

Alachua County Volunteer ARES® / ham radio backup communications plan

Putting our great volunteers in the
context of the entire community
response

Sections

- 1) A BRIEF examination of COMMUNICATIONS
- 2) Review of how SERIOUS is a loss of COMMUNICATIONS
- 3) Survival Goals of Community during real loss of COMMUNICATIONS (*my estimates only*)
- 4) Larger Government Plans/Provisions for real loss of COMMUNICATIONS (*my knowledge is incomplete, but much better after input from K. Rulapaugh*)
- 5) How WE fit in!

Acknowledgement

Even though I've been "doing this" for a decade or so now, I still don't know everything about the authorities' capabilities and plans to safeguard communities. (Because I don't DO that for a living!)

Kevin Rulapaugh KE4NVI is high up in the Fire/Rescue (under which we volunteer) and was kind enough to look over the preliminary talk and give me a LOT more insight into the likely authorities' response to disaster and how we fit in!

Thanks!

1. A BRIEF examination of COMMUNICATIONS

Massive Daily Data Throughput

- Global daily Internet throughput (2024) > 33 exabytes (33 x 10^{18} Bytes daily)
- Approx 4.2 Gbytes per user per day (4.2×10^9 bytes)
- Additional traffic moves over copper-wire telephone, and local cell-phone tower-to-tower traffic
- Gainesville (~ 1×10^5 population): conservatively 4×10^{14} daily bytes.
-

Ham Radio Total Throughput

- Assume 50 MHz bandwidth
- Pack EVERY SINGLE kHz with maximum digital
- Shannon Limit of 25 Mbit per second throughput = approx 2.5 Mbytes/second
- Daily theoretical limit of 50 MHz = $\sim 2 \times 10^{11}$ bytes
- **Only able to move 1/2000 of the normal daily traffic of our city....**
- In other words: even theoretically impossible to sustain NORMAL throughput: RATIONING of communication will always happen

All of ham radio can't come close to replacing NORMAL communications for even a modest city.

Some Categories of Communications Types

- Estimated 65% or more data throughput = VIDEO (e.g. streaming TV, radio, youtube etc)
- Email. (Huge amount = SPAM)
- Telephony
- Industrial/commercial command/control (electrical grid; natural gas grid; water grid; just-in-time ordering of parts, fuels, groceries, products)
- Consumer Internet usage (google searching, web browsing, etc)
- Banking/Finance (e.g. buying gasoline at pump, withdrawing \$\$ from ATM)
- Essential governmental functions: POLICE & FIRE command and control

Obviously, for protection of life/property, some of these are of differing importance during a real, huge, disaster. We can dispense with spam email, right?

2. Review of how **SERIOUS** is a loss of **COMMUNICATIONS**

Actual History Comms Outage New Orleans / Katrina (1/3)

HURRICANE KATRINA DEVASTATION



“local Communications . . . destroyed.”

- Crippled thirty-eight 911 call centers.
- Knocked out more than 3 million customer phone lines in Louisiana, Mississippi, and Alabama.
- 50% of area radio stations and 44% of area television stations went off the air.
- 1,477 cell towers were incapacitated.
- **The complete devastation of the communications infrastructure left responders without a reliable network . . . Local emergency response officials found it difficult or impossible to establish functioning incident command structures. . .**

- o The Federal Response to Hurricane Katrina: Lessons Learned

[https://
www.napco.org/
documents/2014-
05_Benoit.pdf](https://www.napco.org/documents/2014-05_Benoit.pdf)

Actual History Comms Outage New Orleans / Katrina (2/3)

- Few radio/TV remained
- Vast number of cell phone towers down
- General public = extremely limited comms
- Police/Fire = extremely limited comms (trunked = down; limited simplex remained). **Police were guided by gunfire sounds where to go.**
- Just-in-Time ordering systems ZERO.

Katrina (3/3) – it's HORRIBLE!

- Very difficult to notify public of essential survival info
- Horrible situations for shelter / food / sanitation
- Hospitals flooded, power loss
- Medications gone – no PAINKILLERS for suffering patients
- Mercy killings thought common
- Unchecked Crime & even police killings
- Defensive Civil rights of citizens violated

3. Survival Goals of Community during real loss of COMMUNICATIONS (*my estimates only*)

Survival Goals? (my guesses....)

- Provide and announce **SAFE WATER** (required in HOURS for many)
- Create & announce **SHELTER** for vulnerable / displaced citizens (required within HOURS in dangerous weather)
- Provide and announce **SAFE FOOD** (required within a DAY to prevent crime/riots)
- **Keep POLICE on the road** (absolute requirement for comms and backup or Blue Flu)
- **Keep FIRE on the road** (or city begins to burn down)
- **UPWARD notification:** continuous status reports and requests to state/federal suppliers
- **DOWNWARD Information:** toward all citizens (utilize all possible announcement system: radio TV signs, PA trucks – anything that still works)
- **LATERAL Communications:** inter-group communications
- **FAMILY REUNIFICATION** – likely essential for survival of vulnerable populations; more important for unplanned and sudden disasters

Next Goals: (my guesses....)

- Support resupply of HOSPITALS (1 day?)
- Support resupply of FUELS (3 days?)
- Support resupply of GROCERIES (3 days?)
- Support citizen telephony beyond REUNIFICATION (? 1-2 days required?)
[Make possible: Large providers / Cell on Wheels etc]
- **Civil Authorities definitely push hard with a zillion assets to bring all of these about.** *Our volunteer team has limited number, limited throughput, but we are one of their tools to put to work, and we have some techniques that can be of help! Working INSIDE the system has significant advantages!*

Reality: Most Disasters Not Nearly That Bad!!

- We COULD be hit badly by a hurricane, since we are only 40-50 miles from the coast....
- BUT NORMALLY we only get 60 mph winds, lots of power outages, some traffic accidents, lots of trees down and roads snarled.
- Deputies carry chain saws & immediately start clearing roads!
- Our wonderful volunteers are generally deployed only two-half-days and one night – in private rooms just for them!!
- Nevertheless....we TRAIN for far bigger problems (just like any responsible armed forces does!) By BEING THERE all the time – we gain standing to be used if there IS a huge disaster. We aren't "outsiders"

4. Larger Government
Plans/Provisions for real loss
of COMMUNICATIONS (my
knowledge is incomplete)

Levels of Assistance

- “Disasters start and end locally”
- We are “on our own” as a community to use our OWN TOOLS in the beginning, until we NEED and CAN GET any additional help.
- Once we are beyond local tools, we turn to STATE. (So does everyone else....) Once STATE is beyond their tools, they turn to FEDERAL....
- Adding layers takes TIME. Assets may or may not be pre-positioned. **There is a huge advantage to having our ducks already in a row.**

Federal: FEMA Disaster Emergency Communications – Goals / Assets

- Professionals doing this for years – what are THEIR assets, skills and plans to help?? (looking at their plans helps me understand what has worked in the past)
- <https://www.fema.gov/about/offices/response/disaster-emergency-communications>
- Slide show: https://www.napco.org/documents/2014-05_Benoit.pdf
- (One of multiple types of emergency response efforts....for more, see ARRL Basic/Intermediate Emcomm training)

This is only ONE of possibly MANY federal assets – take courses to learn more...

FEMA DEC GOALS

- Support **effective tactical interoperable voice, video and data communications for emergency response teams**
- Identify mission-critical disaster emergency communications capabilities, requirements, solution and mitigation strategies
- **Develop an effective command and control communications framework** for the Regional Administrator
- **Promote communications interoperability with State and local response organizations** through Regional Emergency Communications Coordinating Working Groups (RECCWGs)
- **Overall: Support the ability of public safety entities to operate, to interoperate with other organizations and jurisdictions and to continue operations when their primary infrastructure is damaged or destroyed**
- https://www.napco.org/documents/2014-05_Benoit.pdf

We DO These
Too!

FEMA thought these useful:

DEC can provide:



Mobile
Disaster Recovery Centers



Wired and Wireless
Public Internet (limited area)



Charging Stations

DEC (2)

In addition to services provided to First Responders, DEC can provide:



Temporary Mobile Office Space with Full Communications Suite



Temporary Facility Communications Support



Live Video Feed

DEC can provide:



Temporary
Restoration or
Augmentation of
Land Mobile Radio



Radios and
Satellite Devices
(short duration)



Technical
Assistance

STATE level includes:
MARC units (Total: 8) have
these capabilities also.

Our group has modest
capabilities also, which can
be deployed by the EM

DEC for the public:

DEC can provide:



Mobile Communications Support



Handheld Devices to Augment Teams
(if requested)

Similar to ideas we have had to directly assist the PUBLIC

I was basically unable to convince FL Bapt Disaster to pursue these

We have near-zero experience and difficult to predict usage... so far I have not seen a huge need in limited hurricanes.... Likely different in a major disaster!

State/Local Assets

- State assets include 8 MARC Units + I don't know what else
- MARC Units are phenomenal – we have had talks from Kevin Rulapaugh at several Field Days
 - 100 foot towers
 - Ability to support multiple repeaters
 - AMAZING amount of handheld radios they can disburse with batteries – equip pretty much an entire city

SOME units that can be activated

- Local: Police/Fire – use Trunked Radio System, multiple towers, computer control (fiber optic).
 - Isolated tower can be downed by tornado: units in that area cut off. Local teams can repair (time?)
 - Larger system failure: huge problem! Have to shift to individual repeater(s) / simplex – e.g. Katrina.
 - Tabletop efforts have raised eyebrows of the severity of that outcome...
 -

Asking for more help...

- VENDORS – e.g Motorola, AT&T, Verizon, etc etc – move in to help (\$\$\$)
- Mutual Aid requests. State EOC / ESF#2 @ state level coordination / response → may initiate strike teams to tackle needs
- Urban Search & Rescue (have their own comms, and 2 Starlinks/Equivalent – MARC units may work closely with US&R to help provide their comms
 - Each MARC team has 1 starlink & 100-foot tower/repeaters and also now HF capabilities / CODAN (with lots of capabilities, including ALE) “connected bubbles” created by MARC teams
- Incident Management Teams have Starlink also
- **Federal teams** (may be stretched to multiple states, but FEMA has multiple Incident Management Teams, daily briefing of where deployed available to everyone)
- **DOD & National Guard** may also be deployed – have their own comms, land mobile radio and satellite – but for THEIR needs

Our LOCAL Assets / Abilities

- Nice assets: but State/FEMA will be stretched THIN THIN THIN
- State FDEM does have HUNDREDS of Starlinks (we've already used one 2024 for example)
- We may see little to zero of their gear / depends of size of disaster
- As part of Alachua County ESF#2 – **we can be deployed as well**
 - LOCALLY: 14 rugged VHF/UHF GO BOXES (Sheriff) w/both public service and ham radio. 11 equipped to immediately connect to Signalink (**please** get one for yourself and bring it, OK???)
 - LOCALLY: 2 loaner Signalink; 2 loaner PCs [EOC backup radio room]
 - LOCALLY: Small number of STARLINKS privately in our volunteers
 - Able to be deployed **anywhere needed**: Shelters, Hospitals, Points of Distribution (food, water, fuel); Fire Stations – anywhere needed
 - Pre-vetted, liability protection & workman-comp. We will be utilized.

Limitations: Our LOCAL Assets / Abilities

- Modest # of **badged/trained volunteers** – I'm constantly trying to INCREASE this number! People AGE OUT!!
- Modest # of volunteers **digitally capable** on top of voice (key for high volume hospital orders etc) We are constantly trying to help more of you gain these useful skills!
- SMALL number of STARLINK deployable assets (?3)
- Small number of **home-bound volunteers** with significant skills
- Multiple voice repeaters / Multiple RMS stations / Digipeaters

Unknown depth of State/Federal etc

- Although FEMA / ARRL training has introduced me to MANY amazing communications assets.....
- (Some of which have some hilarious breakdowns....)
- I just DON'T KNOW all of their assets – when DOD (military) might also come into play!!!
- It isn't my JOB or PLACE – I just work to manage the missions we have been tasked with
- *If feel certain that if there were a huge need for health & welfare or other comms needs and we (MOU volunteers) had depth & assets to fill it – the EM would react positively to sending our resources to fill that hole! I just haven't ever seen a disaster where this was a huge need, so far...*
- We then have the advantages of SUPPORT, LIABILITY COVERAGE, VOLUNTEER COVERAGE

5. How WE fit in!

- 1) We DON'T get "in the way"** (volunteers are sometimes a "disaster within the disaster" and many groups have been sent away permanently for this reason....)
- 2) We DON'T cause DRAMA** (see above)
- 3) We DON'T try to run the show** (e.g "*because we know better than the authorities*")
- 4) We DO work constantly** toward our two currently ASSIGNED MISSIONS
 - **Provide backup comms to requested deployed locations** (e.g. shelters)
 - **Provide backup comms to State** (and likely other counties)
 - (nomenclature: you pick where on the PACE you think we are; the EM didn't use those terms when she assigned our missions)
 - As long as we don't get in the WAY or cause DRAMA they seem generally happy with our activities....and are learning more about our capabilities

How to find our COMM PLAN



NORTH FLORIDA AMATEUR RADIO CLUB MOST ACTIVE GAINESVILLE HAM RADIO CLUB!!

NF4RC – HAM RADIO LEARNING AND SERVING – THE TEAM THAT POWERS ALACHUA COUNTY ARES(R)

HOME ABOUT/CONTACT/ZOOM VOL HRS CLUB HIST. **COMMS PLAN** INCIDENTS PAST EXERCISES CLUBCALENDAR

EDUC. ARTICLES MINUTES/LIC. WINLINK INFO FIELD DAY PAGES LINKS

GROUPS.IO



Winter Field Day Jan 24 Training Conference

© GORDON GIBBY KX4Z © DECEMBER 17, 2025 0

We invite local as well as distant leadership or...

READ MORE

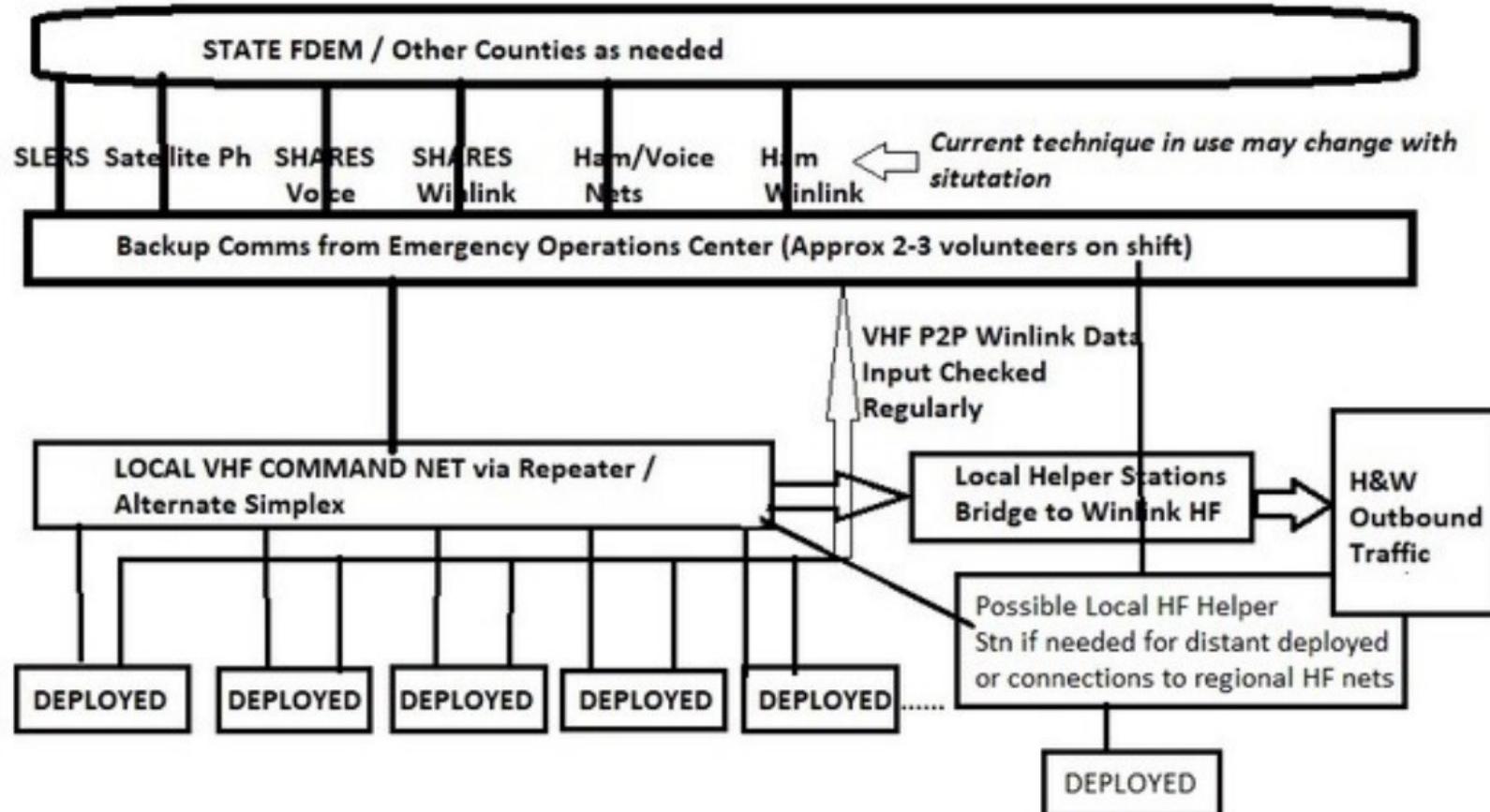
ALL KINDS of ACTIVITY!

- Every Wed @ Alachua County EOC: SHARES & SARNET check-ins to maintain county competencies (visitors welcome!)
- Every Thu Evening: ARES(R) net 8PM on the K4GNV 146.820 Repeater (many thanks to GARS!)
- ARRL Field Day: ~294 volunteer hours in

1

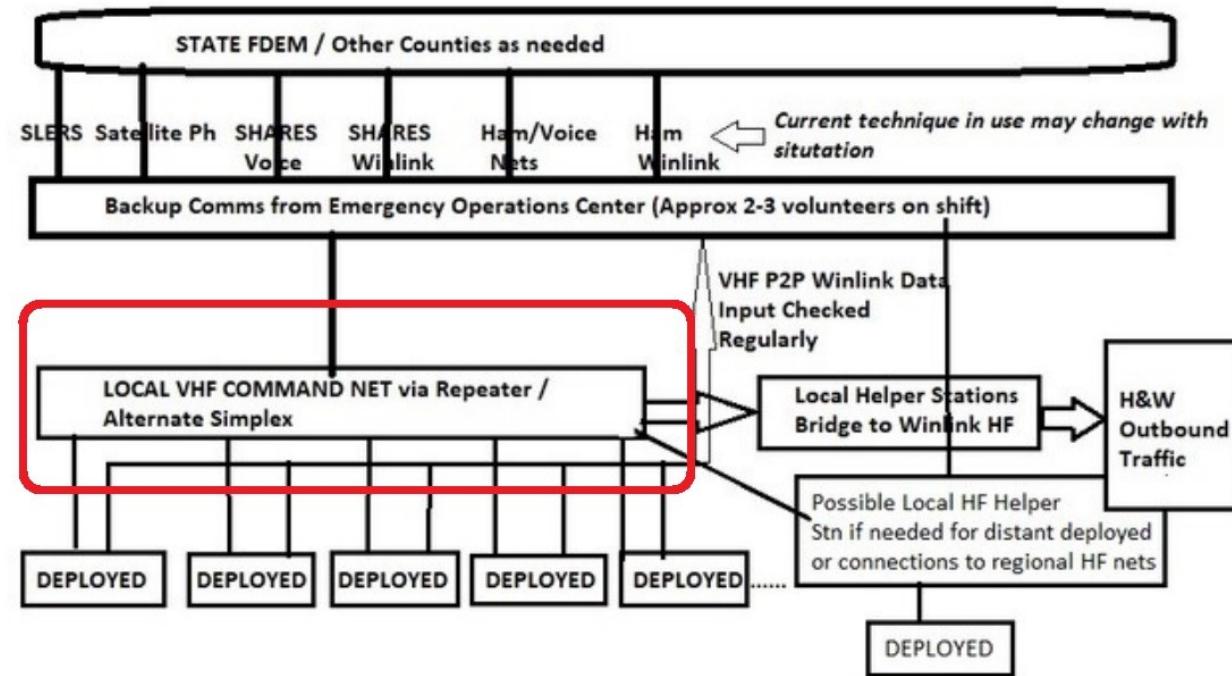
Alachua County ARES(R) takes 1st Place

Flexible Comms Groups



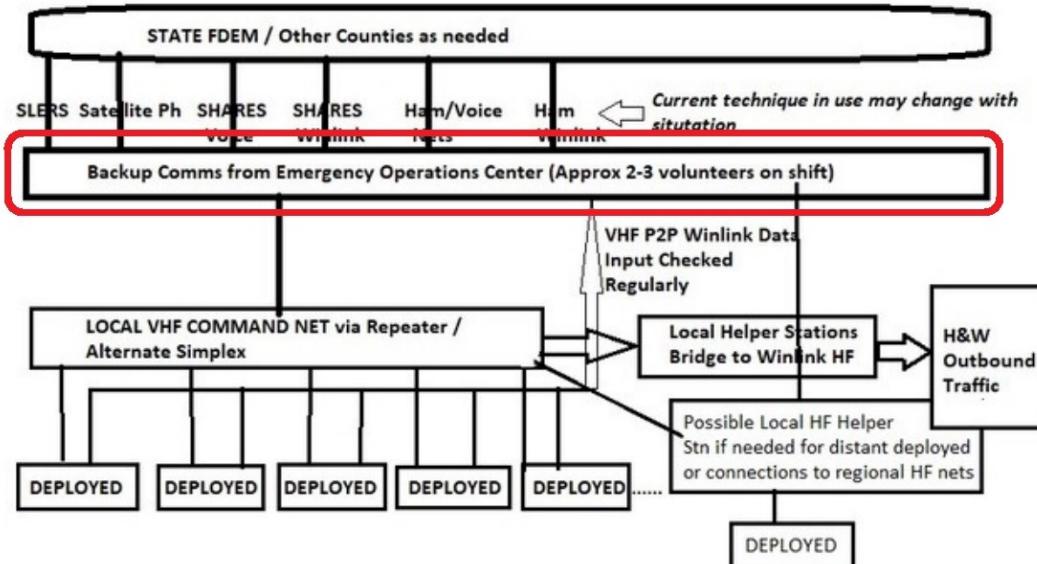
Backbone VHF Net

- Repeaters per ICS-205
- Simplex if necessary
- Provides backbone for other systems
 - STAFF OUTSIDE of the EOC!!
 - Local helper HF/WINLINK offloading
 - Possible GMRS or Meshtastic (if staffed by volunteers)



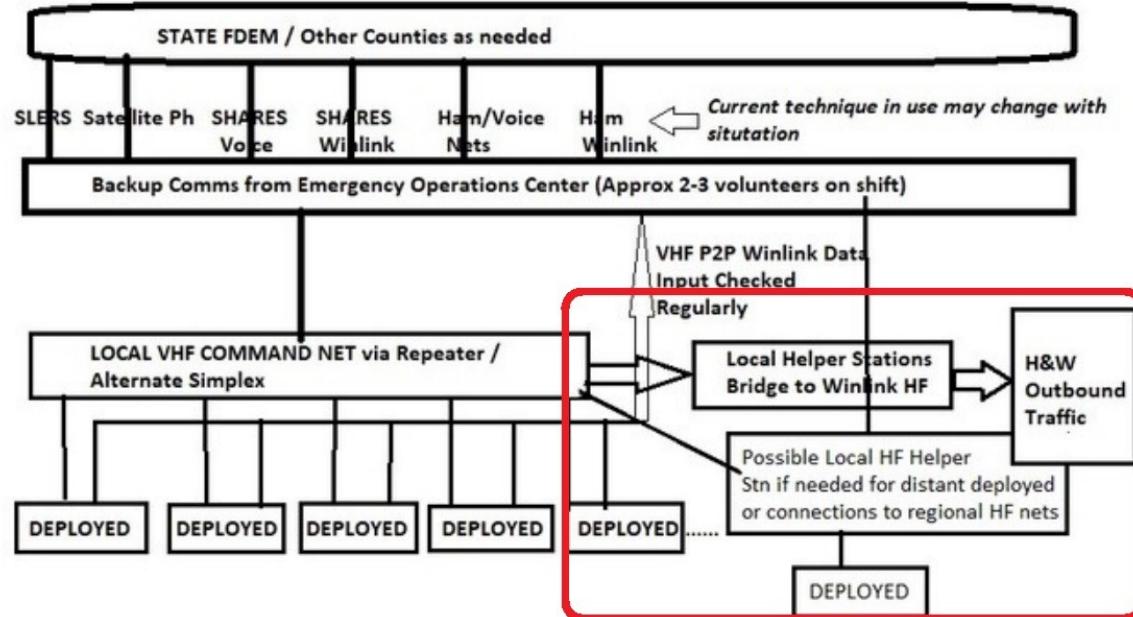
EOC End

- 7 Techniques to reach STATE
- Multiple techniques to reach surrounding counties
- Continuous digital input
- Participate in multiple NETS simultaneously
- Participate in ESF#2
- Participate in all EOC Briefings



Flexibility for Connected Systems

- No limit on external systems able to connect
- Bidirectional
- Meshtastic / GMRS / anything
- Requires dedicated relay volunteers
- Usefulness probably depends on reliability of interface
- Authentication on incoming msg is an issue?



Very limited monitoring capabilities of available humans means "new systems" MUST interface flexibly and reliably to existing backbone.

Limited Frequencies FOCUS The Job!

Rather than guess where the organized response lives, we have solid written PLANS for connections and alternates....

INCIDENT RADIO COMMUNICATIONS PLAN ICS-205

INCIDENT RADIO COMMUNICATIONS PLAN (ICS-205)

1. Incident Name: BASIC TEMPLATE			2. Date/Time Prepared: Date: 11/4/2022 Time:			3. Operational Period Date From: NONE Date To: Time From: Time To:				
4. Basic Radio Channel Use:										
Zone Grp.	C h #	Function	Channel Name / Trunked Radio System Talkgroup	Assig n-ment	RX Freq. N or W	RX TON E / NAC	TX FREQ N or W	TX TON E / NAC	MOD E (A, D, or M)	Remarks
		Command	Local Net	Ham	146.820	123	146.220	123	A	Primary local command net; simplex if repeater down
		Command	Local Net	Ham	3.970 LSB	N/A	3.970 LSB	N/A	A	Primary comms in extreme comms event / EMP for direction
		Logistics (VARA-FM)	GNV-VARA	Ham	144.990 FM/W	N/A	144.990 FM/W	N/A	D	Growing VARA-FM communications possibilities Note Digipeater NF4RC-7 Expect EOC to operate P2P Winlink NF4AC VARA-FM
		Packet	GNV-PKT	Ham	145.070 FM/W	N/A	145.070 FM/W	N/A	D	Local Winlink packet servers / digipeaters
		Command	Local Net	Ham	146.985 FM/W	123	146.385 FM/W	123	A	Secondary local command net
		Command	Local Net	Ham	443.025	N/A	448.025	123	A	Tertiary local

What do these frequencies MEAN?

- We maintain a **VOICE NET** on VHF repeaters, with alternatives (**in order**). Also a SIMPLEX freq if all fail. (“Command Net” in FEMA terms)
- During “daylight” a **formal net convenes on each hour** and all deployed persons “check in” – we also take other hams and can serve as a clearinghouse.
 - Additional systems should connect to the Command Net as it is our “backbone”
- At **NIGHT**, this is “quiet monitored” so help available but you can snooze.
- Continuously we maintain **digital input Winlink Peer to Peer at the EOC on 144.990, callsign NF4AC**. You can send any messages to that callsign on that frequency, PEER TO PEER. Digipeater NF4RC-7 operates on that frequency and covers pretty much entire county
- *We can participate in additional SHARES & Amateur nets from EOC via our Antenna Multiplexer, which allows us to operate multiple HF bands simultaneously*
- *If needed we can bring up additional assets.*

How to connect UP & LATERAL

- Our ICS-205a provides useful connection information.
- Continually being upgraded as new connections develop.
- (Brett Wallace working on inter-county connections)
- **KEY: EM IS KEPT AWARE / involved!!**

ALACHUA COUNTY BASIC BACKUP VOLUNTEER COMMS

ICS-205A

1. Incident Name:	2. DATE / TIME PREPARED: Date: Time:	3. OPERATIONAL PERIOD Date From: Time From: Date TO: Time TO:
3. Basic Local Communications Information:		
Incident Assigned Position	Name (Alphabetized)	Method(s) of Contact (phone, pager, cell, etc.)
AUXCOMM Coordinator	David Byrum - KA4EBX	Email: dbyrum@tampabay.rr.com CELL: 727 297 5936
Alachua County Emergency Operations Center Backup Radio Room		Amateur Call: NF4AC SHARES Call: NCS181
ESF#2 Lead		
State FDEM	NNA4FL@WINLINK.ORG (Avoid contact unless absolutely necessary.) ALE: NNA4AI ((corrected)) (via ION2G) (Avoid contact unless absolutely necessary) Amateur: KA4EOC State Disaster Information: https://floridaeemergency.net/ Flinbook: https://www.florididisaster.org/globalassets/master_flin-	

WHAT WE CAN DO

- Provide backup tactical messaging from ANY deployed location (typically VOICE) [An assigned mission]
- IF REQUESTED: Provide logistical (digital) message if needed (e.g. hospital resupply etc) (typically WINLINK, possibly FLDGI)
- IF REQUESTED: Provide STARLINK support to limited number of sites (e.g. public comms / groceries / banks / fuel purchase)
- (State has MANY MORE – HUNDREDS – of Starlinks – Alachua County can requisition as needed)
- AS DIRECTED: Direct connections to other counties / STATE EOC as needed (VHF, HF, amateur / SHARES)

Considerable local talent!

- High power MESH systems
- High gain UHF antennas
- Possibility of quickly bridging fixed point-to-point comms needs with same systems we utilize for Field Day
- Experience with Duplexers, spectrum analyzers, power amplifiers – can quickly produce new repeaters on needed frequencies

Very useful capabilities for business

- **IF CALLED UPON BY EM**
- Assist by adding STARLINK to important facilities (hospital, bank, grocery, fuel) – connect businesses and put them back in business!
- Black Mtn Savings Bank did exactly that for Helene!
- Purchased Starlink: got their bank working again!



Volunteers & Notification

- 1) TO: **All known volunteers:** Notification of impending disaster via Command Net; groups.io/NF4RC/; Everbridge Telephone; Local WINLINK Gateways; Winlink Radio Only (works even if EMP)
- 2) TO: **Folks who indicate potential deployment:** Specific information on potential shelter opening (privileged information)
- 3) TO: **Actual deploying volunteers:** Directives to deploy; frequencies etc, other specific information

Our Communications Plan gives you **suggested items to carry with you** on deployment and also **information on using the radio(s)** you'll be provided.

Limited Knowledge/Experience

- Unexpected problems
 - *Nov 2025: Buncombe County (Black Mtn/Asheville) – emergency notification system HACKED. Unable to send mass alerts!*
- Unexpected resources (lots of agencies have radios!!)
- Hams often “think out of the box”
 - Can sometimes come up with unexpected SOLUTIONS
 - Broadest possible experience/knowledge can benefit their communities

Best way to serve is to

- 1) Carry out our ASSIGNED MISSIONS
- 2) Get BETTER AND BETTER via our training / exercises
- 3) Continue to develop increasing relationships with the legal authorities
- 4) Understand existing capabilities and assets
- 5) Suggest our services as appropriate when appear needed (we are right there with everyone else in the same room, face to face. Easy to discuss possibilities for better outcomes!)
- 6) DON'T TRY TO USURP the legally appointed authorities
- 7) Certainly help your local neighbors!! But never misrepresent yourself!





