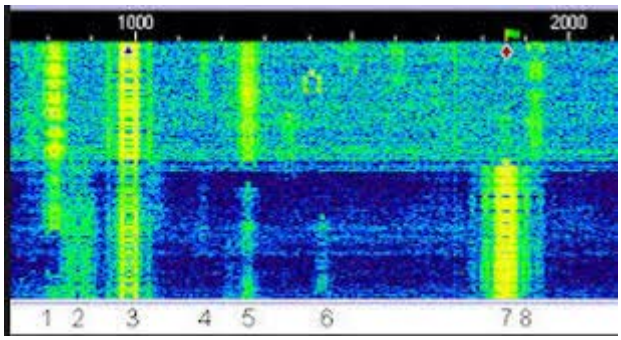
Missouri Section ARES®

Digital Data Net



2020

Missouri Section ARES® Digital Data Net

Contents

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Mission

To create a statewide amateur radio digital network consisting of ARES District and local networks capable of assisting State and Local government and Non-Governmental Agencies (NGO's) with accurate and timely digital data communications in the event of disaster or emergencies when normal communications may be interrupted. These agencies include but are not limited to the Missouri Emergency Management Agency (SEMA), local emergency operations centers (LEOC's), the National Weather Service, the American Red Cross, Salvation Army and other disaster relief organizations providing services to a disaster impact area within Missouri.

Concept of Operations

Past exercises and activations of Missouri Section ARES have revealed deficiencies in the manner, timeliness and accuracy of emergency message transmission using voice nets exclusively. Specifically, problems cited in After Action Reports (AAR) revealed a lack of training in message handling protocol, excessive time to transmit lengthy messages such as resource requests and problems with accuracy requiring numerous "fills" further delaying transmission.

It became readily apparent that although voice nets are essential components of the EmComm environment they would be better utilized for short messages of a tactical nature. Therefore, Resource Management, lengthy situation reports (SitReps), Command and Control, and administrative messages should be transmitted in a digital mode.

Under the auspices of the Missouri Section ARES Section Emergency Coordinator (SEC), the Missouri Section ARES Digital Data Network and the Missouri Emergency Services Net (MESN) will establish a joint operational interface that incorporates operating standards, training for operators and the development of procedures to facilitate the smooth transition of messages from one network mode to the other.
It is intended that this document be compatible with the ARRL Strategic Plan (2018) and the Missouri Section ARES Emergency Operations Plan (April 2020).

Objectives

- To provide an advanced high speed digital network for emergency service communications
- To provide training required
- To use standard hardware, firmware, and software configurations
- To be easy to set up and expand
- To be upgradeable for future technologies
- To be able to be built with available "off the shelf" equipment
- Appointment of ARRL Section Net Manager for this net
- Creation of a net response protocol and the assignment of NCS operators to be established by Missouri Section DECs and to become a part of all District operations plans.
- Establish a GroupsIO account for general discussion, library of pertinent documents, database of digital data operators, vetting of membership
- Create a DMR talk group for the Digital Data Net for liaison communication and training.

Missouri Section ARES® Digital Data Net

Net Composition and Operations

A. Operational Requirements:

- HF Transceiver capable of operating in digital modes
- Personal Computer
- Unless otherwise directed, all net operation is based on the latest version of the FLdigi suite of programs downloadable at http://www.w1hkj.com/download.html
- Internal PC sound card or external USB sound card such as a SignaLink,or RIGblaster
- NVIS Antenna cut for Digital Net Operating Frequencies. An NVIS antenna configuration is a horizontally polarized (parallel with the surface of the earth) radiating element that is from 1/20th wavelength (λ) to 1/4 wavelength above the ground. Optimum height is about 1/4 wavelength, and high angle radiation declines only slightly for heights up to about 3/8 wavelength. That proximity to the ground forces the majority of the radiation to go straight up. Overall efficiency of the antenna can be increased by placing a ground wire slightly longer than the antenna parallel to and directly underneath the antenna. Communication range for NVIS is typically 50-600 miles.
- Conversational chat and check–ins shall occur on 1500 Hz waterfall
- FLmsg shall be used for formal traffic handling, 700 Hz on the waterfall. Flamp may also be used as appropriate. The Fldigi section in the Digital Data Modes, Hardware and Software section of the Missouri Section ARES Digital Data Communications Resource Guide 2020 may be consulted for detailed information regarding the use of messaging modes.
  TIP: Activate two (2) instances of Fldigi for efficiency – one for 1500 waterfall chat, one for 700 waterfall messaging.
- ICS forms such as ICS-213 or served agency-related forms such as Ham Radio WebEOC should be used for official messaging. See Appendix A.
- Plain text formats may be used for ARES administrative matters.

B. Frequencies and Modes

Statewide HF frequencies for initial response and message handling are provided in the table below.

Statewide Primary Call (Rally) Frequencies

Assignment	Frequency	Mode	Waterfall
Primary Call	3.590 USB	*BPSK-31	1500
Secondary Call	7.083 USB	*BPSK-31	1500
Alternate Call	5.3465 USB	*BPSK-31	1500
Working/Messaging	NCS Directed	**TBD by Band cndx	700
***MESN Voice Net	3.963 LSB	A3	N/A

* BPSK-31 shall be the initial mode employed to assemble the net. However, NCS shall have the discretion to temporarily change the frequency, mode and waterfall as deemed necessary. BPSK-31 is chosen due to its universal availability and history as a common operating platform among radio amateurs.

** Band conditions will, in large measure, determine the best 'mode' of operation (including decisions whether to use ARQ) - - See NBEMS Messaging Modes chart below:

NBEMS Messaging Modes

* Preferred	Conditions
PSKR 250 or 125	Very Good
8PSK 250 or 125	Very Good
***Thor22 or MFSK32**	Good
***Thor 16 ,11 or MFSK16**	Average
***Thor8**	Poor

***It is intended that the statewide, district and local digital nets work together and pool resources with the Missouri Emergency Services Net (voice) to provide first mile (origin) or last mile (destination) connectivity as may be required to complete the route.

C. Operational Tips:

- A minimum of two operators at each station; one to operate, one to take notes and fill out log
- Recommend balancing fldigi program audio drive level to have an output power no more than 20 watts for a 100 watt capable transceiver.
- Develop a set of Fldigi macros to increase efficiency of standard transmissions such as log-ins
- The NBEMS messaging modes table above should be consulted for best practices under various band conditions.
- See the Fldigi section in the MO-ARES Missouri Section ARES Digital Data Communications Resource Guide 2020 for tips on optimizing Fldigi and its features such as Flmsg.

D. Net Procedures:

The MO-ARES Digital Data Net is a directed net called on the Primary Frequency 3.590 MHz, USB, BPSK31, 1500 Hz waterfall. After the net is established, the NCS may designate an alternate mode from the Fldigi suite as deemed necessary.

Fldigi

- All operation is based on the FLdigi suite of programs downloadable at http://www.w1hkj.com/download.html.
- FLmsg will be used for formal traffic handling. Flamp may also be used as appropriate. The Fldigi section in the Digital Data Modes, Hardware and Software section of the Missouri Section ARES Digital Data Communications Resource Guide 2020 may be consulted for detailed information regarding the use of messaging modes. The NBEMS messaging modes table above should be consulted for best practices under various band conditions.
- The net may be convened with or without a Net Control Station as dictated by the intended use and the number of participants.
- Stations checking in should activate the fldigi TUNE feature for two seconds to manually alert stations of your intent to transmit. ((Note: The two second tone can be automated in Configure-Config Dialog-IDs-RsID (in dropdown)-Pre-signal tone: enter 2.0 sec))
- ARQ should be implemented when passing traffic if band conditions permit without undue time required for 100% copy.

(Continued Next Page)

- Fldig Macro for checking into digital net:
  Right click on an unlabeled macro button and type in the following sequence or select from the drop down list provided and click the arrow (<) to transfer the selection to the text box

  <MODEM:BPSK31>
  <GOFREQ:1500>
  <TXRSID:ON><TX>
  NCS callsign de
  <MYCALL>
  <MYNAME>
  <MYQTH>
  <MYCALL>
  <MYNAME>
  <MYQTH>
  <RX><@TXRSID:OFF>

  *Now label the macro button at the bottom of the pop-up, click Apply, then close (or leave open for editing after testing). To test without transmitting just turn off the radio, left click the new macro and watch the contents of the macro print across the upper window of Fldigi screen. Be sure to SAVE macros when you exit Fldigi.

Check-ins

- Stations may abbreviate- check ins with the following sequence, each repeated twice:
- (NCS callsign) DE your call sign (or agency tactical callsign)
- Your name
- Your county, ARES District, and tactical callsign if applicable
- Advise NCS of traffic for the net
- Advise NCS when leaving or re-entering the net

Sample Roll Call Check-In Text:

NCS: Calling KA0RES
KA0RES: KA0RES, at Morse City Shelter 3 no traffic,
NCS: KA0RES ack
NCS: Calling W0QRP
W0QRP: W0QRP, Morse City EOC, have routine traffic to SEOC
NCS: W0QRP ack - Stnby
NCS: Calling KD0QTH
KD0QTH: KD0QTH, no traffic, Morse City Fire Dept

Alerting

In the event of any widespread communications emergency, every EC, DEC and the SEC should have an HF station monitoring MESN SSB frequencies 3.963 MHz (Primary) or 7.263 MHz (Secondary) and Digital frequencies 3.590 MHz USB (Primary), 7.083 MHz USB (Secondary) or 5.3465 USB (Alternate). Alerts may also be broadcast on the Missouri Section ARES DMR talk group. If the EC, DEC or SEC does not have HF capability, they should have an Official Emergency Station (OES) designated to monitor the above frequencies.

General instructions for activating the Digital net are provided below. For more detail refer to page four in the Missouri Section ARES Emergency Operations Plan (April 2020).

Activation

The evolution and expansion of the incident from the local level will determine the sequence and the scale of response from the MESN and the Missouri Section ARES Digital Data Net. The on-site ARES responder(s) will evaluate the communication needs to determine which communications assets will best meet the immediate or anticipated net requirements. If deemed necessary, the EC may request the Net Manager to activate the MESN and the Missouri Section ARES Digital Data Net or the Missouri Section ARES DMR talk group, number 31290

E. NCS Procedures

The following procedures are recommended for use by the NCS as MO ARES Digital Data Net standards. Deviations from these procedures may be made at the discretion of the NCS as necessary.

All nets start with an announcement by the Net Control Station (NCS) of the commencement of the NET, its purpose, and any critical information (such as if the net is being conducted peer-to-peer or if relay stations will be needed).

- The NCS transmits a net call-up promptly at the pre-established net meeting time.
- NCS will assign a station to act as liaison with the MESN net
- If no check-ins after 10 minutes, the net will be called again on the secondary frequency (7.083 MHZ USB) and the alternate frequency (5.3465 MHz USB) as desired. The net will then return to the primary frequency and the cycle begins again.
- Once the net is established, a general call for emergency or priority traffic should be made so as not to delay this material.
- Take check-ins and traffic from stations performing liaison for served agencies or other traffic nets first.
- Inform stations that if other EMERGENCY traffic should arise during the net, they can break into the net at any time using the text “EMERGENCY BREAK - EMERGENCY BREAK”, followed by their call sign.

General Net Operation:

- Pass stations that need to conduct point-to-point communications to other frequencies.
- Be flexible. The net will likely evolve as the emergency progresses and the served agencies activate.
- If the net is to remain in session with periods of inactivity, announce the net every 10 minutes or so to ensure people do not forget the net is active.
- Stations reporting into a net are held until released by NCS or upon the request of the station.

F. Controlling traffic flow to agencies

Some agencies may become overwhelmed with traffic during a major disaster in their venue. Such agencies may find it necessary to control the 'flow' of traffic to and from their communications center. The lack of sufficient radio operators, radios, antennas, computers, physical space and slow throughput may contribute to this situation.

Agency Ring: One method of regulating the flow of traffic is to establish a number of intermediary 'buffer' stations configured in a virtual geographical 'ring' around the served agency. The 'ring' is used to receive and forward traffic to and from the agency, thereby keeping the flow to the agency at a manageable level. Only 'ring' stations would be authorized to communicate with the agency. The NCS would direct all traffic to and from the 'ring', not directly to the agency, on a frequency set aside specifically for the 'ring'. Additional HF/VHF/UHF frequencies and modes could be used for agency-to-ring communications. For example, SEMA has used the 'ring' concept (so-called JC Ring) with the MESN voice net successfully for a number of years. Winlink, email and packet links have been used for communication between the 'ring' and the agency.

Agencies without a 'Ring' should establish a frequency specifically for passing traffic. All traffic to and from the agency would occur only on that frequency.

G. General Message Handling

Operators should become familiar with using partner-preferred forms. If a specific form is used by a served agency the amateur operator should examine the list of form templates included in Flmsg to see if it is included. If message forms are not available you may also use any paper or tablet. Write neatly because messages could become part a legal record. Brief, clear messages are best. Be sure to have the sender approve the message before sending. You should include a message number, your call sign, or a tactical call sign in an appropriate location in the message so the recipient will know where to respond if necessary.

The most common form is the ICS-213 general message form used by-EmComm organizations. A template of the ICS-213 is included in Flmsg. The ICS-213 is used by the Incident Command Post and other incident personnel to transmit messages (e.g., resource order, incident name change, other ICS coordination issues, etc.) to the Incident Communications Center for transmission via radio or telephone to the addressee. The form is used to send any message or notification to incident personnel that require hard-copy delivery. A sample copy of the form and instructions for its use is included in Appendix A of this document.

A variation of the ICS-213 is used for Resource Requests and is identified by the suffix "RR". This form is not included in Flmsg but can be found in Winlink Express' standard templates. The overall format is similar to the standard ICS-213 but it has additional blocks for a description of the resource required, when it is needed, the intended user's name and delivery location. A copy of ICS-213RR is also included in Appendix A.

H. Logging and Record Retention

All Digital Network stations must maintain a complete log of all network sessions.

- Electronic logging may be accomplished by activation of the Fldigi auto log and auto archive features.
- The ICS-309 Communications Log is recommended for manual entries
- Document and archive all messages, including pertinent notes.
- Make all logs and documents available to the served agency during and immediately following the activation.
- All logs (and documents and notes if required) will be kept as a part of the ARES records and the originals remain with the ARES EC. Operators may make personal copies.

Appendices

Appendix A – Message Forms

A1 ICS-213 General Message Form
A2 ICS-213RR Winlink Express Resource Request
A3 ICS-309 Communications log
A4 Amateur Radio WebEOC Resource Request

Appendix B – Drills and Exercises

Appendix C - Training

Appendix A1 ICS-213 General Message Form

GENERAL MESSAGE		
TO:	POSITION:	
FROM:	POSITION:	
SUBJECT:	DATE:	TIME:
MESSAGE:		
SIGNATURE:	POSITION:	
REPLY:		
DATE:	TIME:	SIGNATURE/POSITION:

Appendix A_2 ICS-213RR Winlink Express Resource Request

RESOURCE REQUEST MESSAGE ICS 213 RR

1. Incident Name | 2. Date/Time Click to Add Date/Time | Load ICS213RR Data | Form Info

3. Resource Request Number

REQUESTER

4. Order *Use additional forms when requesting from a different source or vendor to fill request (s)*

Detailed Item Description; Vital characteristics, brand, specs, experience, size, etc.				Needed Date/Time (local 24 hr)		
Qty	Kind	Type	Item Description	Requested	Estimated	Cost

5. Delivery/Reporting Location

6. Substitutes and/or Suggested Sources

7. Requested by Name/Position | 8. Priority ◉ Low ○ Routine ○ URGENT

9. Section Chief Name for Approval

LOGISTICS

10. Logistics Order Number

11. Supplier Phone/Fax/Email

12. Name of Supplier | 12A Point of Contact

13. Notes

14. Name of Auth Logistics Rep | 15. Date/Time Click to Add Date/Time

16. Order Was Requested By | *Indicate Unit / Section or Person who is to get this order.*

FINANCE

17. Reply/Comments from Finance

18. Finance Section Chief Name | 19. Date/Time Click for Date/Time

Save ICS213RR Data | Submit | Reset Form ICS 213RR v. 14.2

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Appendix A3 ICS-309 Communications Log

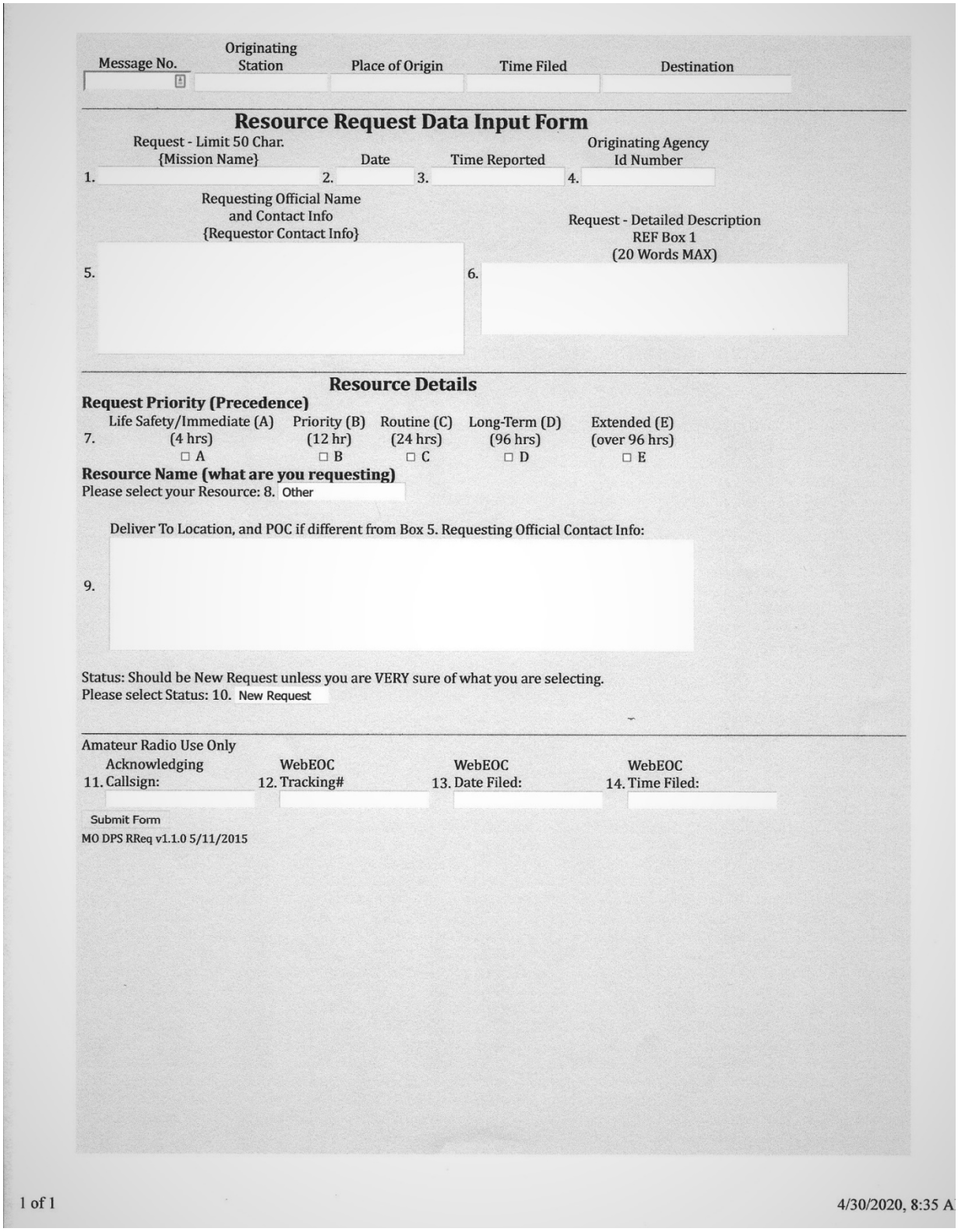
COMM Log ICS 309 ARES/RACES	1. Incident Name and Activation Number	2. Operational Period (Date/Time) From: To:
3. Radio Net Name (for NCOs) or Position/Tactical Call		4. Radio Operator (Name, Call Sign)

5. COMMUNICATIONS LOG					
Time (24:00)	FROM		TO		Message
	Call Sign/ID	Msg #	Call Sign/ID	Msg #	

6. Prepared By (Name, Call Sign)	7. Date & Time Prepared	8. Page _____ of _____

Appendix A4 Amateur Radio WebEOC Resource Request Form

https://ares-mo.org/forms/sema-resource-form/



Message No. | Originating Station | Place of Origin | Time Filed | Destination

Resource Request Data Input Form

1. Request - Limit 50 Char. {Mission Name}
2. Date
3. Time Reported
4. Originating Agency Id Number
5. Requesting Official Name and Contact Info {Requestor Contact Info}
6. Request - Detailed Description REF Box 1 (20 Words MAX)

Resource Details

Request Priority (Precedence)

7. Life Safety/Immediate (A) (4 hrs) ☐ A | Priority (B) (12 hr) ☐ B | Routine (C) (24 hrs) ☐ C | Long-Term (D) (96 hrs) ☐ D | Extended (E) (over 96 hrs) ☐ E

Resource Name (what are you requesting)

Please select your Resource: 8. Other

Deliver To Location, and POC if different from Box 5. Requesting Official Contact Info:

9.

Status: Should be New Request unless you are VERY sure of what you are selecting.

Please select Status: 10. New Request

Amateur Radio Use Only

Acknowledging

11. Callsign:
12. WebEOC Tracking#
13. WebEOC Date Filed:
14. WebEOC Time Filed:

Submit Form

M0 DPS RReq v1.1.0 5/11/2015

1 of 1 4/30/2020, 8:35 A

Appendix B Drills and Exercises

Drills and Exercises

Drills and exercises are needed to achieve and maintain efficiency in the use of digital data nets. Along with proper training, drills and exercises provide a common understanding among the net participants as to what to expect and how to conduct business. Regular drills and exercises provide experience in operating within an emergency net environment and encourage ARES members and prospective ARES members to participate. The goal here is to develop a natural reaction to net operations rather than stumbling through the net as best you can. The following topics and methods should be considered for drills and exercises:

- NCS practice – rotate NCS within the group
- Log in procedures – automated vs manual
- Passing messages – Each participant passes at least one message
- Multi-net liaison – multiple nets practice communicating with one another via DMR or Winlink and pass messages between voice and digital nets
- Winlink Express exercises
- Fldigi exercises
- Mobile and portable stations set up digital data/voice EmComm in remote or anticipated deployment locations for an exercise to pass traffic
- Test and evaluate net activation procedures and response times
- Pass messages with forced relays of digital data and voice messages
- Start with local or District exercise then expand to multi-district and Section-wide exercises.

The following abbreviated descriptions and commentary regarding nets is excerpted from: https://www.idahoares.info/___operating_tips.php#net_structure

Readiness Net: The purpose of a Readiness NET is to confirm the availability and operational status of participating stations.

Training Net: A training NET has a primary purpose of instructing NET participants in processes and procedures. The NET is structured to provide instruction on the process or procedure, and then provides a venue for participating stations to perform the process or procedure.

Exercise Net: This NET is nearly identical to the Training NET. However, no instruction will be provided. This NET will attempt to simulate a specific scenario, and participating stations are expected to adopt all procedures appropriate to the exercise. Such an exercise may handle simulated traffic between served agencies and over amateur radio.

Emergency Net: This NET is put in place to address a real scenario. Well in advance of such an event, emergency communications plans should be in place. Any need for service will be passed from served agencies through the organization chain of command.

A NET should have a NET script, which is used by the NET Control Station to provide instructions to participants and to ensure that the NET flows in an orderly manner. The NET administrator will determine the goal for the NET and establish processes and procedures that fulfill the goals of the NET.

Appendix C Training

A Group.IO account will be created for the Missouri Section ARES Digital Network. Before operating on the net an operator must email a request to join the Group.IO site. This procedure will allow the group moderators (i.e. SEC, ASEC, et. al) to vet the operator through the appropriate DEC's to ensure the operator has experience or interest in digital operations.

Once accepted an amateur will be placed on the network roster and emailed the Net Operating Guidelines and advised of the date and time when the next net will be held. He may also be given a topic to research for discussion during a net training session.

The Missouri Section ARES Digital Net Groups.IO will provide the following features:

- A Site for amateur digital operators to register for inclusion in the net
- Maintain a roster of Net Stations
- Track training level of operators
- Provide a calendar of Net events
- Allow group notification of messages or documents posted to the group
- Establish a WiKI containing Net Operating Procedures and training documents
- Create moderator's for training topics

Training can take place in several ways:

- A topic can be assigned for research and discussion at the next net
- Discussion over the Missouri Section ARES DMR group, teleconference, simplex net or repeater
- A topic could be discussed during a one on one chat with a mentor
- A topic can be discussed during a one to many chat with a mentor

Training materials will be available in the Group WIKI and will include topics such as:

- Fldigi features
- Using various digital modes
- Propagation
- ICS forms
- Emcomm operations
- NVIS Antennas
- Other topics relevant to digital communications