

K9SO

## **Have Laptop, Will Travel**

### **Remote base approaches for the rest of us**

Fred Glenn, K9SO

An exciting new trend in Ham Radio has slowly appeared over the past 10-15 years. From a handful of pioneers to hundred of operations today, remote control of base stations is now a reality for many. While a few lucky hams today operate superstations remotely and are technically savvy, the rest of us must face financial and technological realities. Fortunately, remote base technologies have evolved and there are now simpler and more cost effective ways of thinking about remote base operation. For years, I've operated my relatively modest station at home via remote control. I simply use my laptop computer as my radio control head ... and in spite of the fact that home is often half a globe away, it's sometimes hard to tell the difference (at least as far as operating my radio is concerned). I'm the one that's remote ... not my station... and that's the different way of looking at a "remote base". Operation can be so seamless that station operators may simply think of the setup as a remote radio control head with a (very) long control cable.

In the final analysis, there are just 3 basic steps that that you must tackle in order to set up your own "remote" or "laptop" station and you may already have all the necessary hardware!

1. Set up an audio link (you already know how to use a telephone. Now use one of the free and simple internet phone lines such as Skype instead)
2. Set up rig control and audio interfaces using a computer (you may already be doing this... it is the same setup you may already be using for RTTY and/or logging programs)

3. Set up a data link (nowadays, this is really easy!)

Break this up in parts and the task is not so formidable. Stop and enjoy different experiences such as the Echolink project along the way too. Today, all of this is much easier than it was just a few short years ago.

## Basic Functions

The three necessary functions

### Audio Link

Pass audio in between the HOST and the CLIENT locations. May also be used as the DATA link

### Rig Control Software

Ultimately this will run on the CLIENT computer, but this is the same software that may already be in use at your home station

### Data Link

Frequency and rig controls. This can be quite complicated, but available Freeware can simplify the details if the internet is to be used

## Options

### VoIP (Internet)

For example, SKYPE is one free service

### VHF/UHF Radio

You may be able to use your local repeater

### Wireline Telephone

### Ham Radio Deluxe

Many other software choices

### Audio Modem

Link may be the same as the Audio Link

### Internet PC Control

“fool” your rig control program into thinking the rig is attached by using “Virtual Serial Ports” that link via the internet

Figure 1: The basic needed functions and some of the options. While simpler approaches are possible (see for example <http://www.K9SO.net>), this article gives examples using the VoIP, HRD, and Internet Control options.

1. First, the audio link:

A telephone line can send and receive audio and serves this purpose well. So does a UHF radio or repeater. Nowadays however, you can set up a “virtual” telephone line using the internet. There are several approaches to this, but one free internet service called SKYPE is very effective and provides both video and audio services. SKYPE can set up VoIP calls over the internet for computer to computer connections (for free) or computer to wireline calls (for a modest charge). There’s no need to go into the details on how to set this up, since the SKYPE instructions are quite simple to follow. You will ultimately need two SKYPE accounts: one for your laptop and one for your base computer. Note that SKYPE works anywhere in the world too. Visit [WWW.Skype.com](http://WWW.Skype.com)

## 2. Set up rig control locally

You probably already know how to do this if you have ever used your computer to interface your radio. Use your favorite Rig control software and get it working locally before you go on.

## 3. Set up your data link.

I will describe 3 ways of setting this up. The first one uses the host PC and is the most commonly used approach. The second approach can eliminate the HOST PC’s role in the data link function and can give an extremely high level of security. Lastly, for those longing for that “radio feeling” while operating, a master-slave operation using two Icom radios will be described.

If you want to connect via the internet, start out by operating locally over your wireless LAN connection. Once again, you may already have this in place. Operating locally (intranet) is easy and secure. Operating over the internet is more complicated primarily due to security concerns.

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In the first approach, you essentially “fool” your rig control program into thinking it’s connected directly to a radio. This is done using “virtual” COM ports that link to each other via a TC/IP (internet or intranet) connection. Stan Harrington, N8VB, has provided the Ham community with excellent freeware to accomplish this. Ham Radio Deluxe, another free rig control program uses the N8VB software and setting this up can be almost automatic. There is plenty of on-line help from the HRD group.

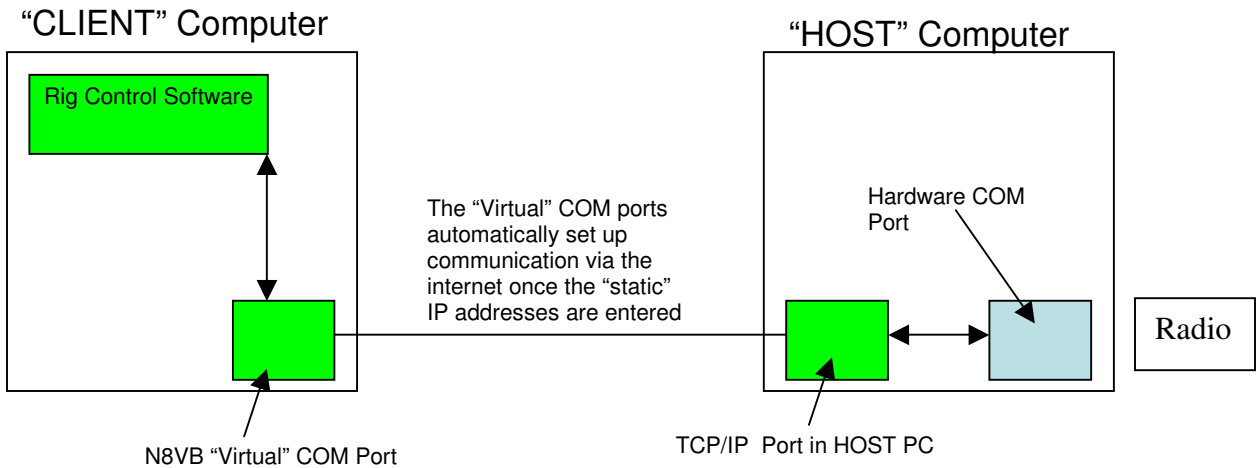
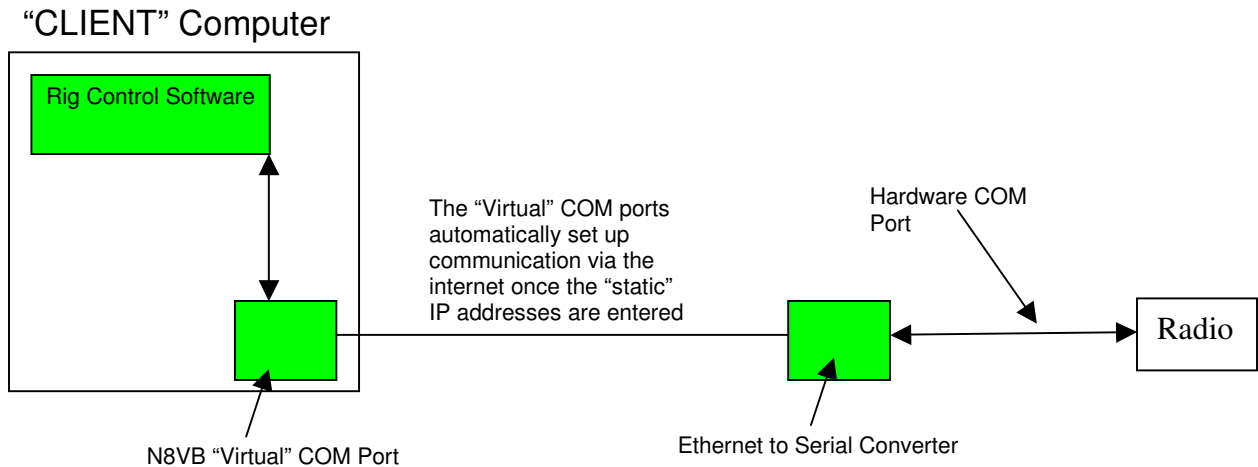


Figure 2: Internet Data Linking for dummies. Linking approach #1 uses N8VB’s “Virtual” COM ports to “fool” the rig control software into thinking it’s connected directly to a radio. Yes, it’s this simple using HRD.

Data Link method two eliminates the HOST PC by using a commonly available but little known device known as an ETHERNET TO SERIAL CONVERTER.



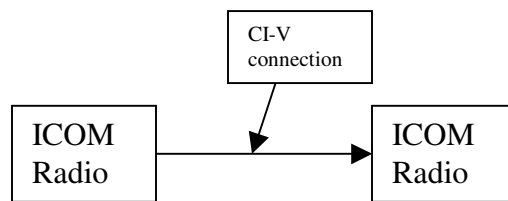
**Figure 2: Linking using an Ethernet to serial converter can relieve the HOST PC of data handling duty.**

These devices are readily available and several suppliers are listed in the footnotes. While not free, they are usually available for less than \$100. What's the advantage of this approach? Primarily, once you get out onto the internet with this, it can provide a high level of security. Also, it is not prone to computer crashes. Even if power is lost, "rebooting" is almost instantaneous and transparent to the user. Lastly, the converter is very small, about the size of a pack of cigarettes. At the K9SO host location, the PC is completely eliminated for the basic functions since another VoIP approach is used for the audio connections.

The final approach can completely eliminate the computers on both ends and was first put into operation at K9SO in 1997. It is not well known that two ICOM radios can slave off of one another using a direct connection between the CI-V ports. Many control features are available (especially tuning and basic rig controls like band changes, etc.) and simply pushing a button on one of the radios causes the same action on the other. Since the raw

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CI-V connection is standard serial at TTL levels, standard audio modems can be used to transmit the data over a phone line (or Skype) or a UHF radio link. More detail on this approach is posted on the author's website <http://www.k9so.net>

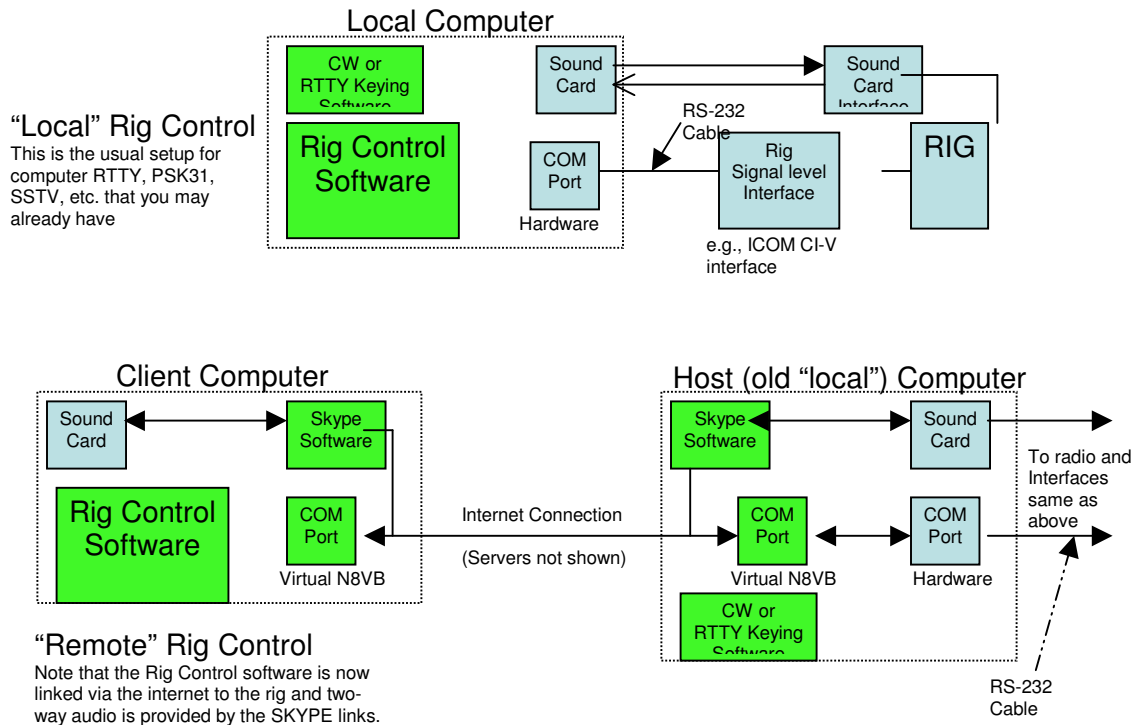


Once you have the intranet interface working locally, it's time to go out into the world. Access to the internet requires the opening of ports that may be visible to unwanted prowlers. Many, many users of Skype and HRD have had no issues with this, but for security reasons, I recommend the installation of your own VPN (Virtual Private Network). VPNs provide access to everything attached to your local Ethernet and provide another level of security. I take this seriously since during setup of my many different stations, I have been "hacked" when I inadvertently left unused ports open on my PC. I won't go into the setup of a VPN, but there is some additional information at <http://www.k9so.net> .

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Now would be a good time to look closely at the work of Stan Schretter, W4MQ, and visit his website at <http://www.w4mq.com> to see how far you can take this. You can make this a weekend project or a lifelong continuing effort. Don't be taken aback by some of the "super remote stations" out there. None of these happened overnight, including the one at K9SO. Start simply, get the basic control functions down and working and then start getting "fancy".

Just to provide an example, the K9SO CLIENT screen below uses approach #1 (HRD) and some rig control software from W4MQ for other control functions. The screen is split into three parts called CONTROL, RIG CONTROL, and VNC (HOST viewing). The VNC software (also free) allows the operator the remotely view the HOST PC screen the CLIENT location for improved speed. HRD supports this as well. A somewhat simplified block diagram is shown as figure 3.



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Figure 3: Final internet configuration. Items shown in green may be available for free. You may already have the items shown in blue. Not shown are the internet modems or server connections. The VPN software would reside on the Host side modem or server. VNC programs running on both the HOST and CLIENT computers would enhance connectivity and provide additional redundancy. This can be done without the VPN complexity, but having one provides another level of security. computer.

I can operate 160 meters through  $\frac{3}{4}$  meters running FM, CW, SSB, RTTY, and digital modes. The “final” operating screen shot is shown as figure 5. You can keep your own “remoting” simple or take it as far as you want. Call your realtor and make a bid on that 50 acre mountaintop antenna site (call me if you buy it!). But be sure to stop along the way and appreciate the different ways of operating. We owe a debt of thanks to the true pioneers of remoting, some of whom I have already mentioned. Thanks to their huge efforts, all of this can be done with almost no cost in software (but remember to consider some voluntary donations ... this took a huge and continuing effort to make it happen).

So 73 and happy “laptop-ing”! Hey! I just worked Ethiopia on 40 CW while sitting in a Starbucks sipping on a Frappuccino. Life is good.

Is this Ham Radio? You bet it is!

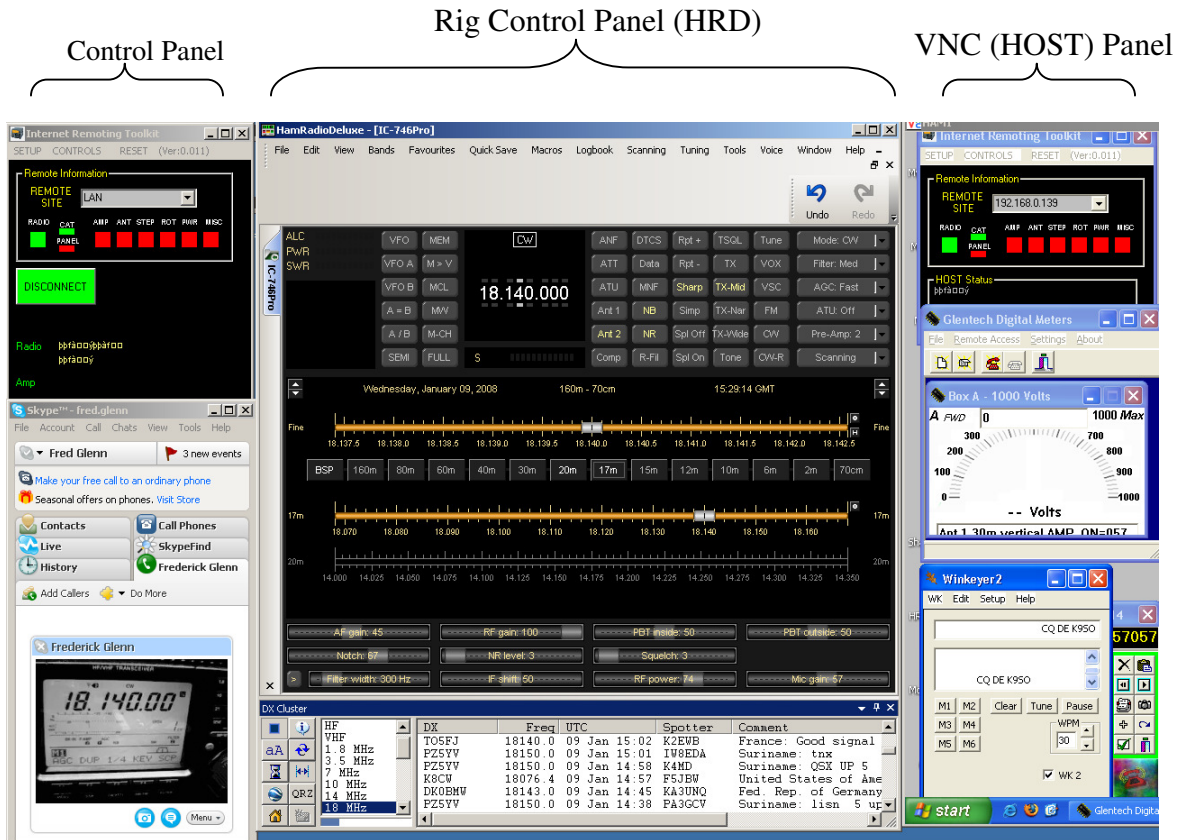


Figure 5. Final screen view as seen on the CLIENT computer. At left is the control panel showing IRT running on the CLIENT computer and the SKYPE panel immediately below. Note the real-time video of the IC-746PRO screen in the lower left corner. In the center is the HRD rig control program running on the CLIENT (with DX spots at the bottom). At far right top is IRT running on the HOST computer. A meter monitoring program view is seen right below that. At bottom right is K1EL's Winkeyer2 program running on the HOST computer. Additional programs running on the HOST provide antenna and amplifier selection as well as other less time-sensitive functions.