Remote Winkeyer Applications

Judging by the emails we have been getting, there is quite a bit of interest in remote station operating. As hams downsize and/or move into housing situations that prohibit outdoor antennas they are seeking ways of having a nice station setup in a remote area and running it over the Internet. I have put together an application called WKremote that implements one way of operating WK at a remote site. But that is only part of the solution.

Whenever anyone emails me to tell me about their remote setup I ask if they might be willing to submit a description that I can post on the K1EL website. The first ham kind enough to respond is Gary, WA6HZT who has submitted a really interesting article which you can read below. If you have a setup that you would like to submit please send it along. As soon as I get my remote setup working I will post a description of that as well. This is fun stuff and still relatively new for Amateur Radio.

If you have any questions or comments about Gary's article please post it on the K1EL Newsgroup. Thanks ! Steve K1EL

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The Remote Setup at WA6HZT

When Steve asked me if I would "document the steps you went through to put all the pieces together" for my Internet Remote Base, I was flattered and took him up on the offer to share what I've learned so far. I'm certainly not an expert in the field, but I have done a lot of legwork and pondering, so the following may save you some time and trouble.

There's a lot to consider when contemplating an Internet Remote base, including:

● Location
● Desired bands, modes, and results
● Control of the radio
● Audio quality
● Internet availability
● Simplicity of design
● Robustness
● Computer capabilities
● Site installation permission and logistics
● Insurance
● Interference

I'll start by listing my system's radio and antennas, explaining the "why's" for the selections made, then move into the issues I encountered in developing the system.

Radio: Kenwood TS-B2000
HF antenna: Buxcomm Windom
VHF/UHF antenna: Diamond V-2000 6/2/70 cm with Diamond MX-2000 triplexer

My remote base will be located atop a very tall building, affording me a great launching and listening site for radio waves. Not wanting to lose any operating opportunities, I chose to buy a rig that would cover all HF bands as well as 6 and 2 Meters and 70 cm. I also needed a rig that I could fully control remotely (not so with many radios, so check the remote control capabilities very carefully when choosing a radio), and the winner was the Kenwood TS-B2000. I got the "B" version without controls on its face to save money, and because they wouldn't be needed in a remote operation.

The antennas needed to be rugged, efficient, dependable, and perform well. I opted for a Buxcomm Windom (off center fed dipole) on HF for several reasons: the quality is high, price is low, it's built like a tank, is very efficient, at any decent elevation it will offer gain over a vertical or dipole on bands above 80 Meters, and it gets rave reviews from the field on EHam.

FYI - you need to install a second dipole in parallel with the main antenna to get 15, 30, and 60 Meters (no big deal, look online). I found through modeling the antenna that by orienting it correctly, I could put a signal into Europe, the Caribbean, Australia and Asia that was 6+ dbd over a dipole, or the equivalent of getting ~500 Watts of signal out of the radio's stock 100 Watts. Another option might be an all-band vertical with counterpoise system, like the Cushcraft R8; that would be my first choice at a location where the installation was closer to the ground.

In any event, a mounting arrangement is called for, and if that means a support pole must to be put somewhere on a roof, it's likely your hosts won't warm up to holes being drilled up there to support your antenna system. That will get you into the realm of NPRM's… Non-Penetrating Roof Mounts.

Depending on what you need to support, you can find suitable NPRM's starting around $50, with another $15 or $20 thrown in for shipping. Searching the Internet will be your best friend in finding these… and, once you find a model that will work, check every source you can for prices. The same item can cost $50 to $100 or more, varying by vendor.

For VHF and UHF, I wanted a vertical for simplex and repeater work. I've always had very good luck with Diamond products, and their V-2000 antenna does what I need. The antenna also has a wind survival rating of 110 MPH, which is tops in its class. And, Diamond also makes a triplexer to split the three signals for connection to the radio that has excellent specs, better than any other Ham competitors' triplexer, so, again, these were obvious choices.

What follows are some of the things I have found to be different or altogether new in planning an Internet Remote Base station versus a station for home or mobile use.

Each time you want to use the remote base, you'll need to connect to the remote base computer, establish an audio link, and control the radio. This will involve a computer to interface to the radio, software to allow you to see what the remote computer "sees", software to control the radio, and an audio "chat" program to get audio back and forth between you and the remote base.

The computer has to do only a few things, but it has to do them well, and within its capabilities. In my case, I am running a 1.8 GHz box with 512 MB of RAM and Windows 2000, and it is perfectly adequate. I would suggest starting in the 1 GHz range with at least 256 MB of RAM and either Windows 2000 or Windows XP.

When you get everything running, be sure to use the Windows Task Manager to check CPU and memory usage; you want them to be as low as possible. Audio and control functions will start misbehaving if you are using too many resources. Trust me, I found this out the hard way, starting with a 500 MHz PIII box and 256 MB of RAM.

In order to see what the remote computer sees, I use Real VNC, a free program. It allows you to log in to your remote computer and see, on your monitor, what a monitor connected to the remote computer would see. It is secure and used worldwide. Be sure to use a strong password.

To connect to the computer, you will probably want to investigate services like tinyurl.com, or no-ip.com and secure a simple internet address for the computer, unless you're fortunate enough to have a static IP address at the site. This way, no matter what IP address your ISP has assigned you (and it can/will change frequently), all you ever have to do is type the short URL you've created, and you're good to go.

To control the radio, I am using the software that came with the radio, as it supports every function the radio offers. If your radio does not come with control software, or you don't like the software provided, look at Ham Radio Deluxe - a free program that is nothing short of excellent. It does not support a couple of the key features of my radio – yet – but, when it does, I'll probably convert to it. I cannot say enough good about this product or its support group… this is as good as it gets.

Obviously, one of the most critical aspects of an Internet Remote Base is audio quality. I spent a lot of time evaluating different chat programs and settled on one that uses the SoundEngine technology from Global IP Sound (GIPS). Why? It sounds great!

A chat program you currently use may use the GIPS SoundEngine, the software that compresses the audio, is responsible for its frequency response, and its ability to thwart jittery sounding audio. Check out Skype, AIM, The Gizmo Project, and others. However, of those products, Skype has had some well-documented bandwidth issues in the past (do a Google search on "Skype" and "bandwidth"), and I didn't want to have a bad bandwidth experience at my host's expense (more below). It bears mentioning, too, that the GIPS software also does very well at dealing with packet loss (jitter, lost audio), which is a big plus in addition to the great audio.

I did frequency sweep tests on at least ten different programs, and the GIPS products easily won. I also used the same song on all codec tests; one with a lot of high frequency content and strong bass line. Audio is essentially flat from below 50 Hz to over 8,000 Hz with minimal distortion. They sound very good, and on the air reports verify this.

I am using a headset/mic combo from Altec Lansing that has great frequency response, and cost all of about $15 new. The bottom line is to use as good as mic as you can.

I also invested in new, matching sound cards for the remote base and my home PC, the one I will use most frequently to access the base. Following a review of sound cards in a recent QST, I settled on two 24-bit Sound Blaster Audigy SE cards. They offer a signal-to-noise ratio in the 100 db range, and have excellent frequency response. They were also inexpensive at about $25 each, which seemed like cheap insurance to make sure the audio started and stopped its journey in the best way possible, within the confines of my budget.

Speaking of sound cards, if you plan to run the speaker output from your sound card into your radio as a mic-level signal, you will have to pad the signal… a lot. I wound up using a 1 MegOhm resistor is series with the + audio signal, although a true Impedance pad would be the proper way to go. And, depending on your computer, sound card, and radio, using isolation transformers between your rig and computer may be necessary.

And, don't forget the ferrites - every lead exiting the computer and monitor is suspect; you'll hear the CPU whining all over the bands if you're unlucky. There are many solutions out there to choose from, some more expensive than others. Good luck!

The building where my system will live does not have broadband Internet service, so I am mooching connectivity from a sympathetic business I have had some dealings with and connecting the two sites via a point-to-point radio link. In my benchmark tests of bandwidth used, I am using 60 to 70 KB/s of bandwidth with the system described, versus 120-400 KB/s with Skype.

FYI, I used a bar graph in my pitch to the site's company president showing upload and download speeds (1500 down and 512 up) versus the paltry 70 KB/s I would be using, stressing the use would be primarily nights and weekends, when his staff would not be using the network. Don't forget to mention the hobby, non-commercial aspect of your station and its potential worth in an emergency situation if you need extra selling points.

It was unthinkable to put this much effort into a remote base without having the ability to do CW. This is how Steve and I came to shoot emails to one another. At the time, he was building his own remote base, and I was looking for a keyer that I could operate remotely, so we both had questions the other fellow could answer.

I purchased the USB Winkey2 and it's perfect for the job. Steve supplies a free program that allows you to type from the keyboard and key the transmitter. Using Real VNC, all I have to do is type from my home keyboard into the program on the remote computer and the remote computer responds as if my home keyboard were plugged into it. I have found that a 500 Hz sidetone works very well to hear what's going out over the air.

Also important to me is PSK31. DigiPan has proven to be a great solution; it is a well-designed, intuitive, and free program that works flawlessly with the 24-bit Creative sound card.

Let's review: We now have the radio landed with antennas for all bands and have complete control of the radio from home (or anywhere there's internet connectivity), doing all desired modes, with great audio and CW. This is the point where I started realizing just how much "extra" work was involved in dealing with the usual "station" types of issues.

Here's a short list:

Robustness/redundancy – UPS for the rig and computer. Make sure the computer will "right" itself after the power dies, since you know it WILL die, eventually. Test it… pull the plug… make sure it comes back correctly. APC is a well known UPS vendor.

I am using a 40 Amp commercial supply that was originally designed for computer server use. I got this for about $40 from a surplus outlet. Since it was designed to be commercial grade to begin with, I felt pretty good about the purchase. Short version: get a reliable supply that is rated to deliver more than you will ask of it.

Grounding – Read the information at the Polyphaser and I.C.E. sites on how to do effective protection, order the devices of choice, and do it.

Coax, tuners, VSWR – If your rig doesn't have a built in tuner, the Windom solution is a very good one. Excellent bandwidth is to be had, often not requiring a tuner, but can be tweaked using a rig's internal tuner or an external unit, like the MFJ-991B, which I have and can endorse.

Formal permission – If you're setting your Internet Remote Base up at someone's place of business, get permission in writing that you are authorized to be there, doing what you're doing. It's a good precaution, just in case…

Insurance – For you AND your host's sake. I use the Ham Radio Insurance from the ARRL guys and find their rates and ability to speak my language very persuasive in getting and maintaining coverage. I think it's important to be a good neighbor and make sure things are covered, just in case… like the point above.

Interference – Do lots of testing to make sure you're not a part of your host's phones or creaming their (or a nearby neighbor's) two-way system. Consider a low pass filter for HF radios.

Gear – Oh, yeah… coax, masts, tape, you name it. Everything you'd expect to use in a "normal" setup will be used here.

I hope this has helped you get an idea of what might be involved in creating your own Internet Remote Base. The challenges are formidable, but the rewards far exceed the effort.

73,
Gary, WA6HZT   July, 2007