By John Champa,* K8OCL

Communicating Voice, Video, and Data with Amateur Radio

Getting on the Internet

Your First HSMM Radio Station

In our previous column we discussed an HSMM radio repeater (Wireless Access Point/Router + PC) and the setup of a simple RAN (Radio Area Network). This time we will look at what is in a basic HSMM radio station (client). However, first let us look at another related area.

HSMM Radio Mobile I-Gate (Internet Gateway)

By combining an HSMM radio repeater with a laptop having broadband wireless Internet access such as provided by Sprint and other carriers, it is possible to provide shared Internet access for the radio stations connected to the RAN. Field experience with such a configuration indicates several special steps need to be taken for this configuration to work effectively:

1. Use a broadband card, or ED-VO card with an external antenna port.
2. Mount the broadband Internet access external antenna on the roof of your vehicle as far away from your HSMM radio antenna(s) as possible to avoid desensing.
3. Use *two* external antennas, if possible, on your HSMM repeater in order to achieve receive space diversity.
4. Mount the two HSMM antennas a minimum of 9–10 inches (approximately two wavelengths) apart; the more the better, up to about 10 wavelengths.
5. Inverter selection—determine the power requirements of the laptop and the HSMM repeater and any other devices, such as LED lights, etc.
6. Then double that wattage figure to determine the size of the inverter needed for the system. You want the inverter to run cool and easy.

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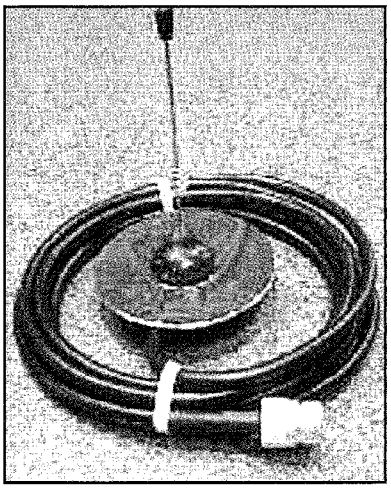

Photo 1. An HSMM Area Survey Antenna. (All photos courtesy of Fleeman, Anderson, and Bird; <http://www.fab-corp.com/>)

This should allow you to drive your mobile I-gate vehicle into a gathering of other radio amateur EMCOM vehicles and provide them with immediate network connectivity (RAN) and Internet access. Let us know how your experiments go in this area, and we will pass them along to our readers.

Photo 1 shows an HSMM Area Survey Antenna. A pair of these antennas should work well for your mobile I-gate station's repeater antenna system.

Basic HSMM Radio Station

The heart of a typical HSMM radio station is a computer-operated wireless local area network (WLAN) 2.4 GHz radio transceiver commonly called a "Wife card" named after the consortium (Wireless Fidelity) that certifies such devices for meeting the IEEE standards for 802.11 modulations.

It is simply a PC wireless client adapter card. It usually slides into a slot in the side of a laptop, but more on that later. It will probably cost well under $80, and perhaps as little as $5. Many ham markets

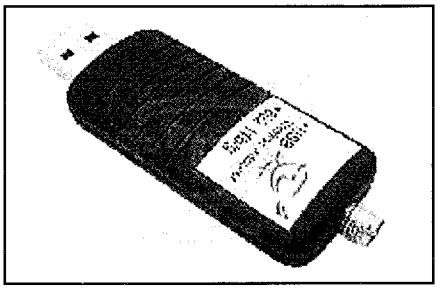

Photo 2. A wireless USB adapter.

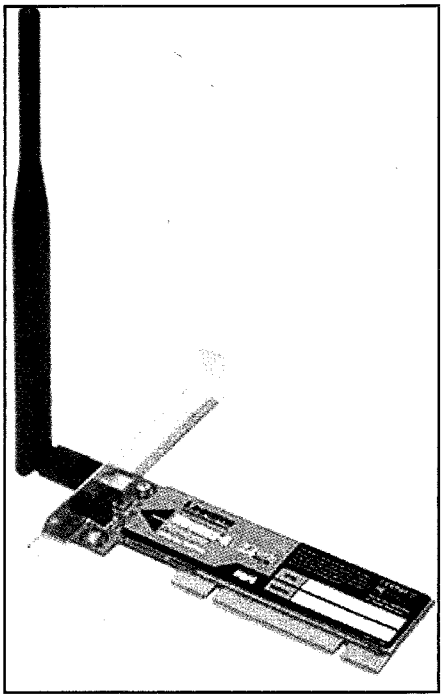

Photo 3. The Linksys WMP54G Wireless-G PCI adapter.

sell the older 802.11b type cards (which are just fine for HSMM radio work) for just a few dollars. Most of these small approximately 100-mw radio transceiver cards come in three forms:

1. The most common form is a PC card. Earlier these were called PCMCIA cards,

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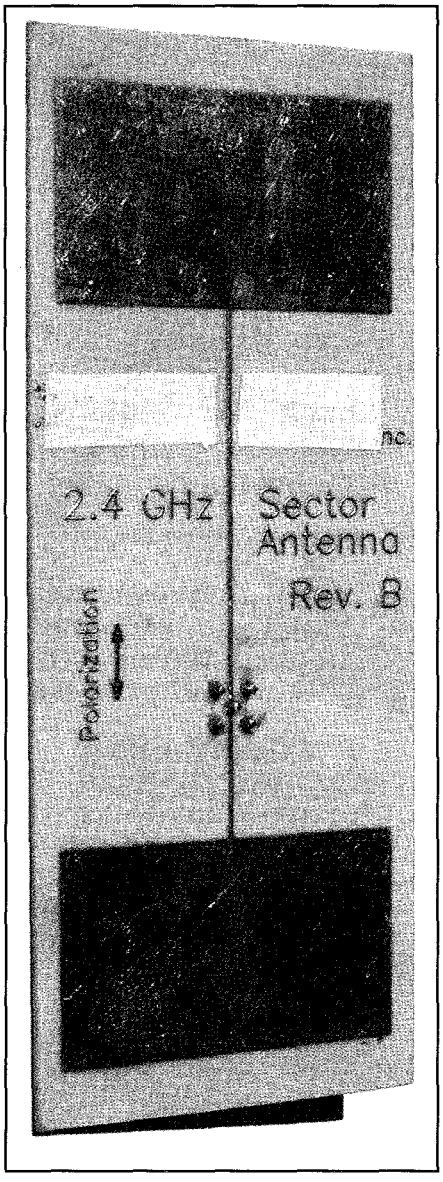

Photo B. Stacked patch antennas with power divider and identical phasing.

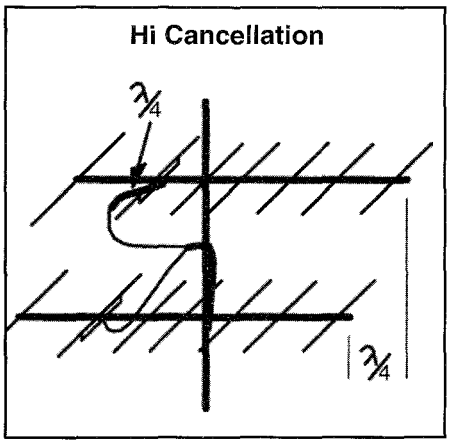

Figure 4. One-quarter-wave offset stacking to increase Yagi front-to-back ratio.

cable companies put up a tall tower and pulled in TV signals from 100 or so miles away. This TV signal was amplified and distributed to customers. Communication satellites were still many years in the future. At this height it was common to pick up a second TV station on the same channels. The on-channel interference gave the paying customers zigzags and bars on their screens, so it was very important for the CATV antennas to reject signals off the back.

The antennas were stacked with one antenna 1/4 wave in front of the other one (figure 4). Next the coax in the power divider was made 1/4 wave longer on the forward Yagi. This was 1/4 wave longer in coax. Thus, the coax velocity factor was used in the calculations. From the front, the radio wave has to travel 1/4 wave longer just to get to the back antenna. However, then the radio wave travels 1/4 wave less in the coax, so all the signals combine in phase.

Now let's have a radio wave come in from the back of the antennas. The radio wave has to travel 1/4 wave farther to get to the antenna with 1/4 wave more coax. The signals are now 1/2 wavelength out of phase and neatly canceled. With care, it is possible to get an additional 20 dB of front-to-back ratio out of the antennas' natural front-to-back ratio. This is a good technique when you really need a very high front-to-back ratio.

As always, I welcome your antenna questions and ideas for future antenna topics. You can drop me note at my e-mail or snail mail address on the first page of this column, or visit <www.wa5vjb.com> for more antenna topics. The weather is nice, go get some antennas in the air!

73, Kent, WA5VJB

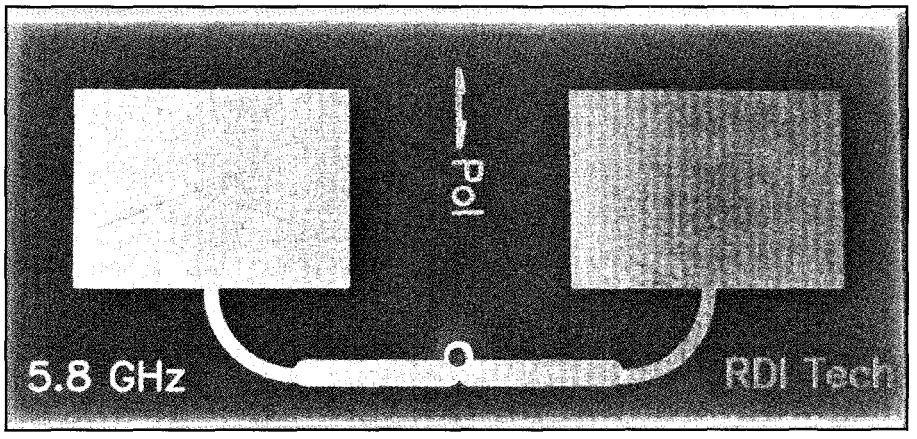

Photo C. Stacked patch antennas 180 degrees out of phase with an extra 1/2 wave in the power divider.

HSMM *(from page 81)*

but more recently they have been known as laptop PC cards. Note that unlike other PC wireless cards, theses devices do *not* have a built-in antenna. They are designed for an operator-supplied external antenna, such as an MFJ 1800, etc.

2. Another type of transceiver/adapter comes with a USB interface. This is often considered a superior interface for most HSMM stations. The reason for this has nothing to do with the quality of the transceiver, but rather the fragile nature of the tiny external antenna connectors (MMCX, etc.) that are found on the PC cards. They are not really designed for frequent plugging and unplugging. Without extreme care, they can easily be torn out. An example of a wireless USB adapter is shown in photo 2.

The transceivers with a USB interface to your laptop or computer will usually have a normal TNC connector.

3. Linksys and other manufactures also produce similar cards for the expansion slot on the rear of a desktop PC, too. An example is the Linksys WMP54G Wireless-G PCI Adapter, which is shown in photo 3.

A final note: make certain that the transceiver you purchase has an antenna that is removable, and thereby has an external antenna connector of some type!

Until next time . . .

73, John, K8OCL