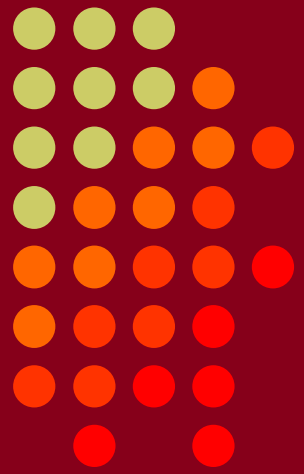
# CTU Presents

**Success Strategies for Remote & Hybrid Multiop Contesting**

Gerry Hull, W1VE



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Success Strategies for Remote & Hybrid Multiop Contesting
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- **Definitions**
  - Remote
  - Hybrid Remote
- **MultiOperator Station Challenges**
  - Staffing
  - Technology
  - Strategy

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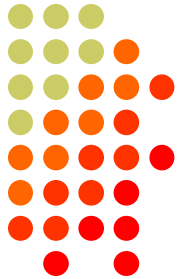
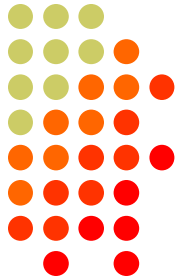


- **Attacking the Challenges**
  - Remote Methodologies
  - Example/Best practices that work
  - The challenge of “Remote Challenged” operators
  - “What About? …”

# Definitions

- **What is "Remote" Multiop contesting?**
  - Simply put, using the internet, connecting one or more operators to a station, in order to operate a contest.
- **What is "Hybrid" Multiop contesting?**
  - In the Hybrid scenario, at-station operators are supplemented with operators located elsewhere.



# MultiOperator Station Challenges

- **Staffing**
  - Operators are aging out. There are simply not as many operators able to come and staff a multi-op station.
  - Health Concerns: Covid and related communicable health conditions remain pervasive.
  - Great stations may be located far from population centers, so travel may be prohibitive due to cost or other barriers.
  - Hosting Costs/XYL Support: Bringing a big team over to the QTH for a weekend is not a problem for some, but a huge barrier for others.

# MultiOperator Station Challenges

- **Technology**
  - Your well-equipped multi-op station has all manual controls for antenna/filter switching and amplifier control.
  - Internet access and speed. Not enough bandwidth.  Too much latency.
  - All technology at the station, with a simple interface for remote ops, or, the “full experience” for the remote ops?
  - You see a sea of remote technology out there, and it seems just too expensive.
  - You are not sure how to start

# MultiOperator Challenges

- **Strategy**
  - Multiplier station or In-Band?  Will these work on a remote?
  - Team Competency and Roles: Run vs In-Band/Multiplier hunting
  - Team Cohesiveness: Does everyone agree on the goal, and how?
  - Team Communication: vital for all multiops, critical for remote or hybrid scenarios.
  - Team Staffing on Remote: license issues, Internet quality at an operator's location.

# Attacking Challenges – Remote Technologies

- Internet Access
  - Use Fiber-To-The-Home, Cable Modem, Starlink Satellite or 4GLTE connections
  - Stay away from Wireless Internet Service Providers – they have excessive latency and jitter.
  - Latency is typically not an issue these days. In most of the world, latencies are 140mS or less point to point: a single character at 40 wpm takes 135 mS. It is not noticeable.
  - Different remote implementations have specific Internet Service Provider requirements.

# Attacking Challenges – Remote Technologies

- Remote Implementations:
  - "Being There" Remote Operators using the Microbit RRC boxes:
    - Full Radio interface via 2nd Rig or Control Panel (K3/0), or Yaesu/Kenwood/Elecraft twins.
    - VFO knobs and the whole radio at the Remote Ops location
    - Requires port forwarding, possible DDNS for RRC Server box. Will not work with a 4GLTE station-side endpoint without a bunch of technology (VPN, etc). Some Starlink plans offer Dynamic IPv4 Public addresses and RRCs work fine.
    - The "Cadillac" of remote technologies, but also quite expensive for boxes and Radios if a lot of remote ops, which limit your operator pool.
    - CW Paddle remote.

# Attacking Challenges – Remote Technologies

- Remote Implementations:
  - Manufacturer Specific Remote Solutions:
    - Yaesu SCULan10 box and software offers nice remote UI with spectrum scope and front panel like the radio, but offers zero support for CW. Nothing special required on operator PC. Requires port forwarding or a VPN.
    - Icom RS-BA1 also offers the full control panel of the radio, including the spectrum scope. Overly complex to configure, and very hard to debug.
    - Flex Systems is natively remote, as it uses Desktop software connected via IP. However, it uses a proprietary VPN that has had reliability issues, and the remote provides no sidetone for CW operation. There are work arounds to not use the proprietary VPN. Quite Popular.

# Attacking Challenges – Remote Technologies

- Remote Implementations:
  - Off-the-shelf Custom Do-It-Yourself Remote:
    - Use Remote Desktop Technologies (Anydesk, RustDesk, TeamViewer) to connect to a station desktop. On the desktop is every piece of station automation software you want. The complexity of implementing remote is no more complex that what you have done without remote.
    - For High Quality Audio, use a low-latency centralized Mumble Server, and Mumble clients at the station and operator locations.
    - All of this software is free. See the URLs at the end of my presentation.
    - This is a start-simple solution that works incredibly well, and is a contest-winning remote strategy.
    - CW via keyboard only.

# Attacking Challenges – Remote Technologies

- Antenna Switching and Other Controls
  - No matter the remote choice, you will still have antennas to switch, Rotators to turn, and amplifiers to control.
    - Use Remote Desktop Technologies (Anydesk, RustDesk, TeamViewer) to connect to a station desktop. You'll have access to the automation provided by the devices you use.
    - If your station has all manual antenna switching, start off as a hybrid remote. Operators at the station can do antenna switching and rotation chores.
    - If the station is not to be occupied, then a remote AC Power Switch is pretty much mandatory.

# Attacking Challenges – Strategy

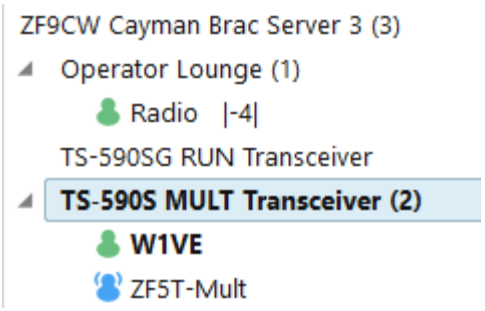
- In-Band is a hot trend in Multi-Single and Multi/2 these days.
  - If you have bandpass filters, and a second antenna (gain or vertical) with enough separation, in-band can provide a significant advantage.
  - At band-opening times, there are many multipliers available in the same band. Having a single operator leave the run frequency is not as efficient as having a 2nd radio running down all those mults (and extra QSOs) while the run rate is pretty much not effected.
  - If you are not sharing a second antenna with the run radio, you can build a simple lockout using the INHIBIT inputs available on most all modern radios. Give the In-Band guy priority – when he transmits, the run station is inhibited. If antennas are shared, then additional relay logic should be in place to route antennas appropriately.
  - In-Band is TOTALLY compatible with remote operation, as I'll explain ahead.

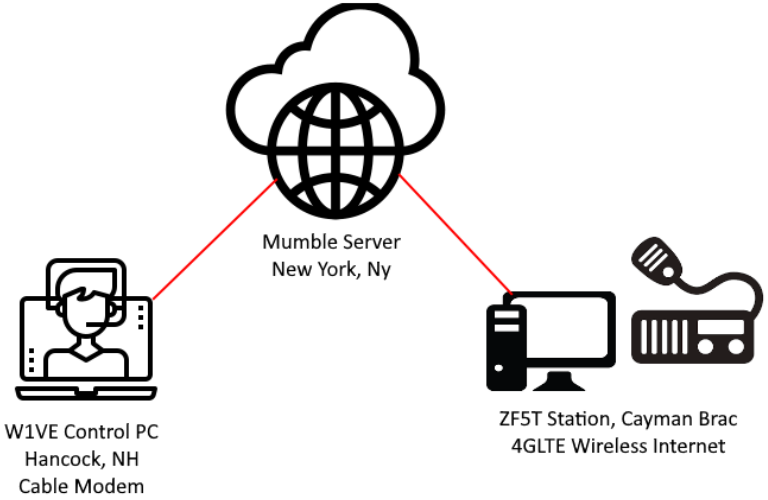
# Attacking Challenges – Strategy

- Build the right TEAM:
  - There are typical rate jockeys, multiplier mutants, and, well, typically much slower (typically newer) guys. They are ALL key to your operation. Put the right people in the right roles. New guys are GREAT on an In-band radio, as they can typically add 30% more QSOs to a band. Misplacing a person in the wrong role can lead to a very poor showing, and, even worse, an operator who might not come back.
  - Set GOALS and talk about a strategy with the team. This is especially important if your team is all remote or partially remote.
  - Communicate EFFECTIVELY. Doing well in multiop includes communication off of the radio. This is especially important with remote operators. Without effective communication, they are stranded on an island and don't understand the flow of the contest. Use the chat window in the logger, out-of-band apps like WhatsApp or Slack, and, if you are using Mumble (as I will talk about in the new few slides), use an "Operator Chat" channel to talk about the contest (even to BS with other ops – it is a social sport.)
  - Do not put a technology-phobic operator at a remote position.

# A MultiOp Remote Hybrid Example

- K5GO Built ZF5T in the Cayman Islands
  - Stan has many years of experience building great stations. The station is setup for Mutli-Single, With two radios, Two towers, two homebrew triband yagis, an In-Band Vertical, a 40m vertical, loaded towers for 160 and 80, a YCCC 9-Circle receive array, Green Heron antenna switching, and a homebrew interlock mechanism for In-Band lockout. Pretty slick.
  - **However, Stan could not use the station when he was back home in AR.**

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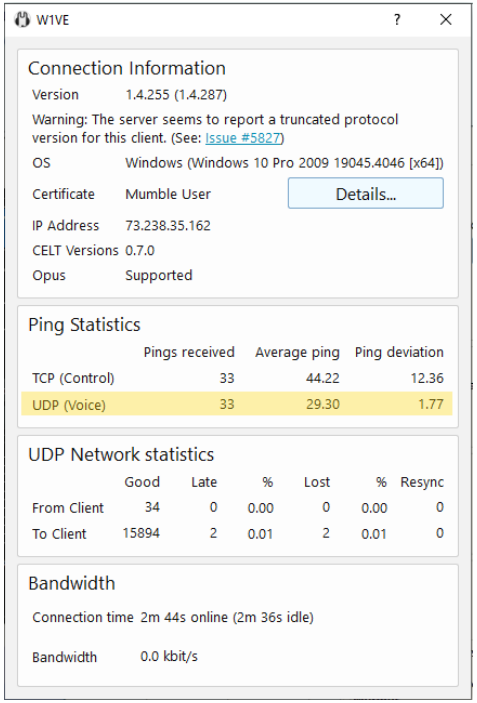
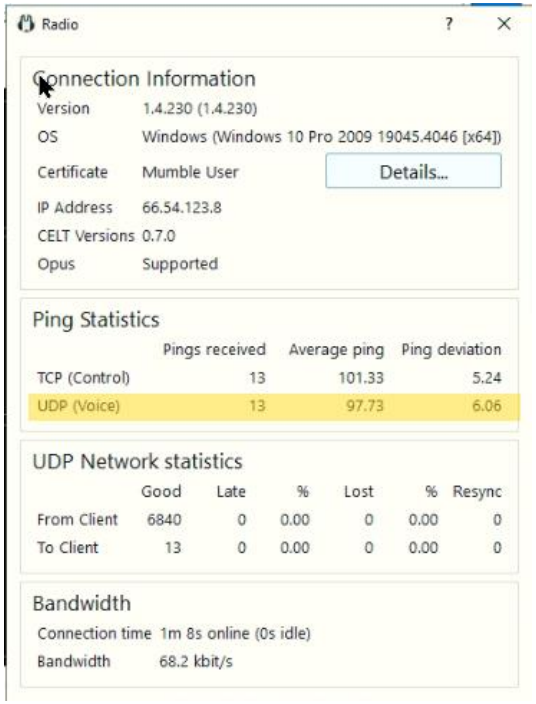
# A MultiOp Remote Hybrid Example

- Remoting ZF5T:
  - Anydesk is the Remote Desktop application of choice, but we have RustDesk and TeamViewer as backups.
  - Mumble is used as the audio server. We use a central, cloud-hosted Mumble server that provides very low latency and stability to both NH and the Cayman Islands.

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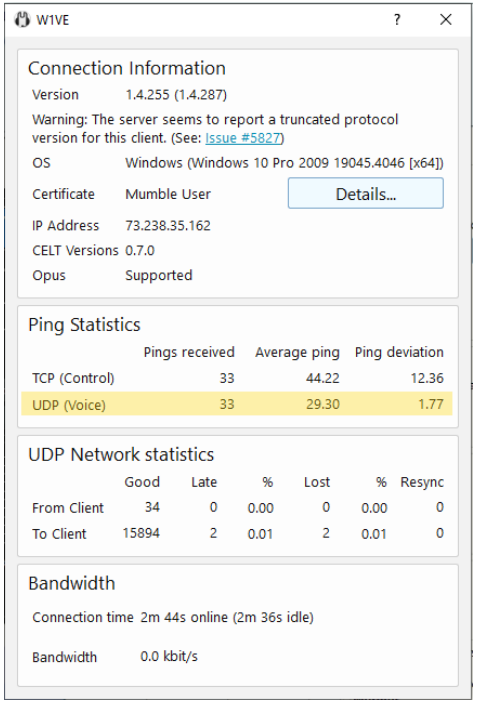
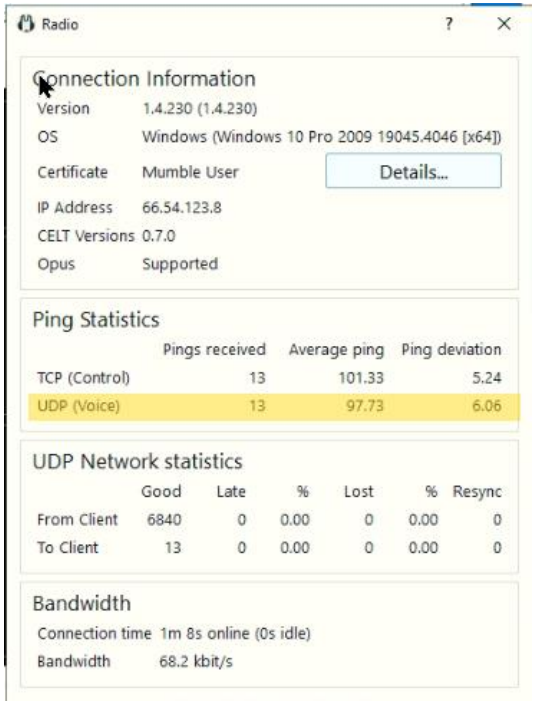
# A MultiOp Remote Hybrid Example

- Remoting ZF5T:
  - Notice the overall latency is 127ms between W1VE and ZF5T.
  - The duration of a single dot in Morse code when sending at 40 words per minute (wpm) is 30 milliseconds (ms). Therefore, the average duration of a Morse code character, assuming an average character length of 3.5 dots/dashes plus a space between elements of the same character, is approximately 135 ms.
  - With a total delay of 127 mS between W1VE, in Hancock NH, the central Mumble server in NYC, and the ZF5T station in Cayman Brac, the delay is less than one morse character.

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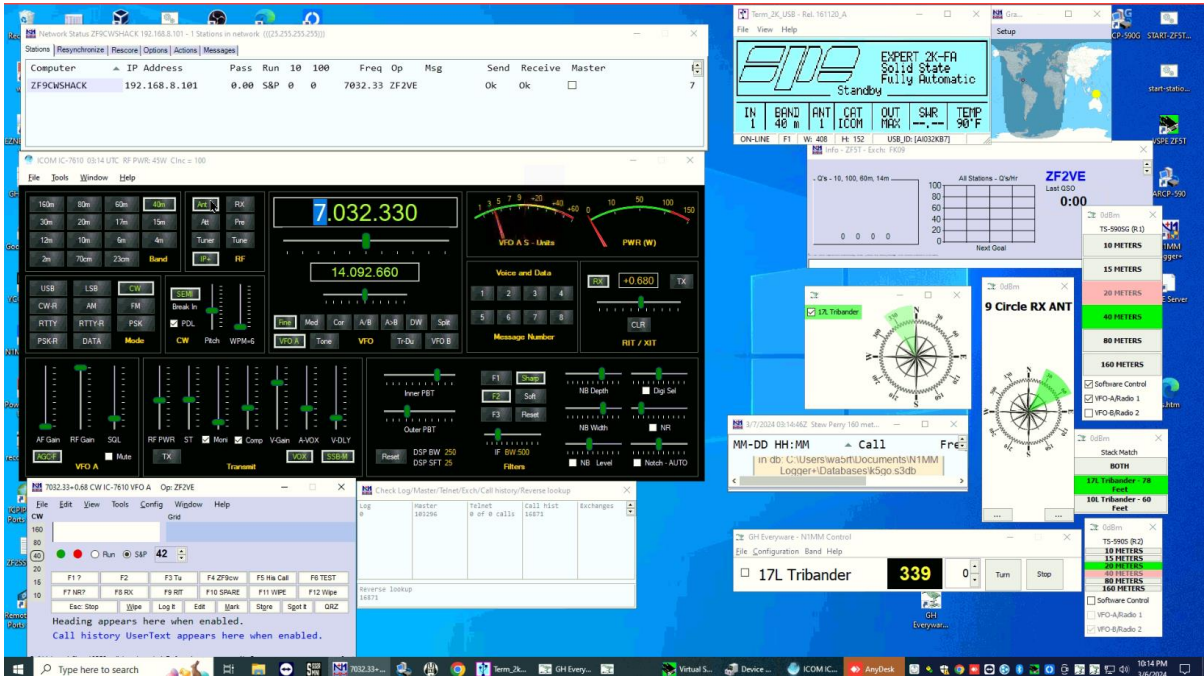
# A MultiOp Remote Hybrid Example

- Remoting ZF5T:
  - The run station consists of an ICOM 7610, with Win4Icom Suite as the radio control software for remote ops.
  - The rather-busy screen has everything the remote op needs:
    - Rig Control
    - Antenna Control
    - Rotator Control
    - N1MM Networking info: CW sending was done using N1MM Macros, and the Key indicator in the Network Status window would tell you what the other station is doing (InBand vs Run)

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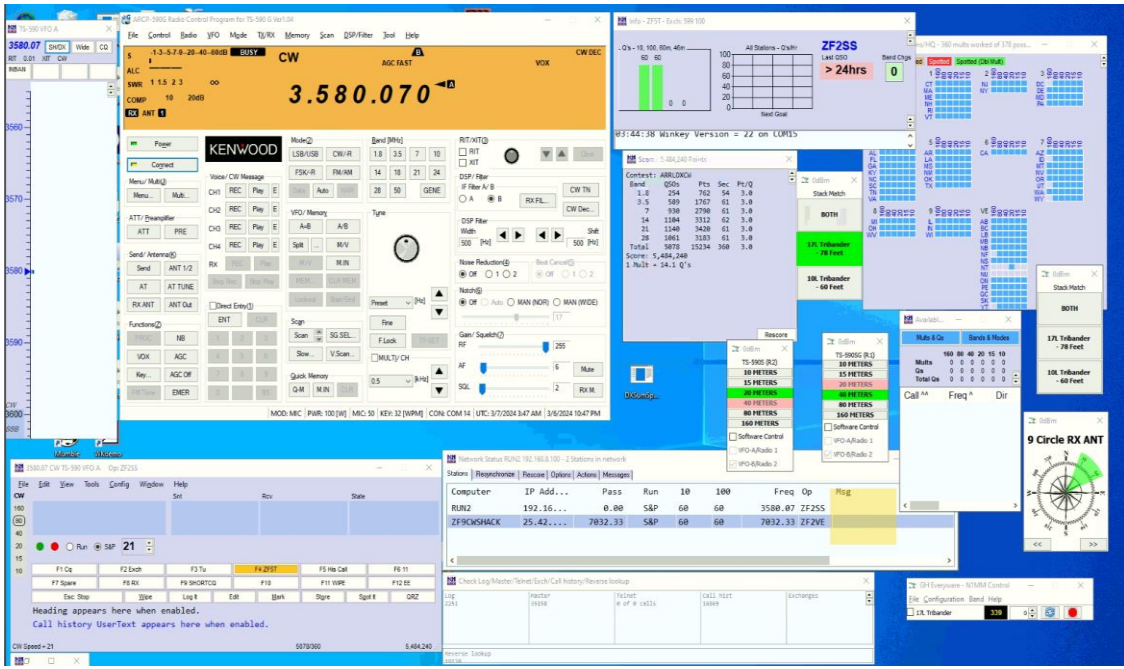
# A MultiOp Remote Hybrid Example

- Remoting ZF5T:
  - **The second (InBand/Otherband) station** at ZFT5 is available by another Anydesk session. This Allows the remote operator to switch radios quickly.
  - This is a Kenwood TS-590s, using the free Kenwood remote software.
  - The same controls are available as the run station.

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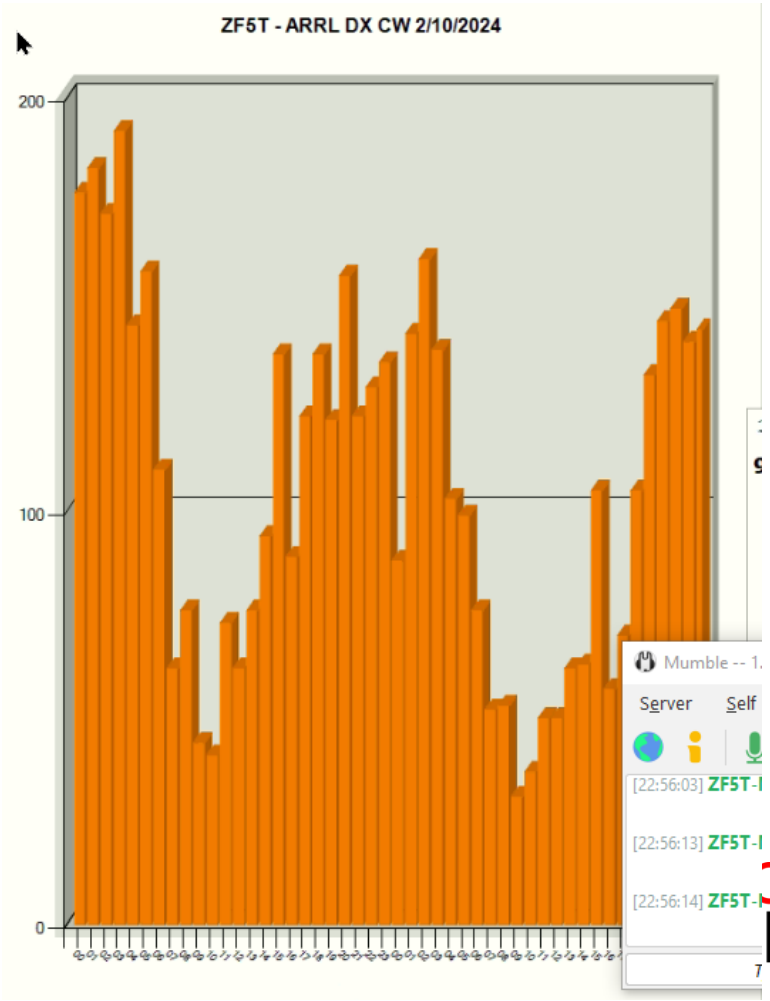
# A MultiOp Remote Hybrid Example

- ZF5T ARRL DX CW 2024 M/S LP
  - K5GO, W5SJ, KO8SS on-site, with W1VE Remote
  - No difference noticeable between remote run rate and local.
  - We used “N1MM Pair Mode” with the Remote Op and Local op entering callsigns. Surprisingly, sometimes the Remote Op would get the callsign entered first. No discernable difference.
  - We used Mumble for both the radio and the interop communication. Our second coms path was WhatsApp.
  - Results: #1 LP M/S World, claimed. We won world last year using the exact same configuration. It was a tight fight with V3T! This was a mid-contest capture:

| | |
|---|---|
| V3T | 3,579,180 |
| ZF5T | 3,579,180 |

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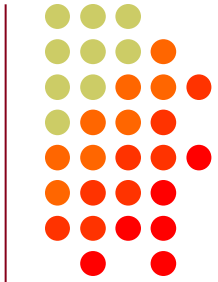
# A MultiOp Remote Hybrid Example

- ZF5T Bottom Line:
  - Remote was implemented with essentially Zero cost.
  - The internet connection at ZF5T is fixed cellular 4GLTE. It provides more than enough bandwidth.
  - Remote does not hinder the performance of the operators.

  - This same Do-It-Yourself Remote Strategy has been implemented/is being implemented by VY1AAA@VY1JAK, VE1JS, W4LT, VE7KW, K3WW, K3AJ, AG2J any many others.



# A MultiOp Remote Hybrid Example

- Follow Ups, further reading
  - My previous articles in NCJ
  - My blog on remote operation at http://blog.radiosport.network
  - gerry@w1ve.com
  - What About?... Any Questions?