

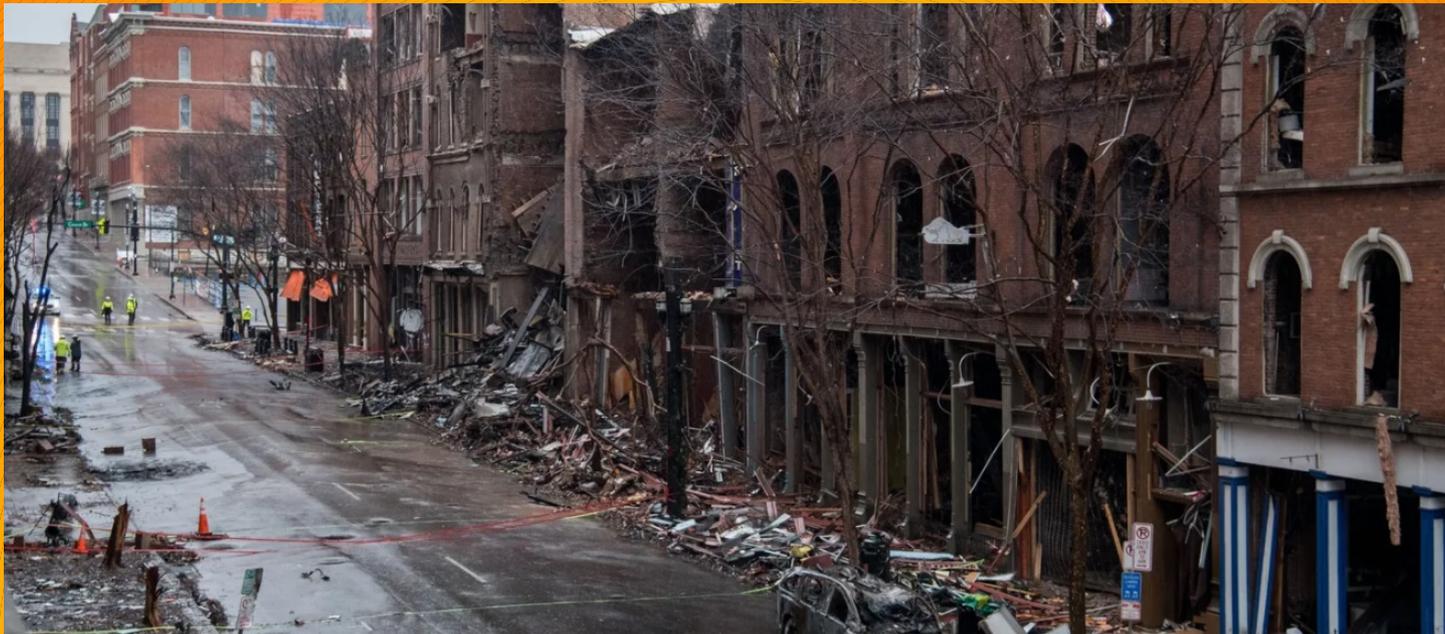
# Communications when normal no longer works

- Talk for Florida Baptist Disaster Relief
- April 2, 2022

# PSTN

- Public switched telephone network
- Moves internet + telephone
- Majority of connections likely by RADIO today (cell phone)
- Combination of many different technologies, many different protocols.
- Resilient via multiple vendors
- Vulnerable via communications hubs

- Nashville, TN AT&T
- Christmas Day, 2020, 63-year-old Anthony Quinn Warner detonated his RV in front of the AT&T building at 0630 local



- Tennessee State EOC lost most, almost ALL of their connectivity. A mesh-based system remained.
- AT&T did a herculean effort, basically rewiring the entire building after cleaning all of it out.
- Systems rerouted as best as possible, but this was a huge communications hit that left PSAPs in many counties disconnected for a long long time.

- Hurricanes routinely destroy towers, cables.
- Trucks get bogged down trying to refuel generators – or don't even try
- ICE warps or destroys towers, bends microwave dishes, no longer point correctly
- DNS hackers disrupt addressing; denial-of-service attacks hamper usage – and state-adversaries can disrupt at multiple levels.

# FEMA

- Craig Fugate recounts asking FEMA to contact State EOCs without using the PSTN. Their much funded ALE-based system.....didn't work.
- Florida: strange request just last week to contact the State EOC from our EOCs if possible.....Craig said he was "running another test" ....and I bet they all failed.

# Without the PSTN

- How do you reach your volunteers?
- How do you reach your NGO?
- How do you reach your law enforcement?
- How do leaders communicate any orders?
- Command and Control often depend on the PSTN
- Russian generals....dependent on the PSTN – and easily geo-located, targeted with fatal outcome after fatal outcome.

# Alerting Systems

- Very difficult to maintain.
- Example: tornado warning, broadcasts; weather warnings
- National system exists, and WINLINK can send messages to it....
- But it won't really likely work for NGO's.
- **Your volunteers are going to have to self-alert** and then have a way to get information.
- Your NGO is going to have to have command and control without PSTN

# When the wires don't work

- Long distance comms basically require wires or radio, or radio/satellite
- If the wires (PSTN) are broken, back to radio / radio+sat
- Comms:
  - (A) Everyone monitors XYZ 24/7/365 (improbable)
  - (B) Everyone meets if concerned – possible, but resource intensive
  - ( C ) Everyone caches messages to each other

# Available Caching systems

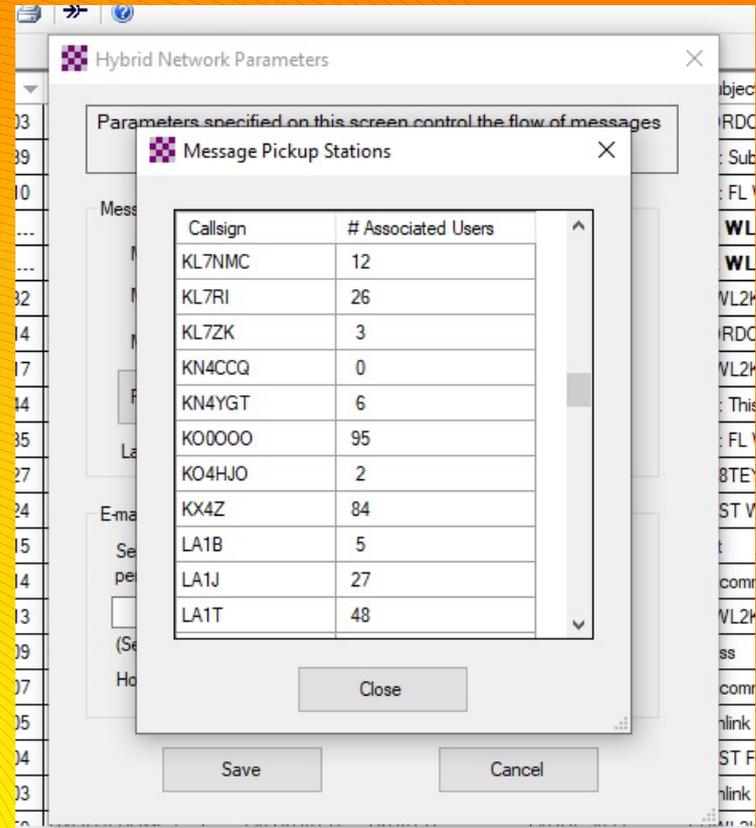
- (1) Voice Nets with real humans: SHARES SE / SHARES National / NFL ARES Emergency Net
- (2) Radio-Only SHARES / Radio-Only Public WINLINK – requires checking a pre-chosen MPS (message pickup station) – WORKS!
- (3) JS8 Caching Systems – informal AA3YB at present

# (1) Voice Nets

- Humans may **CACHE MESSAGES** for you
- **NFL ARES: 3.950 LSB or 7.224 +/- LSB**
  - Best if you gain some familiarity. Often you'll need **POWER**
- **SHARES SouthEast**
- **SHARES National**
  - Also best if you gain some familiarity, and often you'll need some power but relaying likely
  -

## (2) Radio Only Winlink

- Emails injected into the “radio-only” will be cached at your MPS station(s) without any need for the internet
- Just like the voice nets, **you will need to check into one or the other of your MPS’s in order to retrieve.** So this is SELF-AWARENESS ALERTING.
- (System can notify you of cached messages via email, but that’s not useful if that’s the problem in the first place....)
- Lists of MPS stations
- Settings | Hybrid Network Parameters



- Setting your MPS
- Set 1 or 2.

Hybrid Network Parameters

Parameters specified on this screen control the flow of messages when they are being sent via radio-only forwarding.

Message Pickup Stations (MPS)

MPS 1: KX4Z

MPS 2: N5TW

MPS 3:

Update list of RMS available as MPS

Display list of RMS available as MPS

Register MPS via Internet

Queue radio message to register my MPS

Last MPS list update: 2022-04-01-19:21

E-mail notification of pending messages on MPS

Send e-mail notifications to these addresses when there are pending radio-only messages being held on MPS for you.

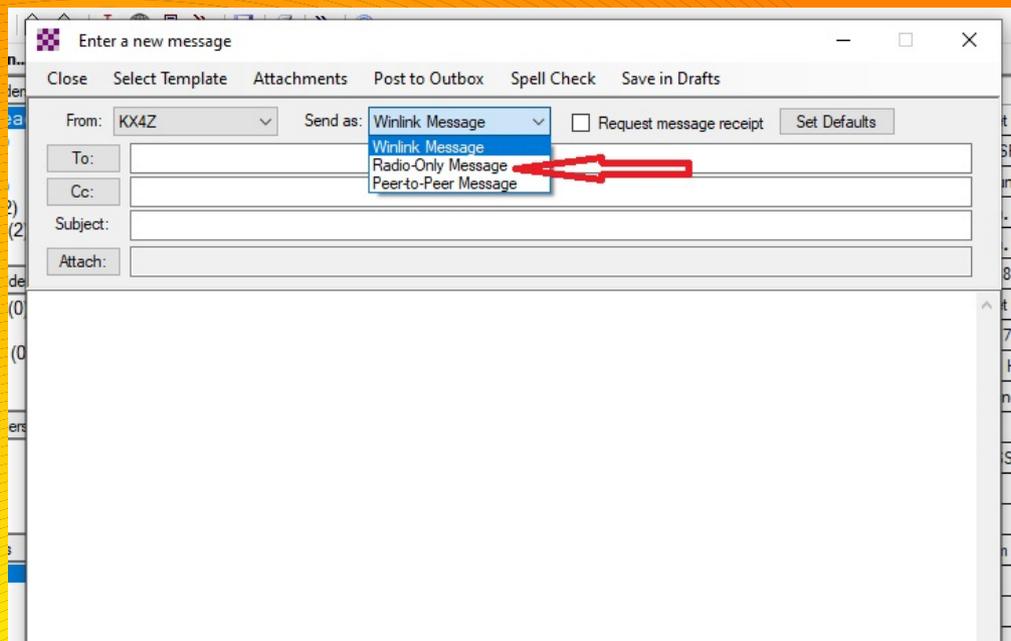
(Separate multiple e-mail addresses with semicolons)

Hours pending before notification message is sent: 4

Save Cancel

# Injecting Messages

- Sender creates “radio-only message.” This is handled and marked DIFFERENTLY.



- Sender must transmit using a Radio Only winlink Session. (e.g. VARA or PACTOR)
- Must connect to a HYBRID STATION.

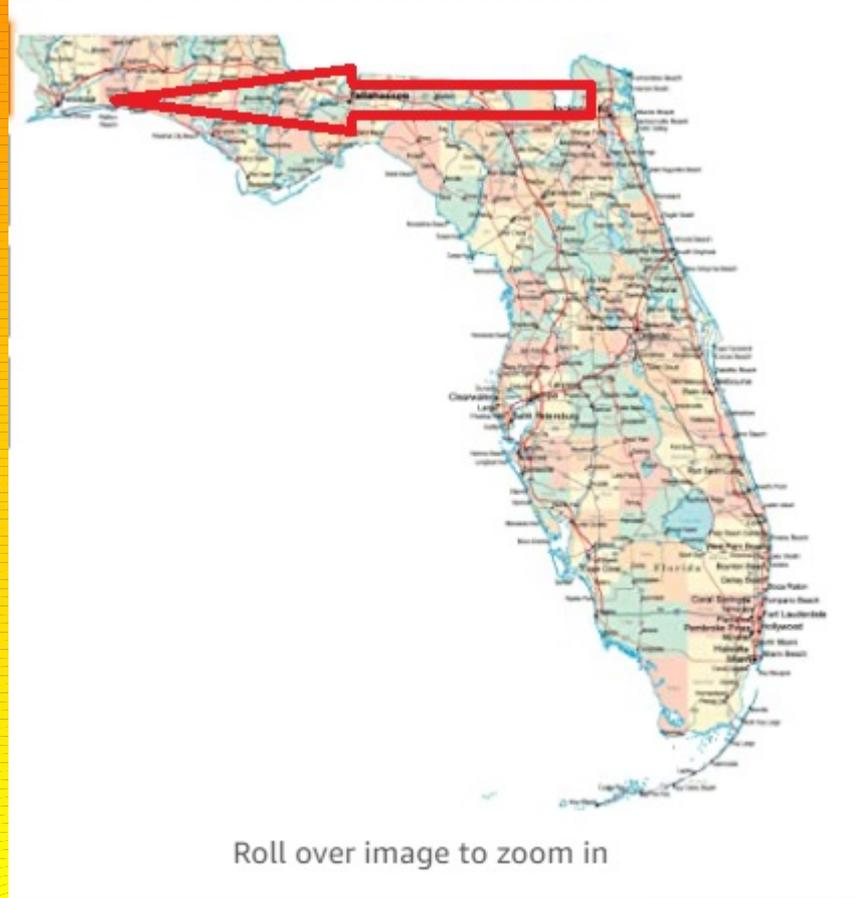
1.6.2.2 - KX4Z

Settings Message Attachments Move To: Saved Items Delete Open Session: Logs Help

Date/Time	Message ID	Size	Source	Sender	Recipient	
2022/03/22 17:03	JO6S43WGFHIZ	1543	W4AKH	W4AKH	KX4Z	Telnet Winlink
2022/03/22 13:39	BKL8YKMR8OX3	2245	SMTP	SMTP:galluplelan...	KX4Z...	Ardop Winlink
2022/03/22 13:10	VNGQLWBLOUKG	451	W4AKH	W4AKH	KX4Z	Vara HF Winlink
2022/02/21 1...	2Y2NOU75ZU...	221	KG4VWI	KG4VWI	KX4Z	Vara FM Winlink
2022/02/21 1...	DB4EGLWY9...	251	KG4VWI	KG4VWI	W4AKH	Iridium GO Winlink
2022/02/21 08:32	MQ7ZR60XXYMY	3130	KD8TTE	QSP	WD8IJ...	Packet P2P
2022/02/15 16:14	JFXZW418DLBR	970	W4AKH	W4AKH	KX4Z	Pactor P2P
2022/02/14 00:17	LBYO83FTTHS7	3205	KD8TTE	QSP	N2LC...	Robust Packet P2P
2022/02/12 20:44	4YRP6196RKJZ	410	SMTP	SMTP:galluplelan...	KX4Z	Ardop P2P
2022/02/12 20:35	PV4MGU25WHVO	903	SMTP	SMTP:galluplelan...	KX4Z...	Vara HF P2P
2022/02/10 20:27	AJJEG0HJ17B7	178	KE8TEY	KE8TEY	ARRL-2022	Vara FM P2P
						Telnet P2P
						Pactor Radio-only
						Vara HF Radio-only
						Vara FM Radio-only
						Telnet Radio-only
						Telnet Post Office

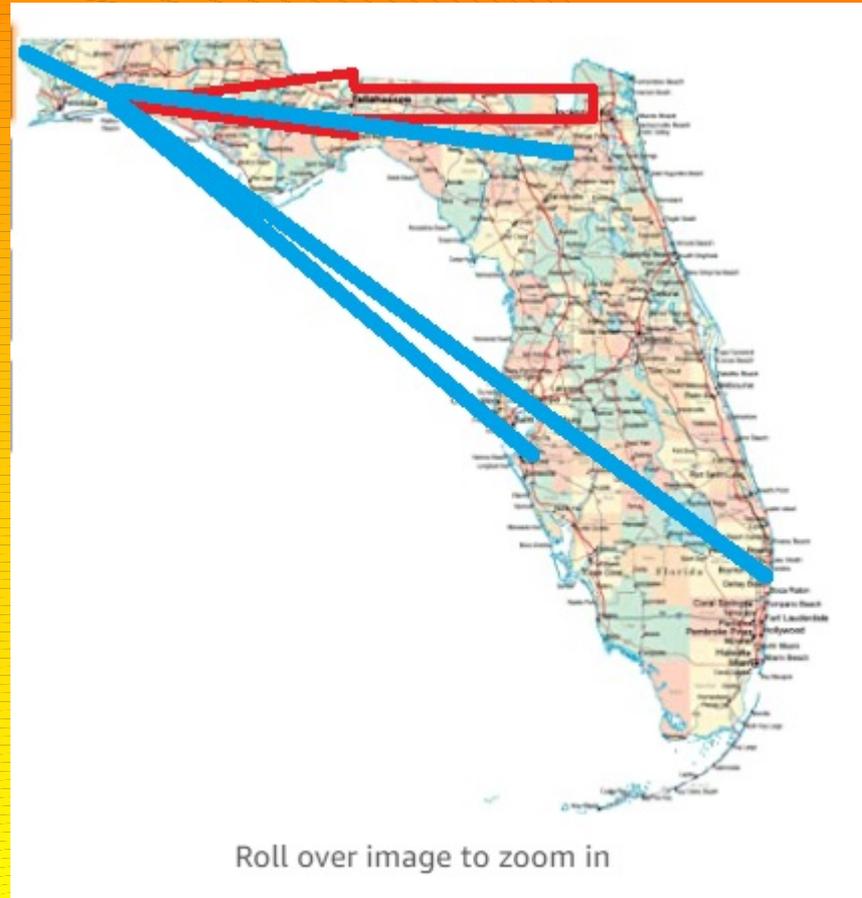
# Use Model

- Incident Commander urgent message posted to Hybrid RMS anywhere in nation.

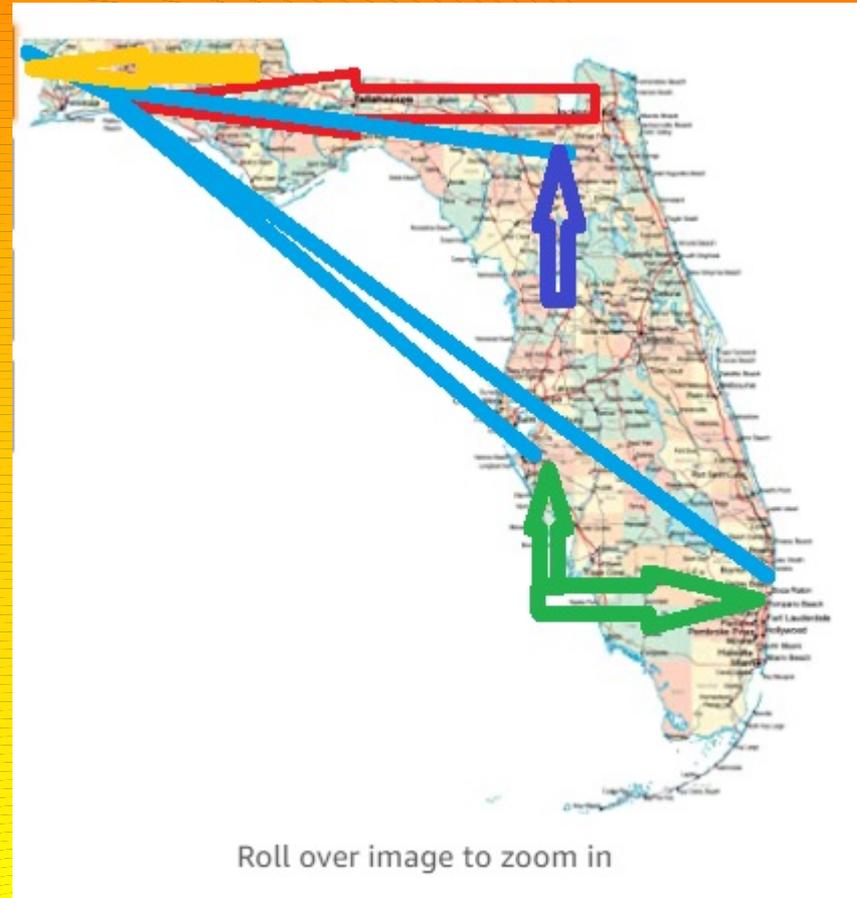


Roll over image to zoom in

- Under computer control, hybrid station moves messages to MPS's of addressed persons.
- This can be 20 minutes... or hours.



- Self-aware volunteers then query their MPS's and pick up the urgent message(s)
- For most of our users, this is going to have to be the HAM WINLINK system, not the SHARES system.



## (3) JS8

- JS8 is an incredibly LOW SIGNAL SYSTEM, that also has many of the features of networking type systems such as APRS or AX.25
- The Signal to Noise limit of JS8 on a 2.5 kHz bandwidth is approximately -20 dB.
- By contrast, good voice readability requires + 10 dB
- JS8 (and FT8) are approx 30 dB better than Voice.
- That is 1,000 times better.

# REALLY low signal

- JS8 can even beat a Pactor Modem – because it uses VERY SLOW and synchronized timed tones.
- Pactor Modem is probably 20dB or more, better than voice.
- JS8 is significantly better than even that.

# Caching Abilities

- JS8 station can issue REQUESTS to another JS8 station.
- JS8 station can automatically REPLY to REQUESTS
- What is my SNR?
- Who hears me? (“heart beat”)
- Whom can you hear?
- Please relay this message to XYZ
- Please cache this message for XYZ
- And more.

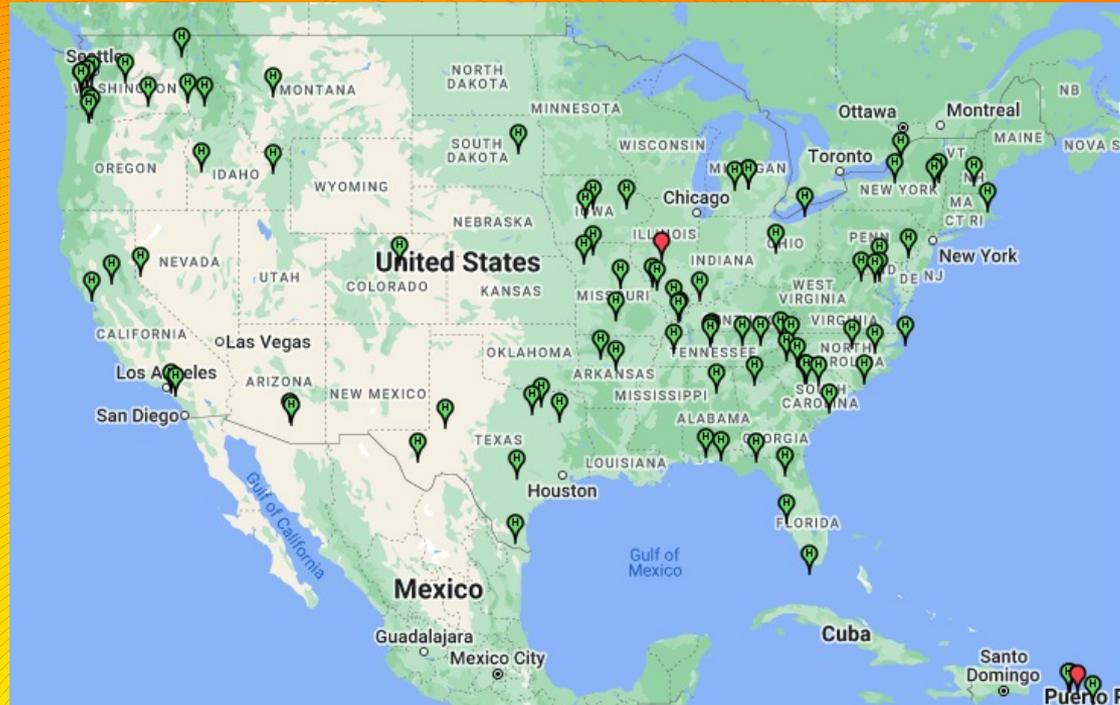
- JS8 is so good that you can move traffic hundreds or thousands of miles with less than a watt....or with a really poor antenna.
- JS8 recognized frequencies are on most HF bands
- We have established an experimental CACHING STATION: AA3YB

# Deployed Communications

- Deployed communications are typically to AGENCIES or SUPPLIERS.
- AGENCIES may have more defined backup communications systems – easier to reach.
- Florida State EOC can be easily reached by direct SHARES winlink email; or via the voice nets, or SARNET
- COUNTY EOC's can sometimes be reached by SHARES VOICE or ARES NFL nets, or SARNET.

# Case: Reach AHJ

- **State EOC or AHJ still has connectivity**
- **Easy to reach:** Winlink or voice or other technique to jump out of disaster area, unload traffic, have it directed to the EOC or AHJ.
- Probably doesn't reach your volunteers in disaster-affected area.



# Case: Reach Home NGO

- Defined techniques to maintain comms
  - If PSTN works distant, then normal WINLINK (shares or public) will work well.
  - Note NND4DR can send email to KX4Z etc
  - If PSTN failed completely, back to MPS's, Voice Nets, JS8
  - Must PLAN these solutions prior to impact.

# CONCLUSIONS

# Organization

1. Need for an organized presentation of the means of communication available to the organization and participants. ICS-205. Allows volunteers to know techniques available.

INCIDENT RADIO COMMUNICATIONS PLAN ICS-205										
CONFIDENTIAL - DO NOT PHOTOCOPY OR DISTRIBUTE										
INCIDENT RADIO COMMUNICATIONS PLAN (ICS-205)										
<b>1. Incident Name:</b> EXAMPLE PSTN-DOWN COMMUNICATIONS			<b>2. Date/Time Prepared:</b> Date: 4/1/2022 Time:			<b>3. Operational Period</b> Date From:                      Date To: Time From:                      Time To:				
<b>4. Basic Radio Channel Use:</b>										
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
DISTANT RADIO CONNECTION SYSTEMS										
1		Tactical	SARNET	HAM	SEE SARNET MAP			A	Microwave linked	
2		Tac/Log	ARES emergency net	HAM	3.950 7.224 LSB	N/A	3.950 7.224 LSB	N/A	A	Often has State EOC representation
3		Tac/Log	SHARES SE	Shares				N/A	A/D	<b>CONFIDENTIAL NND4DR</b>

# Planning

2. Plan which techniques will be monitored during an awareness of loss of communications, by each volunteer.

KNOW how to reach each key player.

- Will you check an MPS?
- Will you check a JS8 Cache?
- Email?
- Other?

<b>ICS-205A</b>		
<b>1. Incident Name:</b>	<b>2. DATE / TIME PREPARED:</b> Date:  Time:	<b>3. OPERATIONAL PERIOD</b> Date From: Time From: Date TO: Time TO:
<b>3. Basic Local Communications Information:</b>		
Incident Assigned Position	Name (Alphabetized)	Method(s) of Contact (phone, pager, cell, etc.)

# COML

Deployed unit should notify COML of Incident Command of their communications plans to provide integration and deconfliction. (Standard ICS behavior)

List Repeaters in Use

List methods of contact

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