

## Operate a Winlink Station Remotely Over a CAT-5 Cable

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I recently had a need to demonstrate a Winlink connection in a classroom at the building that houses our County Emergency Operations Center. The catch is that the building is pretty well sealed for security purposes. The front entrance is the only means of ingress or egress outside of an emergency, the windows don't open, and there are no openings in the wall — not even any electrical outlets on the building's exterior walls. And the classroom was far removed from any entrance to the building.

The solution that I came up with was to set up my battery-powered Winlink station with its laptop computer at a convenient location outside the building. Inside the classroom, I set up a second laptop computer. Both laptops were connected to stock Ubiquiti Nanobeam digital microwave radios, with one radio configured as an access point and the other as a wireless client station. These two microwave radios provide the functional equivalent of an ordinary CAT-5 ethernet connection linking the two laptops. I then used remote desktop connection (RDC) software so that the outdoors laptop could be controlled using the indoors laptop.

Recent versions of Windows have RDC software built in, but I was using vintage laptops (an XP machine and a Windows 7 machine). So I downloaded Ultra VNC, a remote desktop support tool that is freely available on the Internet for non-commercial use under the GNU General Public License. I was able to configure everything in an evening. On the day of my demonstration, it took about two hours to set everything up with a little help from my friends. Fortunately, the weather was gorgeous. It would have been a bit more challenging had it been raining or snowing.

I can see multiple applications for this kind of arrangement. For example, suppose you had a temporary and urgent need for a HF station at a hospital. Ideally, you would like the HF antenna to be located at some distance from the building, away from sensitive medical equipment and other electronic infrastructure, and also away from people and the attendant RF exposure concerns. Even if you have a way to get the coax through the building envelope, the signal loss in a long coax run could be crippling, especially if you are using multiband antennas. Wouldn't it be nice to have the radio mounted and prewired with an industrial computer, the necessary software, and a 12 V power distribution system, all mounted in a lightweight portable rack case? With a suitable configuration, this system wouldn't even need a keyboard and monitor. Just hook everything up, connect a 12 V battery and the microwave dish, autoboot the computer with a script to start your software, and you would be ready to operate.

Inside the building, you could run a CAT5 cable up to 100 meters from the operating position to a location with a view of the equipment set up outdoors. With the addition of

an inexpensive Ethernet switch at both ends, multiple radios could be remotely operated over one microwave link.

A number of design considerations would be important for a robust system. First, the outdoor equipment needs to be protected from the weather. That means the electronics must be raised off the ground and protected from stuff falling from the sky — or blowing sideways! At the same time, the arrangement needs to provide adequate airflow for cooling the equipment, while protecting the equipment from solar heating. (Keep in mind that a HF radio can easily absorb as much or more heat from the sun than is internally produced when running at full power.) Last but not least, some thought should be given to security. Depending on your situation, the equipment might be needed to be chained to an immovable object, but it might be sufficient simply to encircle the whole setup with caution tape (readily available from your local full-service hardware store) with a few HIGH VOLTAGE and RADIATION HAZARD signs thrown in for good measure.

Some consideration of how to provide power to the equipment is also needed. The easiest solution is to run all of the equipment from a 12 V battery, powering the laptop with a high-efficiency DC/DC converter (or automotive adapter). You could design a battery charger into the rig, powering everything from a generator or long extension cord, if that is an option. But another approach is to set up a battery charging station at a convenient location indoors and swap out the battery periodically. That's what the Forest Service often does when setting up radios in remote locations. Heavy though they may be, it is easier to schlep batteries than generators and gas, and batteries are less likely to “walk away” from an unattended site than a generator.