Emergency Communications

FEMA

What is

Amateur Radio Emergency Communications

Why Ham Radio …

Amateur
… for the 'love of' ….

- The FCC– Title 47, Part 97
  - Basis and Purpose:
    - 'Recognition and enhancement of the value of the amateur service to the public as a voluntary, non-commercial communication service, particularly with respect to ***providing emergency communications***.'

Why Ham Radio …

- FCC encourages amateur radio 'to provide essential communications…when normal…not available.'
- When *common* communications modes become overloaded or inoperable because of traffic or power, effective, accurate and timely communications can be provided by licensed hams.

Why Ham Radio ...

- Amateur radio is the only communication 'system' that utilizes multi-band, multi-mode, wide-area networks independent of the 'infrastructure' or commercial power sources.
- A trained amateur operator can be on the air in minutes using only a battery and a wire a few feet off the ground to connect to stations a few miles away or around the world.
- However, it takes training, skill, coordination and discipline to effectively merge the technology with the service.

Why Ham Radio …

- CB, MURS, GMRS, FRS are short-range, low-power radio services available to any citizen.
- Internet connectivity becoming more common but requires comparatively expensive and reliable wired or wireless resources – *for all participants.*
- Telephone requires wired connections and cell connectivity is not always reliable.

But that only addresses the equipment …

Why Ham Radio …

- What we do and How we do it …
  - Mitigation
    - Who we are, where we come from
  - Preparedness
    - Training
    - Equipment
    - Modes
  - Response
    - NIMS and the Communications Plan
    - Disaster Communications
    - Repeater Operations
    - Amateur Radio Nets and Operations
  - Recovery
    - Shelter Operations
    - Health and Welfare
    - Property Damage Surveys / Assessments

Mitigation

Identify resources

- Independent, unaffiliated hams,
- Operators from all over Pima County, Independent and Club Affiliated,
- Members of area CERT organizations,
- Volunteers with Red Cross, Salvation Army, CAP, MARS,
- Trained NWS-Skywarn weather spotters.

Organize, associate

ARES

- *Amateur Radio Emergency Service* is an organized pool of hams who volunteer themselves and their equipment to local non-profit agencies, as well as to local, county and state government, to provide primary or backup communications links.
- Any licensed amateur is eligible to volunteer him/herself and her/his equipment to community service with ARES. The ARES Emergency Coordinator is a ham appointed by the ARRL District EC.
- In Pima County, that is Mike Boger, W7IJ

MITIGATION

Organize, associate

R.A.C.E.S.

- ***Radio Amateur Civil Emergency Service***
  A special phase of amateur radio, sponsored by FEMA (Federal Emergency Management Agency), an arm of the Department of Homeland Security (DHS), that provides radio communications for civil-preparedness purposes only. These emergencies are no longer limited to war-related activities, but can include natural disasters such as fires, floods and earthquakes.

- ***Pima County OEM Comm*** is the organized variant of R.A.C.E.S. which is sponsored by Pima County Office of Emergency Management under the direction of FEMA. During an emergency Pima County OEM Comm can be mobilized as a R.A.C.E.S unit.

Preparedness

PREPAREDNESS

Training

- ARRL Field Day
- Em Comm nets
  - 0700 (1400 UTC) Saturdays OEM Comm Early check-ins 146.880
  - 0715 (1415 UTC) Saturdays OEM Comm HF 75M Net 3865
  - 1300 (2000 UTC) Saturdays OEM Comm VHF Net 146.880
  - 1315 (2000 UTC) Third Saturdays OEM Comm Hospital Net 146.880
  - 0730 (1430 UTC) Sundays Arizona R.A.C.E.S. Net HF 75M 3990
- National Traffic System
  - 1830 (0130 UTC) nightly 147.160
- Local Tabletops and Exercises [arranged]
- Community Events in Southern Arizona
  - https://sites.google.com/view/soazhamservice

Training

- ARRL:
  - http://www.arrl.org/online-course-catalog
- FEMA ICS:
  - https://training.fema.gov/nims/
- AuxComm:
  - https://www.dhs.gov/safecom/blog/2016/07/11/auxiliary-emergency-communications
- CERT:
  - https://www.ready.gov/community-emergency-response-team
- DEMA:
  - https://dema.az.gov/

Training

Red Cross:

- Disaster Services
- Sheltering
- Feeding
- Transportation
- Disaster Assessment
- Volunteer Staffing
- Health Services
- Client Casework
- Facilities
- Supply
- Community Disaster Education

Training

Skywarn – National Weather Service:

- Weather Safety
  - Watch v. Warning
  - Flash Floods
  - Lightning
- Spotter Training
  - Thunderstorms and Tornadoes
  - Winter Storms

The Ready Kit

- The ARRL *Operating Manual* contains the Go Kit, Ready Kit information.
- Pima County *Volunteer Emergency Operations Plan*.
- Ready.gov – https://www.ready.gov/build-a-kit

Radio Gear

- 2 meter radio / HT (if multiband, 2m/440)
- Power
  - Extra AA replacement pack if available for your HT
  - Quick recharger(s) for battery type(s)
  - Wall plug adapter
  - Vehicle accessory (*i.e.,* cigarette lighter) adapter
  - Appropriate power supply, extension cord, grounding plugs, extra fuses if using mobile as 'base' station
  - Adequate ventilation if using automotive batteries
- Speaker Mic/Ear bud for noisy locations
- Appropriate portable/mobile antenna connections and adapters
- Ground plane (pizza pan/cookie sheet) to increase gain w/ mag mount
- SWR meter and Extra Coax
- Operator manual or instruction card for the radio(s)' programmable functions – frequency memory, offset, PL settings, using reverse and simplex

Other Gear

- Identification
  - ARES or ARES/R.A.C.E.S. Photo I.D., Agency IDs
  - Copy of your FCC License
  - Drivers License
- Other Equipment
  - Pens and/or pencils & paper
  - Map(s) of the area
  - Flashlight(s) and extra batteries
  - Credit card or some cash for fuel, snacks and phones
  - List of important phone numbers
- Food – Water - Clothing
  - Appropriate dress for the weather: *i.e.,* Sun screen, insect repellent, rain gear, cold weather gear, hand warmer.
  - Complete change of clothing, especially socks. Keep it dry in plastic. Sleeping bag, pillow, blanket.
  - Bottle(s) of water and some munchies.
  - Hand cleanser/disinfectant, dry towel.
  - *Personal* prescription drugs with instructions.
- Emergency Gear
  - Blanket, First Aid Kit

Alternative Modes for EmComm

- Why 'Alternative Modes'?
  - Efficiency (use 'Right Tool' for the job)
  - Provide both short haul and long haul data communications in event of Internet failure
  - Provide 'situational awareness'
  - Provide reliability and redundancy

Which Alternative Modes?

- Automatic Packet Report System (APRS)

  Used to report position with GPS
- Winlink 2000

  Global e-mail system using RF & Internet
- Digital SSTV (WinDRM, EasyPal)
- Others
  - PSK31, PSKmail
  - Pactor
  - WinDRM voice, FDMDV

  Other digital modes
- Digital Voice Modes

Digital Voice Modes

- Both hardware and software based modes:
  - Hardware: AOR Voice Modem, Icom D-STAR
  - Software: WinDRM, FDMDV

- Why?
  - Provide hi-quality noise-free audio.
  - Provides some confidentiality to communications and immunity to intercept.
  - FDMDV requires only 1100 Hz bandwidth.

Response

Emergencies!

- Blackouts
- Chemical Emergencies
- Drought
- Earthquakes
- Fires
- Floods
- Heat Waves
- Mudslides
- Terrorism
- Thunderstorms
- Tornadoes
- Wildfires
- Winter Storms

The area is likely to be a destination for evacuees from other locations, so local communications volunteers may be activated for hurricanes and volcanic eruptions, as well as other distant emergency events.

Emergency Responses

- Arizona Skywarn
  - http://www.skywarnaz.org/
- Severe weather
  - Monsoon Season
    - Thunderstorm
    - Flash Flood
    - Lightning
  - Not just Monsoon Season

Other Responses

- Hazardous Materials
- Search and Rescue
  - Fox hunts are a sub-set of S+R activity
  - Assist Law Enforcement track signals
- Shelter Operations
- Heath and Welfare
- Disaster Assessment

NIMS

- The **N**ational **I**ncident **M**anagement **S**ystem promotes interagency collaboration on domestic incidents.
- Incident Command System (ICS) is a component of **NIMS**.
  1. Clear text
  2. Unified command
  3. Flexibility
  4. Concise 'span of control'

1. Clear Text

- NIMS and ICS principles require that all transmissions be in clear text.
- No ’10’ codes.
- This assures that all cooperating agencies understand each other’s communications.

2. Unified Command

- NIMS requires that all agencies come under the authority of a single Incident Commander.
- The ICS command is determined by the nature of the event and the size of the response and may be changed during the event.

3. Flexibility

- Emergency events are seldom stable.
- NIMS/ICS recognizes the need to be able to adjust components of the response to the nature of the event.

4. Concise 'span of control'

- Emergency response operations will always include
  - Planning
  - Logistics *[amateur radio support]*
  - Operations
  - Finance
- Small numbers in operational groups mean more effective coordination.

RESPONSE

Amateur Radio Operations

- When an event occurs and as it develops, trained hams usually become part of the emergency communications plan.
- Command of any event falls to the appropriate authority:
  - Public Service: the sponsoring agency
  - Skywarn: National Weather Service
  - Emergency:
    - Civil preparedness: EMA
    - Other events: Red Cross
- Ham volunteers are communicators.

Amateur Radio Operations

- During an ARES response, any ham may participate and pass traffic.
  - The purpose of enrolling in ARES is to register equipment and volunteer for service.
  - It is NOT exclusionary.
- Even if an event comes under the command of DHS, ARES may be used by all agencies.
- But, if a *R.A.C.E.S. emergency* is declared by DHS, *only* R.A.C.E.S. operators may use the frequencies.

  While R.A.C.E.S. has the authority to commandeer a wide range of frequencies, only those necessary will be used for an event.

Amateur Radio Operations

- As much as possible, the operational nets shall be on 2 meters (VHF), which has an historic role in emergency communications.
- More operators, currently, have VHF capability.
- The N7OEM repeater has excellent coverage in and around Pima County.
- Growing numbers are adding 70cm (UHF) capabilities, and this area has excellent 440 systems.

Amateur Radio Operations

- 146.880 (-) [110.9] – Primary Strategy net frequency
  'Strategy' is the 'Big Picture' of the event; overall command and review, general tactics and tactical/resource traffic.
- Smaller ops within the 'Big Picture" are often on different frequencies.
- During an event/emergency, a frequency list will be published.

Amateur Radio Nets

- Any ham may institute a net, but no amateur operator has independent authority to declare an emergency.
- *Open Net* – declared, but usually normal use of the repeater continues while operators *rag chew,* or share information or concerns prior to an event. May have an NCO.
- *Directed Net* – public service and practice nets. Normal use of the frequency is allowed. Will have an NCO.
- Only a R.A.C.E.S. operator may activate a R.A.C.E.S. net at the request of DHS. Access *may* be limited to R.A.C.E.S. operators.

Amateur Radio Traffic

- Tactical traffic
  - The first response communication in an emergency situation.
  - Instructions or inquiries: 'Send ambulance.' 'Where are water supplies?'
  - Tactical traffic is generally unformatted and seldom written, but all traffic should be logged to protect both the radio amateur and the cooperating agency.
- Formal traffic
  - Generally long-term communications, often cast in ARRL message format and handled on NTS nets.
  - Health and welfare traffic is usually formal.

Amateur Radio Traffic

- Routine

The expected traffic and operational communications. On a *Formal Directed Net*, the flow is controlled by the NCO who may allow 'third-party' traffic and 'direct traffic' to facilitate information exchange.

Priority [or Time Value]

The second highest level of interruption, *Priority*, means the traffic concerns an *immediate safety issue regarding* human *life or injury, or impending property damage*.

Emergency

The highest level of priority, *Emergency*, is reserved for **only** *danger-of-death or serious-injury-if-message-is-not-heard-immediately* messages.

Liaison Activities

The Operational frequencies include both local and wide-area nets, both Strategy [Big Picture] and Tactical/Resource nets.

- Locations identified by EMA, Red Cross or other agency:
  - Staging areas
  - EMA / EOC
  - Red Cross Chapter House
  - Shelter locations
  - Hospitals
  - Law enforcement
  - Fire response
  - Service centers

Recovery

RESPONSE / RECOVERY

Shelter Operations

- Shelter operations may occur during the RESPONSE phase and during the RECOVERY stages of an event.
- Support may be provided by both ARES and R.A.C.E.S. operations.
- Shelter during RESPONSE could be service at the site – *i.e.,* a stranded motorist.
- Shelter during RECOVERY could mean serving families displaced by weather.

Shelter Operations

- Initial communications will probably involve inter/intra-agency logistics to open the facility.
- ARS will support shelter activities
  - Equipment logistics
  - Victim location and identification
  - Emergency food and water information
  - Medical equipment
  - Material distribution
  - Life-and-death communication [Emergency / Priority]

Shelter Operations

- Shelter clients need to be able to inform, advise, and reassure friends and relatives of their status.
- Hams will pass *Health and Welfare* traffic from the shelter to cooperating agencies and to HF traffic nets through a liaison.
- Incoming Health and Welfare will be handled after all outgoing traffic is passed.

RECOVERY

Property/Damage Assessment

- Both ARES and R.A.C.E.S. may support Property and Damage Assessment teams.
- EMA may request surveys to ascertain the amount of outside assistance needed in an area.
- Red Cross uses DA to calculate initial impact estimates to aid recovery.
- Hams can train to survey or may ride-along to provide instantaneous contact with Chapter or headquarters.

Post Event Actions

- Submit After Action Reports to your Communications Leader
  - What went well
  - What didn’t go well
  - Suggestions for improvement

Resources

- Online:
  - Pima County OEM at
    - http://webcms.pima.gov/government/office_of_emergency_management_homeland_security/
  - Pima County OEM Comm at
    - http://oemcomm.org/
  - Arizona Department of Emergency and Military Affairs
    - http://www.azdema.gov/