

ORO VALLEY AMATEUR RADIO CLUB

Remote Access to your Amateur Radio Station

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These slides are available at k6ufo.com or via my page at QRZ.com





Why have Remote Access?

- Operate while away from home – visiting the grandkids.
- Work the rare DX while at work – never miss a new country.
- Get apartment dwellers or HOA-restricted hams on the air.
- Provide a club station to club members - at their own homes.
- Your own reasons...

RULE NUMBER 1: All remote operating must follow the FCC rules and regulations, and follow any applicable Award or Contest rules (DXCC, WAS, ARRL, CQ WW, IOTA,...)

Footnote: This is a rapidly changing area. There is no one perfect solution for everyone for all time. Be ready to experiment, test, learn and adjust.

Four Basic Needs for Remote Operation

- 1. Audio In/Out:** Access to MIC/SPKR, Line In/Line Out, or audio over USB. Just like for digital modes (PSK, AFSK, JT65). 
- 2. Radio Control:** To read and set radio Freq., Mode, PTT, CW... You need a radio with a serial port, CAT, CI-V, or USB control. 
- 3. Station Control:** AC power outlets, antenna switching, rotators, tuners, amplifiers, ... Need “Computer-controlled” or “Automatic.” 
- 4. “Good” internet service:** Low delay under 100ms, low packet loss, Up and Down speeds over 1 Mbps, a public-visible IP address for the radio end. 

...and your patience and willingness to solve problems.

Four Proven Ways to Implement

1. Web Browser access to RHR
2. Software Programs
3. Remote Desktop software
4. Remote Front Panels

Solutions vary from 100% Software to 100% Hardware.

“Time spent” from Minutes to Hundreds of Hours.

“Money spent” from \$0 to \$3,000 (or more!)

#2,#3 require a shack PC online. (otherwise a shack PC is helpful.)

#2,#3,#4 will need changes to your internet router ports. (Messy...)

1. Web Browser access to RemoteHamRadio.com

PREMIUMDX

- W1/Calais 80-6
- W1/Calais 160
- W1/Eastport 6
- W1/Eastport 10/15/20/40
- W1/Eastport WARC/80/160
- W2/Summit 80-6
- W2/Summit 160
- W2/Blueberry
- W4/Atlanta
- W7/Tacoma
- W7/Portland

REMOTEDX

- W2/Quaker
- W2/Windham
- W2/Monticello
- W2/Taconic
- W2/Jefferson
- W1/Chaplin
- W6/SanJoaquin
- W6/SanJose
- KP4/Palmas
- HH2/Haiti

FREE

- RHR/Test

Settings ▼
Try Beta

W7/Tacoma

Daylight 12:58 to 03:31 UTC \$0.49/min REMOTERIG STATION IN USE BY K6UFO 44s

Washington Grid: CN87sj 200° A3L ARRL WWA King County ITU 6 CQZ 3 IOTA NA-065 Vashon Island US Islands WA-060

Power On With K3 ▼

C-31XR Tribander @ 72'

265° 20m



250 GO STOP LP

EU AF SA PAC JA

General as K6UFO CW 14,044.0 BETA

CALLSIGN	SENT	RCVD	NOTES
<input type="text"/>	599	599	<input type="text"/>

Save

Elecraft K3 TUNE VOX RX

RX TX 14.044.000 20m CW RX TX 14.026.350 20m CW
← → ±1 kHz ← → ±1 kHz

SD
 A → B A ↔ B SPLIT AGC-F NOTCH NB NR

Real-time CW (ESC to cancel) Edit Macros

— — — — —

20 CMP 30 PWR 25 WPM 400 BW

PTT (CTRL) PRE ATT SUB RX ANT Speaker icon

500 Watt Solid State Amplifier 20m 33° C

OPERATE

v144 ▼
Show ATU

Chat Log DX Spots Station Calendar

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

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

UTC	DX	DE	Freq	Band	Mode	Country	Note
Aug 8 21:12	YY4LLN	NP3RE	28.315.0	10m	SSB	Venezuela	
Aug 8 21:03	YY4LLN	KP4VET	28.315.0	10m	SSB	Venezuela	
Aug 8 18:11	LW6EUR	WB2TQE	28.074.0	10m	DIGI	Argentina	



Web Browser Access Pros/Cons

RemoteHamRadio.com Free 30 minute trial. \$99/yr plus 9 to 49 cents/minute (\$29/hr) Can be accessed with Chrome web browser, Android phone, Chromebook, iPhone App, PC with extra USB device, or the RemoteRig hardware.

(Full disclosure: I have a station on RHR.)

Reviewed in QST Magazine, May 2013, p59.



Pros: Easy to sign up and get started. No equipment to buy. No software to maintain. Some very good stations.

Cons: Can be **expensive** if you hold long conversations. No fun of “tinkering” with the equipment. Is not access to your own station.

Recommend: Good way to see what’s possible. Good “backup” plan.

Many online RECEIVERS are available: websdr.org or globaltuners.com
(Generally, their delay makes them unusable for making any QSOs.)

2. Software Programs

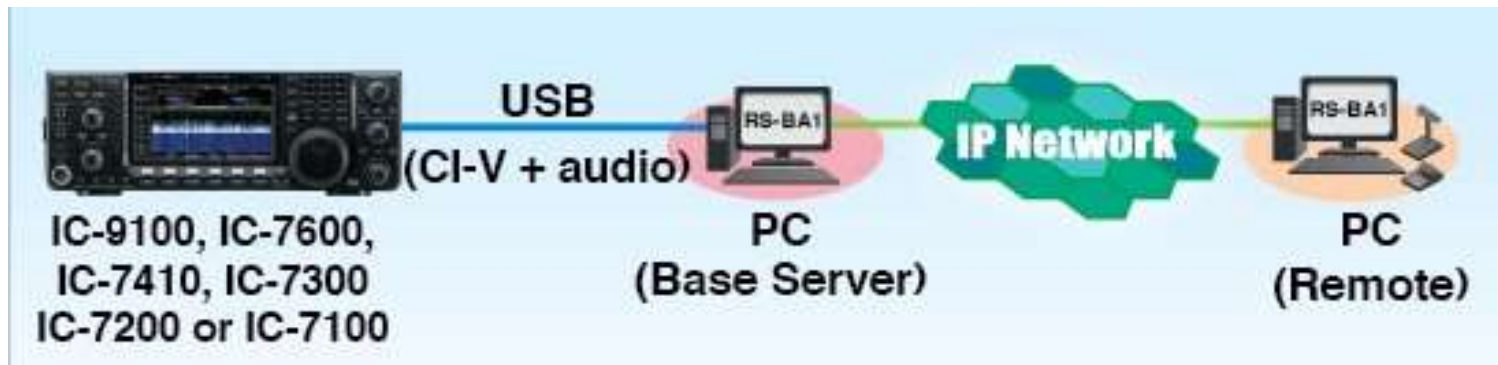


RemoteHams.com Free to sign up.

Many sites free to use, some are “membership”. Wide range of capability and reliability. You must use their RCForb Client software. You can also use their server software to set up your own station as a remote station.

(QST Magazine April 2017, p30: “DIY Remote Radio Now”)

ICOM’s RS-BA-1 IP Remote Control software. \$99.



See also: Kenwood Radio Control Program ARCP-480, Ham Radio Deluxe, TRX-Manager, DF3CB software FT2000RC, N4PY Software, ...

Software Programs Pros/Cons

Pros: Supported by a software vendor. You may already have a compatible radio. The software has already solved many common problems. **You are in control of the station, software, access, settings...**

Cons: Limited to the configurations and abilities of the software. **Requires a shack PC online and a remote PC (laptop)**. Limited control of antennas (Ant1/Ant2) or station accessories (rotator, amp). Rest of shack needs to be computer-controlled or automatic.

Recommend: Good solutions if the program meets your needs, and you want vendor support and a user community (forums).



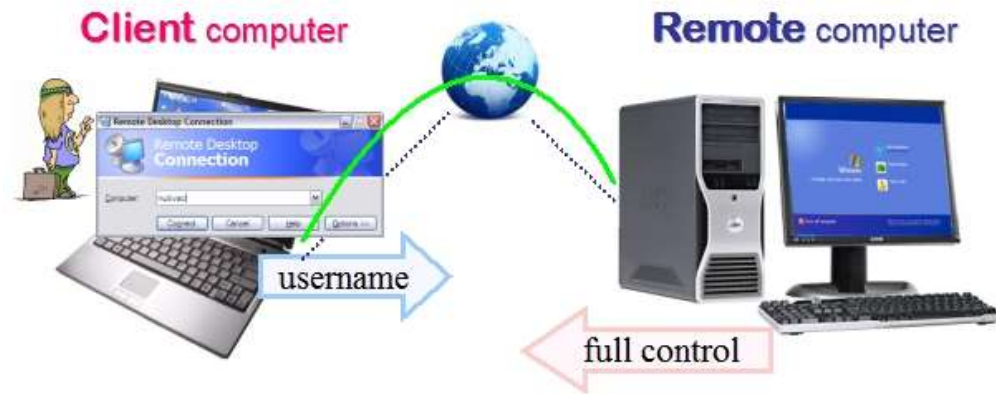
3. Remote Desktop software

Set up your shack PC to control your station. You can use your favorite logging programs or rig control programs - even if they don't have any "remote" ability: N1MM+, Wintest, Logger32, DXLab,...

Then use a "remote desktop" program to connect in to your shack PC. On your laptop you "see" the shack computer, and can control the station.

There are many free "Remote desktop" programs (also called VNC):

- TeamViewer,
- Splashtop,
- Chrome Remote Desktop,
- Windows Remote Desktop,
- Mac OS Screen Sharing*,
- TightVNC*, ...



* If yours doesn't include two-way audio - add Skype, Remaud by DF3CB, or VOIP "chat" software like Ventrilo, Mumble, or TeamSpeak.

Remote Desktop Pros/Cons

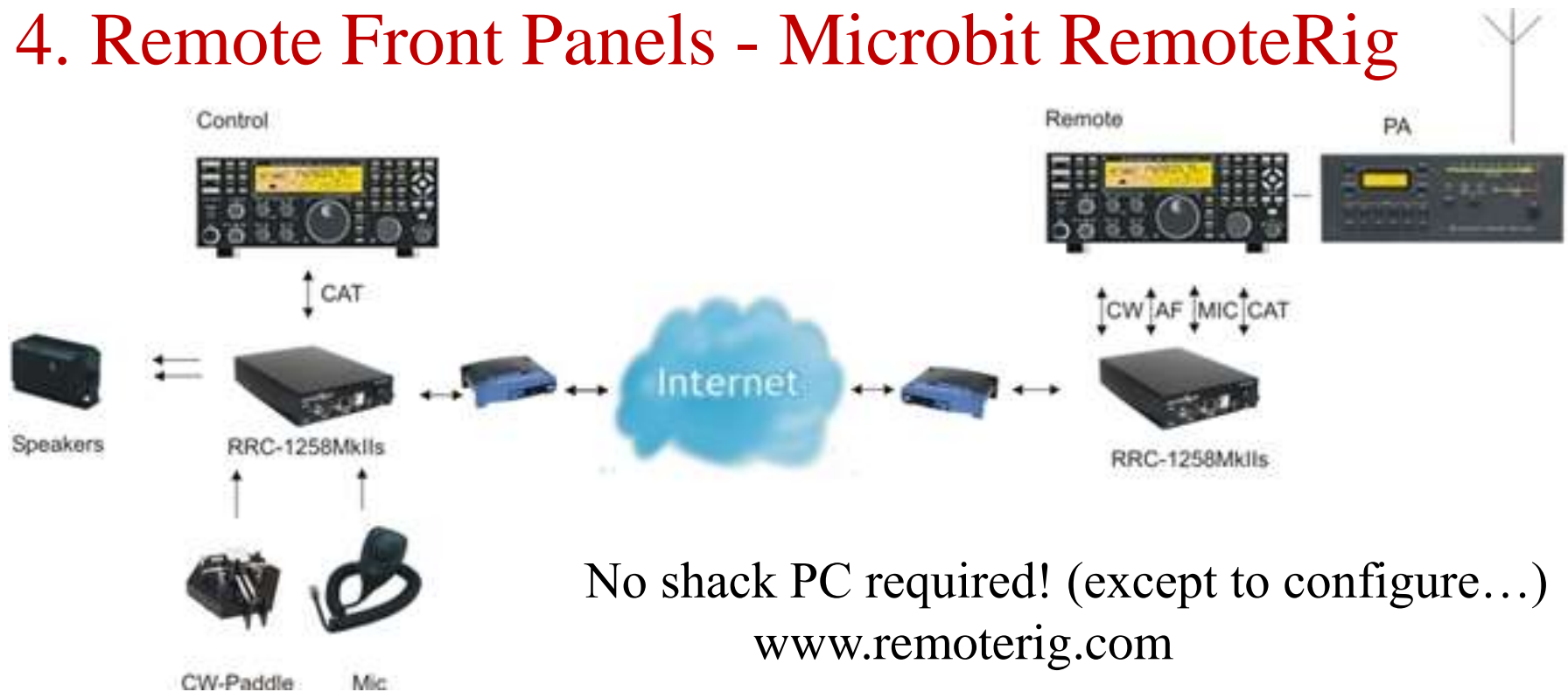
Pros: Use your station just like sitting at the shack PC. Use any ham software on the shack PC. Works well with tablets and phones.

Cons: Needs High Speed Internet. Delays as it tries to duplicate the full desktop view. Requires a PC to be “on” and operating at shack. Rest of shack needs to be computer-controlled or automatic.

Recommend: Easy to use, provides familiar station operation.



4. Remote Front Panels - Microbit RemoteRig



Uses a pair of Microbit RemoteRig “modems” to transfer audio, radio control and some station control. Can use with:

- Radio with a detachable front panel (TS-480, IC-706), or
- Radio with a matching "control head" (Elecraft K3/0-Mini), or
- Two radios that support the "Twin" concept (Elecraft K3, Yaesu FT-2000, or
- Control with a PC program or Android App.

4. Remote Front Panels - FlexRadio Maestro



A FlexRadio Maestro (wireless or wired) connects across a local network or the internet to control a FlexRadio station.

FlexRadio Systems
Software Defined Radios

Maestro™

Win PC runs digitals

FlexRadio Systems **MAESTRO** è la nuova console di controllo per i ricetrasmittitori della serie 8000 che permette l'uso immediato dell'apparato **senza bisogno del PC**, tramite connessione alla rete LAN anche WiFi, oppure direttamente all'apparato.

FlexRadio Systems **MAESTRO** è un moderno e funzionale pannello radio dotato di schermo touch, pulsanti e manopole, connessioni per microfono e tastopaddle con il quale usare l'apparato senza rinunciare alla operatività tradizionale di una qualsiasi apparecchiatura radio, oltre che a permetterne la remotizzazione in qualsiasi punto coperto dalla vostra rete LAN.

Remote Front Panels Pros/Cons

Pros: Provides knobs & buttons, just like a real radio!

Very reliable, once configured and working.

Support by vendors: Microbit / Elecraft , or FlexRadio.

Cons: Expensive. RemoteRig modems (\$500 pair) plus a front panel (\$300 - \$1,200) or 2nd radio. (\$900 - \$2,400)

Can be difficult in initial setup.

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

Recommend: This is current "Top of the Line" for a real radio "feel."



What are the REAL problems?

Station Control: The control of “everything else”: AC power outlets, antenna switching, rotators, tuners, amplifiers, RX-only antennas, watt meters, ...

Look for “automatic” or for “computer-controlled.”

Eliminate things that require you to manually switch or adjust them.

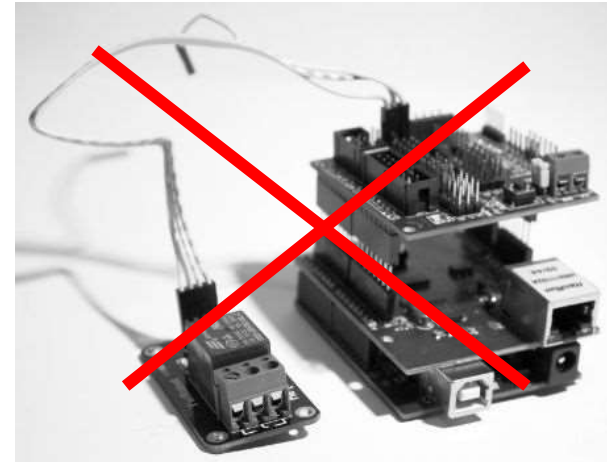


A "killer" problem when remote is when something needs to be reset or unplugged. There are more of these than you think.



Internet control of AC Power Outlets

There are experimenter/homebrew solutions, but for safety and reliability look for complete UL-Listed and shielded/enclosed solutions.



DLI Web Power Switch \$130

... or Belkin WeMo Switch \$30



Hint: A “Webcam” in the shack can help see what’s happening, but uses lots of internet bandwidth.

Internet control of 12 Volt Power: West Mountain Radio RIGrunner 4005i \$280
...or just control an AC socket to the DC power supply.

Antenna Switching can be “automatic.”



- The radio or attached shack computer provides a “band data” output, or you can monitor the serial port for freq information.
- “Band Decoder” by Array Solutions, TopTen Devices, MicroHam, Hamation, ...
- “Remote” antenna switch by same companies plus DX Engineering , Ameritron, ...
- It is helpful to have a “dummy load” on one of the antenna ports.

Rotators can be “computer-controlled” (rarely automatic)

- Requires rotator control box with a serial port (RS-232 or USB.) Green Heron RT-21, Hy-Gain DCU-2, AlfaSpid, Prosistel, MDS-Ham RC1 ...
- Or an “add-on” to control box: EASY-ROTOR-CONTROL(Vibroplex), EA4TX, ...
- The serial port goes to the shack computer running “rotator control software” such as: many logging programs, Ham Radio Deluxe, LP-Rotor, or
 - PstRotatorAz software which includes a remote server. By YO3DMU \$25 (and has SteppIR antenna control!)



- Or RemoteRig box includes a 2nd serial port that can be used for rotator control.
- Or RemoteRig RC-1216H plus 1216L gives web based control with no shack PC.

(If that sounds complex, wait till you have two or three of them to control!)

Tuners (if used) can be “automatic”(“auto-tune”)

- Manual antenna tuners and manual tune amplifiers will be limited to one band, but can be switched in-line with the antenna switching.
- Automatic antenna tuners provide multi-band operation. LDG, Palstar HF-Auto, Elecraft KAT500, SGC, ... Be careful the tuner doesn't require an actual “button push” to tune. Activated by radio, or tunes on “power up” or high SWR.
- 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) must be “automatic”(auto-tune) and “computer-controlled”(On/off and monitoring/reset)

- Solid state amplifiers are auto-tune and easy to use (can be left “On”) Popular: Elecraft KPA-500 \$2,300, SPE Expert Linears 1.3K-FA \$6,000
- Some tube amplifiers are auto-tune and can be computer-controlled. Popular: Alpha 87A, Alpha 9500, Acom 2000A, OM Power...



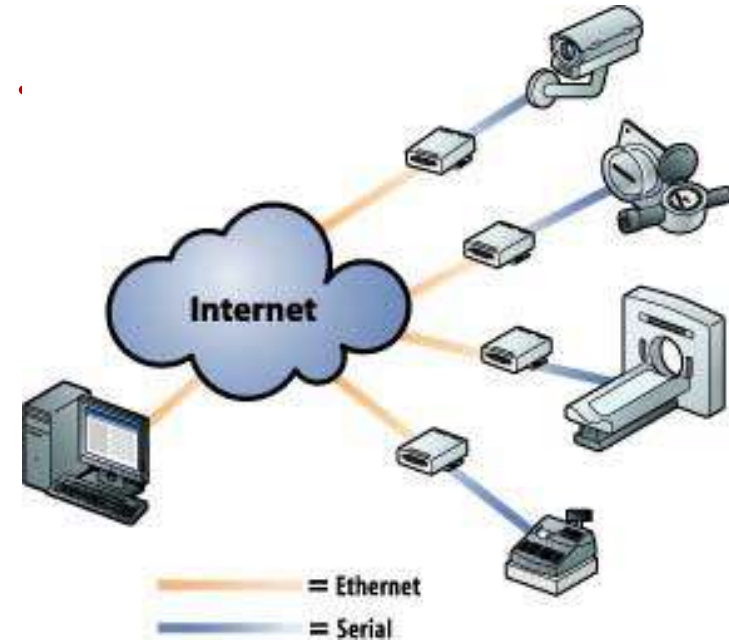
Elecraft KPA500 Remote Software



Alpha 9500 Remote Software

Other devices or switching...

If you have devices controlled by a **serial port**, they can be extended over the internet by a hardware “serial server” or “serial port extender” from Lantronics, Digi, Moxa, ... Or, an all-software solution: com0com and com2tcp. (requires a shack PC online.)



Other switching?

- Computer-controlled relays/switches:
 - ONTRAK Control Systems ADR2200
 - KMTronic
 - National Control Devices
- Internet-controlled relays/switches:
 - RemoteRig RC-1216H
 - Digital Loggers Inc DIN Relay III



You will be surprised to find out...

What about **Monitoring** your sending?

- Many configs do not “echo” your sending onto the receive audio line.
- If you try to “**monitor**” your own voice or CW sending coming back from the remote transmitter, the audio delay is confusing.

How to use a real **CW Paddle**?

- First, where to plug it in – to a laptop?!
- 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.



Examples: What you carry with you.

Essential: Smartphone, tablet or laptop, headphones.

Extras: Mouse, speaker, paddle and keyer, tablet for web access while the laptop is busy.



Examples: How to Connect

RemoteHamRadio.com

1. Start laptop, open webpage to RHR, login.
2. Select a 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!

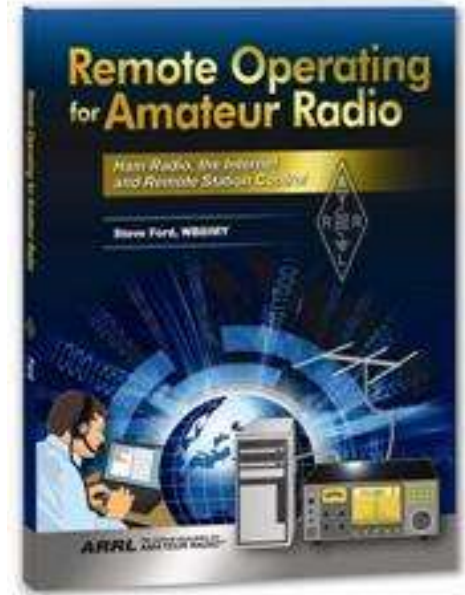
Remote Desktop

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!

Conclusion

- There is no single correct solution. You can vary the Software/Hardware, Laptop/Tablet/Smartphone..
- This is a changing and evolving area.
- Remote Operating is 90% the same as on-site Operating.
 - 9% different – additional HW or SW
 - 1% better – use it even when away from the station!**
- Remote operators just want to be on the air, and enjoy radio operating.



Thank You!