But what if, I thought, I could have a local D-Star-

capable repeater that only had to provide reliable HT coverage in and around my house. It could leverage that Internet connection to connect my HT back to one of the busy reflectors, such as 1C (the D-Star Megarepeater) or 20A (the mid-Atlantic reflector used by my local repeaters).

Some folks have set up their own D-Star Hotspots. A D-Star hotspot uses an analog FM transceiver and a GMSK (Gaussian Minimum Shift Keying) modem. The GMSK modem in turn communicates with the Internet to connect the Hotspot to the D-Star network. Setting up a D-Star Hotspot is a bit of a construction project. If you're interested in going this route, you can Google “D-Star Hotspot” and find a wealth of information. But there's also another path to having something resembling your own personal D-Star repeater.

My Own Repeater?

That's almost what Internet Labs has created with its DV Access Point (DVAP) Dongle (Figures 1 and 2). But unlike the other DV Dongle, this device connects via a USB port to your computer, but is not meant to be used *from* your computer. It contains a lower-power (10 mW) 2-meter transceiver and a GMSK modem. This low-power transceiver and the provided stubby antenna are enough to provide excellent local D-Star coverage around the house. It does function as a repeater, but unlike an RF-only repeater, it listens on the radio and repeats to the Internet connection, and listens to the Internet connection and repeats the audio back over the radio.

The DVAP is simple to set up and use. It supports Windows, Mac, and Linux. I plugged the device into a free USB port on a machine running Fedora Core 13 and installed the Linux version of the DVAP Tool that I downloaded from http://dvapdongle.com/DV_Access_Point_Dongle/Downloads.html. You have to set up the software to use an available 2-meter frequency that is not going to interfere with other users. While it's not likely that the DVAP will interfere with much else, remember that the low-power mode on your HT may only go as low as 0.5 watt, enough to possibly interfere with other local comms if you're in a congested area. Choose wisely. I use 145.67

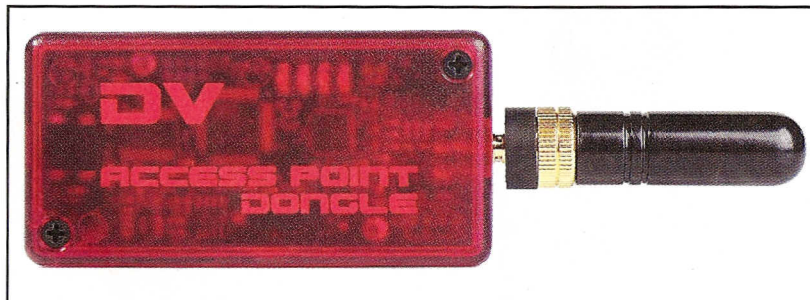


Figure 1. Internet Labs' DV Access Point (DVAP) Dongle. It's smaller than a cigarette pack and has a full 10 mW of RF power!

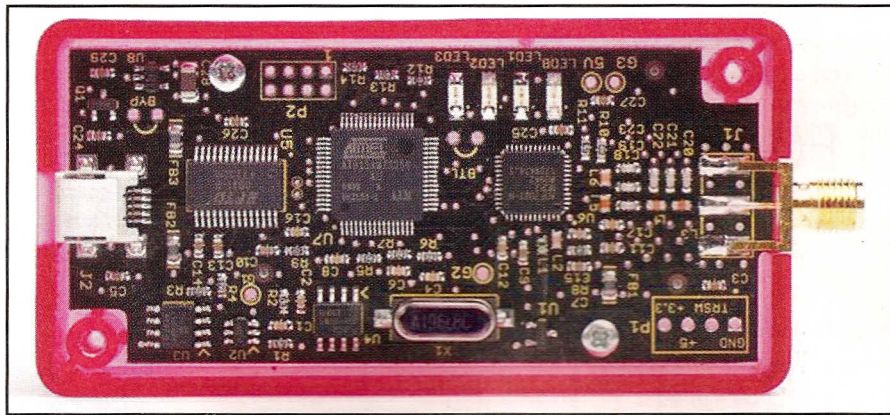


Figure 2. An inside view of the DVAP Dongle.

MHz, which DVAP and Hotspot users alike seem to be increasingly adopting.

Many streaming applications require some "port forwarding" magic on your broadband router. The DVAP is no different and requires that you forward UDP (User Datagram Protocol) ports 2001 through 2005 to the IP address of the computer that will host the DVAP.

Figure 3 shows the DVAP Tool screen. I am running the DVAP on my Fedora Linux computer, version FC13. The software can run as a regular user (root not required) as long as that user has access to the required USB port. The DVAP Tool allows the user to record an audio transcript of all communications on the frequency and attached reflector. The "lock callsign" checkoff prevents RF connections from any device not using the configured callsign.

Remote Control

The DVAP is controlled from the remote HT, which allows linking and control commands to be saved into the various available memories. Important commands include,

REF###aL	Link
bbbbbbbU	Unlink
DVAPbbbE	Echo test
DVAPbbbi	Identify
CQCQCQ	Normal QSO mode

b = blank space, # = numeric digit, a = {A,B,C}

To connect my IC-91AD to reflector 20A, a popular meeting spot for locations in the Mid-Atlantic States, I would use the RS-91 software to program a memory on the HT as follows:

Mode: DV
Name: 20A

Your call: REF020AL (the L is the Link command)

RPT1 and RPT2 should be left blank.

Take a look at **Figure 4** and you'll see the memory screen of the RS-91 software. I have preprogrammed the various memory locations with commands to link to different reflector channels and to transmit the other commands as well. Transmit the link command and the DVAP will respond with an audio and a text message indicating that you are connected. Change the "Your call" to "CQCQCQ" or just switch to a memory channel already programmed with "CQCQCQ," and you can chat away.

So What Next?

You could transmit your callsign and add something like, "looking for a contact on reflector 20A." Just say what you want and someone is likely to come back

to you. Of course with D-Star, that someone could well be in Japan, England, or just about anywhere. You'll hear him or her in communications-quality digital, with good clarity and no QRM through the combination of RF and the Internet.

There are nets on D-Star. Lots of nets. Some are check-in nets, some are emergency communication nets, there are nets in Dutch and Italian, and there is a Sunday night scanner net that is growing in popularity. For a comprehensive listing of nets on D-Star, check the following URL: www.dstarinfo.com/Nets/Nets.aspx.

IC-2820H Crossbanding

Sometimes I use the crossband feature on the ICOM IC-2820H, the mobile D-Star rig I use as my base radio. Typically, FM crossband operation will allow you to come in on either a VHF or UHF frequency and be repeated via the band on which you are *not* transmitting. You could use an HT to transmit on low power via UHF and crossband via the antenna mounted high on the roof or a tower and speak to your friends on 2-meter simplex. At least, that's how I use it.

Enabling the crossband feature on the ICOM IC-2820 is relatively simple. Hold down both the left and right side tuning knobs while pressing the "F" button. The lock icon will appear, signifying that you are now operating a crossband repeater.

When I first discovered the crossband feature on the IC-2820H, I wondered whether I could repeat an FM signal into the D-Star network. No such luck, as this is frowned upon by the operators of the D-

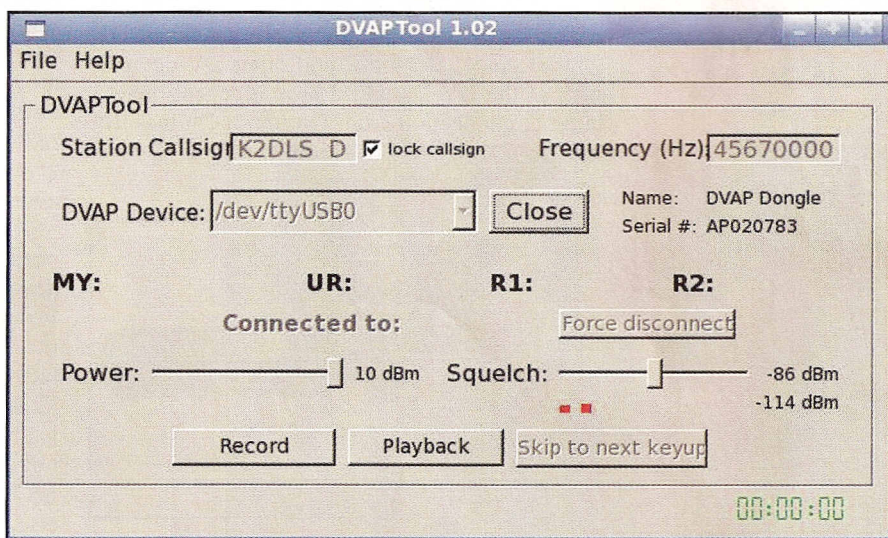


Figure 3. The DVAP Tool is running under Fedora Linux (FC 13) and is setting the DVAP to operate on 145.67 MHz.

Star Trust Servers. D-Star is meant to be a purely digital network and I have heard that anyone caught trying to gateway from FM to DV will be banned on the Trust Servers, at least temporarily.

However, I recently discovered that the FM crossband feature on the IC-2820H can be used to create a simulation of a D-Star Hotspot. The idea is to set up the Main band of the IC-2820H to transmit on the D-Star frequency of your choosing, perhaps a repeater that you would not normally reach via your HT. With your HT in DV mode, pick a simplex frequency on which the HT will transmit, and the non-Main side of the IC-2820H will listen (remember that it must be in the "opposite" band that the Main band is using). Turn on the duplex or "+/-shift" function on the HT and set the frequency shift to 0. I haven't determined why duplex must be on for this to work, but I have verified that this is the case.

Set up your HT just as if you were going to access the repeater that's set up on the Main band of the IC-2820H. This might mean that you have set the RPT1 value to "NJ2DGbbB" and the RPT2 value to "NJ2DGbbG," but your frequency might be set to some vacant 2-meter frequency. Tune the B side of the IC-2820H to the same 2-meter frequency.

Transmit using DV mode on the HT. Your signal will be received by the IC-2820H on the non-main side (set to FM mode) and repeated on the Main band of the rig via FM. The input to the IC-2820H is a DV stream and it's mirrored on the output. Strange though it sounds, you effectively have a D-Star repeater. However, missing is the ability for the IC-2820H to automatically identify as required every 10 minutes, so be sure that you treat this feature as an experiment and don't leave it running unattended.

The main reason you might want to try this is if you own both an IC-2820H as well as a D-Star-capable HT and have problems reaching a particular repeater on the HT. Using the IC-2820H connected to a better antenna and running higher power than the HT might allow you to connect.

Done Digital? Tell Us About It

Have you tried any digital modes of communication lately? Drop us a line using the old digital "store and forward" protocol—email—at k2dls.rfbits@gmail.com.

Until next time, 73 de K2DLS

CH	Select	Freq	DUP	Offset Freq	TS	Mode	Name
300		145.67000		0.60000	15k	DV	ID
301		145.67000		0.60000	15k	DV	Echo
302		145.67000		0.60000	15k	DV	Unlink
303		145.67000		0.60000	15k	DV	CQ
304		145.67000		0.60000	15k	DV	20A
305		145.67000		0.60000	15k	DV	20B
306		145.67000		0.60000	15k	DV	20C
307		145.67000		0.60000	15k	DV	1A
308		145.67000		0.60000	15k	DV	1B
309		145.67000		0.60000	15k	DV	1C
310		145.67000		0.60000	15k	DV	2A
311		145.67000		0.60000	15k	DV	2B
312		145.67000		0.60000	15k	DV	2C
313		145.67000		0.60000	15k	DV	3A
314		145.67000		0.60000	15k	DV	3B
315		145.67000		0.60000	15k	DV	3C
316		145.67000		0.60000	15k	DV	4A
317		145.67000		0.60000	15k	DV	4B
318		145.67000		0.60000	15k	DV	4C
319		145.67000		0.60000	15k	DV	5A

Figure 4. Here's how I set up some of the memory locations on my IC-91AD for easy use with the DVAP.

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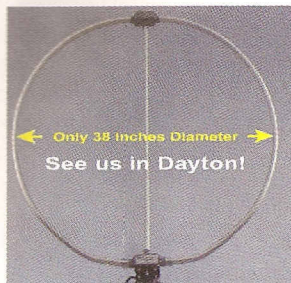
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