SharkRF openSPOT Hotspot

Reviewed by Pascal Villeneuve, VA2PV
va2pv@arrl.net

Recently, I was in my shack looking for DX on 20 meters without any success, as the band was completely closed. I even had to verify that my antenna switch was not on the ground position. Then it came to me: Is this why VHF/UHF digital modes are so popular these days? Is that the most efficient way for hams to keep in touch with distant friends? Or maybe it's because some amateurs face antenna restrictions and view today's VHF/UHF digital as an alternative for worldwide communications.

I guess this must be true for some of us, but for an HF fan like me, VHF/UHF digital modes are an addition to my hobby and certainly not a replacement for HF. One attraction is the new learning opportunities it offers. I frequently receive e-mails from hams returning to the hobby because of the enthusiasm generated by the new digital technologies, and this is very positive.

Whatever the reason, we are not lacking options, with more and more digital hotspots available in the ham radio market. When seeking a standalone hotspot, hams usually consider two important factors: compactness and low power consumption. The Raspberry Pi (a miniature *Linux* computer) is very popular among those who want to build their own digital hotspots, but for some hams learning *Linux* (*Raspbian* is the version used with the Raspberry Pi) can be overwhelming. Some are using small *Windows* PCs, but they have to deal with frequent updates, and the computers are not compact.

There's no perfect solution — the best you can get is the one that suits most of your needs. But for those looking for simplicity, there is an alternative —

the SharkRF openSPOT, a digital radio IP gateway with a built-in low-power 70-centimeter transceiver.

The openSPOT offers a very compact, low-power-consumption standalone solution with a maximum requirement of 210 mA at 5 V. It's user friendly; if you can browse the web, you can use an openSPOT. This is possible because of its integrated web-based software interfaces (web server). You can access the unit via any device that has a web browser, such as a PC, tablet, or a mobile phone. It supports various digital modes including D-STAR, DMR, and C4FM (Yaesu System Fusion). It also supports cross-mode contacts between DMR and C4FM (DN — digital narrow mode), so you can talk to

C4FM radios with your favorite DMR radio, or the other way around.

Overview

The openSPOT hardware is very well built, and I can feel the quality by its surprising weight, considering its size. It comes with the following accessories: an ac-to-USB power supply, a small SMA male antenna, a USB-to-micro-USB cable, and a flat ethernet cable. These are the only physical things you need to operate the openSPOT (excluding the radio). Everything is managed via the integrated web interface or directly from your radio (with programmed profiles).

On top of the openSPOT (see Figure 1), there's a printed description of every port and LED indicator. On the front panel (see Figure 2), you have the SMA female antenna connector and four LEDs providing visual information about the device status. It is not recommended to use a high-gain outdoor antenna or any RF amplifier, because this device was designed to be a low-power unit only.

In the rear (see Figure 3), you will find a micro-USB port that provides power

Bottom Line

The SharkRF openSPOT is a standalone, simple, and flexible multimode digital hotspot operating in the 70-centimeter band that supports D-STAR, DMR, and C4FM (Yaesu System Fusion). It also supports cross-mode contacts between DMR and C4FM (DN), so you can talk to a C4FM radio with your favorite DMR radio or vice-versa.

and is also used for firmware/software upgrades when connected to a PC. There is a RESET button and an ethernet port, but unfortunately there is no Wi-Fi interface. You can use a separate Wi-Fi-to-ethernet (RJ-45) adapter (bridge).

All the LEDs can be green or red, steady or flashing, to show the status of more than a dozen parameters. Those are described in detail in the manual, which is available at **www.sharkrf.com/products/openspot/manual**. There's no power switch on this device. As soon as you connect the micro-USB cable, the LEDs start blinking, and it's on. (Power is supplied by the USB connection when the openSPOT is connected to a computer, or by the included USB power pack for standalone use.)

 A partial description of the LED indications can be helpful. The STATUS LED tells you if you are connected (green) or not (red). The ACT LED provides information about the CPU activ-

ities and firmware update status. The MODEM LED tells you if it's receiving an RF signal (RX) when green and turns red when transmitting (TX). It couldn't be more straightforward.

Prerequisites and Setup

Like all hotspots, the openSPOT requires some prerequisites, depending on the intended mode of operation. For example, some reflector systems require a DMR ID, so you must obtain a DMR-MARC digital ID, which is coordinated worldwide, even if your intention is to use it exclusively in a mode other than DMR. This registration process is free, and the DMR-MARC team is very quick to respond. For details, see **dmr-marc.net**.

You also need to make sure you are registered to the D-STAR trust server in order to use that mode. For more information, please contact your local D-STAR repeater club, or visit **dstargateway.org**.

When you first plug in your openSPOT, connect the ethernet cable to your router and connect the USB cable to your computer. Enter the address **http://openspot.local** in your web browser to access the web interface. If it works, take note of its IP address. If it does not work, you will have to find the IP address manually via your home router. Try to set a fixed IP address or reserve the one obtained via DHCP. You can then remember it or just make a bookmark in your browser for future access. If you're not too familiar with networking, don't worry. This only needs to be done once, and maybe a good friend can help you set it up for the first time.

That's it for the networking part.

With the IP address, you can connect the unit without having the openSPOT connected to the computer. Just enter the IP into the address field of your web browser and press ENTER. From that point, you can use the included power supply and leave it standalone — now you can access it from any device in your local area network (LAN).

The Web Interface (Web Server)

The web interface design looks very good, and all you need to do is browse it like a common web page. It's also responsive for mobile devices, whatever platform you are using. *Windows*, *Mac OS*, *iOS*, or *Android* all work.

By default, the interface is very simple. Advanced users can select the ADVANCED MODE and have more configuration options. On top of the page there is a menu with five tabs (pages); six when DMR is selected.

STATUS page: After you are logged in, this page is shown by default. You will find the latest activities, the hardware and software versions, and some other useful information, such as the uptime and network performance.

CONNECTORS page (see Figure 4): This is the page where you select the mode, local frequency, and reflector or gateway to connect. You have to enter your call sign, your DMR ID, and a frequency for each mode.

DMR SMS page: This page only shows when DMR is selected. When the modem is in DMR mode, or the currently active connector supports DMR SMS, you will have a DMR SMS page between the CONNECTORS and MODEM pages.

MODEM page: This page is normally used to set up a sub mode to be used in cross-mode operations. There are more settings when the ADVANCED MODE is selected.

Figure 1 — Top view of the openSPOT.

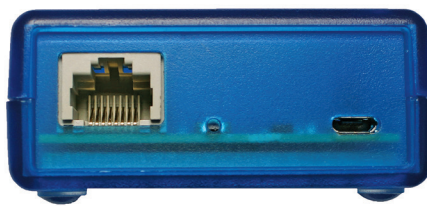**Figure 2** — Front view of the openSPOT.

Figure 3 — Rear view of the openSPOT.

SETTINGS page: This section is used for more advanced and specific configuration of profile, location, network settings, password, and other parameters.

Please note that every time you modify or select an option, you need to click on the SAVE button, then the web page will automatically refresh to reflect the new configuration.

Getting on the Air

The openSPOT can operate in three different digital modes — DMR, D-STAR, and C4FM (Yaesu System Fusion). This unit does not convert analog FM signals to any digital mode, so you need at least one digital radio if you want to be able to use the unit. After the initial setup, go on the CONNECTORS page, select your connector (mode and reflector type), and click on SWITCH TO SELECT. Enter the transmit and receive frequency (these are the same for simplex), select a reflector and port (or module), enter your call sign and DMR ID (if required), and click SAVE. Then just grab your digital radio (set for the same mode and frequency) and enjoy. When you get more familiar, you can program profiles and switch between them using your radio.

You'll need to be familiar with your radio settings and how to configure it to operate with a hotspot. For example, in DMR, we use TG9 (Talk Group 9) on TS-2 (Time Slot or Repeater Slot 2), with default color code 1.

DMR Mode

In this mode, you have three connectors — Homebrew/MMDVM (BM-Brandmeister), DMR-PLUS, and TS-Repeat. You also have a very efficient and useful feature for DMR, called autocalibration, that allows you to have a good synchronized transmission over the reflectors. For C4FM
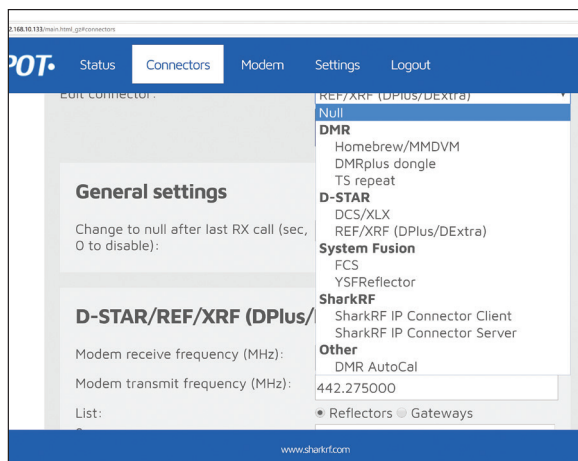

Figure 4 — The CONNECTORS page is where you select the mode, local frequency, and reflector or gateway to connect. You have to enter your call sign, your DMR ID, and a frequency for each mode.

cross mode, select a DMR connector, but change the modem sub mode to C4FM on the MODEM page.

D-STAR Mode

On D-STAR, you have two connectors, DCS/XLX and REF/XRF (DPlus/DExtra). This device has the capability to connect directly to D-STAR repeaters and gateways — a clear advantage when your local club is using different setup, such as the one we have with the VE2VPS network here in the province of Quebec.

C4FM (Yaesu System Fusion)

There are two connectors available for this mode, FCS and YSF. Note that C4FM has two different voice modes, DN for digital narrow and VW for digital voice wide. Even if the VW mode can work with reflectors, it is recommended to always use DN with any hotspot. Note that only DN will work with the openSPOT DMR/C4FM cross mode. For DMR cross mode, select a C4FM connector, but change the modem sub mode to DMR on the MODEM page.

Special Features

DMR/C4FM cross mode is just one of many special openSPOT features. Another cool feature is the ability to interconnect two openSPOTs directly

(in point to point) using their IP address. It is called the SharkRF IP connector; one unit acts as the server and the other the client. This option is available for all the supported digital modes, and you can still do cross mode between DMR and C4FM. If you want to connect more than two openSPOTs, SharkRF provides an opensource server application. Multiple openSPOTs can connect to this server application (there is no client limit), so you can operate your own multi-client server.

Let's say you have one preferred DMR reflector, two in D-STAR, and another in C4FM. You can preprogram up to five profiles. After programming the profiles, you're able to recall directly from your radio a combination of mode, frequency, and reflector settings. You also have a voice announcements feature that is very useful to confirm a profile change through your radio.

When ADVANCED MODE is selected, you have a lot more configuration possibilities in each page. Unfortunately, the list is too long to be described completely in this article, but the online manual is quite detailed.

Conclusion

I received my openSPOT in August 2016 and have been using it ever since. SharkRF provides very good support and frequent software upgrades that improve the performance of the unit every time. The web interface is easy to use and the hardware looks nice and works well. I just wish it had an integrated Wi-Fi interface. For now, we can use a third-party Wi-Fi-to-ethernet (RJ-45) adapter.

With the openSPOT, you get the best of two worlds — simplicity for beginners and an experimentation playground for the more advanced users.

With all those new digital toys on the market, it's getting more and more difficult to choose. If you are looking for a standalone, simple, and flexible multimode digital hotspot, the openSPOT represents a very good option. For more about digital voice operation and a longer video of the openSPOT in operation, check out my YouTube channel, **Laboenligne.ca** (or search for VA2PV).

Manufacturer: SharkRF, Tallinn, Estonia; **www.sharkrf.com**. Available from the online shop, **shop.sharkrf.com**, and from Amateur Radio dealers. Price: $240.

Visit https://youtu.be/3w6VqNS3oBA to see our review of the SharkRF openSPOT Hotspot on YouTube.