# Missouri Section ARES® VHF/UHF Interoperability Plan



**April 2020**

# Reading this document

Please make note of your questions as you read the document. As you continue reading through some of the examples will make more sense as additional terms/contexts are defined.  If terms/concepts are still not clear, please contact the SEC,

# Why

Interoperability in this document refers to the ability of ARES groups and individuals involved in a coordinated response to communicate with each other.

In the event of an emergency or exercise, an interoperability plan can address connectivity issues and increase the effectiveness and speed of the response.

The idea is if you have these VHF frequencies in your rig, you will be able to start working as a communicator no matter where you are in the state. This plan is designed to augment your existing structure, not totally replace it. If you have an operational repeater or simplex net, by all means utilize it.  However, please continue to monitor HVCall.

The APRS/Packet/DATA frequencies are meant to supplement your existing plan.

> Example:
> Instead of having one Moniteau ARES op contacting Cole ARES to pass traffic for MARS on one frequency, and another Moniteau op contacting Morgan ARES to pass MESN traffic on a different frequency, one op should go to "HVCall" and contact the Liaison stations for Cole and Morgan. Once they have made contact they could QSY to "Foxtrot" to pass the traffic, leaving the call frequency clear. If another county had something to pass through either of us, they only have to know one frequency for contact.

# Naming

Public Safety (PS) Interoperability frequencies are VTAC # and UTAC #. The ARES/Ham Radio frequencies are prefixed with an H to distinguish them from the PS frequencies.To alleviate confusion, standard mnemonics shall be used in all equipment to refer to individual channels. These are listed in the table below. Should the equipment not be capable of alphanumeric channel mnemonics, the radio should be placarded to indicate the channel mnemonic and its corresponding position on the radio's selector switch.

**Naming Guide**

- V refers to 2M VHF
- U refers to 70cm UHF
- L refers to 6M 'Low Band' VHF, scene ops
- M refers to 6M 'Mobile Low Band' VHF, wide area/mobile

# Frequencies

These frequencies were determined by cross referencing the ARRL band plan with the Missouri Repeater Council band plan.

**VHF 'Wide Area' Frequencies**

| Mnemonic | Frequency | TX CTCSS | Primary ARES District |
|---|---|---|---|
| HVCall | 146.550 | CSQ | Statewide |
| HVStage | 147.555 | 100.0 | Statewide |
| HVAPRS | 144.990 | CSQ | Statewide |
| HVData | 144.910 | CSQ | Statewide |
| HVPacket | 144.950 | CSQ | Statewide |
| HVTac0 | 147.495 | 100.0 | Primary Digital Voice Frequency |
| HVTac1 | 145.600 | 100.0 | Alpha |
| HVTac2 | 145.650 | 100.0 | Bravo |
| HVTac3 | 145.700 | 100.0 | Charlie |
| HVTac4 | 146.400 | 100.0 | Delta |
| HVTac5 | 146.445 | 100.0 | Echo |
| HVTac6 | 146.505 | 100.0 | Foxtrot |
| HVTac7 | 146.595 | 100.0 | Golf |
| HVTac8 | 147.405 | 100.0 | Hotel |
| HVTac9 | 147.450 | 100.0 | India |

**UHF 'Scene' Frequencies**

| Mnemonic | Freq | TX CTCSS |
|---|---|---|
| HUCall | 446.000 | CSQ |
| HUAPRS | 446.150 | CSQ |
| HUData | 446.200 | CSQ |
| HUTac1 | 445.900 | 100.0 |
| HUTac2 | 445.925 | 100.0 |

| | | |
|---|---|---|
| HUTac3 | 445.950 | 100.0 |
| HUTac4 | 445.975 | 100.0 |
| HUTac5 | 446.025 | 100.0 |
| HUTac6 | 446.050 | 100.0 |
| HUTac7 | 446.075 | 100.0 |
| HUTac8 | 446.100 | 100.0 |

**6M 'Wide Area/Mobile' Frequencies**

| Mnemonic | Freq | TX CTCSS | Primary ARES District |
|---|---|---|---|
| HMCall | 52.550 | CSQ | Statewide |
| HMData | 52.790 | CSQ | Statewide |
| HMTac0 | 52.710 | 100.0 | |
| HMTac1 | 52.310 | 100.0 | Alpha |
| HMTac2 | 52.350 | 100.0 | Bravo |
| HMTac3 | 52.390 | 100.0 | Charlie |
| HMTac4 | 52.430 | 100.0 | Delta |
| HMTac5 | 52.470 | 100.0 | Echo |
| HMTac6 | 52.510 | 100.0 | Foxtrot |
| HMTac7 | 52.590 | 100.0 | Golf |
| HMTac8 | 52.630 | 100.0 | Hotel |
| HMTac9 | 52.670 | 100.0 | India |

**6M 'Scene' Frequencies**

| Mnemonic | Freq | TX CTCSS |
|---|---|---|
| HLCall | 52.450 | CSQ |
| HLTac1 | 52.530 | 100.0 |
| HLTac2 | 52.730 | 100.0 |
| HLTac3 | 52.690 | 100.0 |
| HLTac4 | 52.650 | 100.0 |
| HLTac5 | 52.610 | 100.0 |
| HLTac6 | 52.570 | 100.0 |
| HLTac7 | 52.750 | 100.0 |
| HLTac8 | 52.330 | 100.0 |

Portable Repeater Frequencies to be determined. This will require coordination with the Missouri Repeater Council.

# Mode for Voice Communications

The standard mode for voice communications is 20K0F3E, which is 5 KHz deviation FM.

# Tone/CTCSS

- Calling frequencies - NO PL, NO CTCSS, NO DCS
- Tactical frequencies - PL/CTCSS 100.0
- This Tone was chosen to avoid interference from or interfering with Public Safety entities using 156.7.
- Do NOT use CTCSS unless needed to help manage QRM. ALWAYS transmit PL.

# Power Output

- Users are strongly encouraged to increase antenna gain and directionality before increasing power.
- No more power than the minimum needed to establish a near full-quieting circuit.
- Adhere to the FCC regulations requiring the use of the minimum power needed to establish the circuit and RF Safety limits.

**VHF - 2M and 6M**

- Base Station: 200 watts max
- Mobile Station: 100 watts max
- Field Station: 500 watts max
- Tactical Frequencies used 'On Scene': 5 watts max

**UHF**

The UHF frequencies are intended for on scene operations and to minimize the possibility of inference with other stations:

- Base Station: 35 watts max
- Mobile Station: 35 watts max
- Field Station: 35 watts max
- Tactical Frequencies used 'On Scene': 5 watts max

## Time Out Timers

All stations not operating in mobile relay mode, where permitted, shall employ a time out timer set to limit transmission duration to a period of no greater than 60 seconds (1 minute).

All stations operating in mobile relay mode, where permitted, shall be configured to immediately drop transmit carrier upon cessation of input signal. Reasonable hysteresis time in squelching action of weak received signals, Prolonged "hang time" in excess of 500 ms is not permitted.

## Priority Levels

1. Emergency or urgent operation involving imminent danger to life or property
2. Disaster or extreme emergency operation for mutual aid and inter-agency communications
3. Special event control, generally of a preplanned nature (including Task Force operations)
4. Joint training evolutions

To resolve contention within the same priority, assuming all radio equipment is exercising the lowest output and effective radiated power level practicable, the channel should go to the organization with the wider span of control/authority. This shall be determined by the SEC/DEC for the operation or by the levels of authority/government identified in the contention.

## Use

How could these frequencies be used?

1. **Calling**

   - Pt to Pt contacts, Administrative level contacts, NOT tactical comms.
   - After contact has been established, change frequency to the primary frequency of the calling party or the frequency directed. The calling party will then initiate the exchange.
   - (See example above and Primary Intra-District Comms below)
     - Alert paging and SCADA operations are not permitted on Calling or TAC channels.
     - Temporary base station receivers shall not be muted by either selective calling alert mechanisms or DTMF signaling devices.

**2. VHF**

- HVCall may be used to INITIATE contacts for:
  o District to District
  o County to County
  o Mobile/Rover to County
  o Incoming Amateur Radio response to IC or Amateur Radio section chief

- HVCall IS THE PRIMARY CALLING CHANNEL OF THIS PLAN. Command/NCS should have someone assigned to monitor this frequency.

- HUCall, HMCall and HLCall are secondary calling channels. Command/NCS may not be monitoring these frequencies.

**3. UHF**

- HUCall similar to HVCall.
- Primarily Intra-County use and on site tactical use.

**4. 6M**

- HMCall similar to HVCall HLCall similar to HUCall.
- The 'M' frequencies are for Point to Point and Mobile operations. The 'L' frequencies are intended for on scene tactical operations.

**5. Staging**

HVStage is used by hams responding in to an area to check in to staging. When Mutual Aid Teams have been requested, this is where they will check in.

**6. Primary Intra-District Comms**

**a. APRS**

HVAPRS is used for VHF APRS networks. HUAPRS is used for local UHF APRS networks.

### b. Digital Data

- HMData is used for wide area inter-district networks.
- HVData is used for intra-district networks.
- HUData is used for 'scene' data links/networks.

Local area determines protocol.

Refer to the Missouri Section ARES Digital Data Communications Resource Guide for detailed information and recommendations for digital data communications.

### c. VHF

HVTac1 - HVTac9 would be primarily for use within the District's Alpha-India for county to county traffic. Counties in District A would primarily change frequency to HVTac1 after making contact on the HVCall frequency.

### d. UHF

Be aware that in your area HUTac1 - HUTac4 may be used as a repeater link frequency.

HUTac5 - HUTac8 may be in use for digital comms. Determine this ahead of time so you can adjust your response appropriately.

Since the tactical frequencies are intended for use by low power portable stations within a limited geographic area, you should be able to use the same frequency at multiple locations.

### e. Suggested use of non-primary HVTac frequencies:

Note: You may also opt to use an existing repeater to support any of these tasks.

Also, keep in mind that spectrum is a shared resource. Do not interfere with any existing operation.

1. Command/Admin Net
   - Frequency for Administrative Net NCS and IC are here
   - Command or Liaison should also monitor HVCall

2. Logistics/Resources

   The person keeping track of Resources and coordinating procurement of material and personnel is here. This person will work closely with Staging. Ideal is to have them co-located. Staging monitors HVStage.

3. Digital Modes

   A non-primary Tac frequency may be used for digital mode communications. This use should supplement HVPacket and HVAPRS. HVTac0 would be the ideal frequency to use first.

   As of this writing, there are numerous digital voice modes. For this reason, analog FM voice is the main method for communicating in an emergency. If a local jurisdiction decides to use digital voice communications, one operating station should still monitor FM voice on the appropriate frequencies described elsewhere is this plan.

   For instance, you have a team that is equipped with DMR gear. They should be assigned to operate on HVTac0. The team leader is also monitoring/checked in to the Command/Admin net.

   The most popular mode is likely DMR. This mode can provide statewide voice communications via repeaters and hotspots that connect to the internet, if available. The statewide Missouri Section ARES talk group on Brandmeister is 31290. Statewide communications should be on this DMR talk group.

   Uses for Missouri Section ARES talk group are:
   - Coordination of ARES response at EC, DEC and SEC levels.
   - Command and control of ARES resources such as personnel and equipment.
   - Liaison communications with other related nets.
   - Coordination during training and drill exercises.
   - Emergency means of overcoming deteriorated band conditions.

4. Tactical Frequencies

   Intended for low power portables that have been assigned a specific task. For instance, comms may be needed within a shelter location.

   The shelter command should be monitoring and checked in to the Admin Net.

Shelter command should:

- Determine if a Tactical frequency is needed
- Determine a clear Tactical frequency.
- Advise NCS of the local use of the Tac frequency, by name.
- Continue monitoring their Tactical frequency.
- Continue monitoring their NCS assigned Net frequency.
- Advise NCS when the operation on the Tactical frequency has terminated.

## Security

No security is implied. Systems may be readily monitored. Participants should recognize that the third man is always listening. Messages should be brief, to the point, and contain no more information than necessary.

## Distribution

You are encouraged to distribute this document to all ARES/RACES stations so that they are familiar with the plan and have their radios pre-programmed in the event of activation.

## Interoperability with Public Safety

An ARES/RACES Incident Commander or their designee may use the interoperability frequencies designated by the SIEC through the authority of their Served Agency. In addition to following the requirements of the SIEC MOU, the ARES/RACES station should also follow their Served Agency's guidelines. The guidelines should be established with an MOU between the ARES/RACES team and the Served Agency.

Equipment used on these frequencies should be Part 90 type accepted.

**Document History:**

Document Created: 2003
    Contributors:
    Kurt Bleich, KB0HNR
    Joseph Counsil, K0OG
    Stephen Devine, KC0BXQ
    Steve Makky, Sr. KA2AYR
    Gene McGahey, AL7GQ
    Wayland McKenzie, K4CHS
    Bryan Nehl, K0EMT
    Richard Stump, N0QOI
    Mel Whitten, K0PFX

Document Revised & Updated: 2020
    Contributors:
    ARES Section wide Leadership