Radio Net Basics

For Organized Ham Radio Communications

- Welcome 2025!
- Michael Hamby KI4UJY (General)
- Intent of this presentation is general overview of radio net use.

Terms:

- Directed Nets – “is formal, has a set of rules or net directives, all communications must go through net control. It controls the frequency with net related traffic only, and has a specified person in charge, the Net Control Station (NCS). The NCS will issue specific instructions on how he/she wants the net to run. (5,4) A directed net is one in which it is necessary to obtain permission from the NCS before transmitting to other stations in the net. (4,Ap F-1)” (www.idahoares.info)
- Undirected Nets “An open net can be held in the midst of other normal frequency traffic. It is very informal; net participants may converse directly and there may or may not be a specified net control operator. If a net control is selected from the group, that NCS can set the level of formality with informal net guidelines.” (5,3-4) (www.idahoares.info)
- Scheduled Nets – club Nets or a pre-approved Event Net
- ARES NETS – Example is the 82 net Thursdays at 8 pm, MTEARS Nets Mondays
- Emergency/SkyWarn Nets – Unscheduled Nets due to unordinary circumstances – example Tornado watch, National Emergency (note 1)

Terms:

- Note 1: - in the event of an Emergency it is important to control the conversation to Who, What , Where, and When – folks with scanners may be listening and rumors can cause panic – NC Hurricane Helen – is a good example of VHF nets being deployed for emergencies. – same goes for weather`
  - Ham Radio operators became the only source of information in the early days of the event to the extent of damage and the effort to recover (commercial radio stations failed)
  - Interoperability – communications with other radio services continues to be a problem.
  - Address emergency Nets in more detail in this presentation

Structure of a NET:

- Net Control (reference ARRL Net Control Procedures)
  - Net Preamble
  - Net Control Is Identified (rules of conversations are identified)
  - Request for Priority or Emergency Traffic
  - Welcome
  - Check in priorities (mobile, location,)
  - Discussion
  - Close Out of the Net
  - Frequency returned to regular use

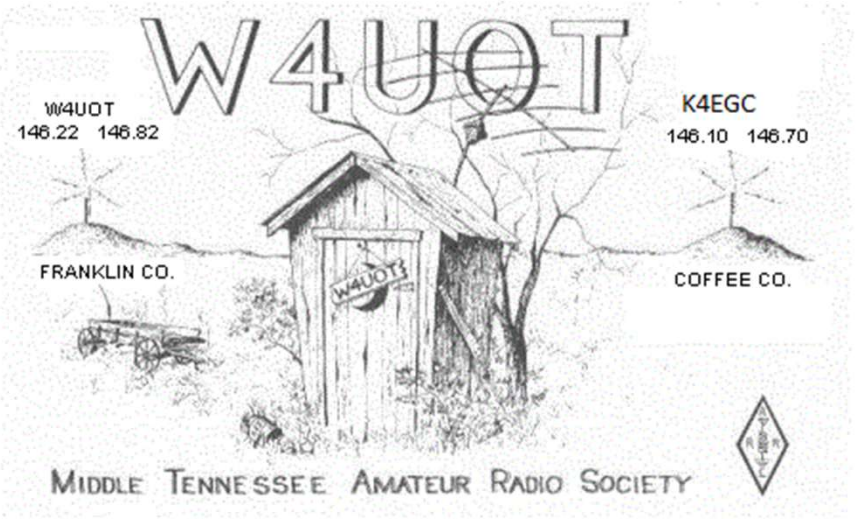
Purpose of Nets

- Gain Operating Experience in a structured Environment
- Promotes Regularly use of equipment (end to end test)
  - Station/repeater issues can be identified
  - Establishes Repeater Coverage and Operator access
- Practice Verbal Communication Skills (Cadence [speech pace] , clarity, confidence, Concise)
- Establish Community
- Raises Visibility of our Hobby

Focus of Topic

- Phone Nets (Especially VHF/UHF)
- Oher Radio Nets available: (example only)
  - 3.980 Tennessee Phone Net (HF)
  - South Cars (Soth Coast Amateur Radio Service
- Other (Internet dependent less known – topic for future discussions)
  - NWS Chat Migrated to Slack (less ham radio friendly)
  - Ham Radio Hotline
  - DMR* (Internet expanded)
  - Meshtastic
  - APRS
  - Winlink

Repeaters



146.700 - T 114.8hz Hillsboro, TN (Solar - Analog) -- Call K4EGC **146.700 MHz, -600 KHz offset, CTCSS/PL 114.8Hz**

146.820 - T 114.8hz Winchester, TN (Link to Huntsville Weather Service) -- Call W4UOT **146.82 MHz, -600 KHz offset, CTCSS/PL 114.8**

443.950 + T 107.2hz Tullahoma, TN (Link to Nashville Weather service/MTEARS) -- Call K4EGC

440.600 + T 107.2hz Tullahoma, TN (Fusion C4FM Digital/Analog) -- Call K4EGC

144.390 Simplex - APRS Digi - Tullahoma, TN --- Call K4EGC-1

146.700 repeater is Solar powered operated from batteries – though large they are not infinite – use wisely cloudy days!

Repeater Settings

Standard set of CTCSS tones (Hz)

67.0	82.5	100.0	123.0	151.4	186.2	225.7
69.3	85.4	103.5	127.3	156.7	192.8	229.1
71.9	88.5	107.2	131.8	162.2	203.5	233.6
74.4	91.5	110.9	136.5	167.9	206.5	241.8
77.0	94.8	114.8	141.3	173.8	210.7	250.3
79.7	97.4	118.8	146.2	179.9	218.1	254.1

Amateur Band	**Standard Offset**	**Example Pair, Listen/Talk (MHz)**
2-meter band	0.6 MHz (600 kHz)	147.345 / 147.945 (+)
70-centimeter band	5 MHz	449.125 / 444.125 (-)
1.25-meter band	1.6 MHz	224.940 / 223.340 (-)

Radio Programming Overview

Repeater Use requires setup on the radio – this is an example for illustrative purpose only!

- Varies with Radio brand and menu structure
- Set Receive Frequency 146.700
- Set Offset (+ or -) for VHF typically , 600 KHz ([-[K4EGC repeater)
- Tone 114.8 hz (Menu setup is T-Sql (for Tone Squelch) – other option is Tone – Tone Squelch is preferable in high radio noise area
- Memory Save the channel for future use.

Typical Radio Setup (using Chirp or RT Systems)

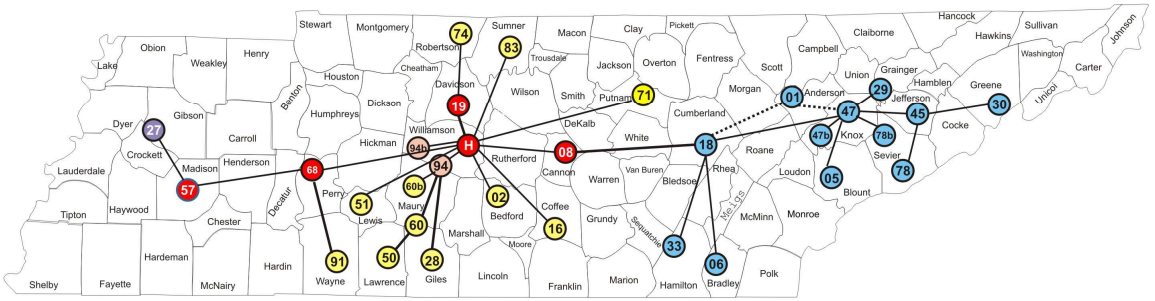
Radio setup is much easier using a programing software (RT Systems sells software and interface cable)

- Practical to have equipment in one brand so that programming is similar.

Location	Name	Frequency	Duplex	Offset	Tone	rToneFreq	cToneFreq	DtcsCode	DtcsPolar	Mode	TStep	Skip	Comment	URCALL	RPT1CALL	RPT2CALL	DVCODE
1	CHATVHF	146.61	-	0.6	Tone	107.2	107.2	23	NN	FM	12.5						
2	SprngVHF	145.13	-	0.6	Tone	107.2	107.2	23	NN	FM	12.5						
3	JasperVH	145.19	-	0.6	Tone	127.3	127.3	23	NN	FM	12.5	S					
4	MontVHF	145.41	-	0.6	TSQL	114.8	114.8	23	NN	FM	12.5						
5	LwsbrgVH	146.625	-	0.6	Tone	107.2	107.2	23	NN	FM	12.5						
6	ShortVHF	146.91	-	0.6		88.5	88.5	23	NN	FM	12.5	S					
7	McMinVHI	146.97	-	0.6	Tone	151.4	151.4	23	NN	FM	12.5	S					
8	ArnoldVH	147.195	+	0.6	Tone	114.8	114.8	23	NN	FM	12.5						
9	ManchVHI	146.7	-	0.6	TSQL	114.8	114.8	23	NN	FM	12.5						
10	WinchVHF	146.82	-	0.6	Tone	114.8	114.8	23	NN	FM	12.5						
11	ShelbVHF	147.06	+	0.6		88.5	88.5	23	NN	FM	12.5	S					
12	DEARRN	145.45	split	144.85	TSQL	127.3	127.3	23	NN	FM	5						
13	PriCCARE	145.45	-	0.6	TSQL	127.3	127.3	23	NN	FM	5						
14	SecCCARE	146.88	-	0.6	TSQL	167.9	167.9	23	NN	FM	5						
15	FayetVHF	147.03	+	0.6	Tone	114.8	114.8	23	NN	FM	12.5	S					

MTEARS

- Middle Tennessee Emergency Amateur Repeater System
- The MTEARS net follows the WCARES net at 2000 CT each Monday. Check-ins are by county.



H 443.725 107.2 Nolensville - Hub
01 441.925 100.0 Oak Ridge
02 442.700 100.0 Deason
05 443.900 100.0 Maryville
06 442.025 100.0 Cleveland
08 444.650 107.2 Short Mtn
16 443.950 107.2 Tullahoma
18 443.875 88.5 Crossville
19 442.800 107.2 Nashville
27 442.300 100.0 West Gibson Co.
28 443.550 100.0 Pulaski
29 443.225 100.0 Blaine
30 441.850 100.0 Greeneville
33 443.125 103.5 Signal Mtn
45 443.725 100.0 Jefferson

47 442.500 100.0 Knoxville
47b 444.500 100.0 West Knoxville
50 443.400 100.0 Lawrenceburg
51 444.850 100.0 Hohenwald
57 444.450 123.0 Jackson
60 442.725 100.0 Southport
60b 443.175 100.0 Columbia
68 442.850 107.2 Lobelville
71 444.600 107.2 Cookeville
74 443.900 107.2 Cross Plains
78 444.900 100.0 Gatlinburg
78b 444.000 100.0 Sevierville
83 444.450 107.2 Gallatin
91 443.950 100.0 Wayne Co.
94 443.075 156.7 Heritage
94b 443.475 107.2 Franklin

MTEARS 2-22-23 by David Wolfe WA4VVX

MTEARS 2-22-2023.PDF
This map is a visual and written record of significant changes to the MTEARS system recorded in February 2023 and since this map was last edited and published on 04-19-2022.

Removed 19b Pasquo. When it is restored to service it will be added back to the map. Moved system link for 60 Southport and 28 Pulaski to 94 Heritage. Dotted lines show variable link paths.

Event Plan – example Jack and Back

- Operating Frequencies: (Reference Event ICS205 as Master)
- 147.06 + 0.6 Tone 127.3 127.3 NN FM
- MMCSIM 146.46 NN FM
- APRS 144.390 NN FM
- KI4NJJ – Bedford/Lincoln County portion of the course (tones are optional)
- MMCSIM – Moore County Simplex (command frequency)
- Primary Cross Band:
- 444.575 + offset tone 107.2hz. This will link to 147.060 repeater.
- Local ham and sags will need this UHF repeater pair to access 147.060 repeater at JD site.

Radio Communications Plan (ICS 205)

INCIDENT RADIO COMMUNICATIONS PLAN (ICS 205)

1. Incident Name:	2. Date/Time Prepared:	3. Operational Period:
Bike MS: Bike to Jack and Back 2023	Date: SEP 26 Time: Version 1	Date From: OCT 7 Date To: Time From: OCT 8 Time To:

4. Basic Radio Channel Use:

Zone Grp.	Ch #	Function	Channel Name/Trunked Radio System Talkgroup	Assignment	RX Freq N or W	RX Tone/NAC	TX Freq N or W	TX Tone/NAC	Mode (A, D, or M)	Remarks
	1	Command	Shelbyville	Command Primary	147.060 (+)	127.3	147.660	CSQ	A	Course-wide primary. Linked to channel 2
	2	Command	Lynchburg Jack Daniels Compound	Command Primary	444.575 (+)	107.2	449.575	107.2	A	Lynchburg portable repeater. Linked to channel 1
	3	Command	Chestnut Ridge	Command Secondary	442.575 (+)	107.2	447.575	107.2	A	Secondary / coverage testing
	4	Tactical	MTEARS Nolensville Hub	Weather and Backup	443.725 (+)	107.2	448.725	107.2	A	Nolensville. Linked to channels 5 and 6
	5	Tactical	MTEARS Deason 02	Weather and Backup	442.700 (+)	100.0	447.700	100.0	A	Deason. Linked to channels 4 and 6
	6	Tactical	MTEARS Short Mtn 08	Weather and Backup	444.650 (+)	107.2	449.650	107.2	A	Short Mtn. Linked to channels 4 and 5
	7	Tactical	Local Only	Secondary Simplex	146.550	CSQ	146.550	CSQ	A	
	8	Tactical	SAGs	APRS	144.390	CSQ	144.390	CSQ	A	Tracking mobile assets using APRS Smartphone APRS apps encouraged

5. Special Instructions:

6. Prepared by (Communications Unit Leader): Name: Adam W8IFG Signature: _____

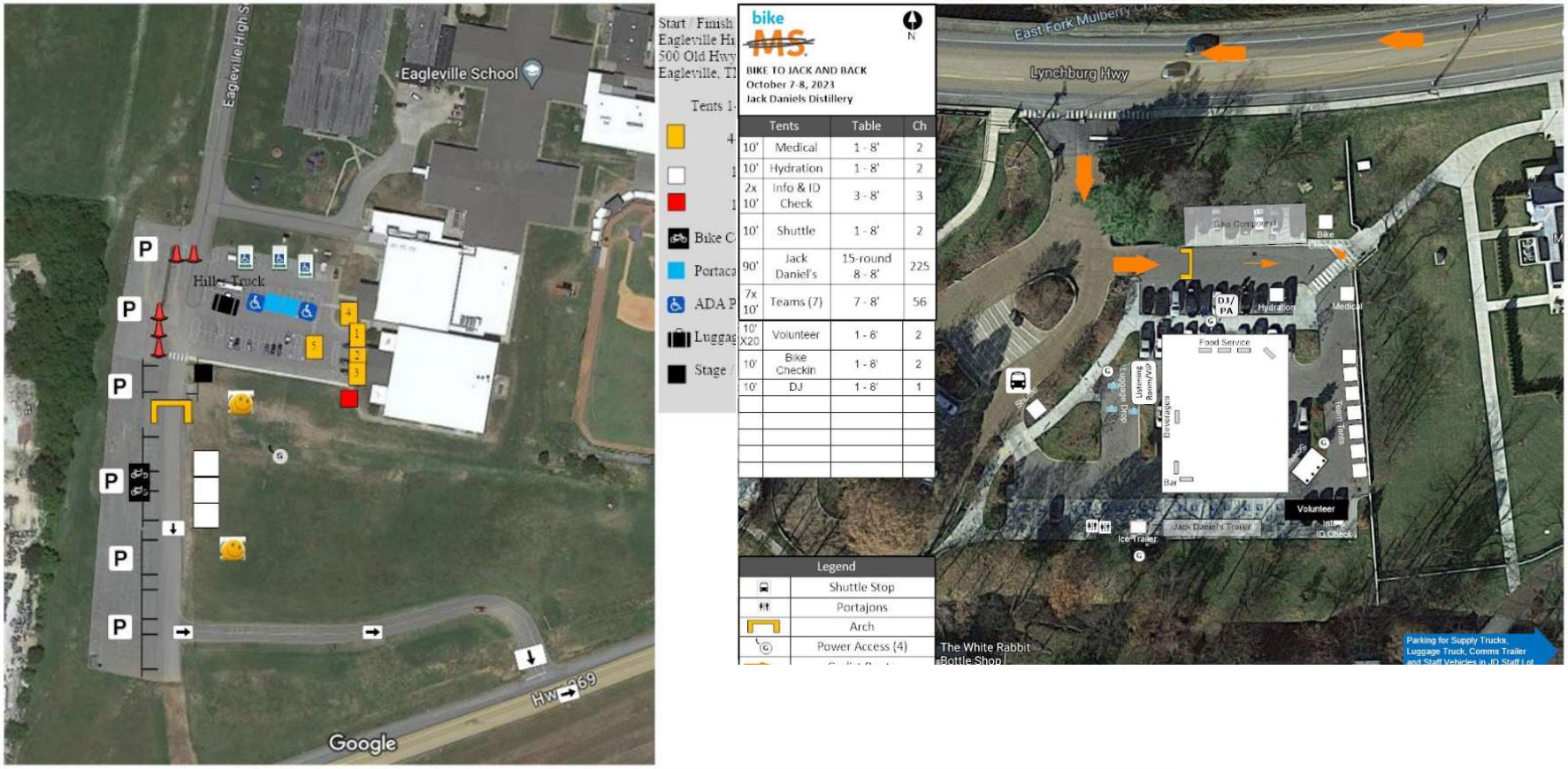
ICS 205 | **IAP Page** ____ | Date/Time: _____

Assignments:

Bike MS Jack and Back
Saturday October 7, 2023
Rest Stops

	A	B	C	D	E	F	G	H	I
1	**SATURDAY**								
2	**Location**	**START**	**Rest Stop**	**Rest Stop**	**Water Stop**	**Rest Stop**	**Rest Stop**	**Rest Stop**	**FINISH**
3	**Site**	Eagleville School	Patterson Baptist Church	Masonic Lodge	Smotherman Cemetery	Maxwell Chapel	Eakin Primary School	Flat Creek Community Center	Jack Daniel's Distillery
4		500 Old Highway 99	12787 Patterson Road	9007 Rockvale Road	4992 Midland Fosterville Rd	191 Maxwell Chapel Road	1100 Glenoaks Rd	115 New Herman Road	280 Lynchburg Hwy
5		Eagleville, TN 37060	Rockvale, TN 37153	Rockvale, TN 37153	Bell Buckle, TN 37020	Unionville, TN 37180	Shelbyville, TN 37160	Shelbyville, TN 37160	Lynchburg, TN 37352
6	**County**	Rutherford	Rutherford	Rutherford	Rutherford	Bedford	Bedford	Bedford	Moore
7	**Mileage**	0/0	9	19	29	13/36	24/47	35/58	48/70
8	**Routes**	48 & 70	70	70	70	48 & 70	48 & 70	48 & 70	48 & 70
9	**Truck Delivery Time**								
10	**Support Time**	6:30 AM - 8:30 AM	7:00 AM - 9:30AM	7:15 AM - 10:00 AM	7:15 AM - 10:30 AM	7:15 AM - 12:00 PM	7:45 AM - 1:00 PM	8:15 AM - 3:00 PM	6:30 AM - 5:00 PM
11	**First Cyclist Arrival Time**		7:50 AM	8:25 AM		8:10 AM	8:40 AM	9:15 AM	
12	**Hard Closing Time**								
14									
15	**HAM**	Todd Bowman (KO4SMP)	Jerry Hedgcoth (NT4J)	Brian Boulden (W4BJB)		Jeff Schwartz (KC1DWP)	Dan Sigmund (W4WWF) with RV	Paul Stinson (KJ4WQN)	Mike Hamby (KI4UJY)
16		Sweep to finish after close							Preston Allen (KN4BVA)
17									Michael Glennon (KB4JHU)
18									Bill Craig (KI6WYN)
19	**HAM Cell Phone**	615-337-4060	615-400-0743	615-516-4813		860-235-5030	615-456-4704	615-830-5225	931-581-4937
20									615-631-2129
21									931-571-0502
22									615-663-9960
23									
24							Alternate Net Control		Net Control

Location Start/Finish



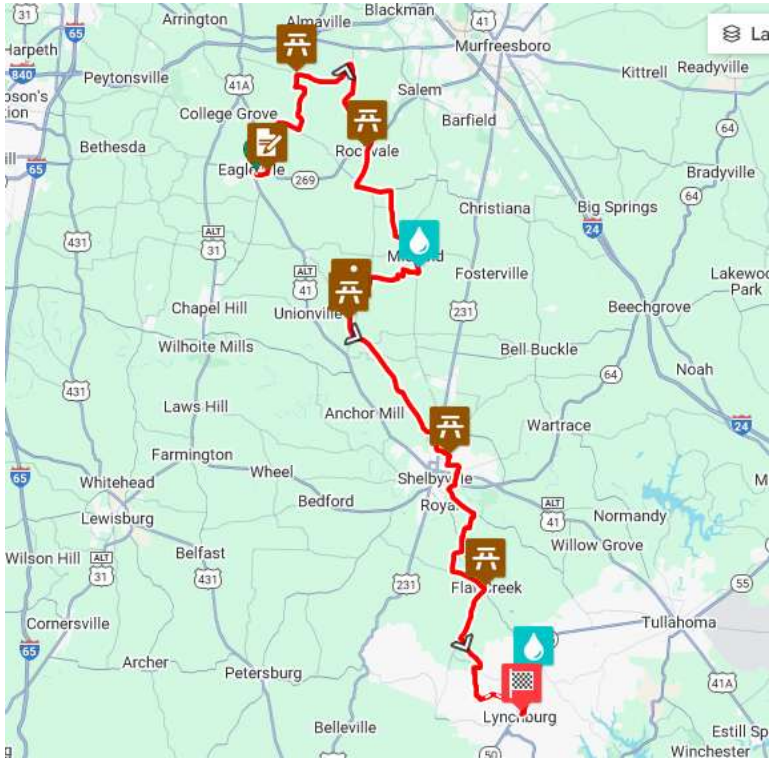
Jack and Back (MS fund raising ride)

- Objective – provide information awareness to served agency (MS)
- Fundraising Bicycle ride from ~Eaglevile TN to Jack Daniels (and back)
- Multiple Ham Radio operators on the course
- Multiple stops along the course (maned)
- Liaison with Non-Hams, Medical, 911 centers if necessary
- ~500 riders, 20 ham radios , medical team, logistic team , mix of cell phone, Zello PTT app, google Earth, ICS Event log,
- Main Emphasis is coordination support for riders in need especially in the event of an accident.
- 2024 was 30th annual ride.

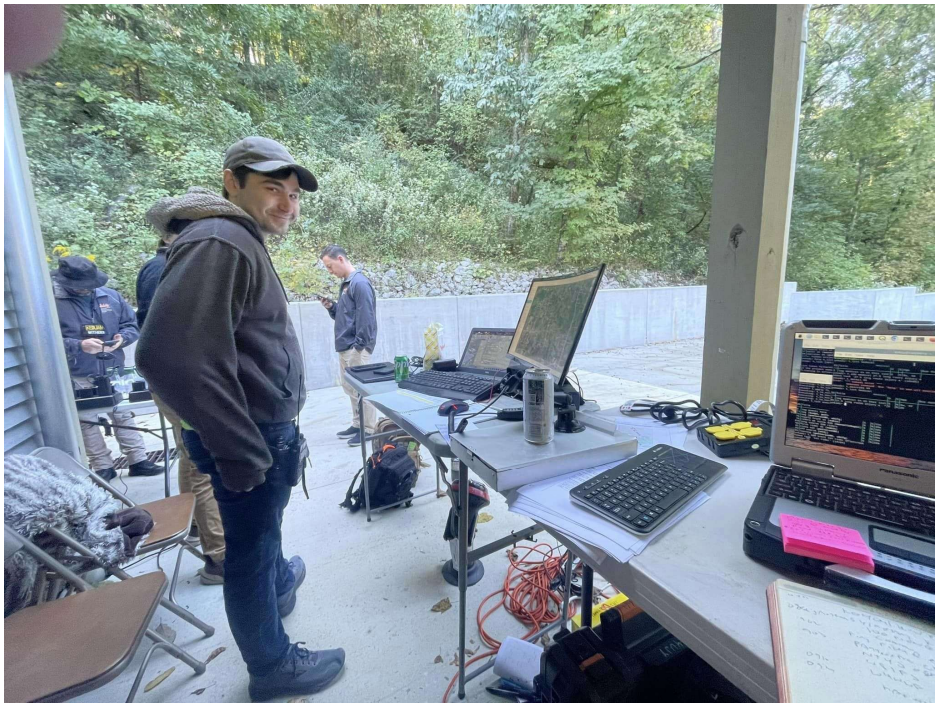
Course Map (2024)

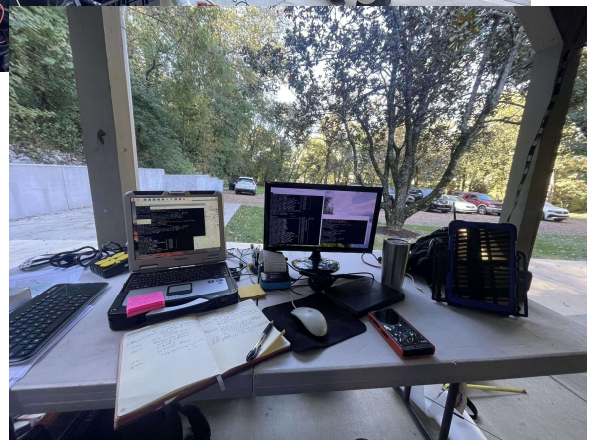
Two-day ride one way each day with sleepover in in Lynchburg

Its usually COLD or WET or BOTH, but some years are pleasant.



Jack and Back 2023



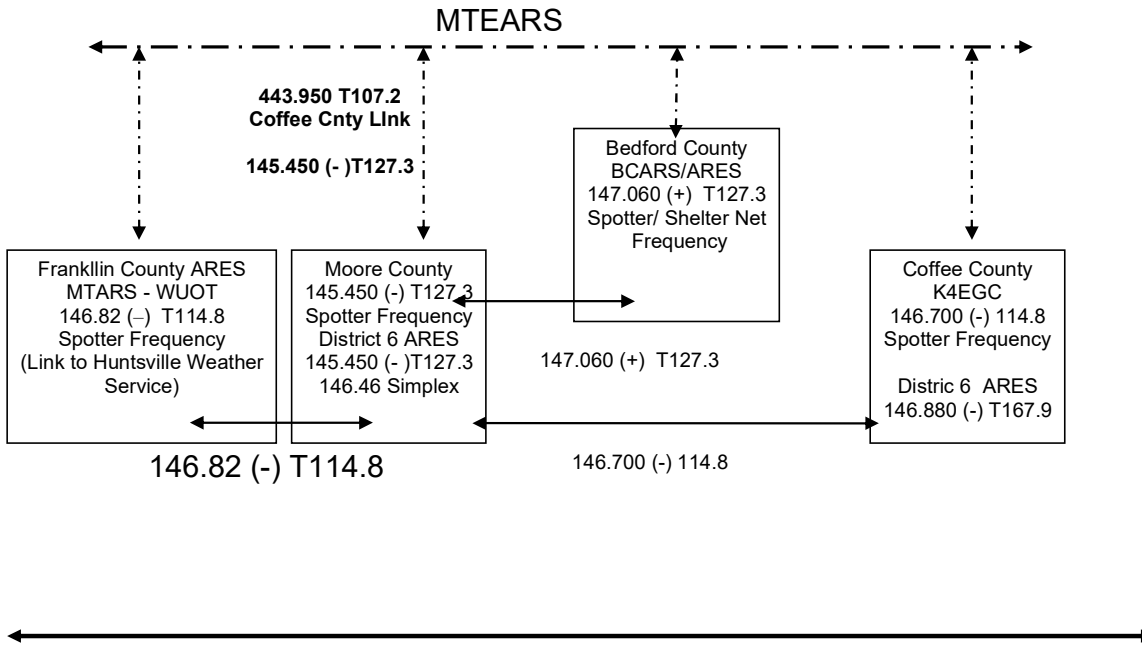


Event Tools

- Radios/Antenna's , Batteries
- Notebooks (Pen/Paper)
- Laptops/Maps, Google Earth .. Extra Screen (sun shield)
- Cell Phone (APRS, Zillow Push Talk Ap)
- Linux (FoxTrot, GPS, Mapping Software)
- HT Radio
- Extra batteries, clothes, water, snacks, portable chairs.
- Portable Power System

Unplanned Events Net.. Plan

- Moore County Emergency Communication Plan:
  - No repeater in Moore County
  - Liaison with other surrounding counties (not shown are Marshall and Lincoln)
  - Entire Plan in ICS format (not required but encouraged)



Unplanned Event Net Plan

- General Communication Plan (weather Nets are good places to start)
- Development of reportable incidents and Liaisons as needed.
- Development of notification chain as needed
- Focus on Interoperability (Winlink via HF/ Star Link in the future?)
- Focus on Resiliency (alternate Power, no Internet)
- Examples (Severe weather event, widespread power outages, disasters)
- Data Gathering and Situation Awareness
- Rendering Aid within the group (Christmas Tornado)
- Part of a larger Family Emergency Plan
- Recent real-world events such as the Hurricane Helen have made it clear the need for a plan.
- Interaction with Served Agencies (need for professionalism)

References

- https://www.arrl.org/files/media/Group/Net control proceedures.pdf
- https://www.idahoares.info/_downloads/procedures/NET_CONTROL_STATION_TRAINING_MANUAL_3-05rev.pdf
- https://www.qsl.net/mtars/net/preambles.html
- https://mtears.org/
- https://wcares.org/net-schedule/
- http://3980tn.blogspot.com/2011/11/net-schedule.html
- https://southcars.com/southcarsnet/ncs-schedule/
- https://www.hamradioschool.com/post/fm-repeaters-an-introduction
- https://www.wb5rdd.org/manuals/

Comments/ Questions