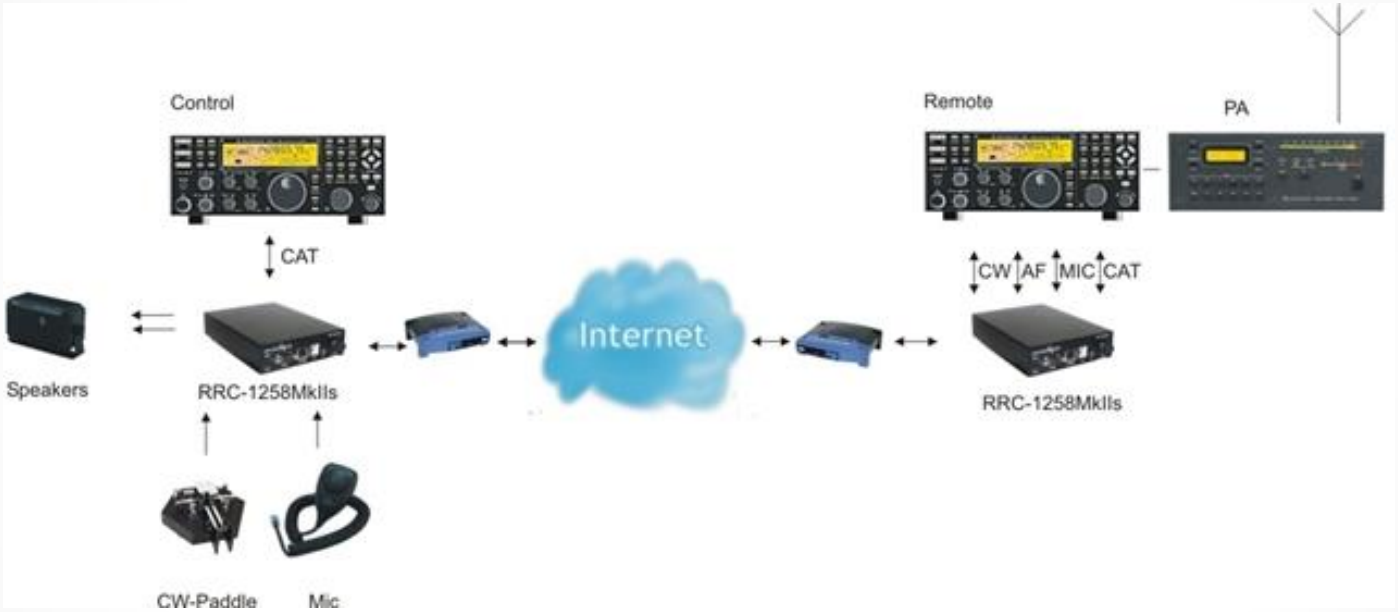
Remote Access - Six Ways to Implement

Mark Aaker, K6UFO - “the alien”
Brian Moran, N9ADG - Editor, ARRL Contest Update newsletter



Fred, K6DGW: "I was worried that operating remote and not making RF at home would not provide the fun level that I've enjoyed for so long, but that turns out not to be the case at all.”

Remote Access - Six Ways to Implement

- We are here to help you be on-the-air more often, with practical details of HOW to implement remote control.
- We are NOT here to debate the ethics or morality of remote operating. All operating must follow your license rules and regulations (ITU and FCC), and follow any applicable Award or Contest rules (DXCC, WAS, ARRL, IOTA,...).
- These slides are available at k6ufo.com or via QRZ.com
- This is a rapidly changing area. There is no one perfect solution for everyone for all time. Feel free to adjust and experiment - that's part of Amateur Radio.

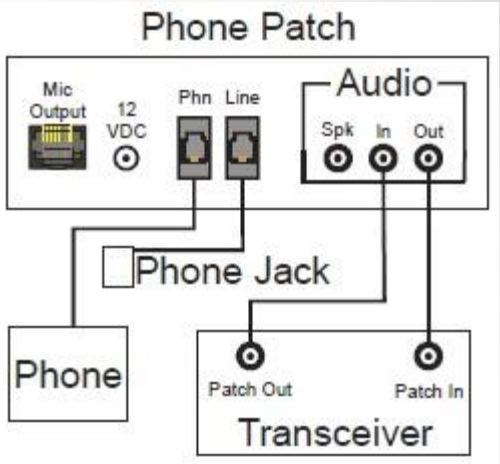
Remote Access - Six Ways to Implement

#1. Use an online station.
#2. Remote Software from your radio manufacturer.
#3. Remote Software from software companies.
#4. Remote Desktop.
#5. RemoteRig Hardware Remote.
#6. The future…

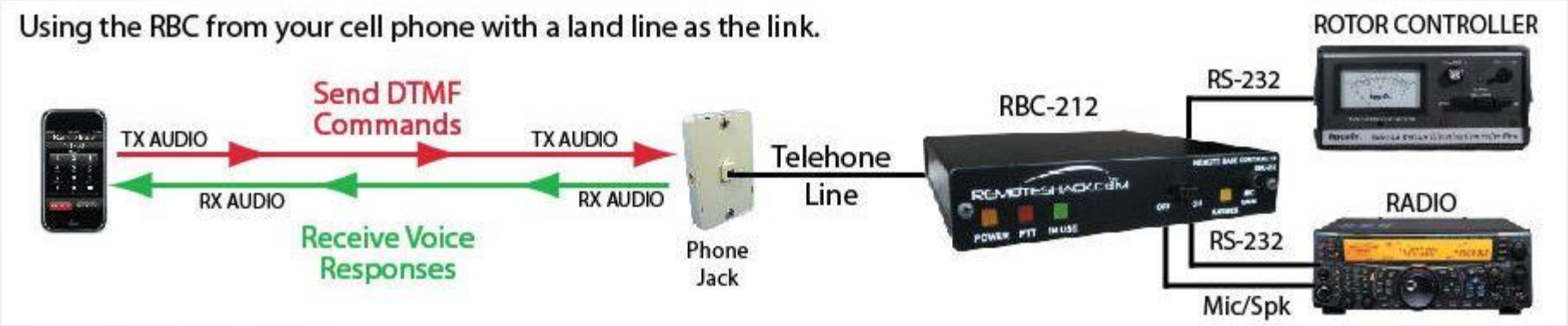
Solutions vary from 100% Software to 100% Hardware.
Money from $0 to $1,200.
Time from Minutes to Thousands of Hours.

First, a little history…

Remote operation over telephone lines is ancient. You can still use an old "phone patch" for about $50 or an MFJ-642E new for $160.



As “good as it gets” is DTMF tone control of additional functions, like a repeater controller or the Remoteshack.com RBC-212 $550.



Pros: Simple. Need only an audio line (telephone, UHF link, Skype)

Cons: Limited. Slow and difficult to tune or change bands. Voice only.

Recommend: You can do better. Use an Internet control system.

If I use an “internet control system” How much internet do I need?

- You need High Speed (also called bandwidth), same as a streaming music service. "3G Wireless" is the minimum at 144 kbps, above 400 kbps is better. Otherwise, audio “dropouts.” Speed is advertised by “download speed”, and upload speed may be only 1/4 of the download speed, but is important for getting your audio and control to the transmitter. If you can Skype across country, you’re good-to-go. www.speedtest.net
- You need Low delay (latency or ping), same as an online game player. Below 200 millisecond is adequate, below 100 msec is better. Otherwise, tuning “lags” and poor PTT timing. Voice and Digital operating are more tolerant of delay than CW. www.pingtest.net
- GOOD: broadband, cable modem, WiFi, DSL, 4G,…
- POOR: Dial-up modem (slow), Satellite (delay).
- Digital modes work well remote. Don’t limit yourself to voice and CW. Digital modes are easier to operate in a “noisy” location like a coffee shop.

#1. Use an online station.

- This is #1, because its free or low cost, and very little time required.
- Look to see what's possible, before implementing for your own station.
- Stations are provided by friends, clubs, contest stations, or "rental" stations.
- Many receivers are freely available: websdr.org or globaltuners.com

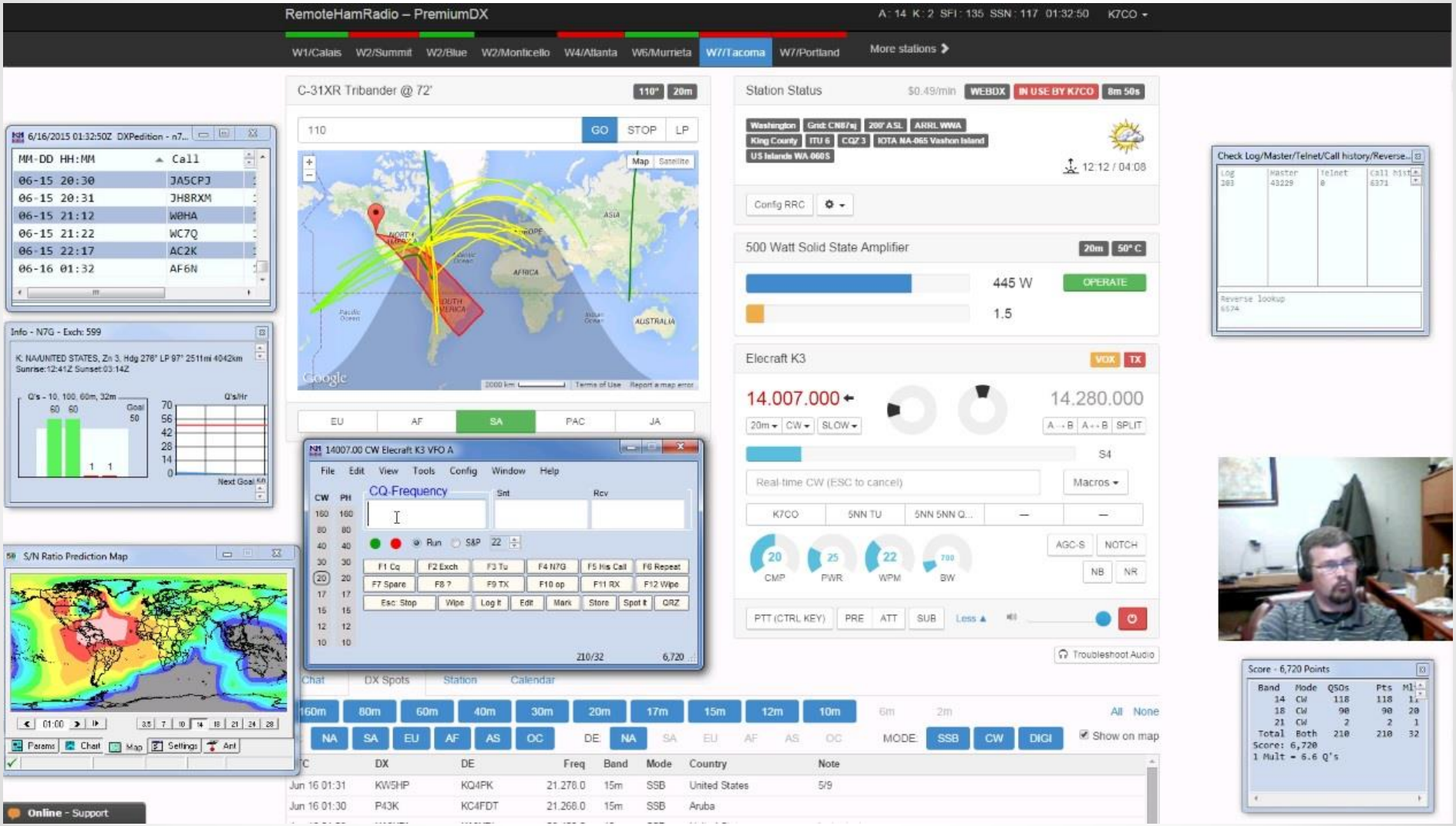
RemoteHams.com Free to sign up. Over 100 stations that vary widely in capability and reliability. Many sites request you join their club and pay dues. You must use the RCForb Client software. You can also use their server software to setup your own station as a remote.

RemoteHamRadio.com $99/yr plus $6 to $36/hr. Very good stations, high capability, high reliability. Limited supply - only 18 stations. Can be accessed with a web browser, with extra hardware, or RemoteRig hardware.

(Full disclosure: K6UFO has a station on RHR.)

Pros: Simple, no station setup, troubleshooting or maintenance by you.
Cons: Limited supply. Can eventually be expensive. No "tinkering."
Recommend: A good way to explore remote access.

Example: RemoteHamRadio.com in a web browser



#2. Remote Software from your radio manufacturer.

- Icom: RS-BA1 software provides rig control and audio.
- Kenwood: ARCP-480/590/990 provides rig control, ARVP-10 audio.
- FlexRadio: SmartSDR has built-in LAN remote, over internet with a VPN.
- Yaesu or Elecraft: no manufacturer software, see ways #3,#4 and #5.

Needed:

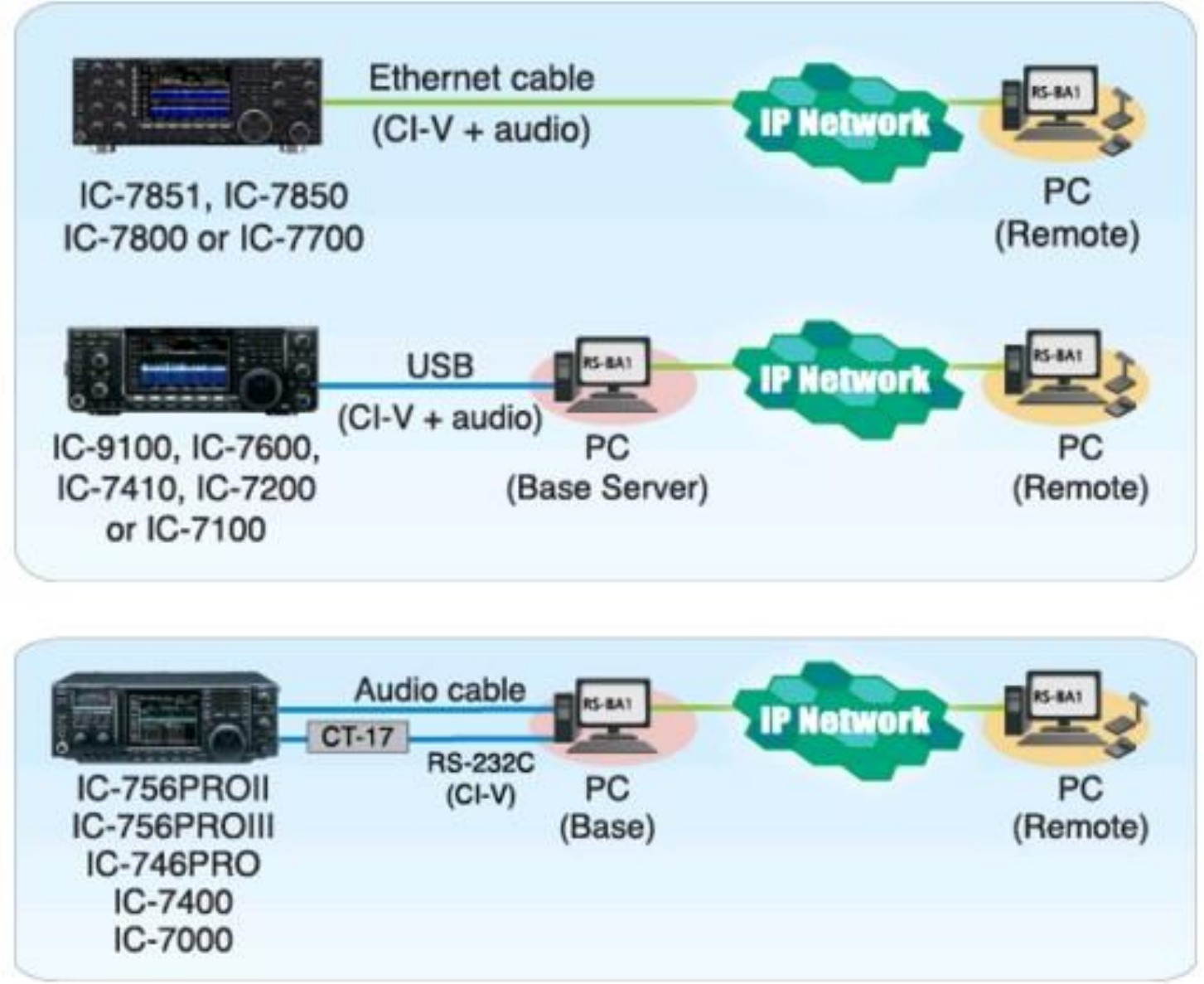
- A computer-controlled radio (serial port, USB, CAT, CI-V, ...)
- Audio IN and OUT connections, MIC and SPKR. (Like for digital modes with a “homebrew” interface or MicroHam, RigBlaster, SignaLink, …)

Pros: Vendor instructions on how to install and get working. All modes!

Cons: Requires a shack PC and a remote PC (laptop). Limited control of antennas (Ant1/Ant2) or other station accessories (rotator, amp).

Recommend: This is a major step-up in capability, recommended.

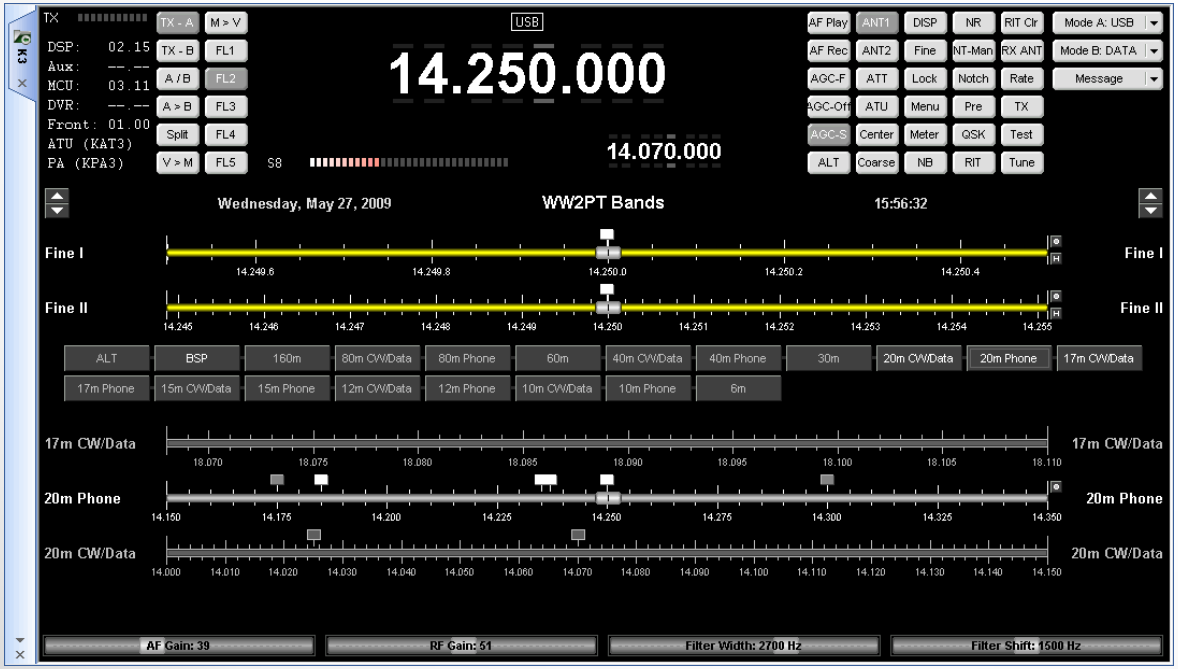
RS-BA1


Ethernet cable
(CI-V + audio)
IP Network
RS-BA1
IC-7851, IC-7850
IC-7800 or IC-7700
PC
(Remote)
USB
(CI-V + audio)
RS-BA1
IP Network
RS-BA1
IC-9100, IC-7600,
IC-7410, IC-7200
or IC-7100
PC
(Base Server)
PC
(Remote)
Audio cable
CT-17
RS-232C
(CI-V)
RS-BA1
IP Network
RS-BA1
IC-756PROII
IC-756PROIII
IC-746PRO
IC-7400
IC-7000
PC
(Base)
PC
(Remote)

#3. Remote Software from software companies.
(Ham Radio Deluxe, TRX-Manager and others…)

Ham Radio Deluxe includes "HRD Remote Server" for remote operation over the internet. HRD versions 5.24 and below were free. Current versions 6 and up are $100 (30 day free trial) but good support. Popular, lots of vendor and user support. Many examples on the web how to setup. e.g., http://k1fs.org/wp-content/uploads/2012/01/hamradioremote.pdf

(Does not include audio: Skype , IP Sound or Mumble are recommended.)



… #3. Remote Software from software companies. Some other good options:

TRX-Manager lets you operate a transceiver by remote control. PC-to-PC, or operating from any web browser or smartphone. *(Does not include audio: Skype , IP Sound or Mumble are recommended.)* Costs $75. http://www.trx-manager.com/remotee.htm

N4PY Software n4py.com provides rig control software and a "Client-Server" for remote. Includes audio. $65.

W4MQ Internet Remote Base software
Includes Audio, Free.

RemoteHams.com RCForb Client software
Includes Audio, Free.

Pros: Built-in remote functions are supported by the software vendor.
Cons: Limited to the chosen software.

- Recommend: Good solutions if you want some vendor support.

#4. Remote Desktop

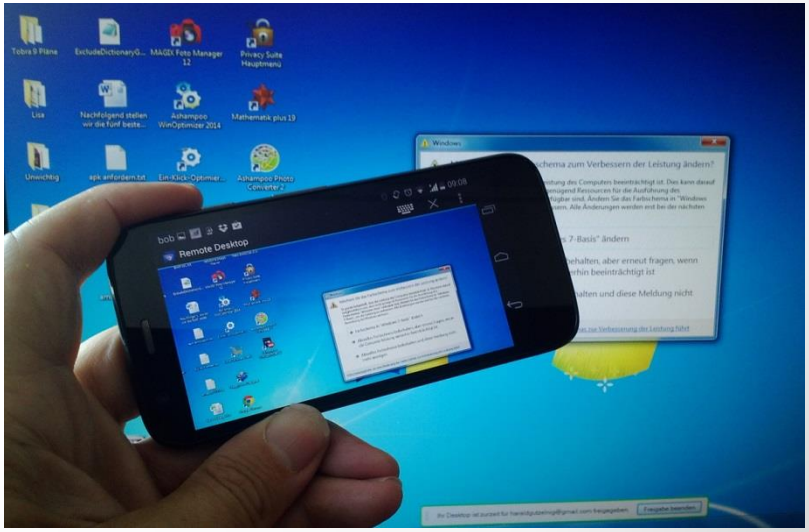
- Setup the shack PC to control the station. Use your favorite logging programs or rig control programs - even if they don't have any "remote" ability: N1MM+, Wintest, TR4W, Writelog, DX4WIN, Logger32, DXLab,... Then use a "remote desktop" program to connect-in from your laptop to the shack PC.
- There any many good "remote desktop" programs (also called VNC): TeamViewer, Chrome Remote Desktop, TightVNC, GoToMyPC, LogMeIn, Splashtop, Microsoft Remote Desktop, Apple Remote Desktop, ...
- Look for one that includes two-way audio, otherwise add Skype, IP-sound, or "VOIP" software like Ventrilo, Mumble, TeamSpeak, ...

… #4. Remote Desktop

Pros: Use your station remotely just like sitting at the shack PC.
Use any ham software that runs on the shack PC.

Cons: Rest of shack needs to be computer-controlled or automatic. There can be computer and network issues to solve. (Firewalls, Routers, DNS, Port Forwarding,...) Ask any teenager who plays "online games."

Recommend: Excellent remote access setup! Lots of options in this area for tablets and phones. Highly recommended!



#5. RemoteRig Hardware Remote

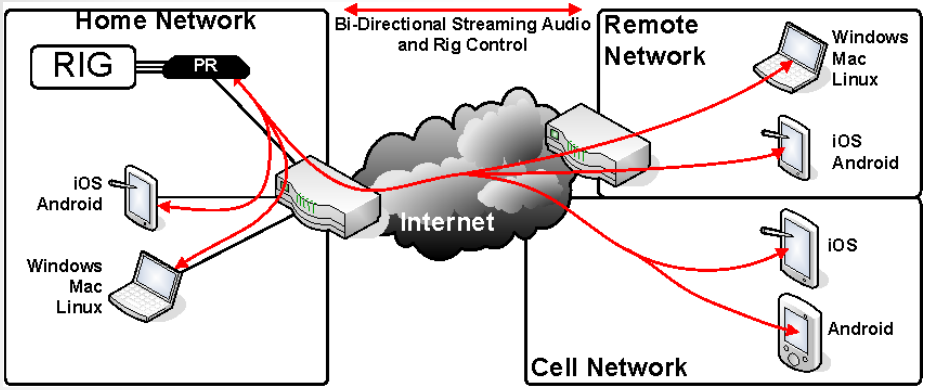
A detachable front-panel, or a 2nd radio in “twin” mode, is used to control the remote radio. The RemoteRig "modems" extend the rig control, audio, keying, serial port, … No PC required to operate, but needed for initial setup.

Pros: Provides knobs & buttons, just like a real radio. Very reliable once configured. Good support by vendor Microbit, and by Elecraft.

Cons: Expensive. Pair of “modems” $500 plus a control panel or 2nd radio for another $700+. Hundreds of potential mistakes in setting the parameters. Difficult to share with local use (connectors all in use.) Eventual HW obsolete?

Recommend: This is current "Top of the Line." But look before you leap.

…#5. Other Hardware/Software Hybrids



PigRemote by
pignology.net
$275 plus apps

DXmate by
RemoteHamRadio.com
$199

ORB Control Device by
RemoteHams.com
$175

FlexRadio Maestro
wireless control panel
$1200 plus a FlexRadio.

(same hardware, different software.)

#6. The future…

- Options will INCREASE, not decrease. Some HW eliminated by SW.
- New “high-end” radios will have a remote access solution by the manufacturer, or by partnering. Not just a USB port, but a network jack (ethernet) or WiFi. Remote access to radio may approach becoming as simple as plug into network router, select: FrontPanel / Local PC / Remote.
- “Front-panel” systems with knobs will remain attractive but expensive.
- More tablet and smartphone apps. “Remote desktop” even easier to install.
- Control of the other station accessories (antenna switch, rotator, amp, …) will continue to be the hardest part of setting up for remote access.
- Using your friend’s radios as easy as using your radios. They’re all online!
- Imagine multi-radio, multi-operator, multi-site “gaming” environments!



Back to reality…

"Rest of shack needs to be computer-controlled or automatic."

- Remote AC Power switch: You'll need to control AC power at the station.
  DLI Web Power Switch $130 … or Belkin WeMo Switch $40

- Be able to remotely "Reboot" the station computer: Enable Wake-On-LAN, or set the BIOS to boot when AC power is applied (and use your remote power switch).
- Your Internet connection: Learn how to remotely restart the router and determine the current IP address, and how to use DNS to map to "yourcall.net" (DynDNS or no-IP)
- Hint: A "Webcam" pointed at the radio and shack PC display can help in troubleshooting.

“Antenna switching needs to be computer-controlled or automatic.”

- Radio’s “band data” output (Elecraft, Yaesu), or the computer “band data” output on LPT, or Icom Band Voltage output, or monitor the serial port (Icom CI-V, CAT, Kenwood serial port).
- “Band Decoder” by Array Solutions, TopTen Devices, MicroHam, Hamation, …
- “Remote” antenna switch by Array Solutions, TopTen Devices, MicroHam, Hamation, …
- It is helpful to have a “dummy load” on one of the antenna ports for testing.

"Tuners (if used) need to be computer-controlled or automatic."

- Manual antenna tuners and manual tune amplifiers will be limited to one band. But can be switched in-line with antenna switch.

- Automatic antenna tuners provide multi-band operation. LDG, Palstar HF-Auto, Elecraft KAT500, SGC, MFJ-998, …

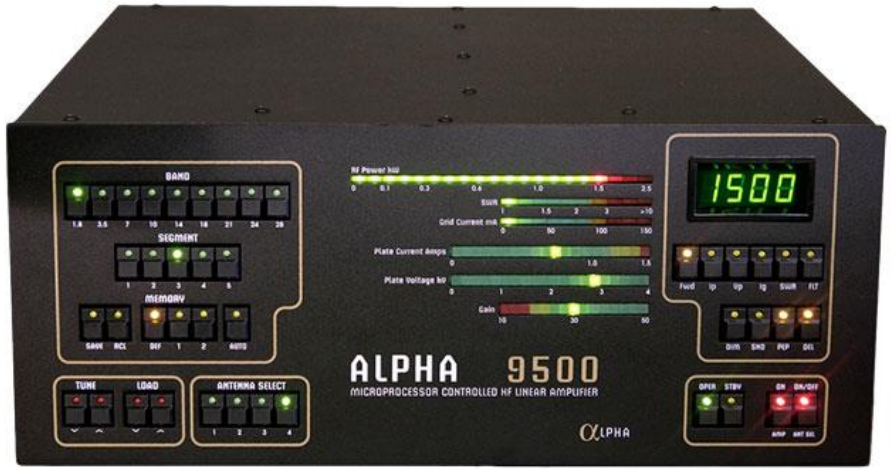
- Some tuners and amplifiers include a wattmeter that can be read by the serial port. If you want an independent external wattmeter: Elecraft W2 $250, Array Solutions PowerMaster III $525.

“Amplifiers(if used) need to be computer-controlled or automatic.”

- Auto-tune amplifiers provide multi-band operation. Solid state amplifers are naturally “automatic”: Elecraft KPA-500 $2,300, Acom 600s $2,800, SPE Expert Linears 1.3K-FA $4,600.
- Some “tube” amplifiers are “automatic” and can be “computer controlled”: Alpha 87A, Alpha 9500 $6,995, Acom 2000A $6,490, OM Power 2500A $6,700.

+ Elecraft KPA500 Utility software

+ Alpha 9500 Remote Software



“Rotator control needs to be computer-controlled or automatic.”

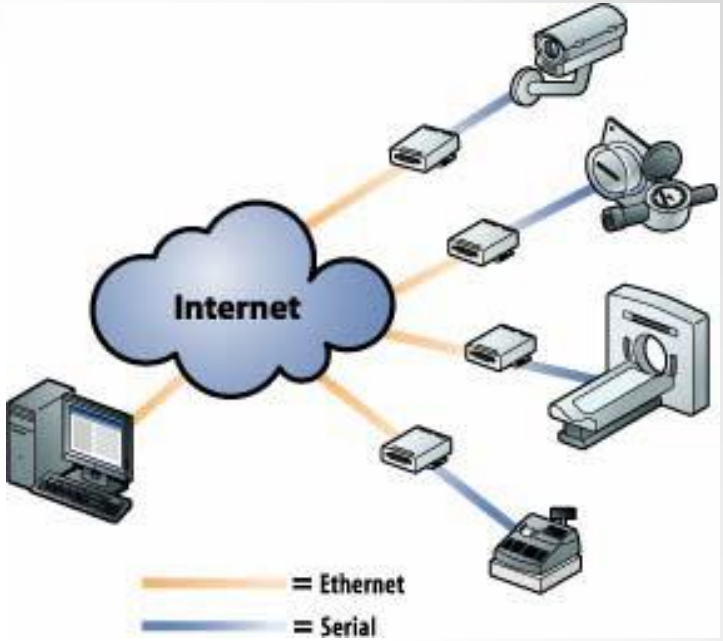
- Automatic control from many logging programs to a rotator control box with a serial port or USB. Most common protocol is Hy-Gain DCU-1.
- Rotator can be software controlled with PstRotatorAZ $25.

  PstRotatorAZ can also control a SteppIR antenna.

- Green Heron Engineering also offers rotator controllers and software for rotator control and antenna switch control.

A few “extras”

If you have other devices controlled by a serial port, they can also be extended over the Internet by a hardware “serial server” from Lantronics, Digi, Moxa, … Or a software solution: com0com and com2tcp.



What about audio delay?

- You cannot “monitor” your own voice audio coming back from the transmitter, the delay is confusing.
- If the operator wants to use a paddle to send CW, you need to generate a local sidetone. e.g., RemoteRig, a pair of linked K1EL Winkeyers (Wkremote), RemoteHams.com ORB Control Device, or Begali CW Machine. Memory and keyboard CW are fine.

A Real World Example – VO1HP

- Frank, VO1HP has a summer house on the ocean, but not practical to be there all the time for operating. First, he installed an SDR receiver (AFEDRI) and had a remote receiver with a very low noise level. The CQ WW 160m contest allows remote receivers up to 100KM away.

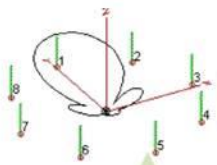
- He has now expanded it to listen and transmit by adding more antennas, an Elecraft K3 and the RemoteRig boxes. Still Low Power. He has been pleased with the results.

A Real World Example – K7JR, Snake River Remote Contesters Club, at the NK7U station.

- The NK7U contest station in Baker City, Oregon had trouble getting a full group on-site for Multi-operator contests, especially in unpredictable winter weather. Also, the host Joe, NK7U started spending more time “down south.” Adding remote access has made it easier for Joe and the “old” operators, and has allowed adding “new” operators who would not otherwise make the trip.

- Initial experiments used TRX-Manager, Skype and various remote desktop solutions. Wanting a more traditional “front-panel,” they have now moved to Elecraft K3 and RemoteRig, and Hamation automation for station control.

K7JR Radio Site Configuration



Hi-Z 8 Circle Receive Array

Wireless to Shack

Hi-Z Controller

To Towers

160-80-40-20-15-10

SteppIR (WARC + 6M)

Antenna Patch Panel, Switching & Stubs

Station A

Alpha 9500

Port 4

Wireless to RX Array

K3

Hi-Z Controller

Remote Rig

Band Decoder

24”

Windows PC

- Alpha amp Control
- ShackLAN Control Center
- PstRotatorAz (Clients)
- TightVNC
- Hi-Z Control

6 Pack

Stack Match X3

Relay Drivers X3

Rotor Controller X8

SteppIR Controller

Server

19”

Windows PC

- PstRotatorAz (Servers)
- TightVNC
- SteppIR Control (Server)

Station B

Port 2

Alpha 9500

Port 4

K3 Dual Rcv

Band Decoder

Remote Rig

24”

Windows PC

- Alpha amp Control
- SteppIR (Client)
- ShackLAN Control Center
- PstRotatorAz (Clients)
- TightVNC

To Internet

Router (Hosts OpenVPN)

Switch X2

Web Power Switch

To Key Components

As of Nov. 7, 2015

November 7 2015

Examples: What you carry with you.

Essential: Laptop and mouse.

Extras: WinKeyer and paddle, speaker, and tablet for web access while the laptop is busy running HamRadioDeluxe.

Examples: How to Connect

RemoteHamRadio.com

1. Start laptop, open webpage to RHR, login.
2. Select station, click Power On button.
3. Adjust radio to band and mode, turn rotator as needed.
4. Start external logging program if used.
5. Operate!

Remote Desktop

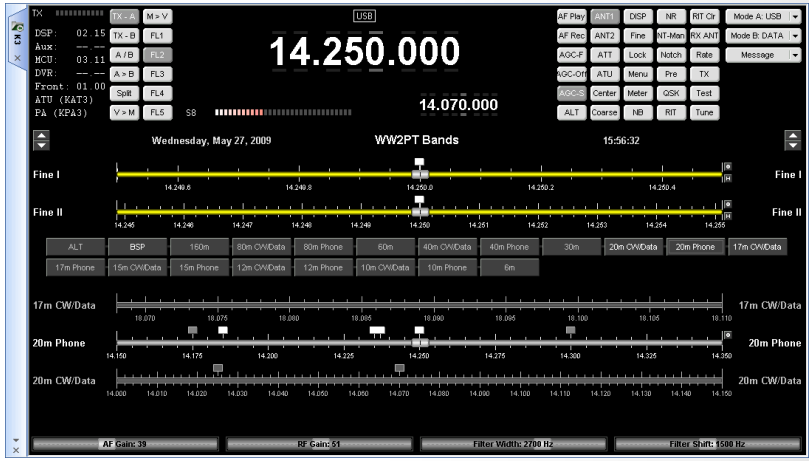
1. Start laptop, open webpage to web power switch, login and turn on shack PC and equipment.
2. Start VNC program, connect laptop to shack PC, login and start audio programs, control or logging programs as needed.
3. Set radio, antenna, amp as needed.
4. Operate!

Yes, once all the setup problems are solved, its easy!

In closing…

- Remote operators just want to be on the air, and enjoy radio operating.

- Remote access may allow you to operate more and increase your enjoyment of Amateur Radio.



- There is no one perfect solution for everyone, for all time. Feel free to start, adjust and experiment.

Thank You!