Introduction to Remote Control of your Amateur Radio Station via the Internet

By Bill McCaa, K0RZ
Who is K0RZ

- Bill McCaa, retired Electrical Engineer.
- Licensed since 1954 and continually active in Amateur Radio.
- Calls: W3ZBE, K0RZJ, K0RZ
- Active on 1.8 MHz. through 47 GHz.
- Setup Internet remote controlled station in 2007.
Remote Control History

- Leased wire line
- Private wire line
- Telephone dedicated circuit
- Telephone dialup
- Radio
- Virtual wire line (Internet)
Subjects to be Covered

- What is Internet station remote control?
- Hardware requirements.
- Software required.
- Setting up your station.
- Problems to overcome.
- Connecting via the Internet.
- FCC requirements.
- Enhancements.
- Examples of remote stations and use.
- Where to get more information.
What is Internet Station Remote Control

- A remote computer accesses a local computer located at the amateur station and connected to the radio and accessories.

- Use the Internet as a virtual wire connection between the remote and station computers.
Internet Station Remote Control Block Diagram

- User End PC
  - Remote
- Internet Access
- Internet
- Internet Access
- Station Control and Accessories
- Amateur Radio
  - Station End PC
    - Local

Operating Software
- Remote Screen
- Remote Audio

Operating Software
- Host Screen
- Radio Control
- Audio Path
- Accessory
Hardware Requirements

- Station computer is at least a 2.0 GHz Pentium IV with a sound card, and one serial and parallel port.
- Internet speed of at least 500 Kb with Router.
- A Radio that can be controlled via the computer.
- A ground isolated duplex audio interconnection between the computer and the radio.
- AC Power control, antenna selection, and timers.
- Remote computer with an Internet connection capability and a sound card.
Software Required

- Remotely operate the station computer.
  - XP Pro Remote Desktop, RealVNC, TightVNC
## VNC feature comparison and download selector

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatibility with Free Edition</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Windows 95/Me, NT 4, 2000, XP, Server 2003</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Windows Vista, Server 2008</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>UNIX (Linux, Solaris, HP-UX)</td>
<td>✓</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Mac OS X (x86 and PPC)</td>
<td>×</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>2048-bit RSA Server Authentication</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>128-bit AES Session Encryption &amp; Tamper-Proofing</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>One-Port HTTP &amp; VNC</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>HTTP Proxy Support</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Dedicated help and support channel</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>File Transfer</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Integrated Address Book</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Chat</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Desktop Scaling</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Direct platform native authentication</td>
<td>×</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Powerful Deployment Tools (Windows only)</td>
<td>×</td>
<td>×</td>
<td>✓</td>
</tr>
</tbody>
</table>

[Download & use] [Download & try] [Buy license] [Buy license]
Software Required

- Remotely operate the station computer.
  - XP Pro Remote Desktop, RealVNC, TightVNC
- Radio control software.
  - Ham Radio Deluxe, Kenwood ARCP
Ham Radio Deluxe Screen
Kenwood ARCP2000

Radio Control Program for TS-2000/B2000

File | Control | Radio | VFO | Mode | TX RX | Memory | Scan | DSP | Help

ITT CTRL | PRE | AGC

BUSY

14.180.000 < A

S

--1--3--5--7--9---29---40---60dB USB

ALC

ANT 1

PF Operation

VOICE | RX M. | DSP M.

Mode

LSB/USB | CW/FSK | FM/AM

A = B | A / B | SPLIT

CALL | VFO/M | SCAN

PM Operation

PM IN | PM 1

Band

RIT/XIT/SUB

DSP Operation

N.R. 1 | N.R. 2 | A NOTCH | FILTER

BEAT CANCEL | MIN | MAX

AUTO | MANUAL

Main

RFGAIN | MIN | MAX

AFGAIN | MIN | MAX

SQUELCH | MIN | MAX

Quick Memory

MR | MR | M. IN | M. IN

Memory Operation

M > VFO | M. IN | M. IN

Menu | V.SCAN | MULTI | P.C.T.
Software Required

- Remotely operate the station computer.
  - XP Pro Remote Desktop, RealVNC, TightVNC
- Radio control software.
  - Ham Radio Deluxe, Kenwood ARCP
- Audio connection.
  - Skype, SpeakFreely (PTT)
The all-new Skype for Windows.
Built for conversations that make a difference.

We've built this brand new Skype so you can have the conversations that make a difference to you, every day. It's easy to use, plus step-by-step guides help you get started.
Software Required

- Remotely operate the station computer.
  - XP Pro Remote Desktop, RealVNC, TightVNC
- Radio control software.
  - Ham Radio Deluxe, Kenwood ARCP
- Audio connection.
  - Skype, SpeakFreely (PTT)
- Station control
  - K0RZ Switch, N8LP Remote
Parallel Port Relay Programs
$40 Parallel Relay Board
Carl’s Electronic Kits
N8LP Serial Remote Control
N8LP Remote Control Board
Setting up your Station

- Install and configure the remote computer and the station computer control software and verify operation.
- Install the radio control software and connect the radio port to the computer port and establish control of the radio via the station computer.
- Install audio software on the remote and station computers and connect the radio audio to the station computer sound card and set audio levels.
- Install station accessory software on the station computer and connect relays as desired.
Problems to Overcome

- Understanding static IP and dynamic IP addresses.
- Configuring your router user side addresses and ports.
- Configuring the station computer for a static IP address.
- Managing a Internet dynamic IP address.
  - Software and services are available to remotely determine your Internet IP address: No-IP.
Connecting via the Internet

- Internet and Router configured.
<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Time</td>
<td>Thu, Feb 26 2009 00:11:40</td>
</tr>
<tr>
<td>MAC Address</td>
<td>00:1f:e9:3b:50:4f</td>
</tr>
<tr>
<td>Router Name</td>
<td>WRT54G</td>
</tr>
<tr>
<td>Host Name</td>
<td></td>
</tr>
<tr>
<td>Domain Name</td>
<td>hsd1.co.comcast.net.</td>
</tr>
<tr>
<td>Login Type</td>
<td>Automatic Configuration - DHCP</td>
</tr>
<tr>
<td>IP Address</td>
<td></td>
</tr>
<tr>
<td>Subnet Mask</td>
<td>255.255.248.0</td>
</tr>
<tr>
<td>Default Gateway</td>
<td></td>
</tr>
<tr>
<td>DNS 1</td>
<td>68.87.85.98</td>
</tr>
<tr>
<td>DNS 2</td>
<td>68.87.69.146</td>
</tr>
<tr>
<td>DNS 3</td>
<td>68.87.78.130</td>
</tr>
<tr>
<td>MTU</td>
<td>1500</td>
</tr>
</tbody>
</table>
Computer Internet Setup

Windows IP Configuration

Host Name: DELL-P4-WS
Primary Dns Suffix: 
Node Type: Broadcast
IP Routing Enabled: No
WINS Proxy Enabled: No

Ethernet adapter Local Area Connection:

Connection-specific DNS Suffix: Intel(R) PRO/1000 MT Network Connection
Description: Intel(R) PRO/1000 MT Network Connection

Physical Address: 00-08-74-FD-17-74
Dhcp Enabled: No
IP Address: 192.168.1.111
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.1.1
DNS Servers: 68.87.85.98
68.87.69.146

C:\Documents and Settings\Administrator>
Connecting via the Internet

- Internet and Router configured.
- Setup a block of static IP addresses on the back or user side of your router.
Router user Static IP address

<table>
<thead>
<tr>
<th>Automatic Configuration - DHCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Router Name: WRT54G</td>
</tr>
<tr>
<td>Host Name:</td>
</tr>
<tr>
<td>Domain Name:</td>
</tr>
<tr>
<td>MTU:</td>
</tr>
<tr>
<td>Size:</td>
</tr>
<tr>
<td>Local IP Address:</td>
</tr>
<tr>
<td>Subnet Mask:</td>
</tr>
<tr>
<td>DHCP Server:</td>
</tr>
<tr>
<td>Starting IP Address:</td>
</tr>
<tr>
<td>Maximum Number of DHCP Users:</td>
</tr>
<tr>
<td>Client Lease Time:</td>
</tr>
<tr>
<td>Static DNS 1:</td>
</tr>
<tr>
<td>Static DNS 2:</td>
</tr>
<tr>
<td>Static DNS 3:</td>
</tr>
<tr>
<td>WINS:</td>
</tr>
</tbody>
</table>
Connecting via the Internet

- Internet and Router configured.
- Setup a block of static IP addresses on the back or user side of your router.
- Setup the station computer for a static IP address.
Computer Static IP address

This connection uses the following items:
- QoS Packet Scheduler
- AEGIS Protocol (IEEE 802.1x) V3.4.5.0
- Internet Protocol (TCP/IP)

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

IP address: 192.168.1.111
Subnet mask: 255.255.255.0
Default gateway: 192.168.1.1

Preferred DNS servers:
1. 68.87.85.98
2. 68.87.69.146

Alternate DNS servers:

Connecting via the Internet

- Internet and Router configured.
- Setup a block of static IP addresses on the back or user side of your router.
- Setup the station computer for a static IP address.
- Configure the router to assign the IP address and ports to match the software installed on the station computer.
### Router user address and port assignments

<table>
<thead>
<tr>
<th>Application</th>
<th>Start</th>
<th>End</th>
<th>Protocol</th>
<th>IP Address</th>
<th>Enable</th>
</tr>
</thead>
<tbody>
<tr>
<td>RealVNC</td>
<td>5800</td>
<td>5800</td>
<td>TCP</td>
<td>192.168.1.100</td>
<td>✓</td>
</tr>
<tr>
<td>RealVNC</td>
<td>5900</td>
<td>5900</td>
<td>TCP</td>
<td>192.168.1.100</td>
<td>✓</td>
</tr>
<tr>
<td>PcAnyW</td>
<td>5631</td>
<td>5632</td>
<td>Both</td>
<td>192.168.1.100</td>
<td>✓</td>
</tr>
<tr>
<td>SpkFrly</td>
<td>2074</td>
<td>2076</td>
<td>UDP</td>
<td>192.168.1.100</td>
<td>✓</td>
</tr>
<tr>
<td>SF–PPT</td>
<td>2223</td>
<td>2223</td>
<td>UDP</td>
<td>192.168.1.100</td>
<td>✓</td>
</tr>
<tr>
<td>PP</td>
<td>3389</td>
<td>3389</td>
<td>TCP</td>
<td>192.168.1.100</td>
<td>✓</td>
</tr>
<tr>
<td>Echolnk</td>
<td>5198</td>
<td>5199</td>
<td>UDP</td>
<td>192.168.1.111</td>
<td>✓</td>
</tr>
<tr>
<td>OmniVII</td>
<td>49152</td>
<td>49157</td>
<td>UDP</td>
<td>192.168.1.123</td>
<td>✓</td>
</tr>
<tr>
<td>IP–9258</td>
<td>6789</td>
<td>6789</td>
<td>Both</td>
<td>192.168.1.106</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>Both</td>
<td>192.168.1.0</td>
<td></td>
</tr>
</tbody>
</table>
Connecting via the Internet

- Internet and Router configured.
- Setup a block of static IP addresses on the back or user side of your router.
- Setup the station computer for a static IP address.
- Configure the router to assign the IP address and ports to match the software installed on the station computer.
- Internet provider generally provide you a dynamic IP address for the front side of the Router. Static IP addresses are generally available but cost more.
Managing the Internet Provider Dynamic IP Address

ManagedDNS: No-IP™ Free

No-IP Free - Tired of remembering your dynamic IP address?

Use our No-IP™ Free Dynamic DNS (DDNS) and redirection service to map a static or dynamic IP address or long URL to an easy to remember subdomain such as yourname.no-ip.org.
- Run a server on a dynamic IP (DHCP)
- Industry leading dynamic DNS (DDNS)
- and a Free Dynamic DNS update client
- Remotely access your computer
- URL redirection / port 80 redirection

Try us out for free

No-IP Free is our entry level service. Use yourname.no-ip.com instead of a hard to remember IP address or URL. Additionally use our dynamic update client to keep track of your dynamic IP address. You will always be able to get to your computer even if your IP address is dynamically assigned.

Applications

No-IP's Dynamic DNS services has many applications. Remotely connect to your computer from work. Run a personal website, access your DVR, run a FTP, game, or mail server. The options are endless.
FCC Requirements

- An Internet remote controlled radio is considered a wire line controlled radio.
- Three minute transmit timeout timer required.
- Requires a control operator on duty whenever the station is active.
- No geographic limitations where the remote computer is located.
Enhancements

- AC power control of the station computer, radio power, and station accessory power.
- Antenna selection and grounding.
- Antenna rotor control.
- Linear amplifier control.
- Antenna tuner control.
- Operate CW, RTTY, PSK31, SSTV.
- RF power and SWR monitoring.
Examples of Remote Stations

- K0RZ equipment setup and screens.
K0RZ Computer & Relays
K0RZ Remote Desktop
K0RZ Remote Desktop Detail

- Power Meter
- Advanced Station Setup
- AT-Auto
- TS-2K
- 10GHZ-Rotor
- Alpha 87A
- DigiPan
- MMTTY
- MMSSTV
- CwGet
- CwType
- 87A Diagnostics
- Windows Explorer
- Recycle Bin
- Note Pad
- Band Plan
- 1917 Group
- Advanced Station Info
K0RZ on 20 SSB
your deck in the 800 last winter and the
guys are putting a new one up... so lots of work to be done with the footings and stuff...
tomorrow will be garden stuff... BTU AI
WOTTY < DE WA7BN H k n
WA7BN (Duff) DE WOTTY WOTTY "AL" IN CLEVELAND OH Fine there so far Duff... Here is the
station setup...
Gear at WOTTY:
Transceiver: YAESU FT-2000 (Running Stoh euner: Drake MN-2700
Antenn
KORZ on 20 RTTY

THE ANTENNA PHOTO AT THE K0RZ QRZ.COM PAGE AT
HTTP://WWW.QRZ.COM/K0RZ.

Bill wrote about working European stations on 15 meters on May 18:

Since moving to K0RZ a couple of years ago, any openings to EU on 15
have been far and few between, and I have counted on my hands the
total number of days I worked any EU on that band. The total number
of EU in the log on that band has been around a hundred and almost
all have been 599 and considerably weaker. On 15 a few days ago, I
put 150 EU in the log. From 1300Z until 2100Z, many of the
stations were a type 599 and 599. The opening ran from the Ukraine
and Scandinavia down to L2 and over to EA and G. There seemed to be
little geographic advantage to the stations with others calling in
with a 599 report, and UK, Italian, and Germans all hitting the 59
mark here. Cond...
K0RZ on 30 CW
KORZ on 160 AM
K0RZ on 144 SSB
### I/O Control

<table>
<thead>
<tr>
<th>Power</th>
<th>Name</th>
<th>Control</th>
<th>Timer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power1</td>
<td>K0RZ Server</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>Power2</td>
<td>Radio DC Power</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>Power3</td>
<td>Switch 3</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>Power4</td>
<td>Switch 4</td>
<td>On</td>
<td>Off</td>
</tr>
</tbody>
</table>

Apply
Examples of Remote Stations

- K0RZ equipment setup and screens.
- Using the K0RZ Remote.
K0RZ Operating in Den
N0BF Operating in Italy
W0WNV Hotel Operation
W0WNV Mobile Operation
Examples of Remote Stations

- K0RZ equipment setup and screens.
- Using the K0RZ Remote.
- Boulder Amateur Radio Club.
Antenna "1" is connected to the 40m Bi-Square, top at 145' tuned to 7.210MHz.
The Bi-Square is oriented for East West propagation.

Antenna "2" is connected to the 20m Ecm at 165' aimed at 115 for KSD.

There is a antenna rotor program installed on this PC. Please DO NOT use it under any circumstances. It will be available for general use in the future but not at this time.

I would like to dispense with the logging screen for the time being and leave only this informational window up as there may be several changes in the near future. So for now no logging is necessary!! Please Do Not remove or change this message!

93, Ken, N5QO
Examples of Remote Stations

- K0RZ equipment setup and screens.
- Using the K0RZ Remote.
- Boulder Amateur Radio Club screen.
- W0LS screen
W0LS Station
Examples of Remote Stations

- K0RZ equipment setup and screens.
- Using the K0RZ Remote.
- Boulder Amateur Radio Club screen.
- W0LS screen
- KC9VF screen
KC9VF Remote Screen
Where to Get More Information

- QST April 2007 by W2LTF.
- Documentation for your hardware and software.
- N8LP (TelePost) web page.
- Internet (Google Search)
- URL Listing (Handout)
Subjects Covered

- What is Internet station remote control?
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- FCC requirements.
- Enhancements.
- Examples of remote stations and use.
- Where to get more information.
END

• QUESTIONS ???

• 73 K0RZ
## URL Listings for Remote Amateur Station Applications

<table>
<thead>
<tr>
<th>Application</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel Port Control</td>
<td><a href="http://www.geocities.com/micgm/">http://www.geocities.com/micgm/</a></td>
</tr>
<tr>
<td>Palstar AT-Auto</td>
<td><a href="http://groups.yahoo.com/group/palstar_atauto/files/">http://groups.yahoo.com/group/palstar_atauto/files/</a></td>
</tr>
<tr>
<td>TelePost (N8LP)</td>
<td><a href="http://www.telepostinc.com/n8lp.html">http://www.telepostinc.com/n8lp.html</a></td>
</tr>
<tr>
<td>XP Static IP Help</td>
<td><a href="http://portforward.com/networking/static-xp.htm">http://portforward.com/networking/static-xp.htm</a></td>
</tr>
</tbody>
</table>