

Remote Operating for Amateur Radio

- Ten Things to Know

Mark Aaker K6UFO



Remote Operating for Amateur Radio

Agenda:

- 9:00 AM Presentation by K6UFO “[Ten Things to Know](#)”
- 9:30 AM Demonstration of [RemoteHamRadio.com](#)
- 9:45 AM [Q & A](#), Discussion...

- Copy of the slides available at my website [k6ufo.com](#)
or via my [QRZ.com](#) page for K6UFO.

#1. If you don't have a home station, it makes sense to "go remote."

- You may have antenna restrictions, a temporary location, or noise problems. E.g., living in an Apartment, Retirement home, Student housing, Condo, Town House, Hotel, RV, ...
- Look for a remote station among your ham friends, club members, club stations (a great club project), or online:
- RemoteHams.com (free!), or
- RemoteHamRadio.com (costs \$, but superb stations) (disclosure)
- Many Receivers (receive only) are freely available on the web: websdr.org or globaltuners.com



#2. Even if you have a home station, you may want to "go remote."

- Operate when away from home at work or travel.



- Operate when the DX station is on, rather than only when you are at your home station.
- Check into your club's weekly Net, even if you are away from your station.

Remote Special Event Station N6V,
Visalia DX Convention 2015

#3. Remote Operating is Legal.

US Station:

- FCC Rules: Part 97.109 Station control ...“Any station may be remotely controlled.”
- FCC Rules Part 97.213 Telecommand of an amateur station:
...has some simple requirements, including a 3 minute time-out on the transmitter in the event of malfunction.

US Station, with Operator outside of US:

Operator must be “licensed” by a US License, bilateral, reciprocal, IARP agreement or CEPT T/R 61-01. The call sign used must always indicate the location of the transmitter.

Station outside of US:

Every country has different regulations, whether remote is legal, whether CEPT T/R 61-01 is accepted, ... In general, both the station and the operator must be “licensed” for that country.

#4. Remote contacts count for DXCC.

- ARRL DXCC Rules: Rule 9. All stations must be contacted from the same DXCC entity. The location of any station shall be defined as the location of the transmitter. For the purpose of DXCC credit, all transmitters and receivers must be located within a 500-meter diameter circle, excluding antennas. QSOs made with legally licensed, remotely controlled stations are allowed to be used for DXCC credit.



#5. Remote contacts count for contests.

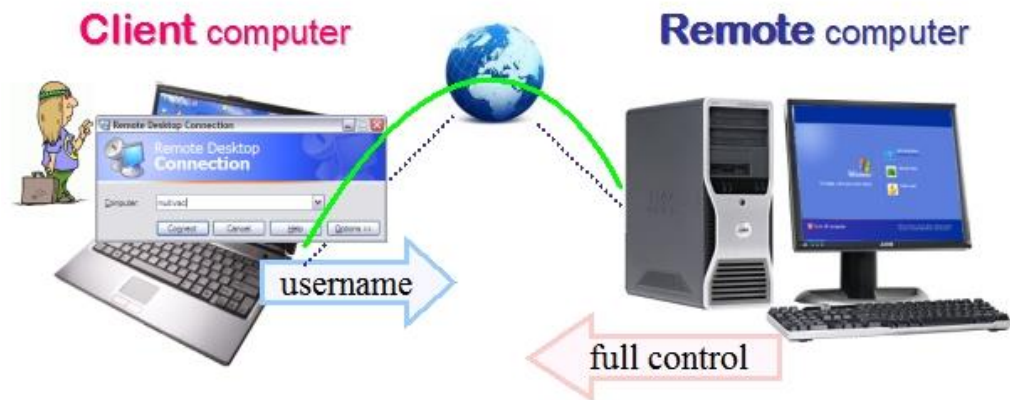
Example: The 2015 CQ World-Wide DX Contest Rule IX.5. Remote operation is permitted if the physical location of all transmitters, receivers, and antennas are at one station location. A remotely operated station must obey all station license, operator license, and category limitations. The call sign used must be one issued or permitted by the Regulatory Authority of the station location.



CQ World Wide DX Contest

#6. The Internet has taken over as the preferred control link

- Internet (WiFi) is widely available.
- Internet developments in streaming audio (music) and remote desktop (remote workers) transfer well to Ham Radio remote control needs.



How much internet do you need?

Two measures: "speed" and "delay".

- You need **HIGH Speed** (bandwidth), same as any 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 1/3 of the download speed, but is important for getting your audio and control to the transmitter.
- You need **LOW delay** (latency), same as any online game player. Below 200 msec is adequate, below 100 msec is better. Otherwise, tuning "lags" and poor timing in the pileups. CW operating for DX pileups or contesting needs low latency. Voice and Digital operating are more tolerant of delay.
- Digital modes work fine remote! Don't limit yourself to voice and CW. Digital modes easier to operate in "noisy" locations.

#7. Remote Operating has Three Parts:

- 1. **Audio Download** from the receiver to you, and **Upload** from you to the transmitter for SSB or digital modes.
- 2. **Radio Control** Frequency, mode, filters, PTT, CW keying... Needs a radio with a serial port, USB, CAT or CI-V control.
- 3. **Station Control** AC power outlets, antenna switching, rotators, amplifier, Steppir antenna, ...

“Using” these functions on other stations is easy.
Setting up **your** station to “provide” these can be a big project!
Lets look at several “popular” solutions:

Example 1: All in the web browser

RemoteHamRadio - PremiumDX A: 14 K: 2 SFI: 135 SSN: 117 01:32:50 K7CO

W1/Calais W2/Summit W2/Blue W2/Monticello W4/Atlanta W6/Murreta **W7/Tacoma** W7/Portland More stations

MM-DD HH:MM Call

06-15 20:30	JASCPJ
06-15 20:31	JHBRXM
06-15 21:12	W8HA
06-15 21:22	WC7Q
06-15 22:17	AC2K
06-16 01:32	AF6N

Info - N7G - Exch: 599

K, NAUNITED STATES, Zp 3, Hdq 278° LP 97° 2511mi 4042km
Sunrise:12:41Z Sunset:03:14Z

Q's - 10, 100, 60m, 32m Goal 50

60	60	70
56	60	42
42		28
14		14
0		0

Next Goal km

S/N Ratio Prediction Map

C-31XR Tnbander @ 72' 110° 20m

110 GO STOP LP

EU AF **SA** PAC JA

14007.00 CW Elecraft K3 VFO A

File Edit View Tools Config Window Help

CQ-Frequency Snt Rcv

Run S&P ZZ

F1 Cq	F2 Exch	F3 Tu	F4 N7G	F5 His Call	F6 Repeat
F7 Spare	F8 ?	F9 TX	F10 op	F11 RX	F12 Wipe

Esc Stop Wipe Log It Edit Mark Store Spot It QRZ

210/32 6,720

Station Status \$0.49/min WEBDX IN USE BY K7CO 8m 50s

Washington Grd. CNR/sj 200° A.S.L. ARRL WWA
King County ITU 6 CQZ 3 IOTA NA-065 Vashon Island
US Islands WA 060S 12:12 / 04:08

Config RRC

500 Watt Solid State Amplifier 20m 50° C

445 W **OPERATE**

1.5

Elecraft K3 VDR TX

14.007.000 14.280.000

20m CW SLOW A-B A+-B SPLIT

S4

Real-time CW (ESC to cancel) Macros

K7CO 5NN TU 5NN 5NN Q...

20 CMP 25 PWR 22 WPM 700 BW

AGC-S NOTCH NB NR

PTT (CTRL KEY) PRE ATT SUB Less

Troubleshoot Audio

Check Log/Master/Teinet/Call history/Reverse...

Log	Master	Teinet	Call history
363	43229	0	6371

Reverse lookup 6574

Chat DX Spots Station Calendar

160m 80m 60m 40m 30m 20m 17m 15m 12m 10m 6m 2m All None

NA SA EU AF AS OC DE **NA** SA EU AF AS OC MODE **SSB** CW DIGI Show on map

C	DX	DE	Freq	Band	Mode	Country	Note
Jun 16 01:31	KW5HP	KQ4PK	21.270.0	15m	SSB	United States	5/9
Jun 16 01:30	P43K	KC4FDT	21.268.0	15m	SSB	Aruba	

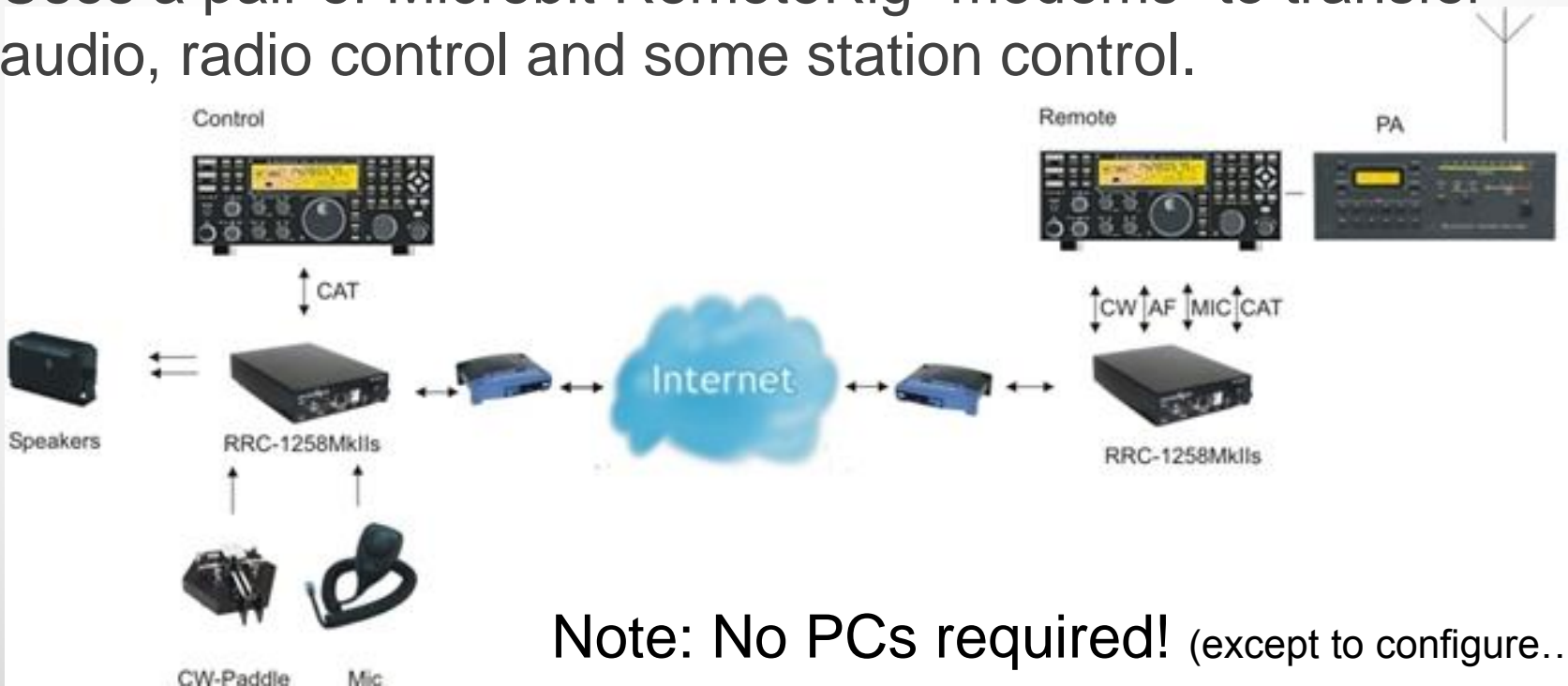
Score - 6,720 Points

Band	Mode	QSOs	Pts	Mult
14	CW	118	118	1
18	CW	90	90	20
21	CW	2	2	1
Total Both		210	210	32
Score: 6,720		1 Mult = 6.6 Q's		

Online - Support

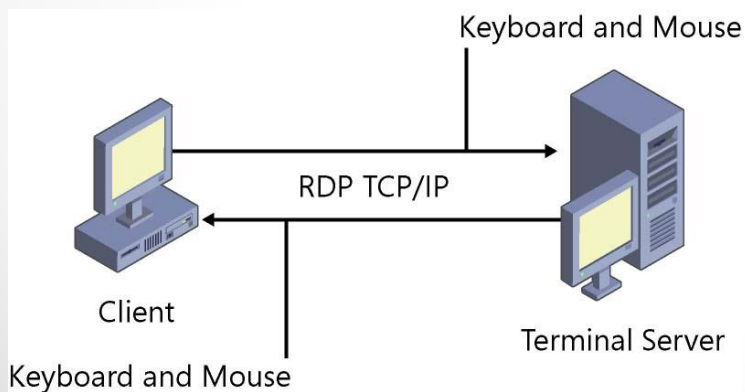
Example 2: Microbit RemoteRig

- Radio with a detachable front panel (TS-480, IC-7100), or
- Radio with a matching "control head" (Elecraft K3/0-Mini), or
- Two radios that support the "Twin" concept where one local radio is used to control the remote radio (Elecraft K3, Yaesu FT-200, Kenwood TS-590,...)
- Uses a pair of Microbit RemoteRig "modems" to transfer audio, radio control and some station control.



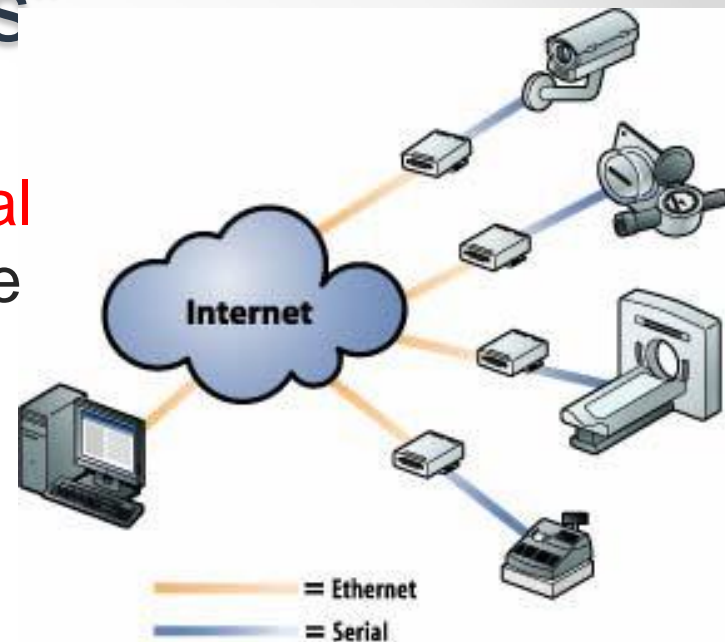
Example 3: Remote Desktop

- Station is setup for control by the shack PC. Use your usual logging software like DX4Win, Logger32, DXLab, N1MM, Win-test. Some software includes some remote functions: HamRadioDeluxe, TRX-Manager, Icom RS-BA1, Kenwood ARCP-590G, ...
- Then, “remote desktop” software is used to reach to the shack PC to operate. TeamViewer, TightVNC, PCAnywhere...
- Software includes audio, or add separate audio streaming software. Skype, IP-Sound, “VOIP” software like Ventrilo, Mumble, TeamSpeak, ...
- Requires a PC to be “on” and operating at the shack.



A few “extras”

If you have **devices controlled by a serial port**, they can also be extended over the Internet by a “serial server”:
Lantronics, Digi, Moxa, ...



What about the **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, RemoteHams.com ORB Control Device, or Begali CW Machine.

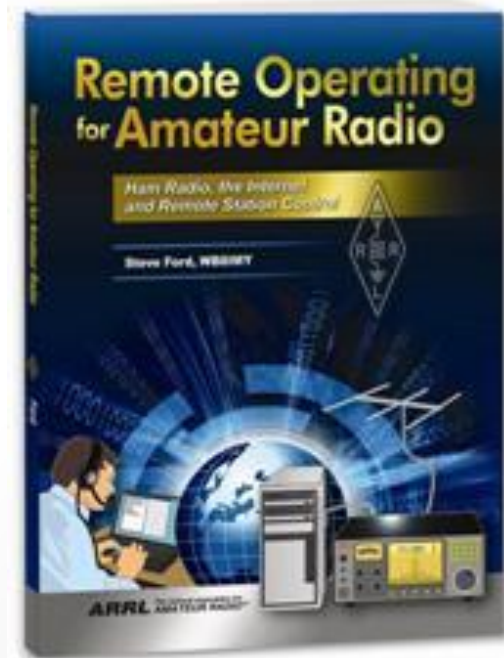
#8. There are a Million Details!

- **AC Power:** You'll need to control AC power at the station, e.g., DLI Web Power Switch.
- Be able to **Reboot the station computer:** Enable Wake-On-LAN, or set the BIOS to boot when AC power is applied.
- Your Internet connection: Learn how to **remotely restart the router** and **check the current IP address**.
- Manual **antenna tuners** and manual tune **amplifiers** will be limited to one band. Automatic antenna tuners and automatic tune amplifiers provide multi-band operation.
- **Antenna switching** and **Rotator** control can be “automatic” or software controlled.



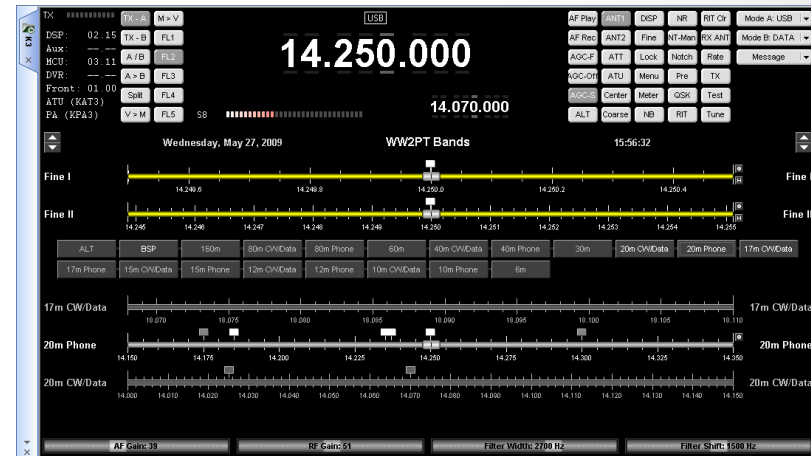
#9. There is no single correct solution.

- Software/Hardware
- Low function/ High function
- PC/ Laptop/ Tablet/ Smartphone
- One radio/ multiple radios (HF, VHF & UHF)
- This is real ham radio experimentation, you can try out new ideas and technology as you wish and experiment.
- This is a fast growing and fast changing topic, and there is far more information we haven't touched on. There are books, web pages, Youtube videos, blogs, ...and it will change a lot by next year.



#10. Things you may miss...

- Glowing amplifier tubes. (They're a long way away... or your amplifier is now solid state.)
- “Hands-on” tuning the “Big Knob.” The laptop screen, and the small delay interrupts the feeling, but the “control heads” are bringing it back.



But once you've gone remote, you'll feel lost without it!

Thank You!