QNI NEWSLETTER

JULY, 2019

THE UBIQUITOUS HRO

The National HRO series of receivers are perhaps the most famous and definitive communications receivers ever manufactured.

The HRO was developed primarily for the airline industry. It's predecessor, the National AGS ("Air Ground Station") receiver was the first practical high frequency super heterodyne receiver. The HRO improved on the AGS design and became the top-performing receiver of the 1930s.

The HRO is perhaps best known for its role in signals intelligence work during World War Two. A number of these classic receivers are on display at Bletchley Park and are maintained in operating condition. Of course, the HRO is also fondly remembered by radio amateurs who remained loyal to the product line for decades.

The HRO-MXTM pictured was modified for use by the Canadian Forces. It saw service through the early 1960s in a variety of applications.

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Summer Issue

In this issue:

QNI MISSION STATEMENT

QNI is dedicated to promoting genuine emergency communications preparedness.

Our newsletter is independently published and distributed free of charge to the Amateur Radio and emergency management community. The opinions contained herein do not reflect the policies or opinions of any particular net or emergency communications organization.

Our mission is to provide a forum for EmComm volunteers throughout North America. We operate on the premise that Amateur Radio public service volunteers should be, first and foremost, communicators and technicians.

If you share this vision, please support *QNI*. Submit your news and articles for publication.

Some years ago, I rebuilt the receiver and sent it to live with a fellow radio amateur in Florida. Recently, he called to tell me he was downsizing and asked if I wanted it back. I succumbed to temptation and said "yes."

The receiver lives up to its reputation for sensitivity and overall performance. As a matter of fact, it is so "hot," one must keep the RF-gain control at about half its maximum gain to avoid being overwhelmed by the usual background noise on the HF frequencies. Selectivity is excellent too for a receiver of that era. The HRO-MXTM does not incorporate the band-spread option familiar to those used by radio amateurs. Yet, it still performs quite well on the crowded Amateur Radio frequencies.

The HRO-series of receivers lasted until the early 1960s with the introduction of the last vacuum tube version, the HRO -Sixty, and finally, the HRO-500 solid state receiver. The latter unit was a bit ahead of its time and didn't prove sufficiently reliable to be a success, but it was an excellent attempt at a modern receiver architecture.

The story of the National Company is interesting in itself. Starting as a toy company and moving into radio manufacturing in the 1920s, the success of National was largely due to the efforts of just a handful of brilliant engineers and designers. Much like Ford Motor Company a couple of decades earlier, the company was almost lost to the scams of the banking and finance industries.

If you come across an HRO with a complete set of coils, make the effort to obtain it and preserve it for future generations. It's a receiver worthy of respect!

The Camp Fire
By James Michener (K9JM)

Introduction: November 2018, the Camp Fire destroyed the city and surrounding communities of Paradise, CA. The fire consumed 153,000 acres and destroyed 18,800 structures. These numbers are too large for the mind to comprehend, I would suggest looking at a map that shows exactly what was destroyed.

https://calfire-forestry.maps.arcgis.com/apps/webappviewer/index.html?id=5306cc8cf38c4252830a38d467d33728&extent=-13547810.5486%2C4824920.1673%2C-13518764.4778%2C4841526.1117%2C102100

There are thousands of stories that came out of the Camp Fire. The actor, director and film maker Ron Howard, a prior resident of Paradise, is making a movie about the fire. I will let Hollywood tell the stories. I thought it would be worthwhile sharing my observations as an amateur radio operator interested in emergency communications, both the good and the bad, with recommendations.

What did amateur radio do during the fire? Very little, as everyone was focused on getting as many people out as possible. After the fact, evacuations were done to the community of Chico, where the communication infrastructure was unaffected.

The Good: Unlike many communities, Paradise had planned for a major fire. They had done the analysis of what it would take to do an evacuation. They knew the limitations of the highways. They had structured the community in zones and had studied and practiced evacuations. The community had adopted the OnSolve ™ Code Red Community Alert System.

The Bad: The fire was driven by high winds and fire tornadoes that blew flaming debris miles ahead. The fire was advancing at 400 to 500 yards a minute. The reality was far worse than anticipated in the planning process. Of course, no amount of planning can replace quick thinking and creative solutions on the ground.

Telecommunications: Over the past twenty years, the cellular telephone system has became the backbone of emergency communications. Notification systems, such as Code Red require internet and the cellular system to be operational to be effective. Government agencies need the internet to send out an alert, and the internet is used to trigger notification through the cellular network. Another factor in this reliance is the fact that both AT&T and Verizon

have been promoting the use of the cellular network for use by community public service and first responders. While they have a system through which these customers get priority service, it nonetheless fails when there is no service. In California, the PUC (Public Utility Commission) can not dictate the level of redundancy or emergency power required for telecommunications. In order to reduce cost, the carriers do not provide redundant communications paths, and in recent years have decommissioned backup power. In California, a fire department can flag and fine private property owners to ensure sufficient defensible space is present around structures, but telecommunications common carriers are exempt. Cell towers, where the electronics is often at ground level are often surrounded by years of brush and bramble. During the Camp Fire, cell towers failed due to both connectivity failures and fire damage.

> **Recommendation:** Require redundancy in communication infrastructure. Require that critical elements be hardened against possible disasters.

Human nature: Paradise is a retirement community and a bedroom community for the City of Chico. Parents sent their children to school and headed for work in Chico, but upon arrival in Chico they could see the fire in the foothills and headed back to save their children. Roads were clogged with fire and evacuation, first responders trying to get to the fire, and parents trying to save their children. Human nature often works against trying to save the most number of people. It took nearly four hours until they could use both lanes to evacuate.

> **Recommendation:** Schools should have a disaster plan that is communicated to parents well in advance of an emergency.

"This is normal:" The power company, PG&E, placed Paradise on notice that because of the high fire danger, PG&E might turn off their power. PG&E never turned off the power, and when the power did fail, people assumed it was normal procedure.

> **Recommendation:** Be clear in your communications. Avoid situations in which public service announcements are either confused with disaster warnings, or diminish the impact of subsequent disaster warnings.

Notification of departure: Eighteen thousand homes were destroyed. Some people fled their homes, but many did not. Some issues/questions to consider include: "Which homes should first responders break into to assure the residents are gone?" "Which house should the cadaver dogs investigate?

> **Recommendation:** Provide residents with a fire resistant tag to display at their location so responders will know the house is clear.

Garage doors: When the power goes out, garage door openers do not work. Many elderly people can not operate the garage door manual release lever. Many just don't know how to do so.

> **Recommendation:** Education. Have all family members practice manually releasing the garage door. Teach the elderly to leave the door open or to leave the car outside if they are worried about a possible disaster or power outage. Encourage the use of battery back-up systems for garage doors, and ensure the battery is in good condition every six months.

Notification of danger: In the Camp Fire, very few residents received notification via the Code Red system. Emergency officials timed the notification to provide for a safe evacuation. The fire destroyed the communication infrastructure before most of the alerts could be sent. In the Santa Rosa fire in 2016, a more 'normal' fire, only half the population had signed up for Code Red alerts. Of those who had signed up, half never received an alert because people turn off their cell phone while they sleep.

> **Recommendation:** A better system is required. I have suggested what I call is "Code Red Radio", a smoke alarm device in residences that is both connected to the Internet and to ISM / amateur radio based mesh network, with battery back-up and the ability to provide multiple connections to pass messages. This is an area where amateur radio could save lives.

Final remarks: The Camp Fire was worst fire in recent California history, largely because of an extended drought and a summer where the average temperatures were at record highs. The fact that eight out of ten of the hottest summers

have occurred in this new century should not surprise anyone who believes in science. Sadly, divisive politics has also hampered the development of useful solutions designed to mitigate risk. I hope these comments will be useful in your planning.

Ed. Note: The traffic community lost a dedicated ham to the Camp Fire. ***Anna Horn K6ZOA SK,*** *a resident of Paradise & long-time net manager of the independent California Traffic Net, escaped the fire, but lost everything including her radio gear & her cats. Six weeks later, she succumbed to a heart attack. She was admired and well loved by all.*

If you can't say something nice, don't say anything at all.
An EDITORIAL by James Wades (WB8SIW)

A government employee involved with the SHARES program was recently heard to poke some fun at the RRI/NTS traffic system by referring to "birthday messages." He is not alone in doing so. The implied argument of naysayers goes something like this:

> *The message content conveyed during routine net operations is of little importance, therefore, the network that conveys that content is also unimportant (or unnecessary).*

If we deconstruct this argument it is easy to show that this perspective is a fallacy of logic sometimes referred to as "affirming the consequent." However, when such a statement is made by a government employee, it also unintentionally falls into another fallacy of logic called "arguing from authority."

Such illogical arguments are particularly damaging to the morale of a volunteer organization. More importantly, they are harmful to the operational readiness of emergency communications organizations and the ham radio community. So, let's proceed with deconstructing the statement of our erstwhile "G-man" and those who would make a similar argument.

First, the process of establishing radio networks and automated traffic systems like DTN is one of building infrastructure. Infrastructure is generally agnostic regarding message content. Therefore, **it is the act of building the infrastructure that has value**.

An infrastructure that can convey a birthday greeting can also convey higher value traffic, be it situational awareness reports, a request for supplies during a disaster or any other important message. An excellent analogy to this is the vast public switched telephone network. Would someone argue that our nation's telephone networks and their associated cellular mobile data networks have little or no value because countless teenagers use the same networks every day to discuss their juvenile fantasies about their favorite celebrity? Of course not. It has also been reported that approximately 60-percent of all Internet traffic is related to pornography. Would someone argue that the Internet has little or no value because of this vast amount of questionable traffic? Of course not! The same network that supports the "Tinder" app or enriches that waste of groceries and oxygen called "the Kardashians," also carries life-saving calls to 9-1-1, important business communications and yes…even important government and defense communications. In other words, **the network is agnostic with respect to content, but it is the availability of the network infrastructure that's important**.

Second, the process of conveying, managing and tracking message content within a network is also of value. While routine messages transmitted on a day-to-day basis may be of little import, *the training value associated with exchanging that traffic is of significant value*. Examples include:

- Radio operators learn to accurately convey unfamiliar names, addresses and other unpredictable message content using efficient, standardized procedures, such as the application of the standard phonetic alphabet, proper prowords, and standardized procedures. In other words, the value is in the TRAINING, not in the message content.
- Radio operators learn to keep a record of messages transmitted and received. They develop an intuitive knowledge of standardized message format, message preambles and the like. In other words, the value is in the

TRAINING, not the message content.

- Radio operators learn to copy message traffic accurately and consistently under variable radio conditions, whether it's adjacent or co-channel interference, propagation anomalies, or background noise. In other words, the value is in the TRAINING, not the message content.

- Radio operators learn service messages, translate UTC to local time and so forth. They learn to efficiently run a net, keep a radio log that summarizes tactical communications and transcribed message content. When using digital methods, they become familiar with the command architecture of modems, software and transceivers. In other words, the value is in the TRAINING, not the message content.

There is no need to belabor the point further. **There is absolutely NO relationship between message content and the value of the traffic system**. The value is in the development and maintenance of the infrastructure, the working relationships developed, the collaborative environment developed, and the training provided by the activity.

As RRI endeavors to rebuild traffic handling there is much work to be done. It is valid to criticize long-standing institutional problems that were allowed to fester for decades by the legacy organization. These might include:

- Delayed or lost messages.
- A lack of delivery outlets.
- The lack of a systematic national emergency plan.
- Insufficient coordination between the national messaging layer and local EmComm organizations.

The above "four horsemen" are the direct result of misplaced priorities and incompetent management during the decades that predate the creation of RRI. They are unrelated to message content, nor do they diminish the value of the infrastructure. They certainly do not diminish the importance of radio operator training.

Lastly, with friends like our erstwhile G-man, who needs enemies? Perhaps, instead of expending energy on criticism, those in authority should use their position to build consensus and cooperation. Let's face facts; anyone can criticize, but the wise man offers solutions and proposals along with the criticism. In other words…..

If you can't say something nice, don't say anything at all!

Basic Training for EmComm

By James Wades (WB8SIW)

Examine any effective organization, from a primary school to a military organization, and one will see a pattern of prerequisites. The "ABCs" are prerequisite to spelling. Spelling and phonics are a prerequisite to reading, and so forth. In the armed services, basic training precedes advanced training in one's MOS or rating, and so forth.

EmComm organizations may want to consider the concept of prerequisites when establishing a systematic approach to volunteer training. There are some skills, which are simply the "ABCs" of emergency communications. These skills stand at the foundation of all other activities and remain essential to operational readiness.

Voice communications skills should be the foundation of all EmComm training because everyone, regardless of skill level or tenure, owns and utilizes a basic voice transceiver. Whether it's a cell phone or a VHF/UHF hand-held, considerable message traffic still moves by voice. Whether one is conveying tactical messages or record message traffic via voice, brevity and accuracy remain extremely important factors.

Most new EmComm volunteers show up at their first meeting or public service event with a hand-held transceiver or mobile radio. They haven't yet applied advanced communications techniques to EmComm. Perhaps their first "mission" will be supporting a community event, such as a parade, a marathon or a similar community activity.

Every new member should be thoroughly trained in proper voice procedures. This is often best accomplished by

combining some initial classroom instruction with practical exercises in the field or on nets.

A few hours are all that's required to explain basic voice communications methods such as:

- The proper use of the phonetic alphabet
- The meaning and use of standard prowords ("over," "out," "wait," etc.)
- Basic net discipline.

The information provided should be integrated into some simple classroom exercises. For example, students can be called upon to spell words or names at random from a list provided. These might be a mixture of chemical names, surnames or other words that are somewhat more complex than monosyllabic.

A basic net can be simulated in the classroom, with the instructor acting as net control. He calls a net to order and students check in properly using their call signs transmitted using phonetic alphabet.

The simulated net control can then provide a bit more basic training on "pairing" participants for information exchange. For example:

"WB8SIW call W8RC report your location, OUT"

"W8RC good readable OVER"

"WB8SIW I-35 and Congress Street, OVER"

W8RC, Roger, OUT"

The simulated net then reverts to the instructor (NCS).

A variety of other simulations can be performed, but the emphasis is always on the proper use of the phonetic alphabet, prowords, standardized procedures and brevity.

Of course, like any classroom instruction, the initial basic training class is of little value unless the skills are practiced regularly. Every weekly EmComm net and every routine public service function (parade, marathon, etc.) should be conducted as if it's an actual life-critical disaster. Brevity and accuracy should be paramount during all functions. Proper prowords and procedures should be applied universally. This converts a run-of-the-mill public service activity into something of far greater value… a training exercise in preparation for when a real disaster strikes the community.

Voice communications stands at the foundation of all public service communications activities, not just in the Amateur Radio Service, but also in the public safety and defense sectors. Many messages start with a question or a directive provided verbally. Even if one's focus is digital comms or high-speed CW nets, it is likely that he will end up interacting on a voice net at some point.

Effective voice procedures are the basic training of EmComm. Ensure your volunteer personnel are fully prepared and drilled in their proper use of voice.

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FRS/GMRS Radio as a Force Multiplier

By James Wades (WB8SIW)

For those unfamiliar with the concept of a "force multiplier," it can be roughly defined as any technology, weapon or superior tactic that allows a unit of men to perform more efficiently, as if they operated in greater numbers. In many cases, information technology or communications technologies serve as force multipliers, improving the efficiency of military units. The force multiplier concept applies to many activities, including volunteer EmComm units.

It's no secret that the number of volunteers in activities of all types are decreasing. The glowing CRT and entertainment culture has diverted many idle hours into a virtual world of Twitter, Facebook, video games, and perhaps less savory forms of entertainment. Many complain that they don't have "free time," yet they spend multiple hours each day consuming the tech narcotic of social media and entertainment.

The result of this evolving culture is the reality that volunteer groups, like ARES®, AUXCOMM and the like must do more with less. Therefore, identifying and implementing possible "force multipliers" can be of great benefit.

So how does a force multiplier work?

In a disaster, which disrupts commercial communications networks, it is common for radio amateurs to shadow responders. For example, several radio amateurs might be assigned to individual members of a search and rescue team working in a damaged neighborhood. This works well, but is it an efficient use of resources?

Consider an alternate scenario…..

Imagine instead that only one ARES® operator is assigned to each SAR team. The individual SAR team members are instead issued FRS or GMRS radios capable of a half mile to a couple of miles of coverage, depending on terrain. The FRS/GMRS units allow the SAR members to coordinate directly between each other, whereas the radio amateur acts as a gateway between the FRS/GMRS network and ARES® nets with their access to the Emergency Operations Center, incident command post, and the 9-1-1 Center.

Whereas a half dozen licensed radio amateurs may have been required to shadow the SAR group in the past, one operator can now do the job….a classic example of a force multiplier at work and a classic example of the application of layered nets. Only traffic (tactical or record message traffic) destined for personnel or agencies outside the team needs to pass through the Amateur Radio network. This also preserves communications circuit capacity, a valuable commodity in a disaster. The same model can be applied to parades, marathons and community events or various disaster response mission in which radio amateurs interact with community service groups.

For such a model to work, the ARES®, REACT®, or similar EmComm organization should provide basic training class on two-way radio procedures, message formats and the like. However, most people learn by example, and the community volunteer group will look to the radio amateur as the subject matter expert and imitate his operating practices. Therefore, the radio amateur must use operating methods that are above reproach.

FRS and GMRS walkie-talkies are now so inexpensive, they can be likely be purchased in bulk and, along with several crates of AA-cells or the like. They can then be distributed to the CERT, SAR or similar teams, which interface with the Amateur Radio Service organization. In many cases, the local EMA or public safety agency can simply purchase a quantity of such radios for use in time of emergency. Just be certain to engrave the radios with an appropriate indication of ownership.

Of course, an emergency communications plan is also essential to reap the maximum benefit of the force multiplier. Network architecture should be defined in advance, accountability paperwork (sign out sheets) should be available to facilitate the issuance of radios, and so forth. Operational packets should also be prepared in advance. Simple manila envelopes with paper maps, a weather resistant notebook, message forms and a few pencils should be staged and ready for distribution along with the FRS/GMRS radios in advance of a disaster. The reward is significant benefit by

using two-way radio wisely in a manner that makes maximum use of scarce, skilled Amateur Radio resources.

Finally, such an arrangement can be operated in concert with the National SOS Radio Network plan. That is: the community group operates on a shared FRS-GMRS channel, thereby allowing citizens to interact with the community/ neighborhood layer if in need of emergency assistance, or if they wish to originate a welfare radiogram.

An Exercise After-Action Report Summary

By Gordon Gibby (KX4Z)

Our group did our 4th or 5th full scale exercise in March, 2019, emphasizing voice formal traffic, but with the largest turnout we've ever had -- 18 or more, not counting the interoperability public safety comms units and air operations units (Drone) involved. The scenario called for a widespread power outage, dangerous animals on the loose, actors on FRS radios creating reports of just pandemonium; hams operating an incident command post, a shelter, and an Emergency Operations Center and so forth. The exercise was three hours in length.

We had NEW PEOPLE in most positions (on purpose) and there were gaffes. The exercise was written by two new volunteers who did a great job and of course, they will learn from the experience and their issues as well.

We ran into a host of technical issues from people who don't PRACTICE enough, but then we ran into at least FOUR major issues with voice traffic alone....that was quite disappointing. We also had some new people who have never attended our training, but have considerable ham radio experience elsewhere.

Some observations include:

1. ICS-213 messages are preferred by agencies but difficult for hams to deal with -- in this case, a unit sent a message formally addressed back to themselves! Tried to get them to recognize it but failed. I played devils advocate and listed (and transferred!) it right back to them. THE TO: NAME AND POSITION ARE CRUCIALLY IMPORTANT -- unless you embed it into a radiogram, THAT IS THE ADDRESSEE!!!! Make sure it is correct. The form is confusing. LOOK at one some time before the emergency!

2. VHF voice repeaters time out. So do VHF handi-talkies. I'm not sure how to handle that, but stopping more frequently was our solution. Along these lines, a new person was very angered when procedural word "BREAK" was utilized! He indicated this was only allowed to announce an emergency need for access. How to defuse this during an exercise? We asked the aggrieved individual to choose which procedural word he preferred and he chose "PAUSE," so PAUSE it was from then on. Issue solved (*Editor's note: "Break" is the proper proword*).

3. Over and over again, message senders who had not participated in our training were plowing along at 80 words per minute OR FASTER. We didn't get that solved very well during the time allotted for the exercise but we can work on it, and it was solidly discussed during the HotWash luncheon afterwards.

4. We had a brand-new net control (but a gentleman with years of law enforcement SWAT team management experience) -- so he handled the net quite well. Unfortunately, he never send anyone OFF FREQUENCY to transfer the copious voice traffic -- and we have THREE VHF repeaters; a learning opportunity.

There were pages and pages of 'issues.'

Technical prowess was also a bit lacking. The EOC Unit had access to 4 antennas, 4 VHF transceivers, 3 HF transceivers and 2 computers -- and they got exactly ONE out of four requested modes working during the 3-hours exercise. The Shelter Unit managed to get one or two out of four modes working. In the unit to which I was assigned, I was trying hard NOT to be running the unit (assigned to someone else for a change)....but members showed up with computers and systems not working, slow-to-configure-systems.....just not "contest-ready" competency. By the end of the exercise we had FIVE modes working but we did a terrible job prosecuting the task of incident command that our unit supposedly was given.

The public safety guys cleaned our clock. Despite initial problems with repeaters not working the way they wanted, they found work-arounds. They don't do anything more than informal tactical messages, but they do those with ferocious proficiency, and the fireman showed up at our canopy every 30 minutes with his little notepad and new information for us. We were NEVER able to reciprocate.

I think as a result:

- I *may* get people to listen to me just a bit more and PRACTICE voice message transfer….Maybe.
- I will try to use this to encourage the EOC team to become more proficient at knowing their radios.
- I may be able to convince one of my team members to get a bit more flexible HF radio setup.
- I have a chance at convincing a couple of people who think they "know it all" and never train with us, to show up and learn more.

I do my best. We'll see where it goes.. The new exercise developers did a great job, despite a goof or two here and there of course!

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What is Interoperability?

By James Wades (WB8SIW)

When one is a hammer, everything looks like a nail. Current generations raised on the convenience of e-mail, smart phones and similar wireless technologies sometimes have a difficult time understanding the concept of interoperability. They struggle to conceive of a communications situation in which familiar capabilities and tools are unavailable. The result can be management decisions, which lead to misguided outcomes in time of emergency.

The most common error is the misconception that interoperability can be achieved without the loss of familiar features and capabilities common to e-mail, text messaging and the like. One regularly encounters individuals in the emergency management environment who insist that all methods of transmitting message traffic MUST accommodate the full set of punctuation, upper and lower-case character sets, the capacity to transmit binary files such as complicated forms and spreadsheets, and the ability to send photos and lengthy documents.

So, let's test this belief using a simple scenario.

A train carrying hazardous materials derails. The crew is incapacitated or deceased, and the conductor's manifest is unavailable to first responders. An initial assessment is made by fire service personnel equipped with a good pair of field glasses and perhaps a good pair of running shoes. A protective perimeter is established, and Incident Command is in place. The EOC is brought on-line and the emergency action guidelines are activated. With an initial, limited data set, new information is being collected rapidly and the response is being continuously modified during the early hours of the incident.

Within this environment, we have a variety of agencies interacting. Communications tools might range from cell phones to hand-held transceivers, MDTs, and other basic two-way radio systems. If the cellular data network circuit capacity is exceeded during the early phases of a community evacuation, greater reliance will be placed on two-way radio systems. In other words; everyone is in a hurry and everyone is using the most convenient communications tools within reach. Basic tactical communications is the primary traffic on all networks.

Assuming there is a requirement for Amateur Radio assistance, there may be a delay of a several hours before radio amateurs deploy more advanced capabilities. Instead, the first radio amateurs to arrive on scene may be using VHF voice methods, such as the hand-held radio in their "go bag." Perhaps the location of the incident command post cannot be fully established due to the lack of sufficient data identifying the materials, risk-level, and plume dispersal.

Therefore, a more complex portable station cannot be deployed during the early hours of the incident. During these first hours, the IC Post may consist of nothing more than a few officials with hand-held radios, some maps and a flashlight atop the hood of the fire chief's car!

In other words, *there's going to be a lot of reliance on voice communications*. Consider:

- Public Safety Talk Groups (Police, Fire, EMS)
- Railroad VHF dispatcher channels
- Railroad VHF maintenance of way channels
- Amateur Radio Service voice circuits (146, 440-MHz, etc.)
- American Red Cross 47-MHz
- DPW talk groups
- GMRS or other land-mobile radio systems
- Cellular data networks when circuit capacity permits

Consider the wide variety of agencies involved:

- Local, county and state law enforcement
- Fire service mutual aid from outside the area
- Railroad officials/field supervisors/employees
- State and Federal natural resources and/or environmental protection agencies
- The Federal Railroad Administration
- EMS and Public Health officials
- Hospitals
  ….etc.

All of these organizations require command, control and communications to function. Many officials will be on scene and for many, their primary communications may very well be voice communication via two-way radio network.

Now, imagine yourself standing at the incident command post. You are called by a net control or dispatcher with a message containing specific information or data addressed to an official. Perhaps it's a list of chemicals or a recommendation from CHEMTREC. What do you use to copy and retain the message/data? Your memory? Your laptop? Paper and pencil?

In some cases, the answer may very well be "paper and pencil." Furthermore, in the process of receiving the data, it is likely neither the individual transmitting the message nor the person receiving the message is experienced conveying that data in mixed case! Will unnecessary punctuation cause confusion and slow the process? Will attempts to deal with upper and lower-case content save time or waste time? Is upper and lower case essential to the meaning of the message traffic? Will scientific abbreviations be understood if not spelled out?

The belief that **all** disaster response communications can be handled with digital methods is foolish. Basic voice communications remains an important tool in emergency response tool bag because it offers a high level of flexibility. One can "talk" while driving. A police officer can coordinate with other officers using a handheld radio while on a foot chase. A firefighter can talk while wearing turn-out gear and SCBA, but he may not be able to read a screen or type. An SAR team in a mountainous area can safely talk on a two-way radio while traversing difficult terrain. Once set to a channel or frequency, there is no need to look at a screen to type, dial or manipulate a touch-screen. A two-way radio network allows for convenient dissemination of bulletins to multiple points simultaneously, and it allows for efficient prioritization of message traffic, informal or formal. A basic two-way radio can often be used while standing in the rain at the derailment/hazmat incident.

There are many cases in which a message may be originated via a digital network. It may even be received via a digital system at an EOC or other key station. However, what happens when that message must be transferred to a VHF or UHF voice circuit to reach its "last mile" destination? Is it realistic to expect that the communicators on both ends of the voice circuit can convey the traffic to its destination as a mixed case, with specialized punctuation? Does someone

originating a message at a state EOC hundreds of miles away really have knowledge of the communications equipment and capabilities available to the *delivering operator* in the field?

Sure, conveying message traffic or other data in mixed case via basic modes is possible. Press telegraphers did so well into the 1960s. However, they were professionals who did so every day. They could even exceed the speed of contemporary teletype circuits using Phillips Code and similar techniques. However, a volunteer radio amateur or a public safety officer is not likely to develop such skills, and to expect it of even an experienced volunteer is very unwise.

Radio Relay International has retained classical messaging techniques, which call for all-capital text and limited punctuation sets for this reason. This is considered the default methodology because it supports *full interoperability*. A message can pass between digital and manual methods to reach the target via the last mile of connectivity, regardless of the communications mode/method available at the first or last mile, be it data, voice, heliograph, a field phone or a message blank tied to a carrier pigeon's foot.

This policy does NOT exclude mixed case communications. If the emergency communications program manager and his staff have certainty that message traffic will remain on a digital circuit (e.g. point-to-point, etc.), and if it is necessary to convey mixed case and complex punctuation within a message in order to not alter its meaning, then it only makes sense to do so. However, without specific insight into the network architecture at the destination, and without knowledge of last-mile conditions, all messages should be formatted in such a way that they can propagate over any type of network, be it digital, voice or CW or via a crookneck flashlight with a red filter used to send International Morse between two hills.

This is the "KISS" approach. Keep it simple. Whenever possible, anticipate equipment failures, the mobility of the addressee, and the fluid nature of the situation where the "last mile" of connectivity terminates. When originating or relaying message traffic, one simply never knows if a message will need to be transferred to a manual mode circuit to reach its destination, whether that manual mode circuit is amateur, police, fire, DPW, a simple phone call with a verbal message.

Interoperability is the key. It supports all communications modes; government, commercial or Amateur Radio Service. It offers maximum flexibility "when all else fails." Don't let inexperienced individuals who profess to be "emergency communications experts" try to convince you otherwise.

Some Thoughts on CB Radio

By James Wades (WB8SIW)

As one who entered ham radio through the traditional route, as opposed to starting in CB radio, I never gave the citizen's radio service much thought. I do recall driving across country to Fort Meade with a friend years ago. As I recall the experience, we had to report on time so he drove at an average speed of about 75 to 80 miles per hour (back when the speed limit was 55-mph) and he used channel 19 in much the same way as one would use a RADAR detector. We made the trip in record time and I had to admit that CB radio had some advantages. Yet, the ubiquitous profanity and the tone of CB radio turned me off.

At the time, CB radio was a fad in much the same way flagpole sitting and dance marathons captured the public's imagination during the 1920s. Unfortunately, CB radio became a victim of its popularity and the anonymity of its users. The "invisible man" syndrome emerged, making it possible for users to hide behind a lack of enforcement and pseudonyms (handles) in such a way that it licensed profanity, malicious interference and widespread antisocial behavior that drove away many responsible users.

In some respects, the era of CB radio bears some similarities to today's social media environment. Today, people regularly post opinions and comments on social media that can only be described as strident, rude and ignorant. Between the false political memes and insulting labels such as "trumpanzie" and "libtard," one's faith in humanity can be seriously diminished after just a few days on "Facebook" or "Twitter." People hide behind their computers in the

same way some CBers hid behind their microphone. They engage in behaviors they would never exhibit if confronting their peers face-to-face. Of course, despite the rampant abuses by social media users, the medium is not likely to disappear anytime soon, and neither did CB radio, which remains quite active.

I witnessed this for myself a couple of years ago, during a particularly difficult summer of business travel, when I tuned the HF transceiver in the car to channel 19 (27.185 MHz) and listened for traffic information. I discovered a much different CB radio than that encountered decades ago. I found channel 19 to be rather quiet and quite orderly. Most communications was limited to professional truckers reporting various hazards, lane closures and the like. Gone was the "CB slang" such as "good buddy" and "bodacious signal." I didn't hear "the purple phantom" calling the "green giant." CB handles have been largely replaced the generic term "driver." In a short time of just a few minutes, listening to channel 19 paid off by allowing me to detour around a massive traffic jam in New York State.

Yes, there are still some anti-social individuals or the occasional trucker likely driven a bit mad by decades of loneliness traversing our nation's interstate highways while trapped in the cab of a truck, but overall, CB is perhaps more useful today than it was back in the 1970s and '80s, when it was inundated by casual users.

As a result of this experience, I purchased an inexpensive Midland CB radio and installed it in the car. Since then, it has proven far more valuable for day-to-day use than a two-meter transceiver. I have found the information provided by commercial truckers to be more accurate and timely than that provided by GPS programs like "Waze" or "iMaps." When modern GPS programs are used in conjunction with a decent atlas and information from CB radio, one can work around most any traffic problem and save considerable time and money.

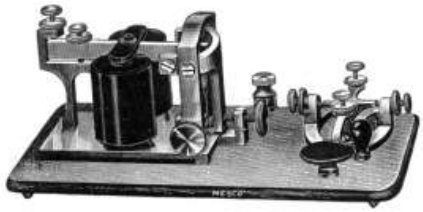
Of course, when the skip opens up on 11-meters, one hears a bit of the "old CB" appear out of nowhere: the colorful language and narcissistic, juvenile chatter arise from the noise. One even hears calls to "skip-land" and a variety of old school "handles." However, the basic utility of channel 19 remains. Best of all, modern CB radios incorporate an effective squelch control.

For casual use and basic utility, CB radio trumps two-meter FM, which has largely been abandoned by radio amateurs. Having been left fallow and, in some cases, even Balkanized with new digital voice modes, one can drive for a year and never hear anything on the 146.520 MHz calling frequency . Many large dense urban areas feature numerous repeaters that are about as active as the population at your nearest mausoleum. Yet, somewhat ironically, CB radio remains active thanks primarily to the professional trucker.

CB radio may even prove useful for EmComm response. In the event of a major disaster, supplies are often delivered by truck. The presence of an EmComm organization on channel 19 could do much to facilitate the routing and delivery of disaster supplies to staging areas, distribution centers and other temporary facilities. As such, CB may remain a useful tool for supporting organized emergency response efforts.

Perhaps the day will come when radio amateurs make a concerted effort to revitalize the two-meter band by encouraging regular activity and specialized uses. In the meantime, if you drive our nation's highways often, give CB radio another chance. It's surprisingly useful.

One final thought … with recent threats to the two meter band, hasn't the time come to restore two-meters to its old role as a primary meeting place for local radio amateurs?



Inexpensive "Police" Scanners
By James Wades (WB8SIW)

There was a time, before the Internet and social media, that monitoring police and fire calls was practically a form of entertainment. It wasn't unusual when visiting someone's home to see a police scanner sitting on the kitchen counter where it could be heard while washing dishes or doing housework. With the emergence of more entertainment options and the development of various digital voice modes, such as APCO-25, scanners use has been reduced to an activity for a core group of hobbyists.

Recently, the author purchased an inexpensive "Bearcat" scanner on "Amazon Smile" for about 60 dollars. An inexpensive outdoor monitor antenna from "Ham Radio Outlet' added another 30 dollars to the overall investment. The scanner will now be used to support the National SOS Radio Network and Hamwatch programs in addition to monitoring local ham radio repeater and simplex channels.

Programmed into the scanner are some common emergency frequencies, such as aviation and maritime distress frequencies, some local emergency management channels and fire dispatch. More specifically, the scanner is also programmed to monitor several nearby ARES®/Skywarn repeaters, the proposed RRI national simplex frequency (145.760 MHz), FRS/GMRS channel 1 and channel 3.

In the event of a widespread disaster, the ability to monitor FRS/GMRS frequencies without tying up an Amateur Radio transceiver can be quite beneficial. Additionally, during routine conditions, the ability to scan local repeater and simplex frequencies is also helpful. If not overly busy with other duties, one can quickly tune a transceiver to a local repeater channel and answer someone's call, thereby increasing overall activity on the VHF or UHF repeaters.

On some weekends, it becomes necessary to lock out FRS channel one. It has been observed that many parents see FRS radios as "toys." It's not unusual to hear several three or four-year-old children somewhere in the neighborhood belching and making funny noises over the radios. Under such circumstances, one simply "locks-out" the channel until the kids get bored. After all, there is no need to monitor these channels unless a disaster is imminent. However, as an aside, it may be time for a "two-way radios are not toys" public education campaign!

Ideally, in more populous areas, it would be nice to have a VHF simplex channel dedicated to traffic and EmComm activities. A standardized simplex would also be ideal for transmitting an emergency activation bulletin and for general coordination between traffic operators who might use it to clear a message or two if needed. This is, of course, the idea behind a universal RRI VHF frequency.

In some areas, it might be wise to monitor the old 146.520 calling frequency. Unfortunately, in some areas, it is monopolized "CB style" by small groups of individuals who might be called "squatters." They monitor it all day, which is good, but they do so in a way that is rather provincial and unwelcoming to outsiders. When involved in extensive conversations, they never move to a nearby working frequency. The result is that one just turns off the radio after an hour of what often sounds like extremely bored conversation in monotone. However, for those who live in areas in which such problems do not occur, the monitoring of '52 could be beneficial to the broader ham radio community, particularly if one lives near a major Interstate highway or in a dense urban or suburban environment.

Finally, It seems reasonable that encouraging the use of scanners to monitor local VHF/UHF frequencies could do much to revitalize our decaying local communications infrastructure. If the Amateur Radio Service made a concerted effort to monitor local repeaters and standardized simplex channels, the simple act of hearing a call may encourage a response and therefore greater use of our frequencies.

In time of emergency, the scanner can become an adjunct to the emergency communications role by allowing a radio amateur to monitor local FRS/GMRS channels in use by his neighbors, so that he can in turn reach out to them to

provide assistance via the National SOS Radio Network or Hamwatch programs. At the minimum, there remains some interesting communications on the older VHF and UHF public service channels. This can keep up a level of interest in between occasional Amateur Radio Service activity.

Let's not forget that VHF and UHF spectrum has ever increasing value to commercial interests. Remember the old adage: "use it or lose it."

CONELRAD
By James Wades (WB8SIW)

Radios manufactured during the 1950s often have the Civil Defense emblem or a triangle graphic on the dial at 640 and 1240 kHz. Many younger people are undoubtedly mystified by these symbols when examining an older radio dial, the origins of which lie in aerial combat during World War Two.

During the Second World War, bomber crews found they could use broadcast stations located near major cities as beacons in much the same way pilots today can still use nondirectional beacons (NDBs) for basic navigation. This lesson was not lost on the Department of Defense as the United States entered the cold war and the age of nuclear weapons. The numerous, reliable 50-kW AM broadcast stations located near major metropolitan areas would make an ideal navigational aid for Soviet bombers.

The author's Sears Silvertone transistor radio from 1963 showing the CONELRAD triangle at 640 kHz

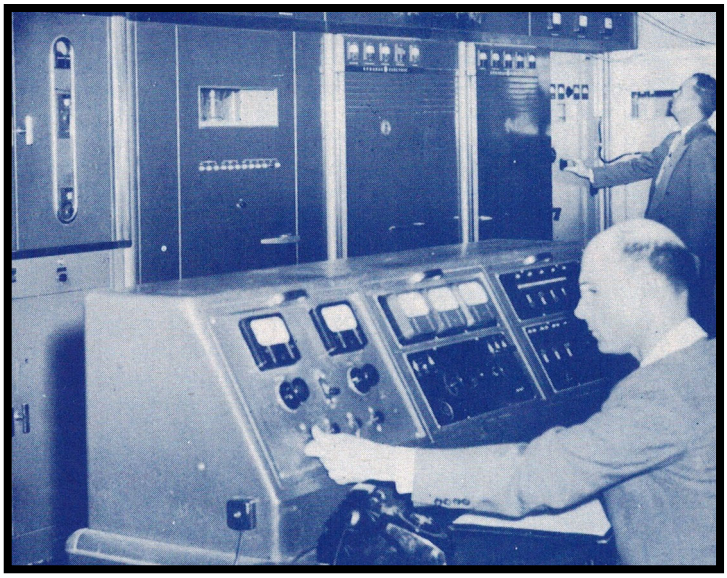
In order to mitigate the risk of broadcast stations inadvertently serving as navigational aids during enemy attack, a plan was developed called "Control of Electromagnetic Radiation," or "CONELRAD." This Civil Defense measure was designed to not only warn the public of imminent attack but also foil attempts by enemy bombers to use regional and clear channel stations as navigational aids.

Broadcast stations were generally divided into two groups; the *basic key station* and the *relay key station*. The basic key station would receive an alert via a dedicated telephone "PX" circuit from an Air Defense Control Center. It would then cycle its transmitter on and off on five-second increments followed by the transmission of a 1 kHz tone for 15-seconds to signal lower priority "relay key stations" of an emergency bulletin. In this manner, the alert bulletin would be distributed to the public. The alert hierarchy was similar to the old EBS system in which an EBS primary station was monitored by secondary stations within an operational area.

After bulletin dissemination, lower priority AM stations as well as all FM and television stations would go off-air. Meanwhile specially equipped key stations would change their operating frequency to 640 or 1240 kHz and operate sequentially from different geographical areas to confuse any incoming bombers.

Whereas CONELRAD was implemented in 1951 for broadcasters, beginning in 1957, radio amateurs were also required to immediately cease operations in the event of an alert. Special monitor receivers that alerted the radio amateur upon loss of the carrier of a monitored key station were

marketed to the ham radio community. Many hams had these in their shack in support of civil defense efforts.



Broadcast Transmitter Engineers, c. 1955

CONELRAD was established during the Truman Administration in 1951. However, by the late 1950s, it was becoming obvious that not only had the defense situation changed significantly, but the system itself was fraught with difficulties. Experts began questioning the efficacy of the system and several high profile false alarms also brought some discredit to the CONELRAD program.

In one example, on the evening of November 5, 1959, WJPG at Janesville, Wisconsin, the CONELRAD key station for Northeast Wisconsin and Northern Michigan was sent an operational alert message rather than a test message from the ADCC. All three Green Bay TV stations as well as local AM and FM stations throughout the area were taken off-line in anticipation of a full CONELRAD activation. It took some time for the situation to be resolved. Such incidents ultimately led to the conclusion that the CONELRAD system was unreliable. Therefore a new plan was developed in the form of the Emergency Broadcast System, which was established on August 5, 1963.

The newer EBS would eventually be expanded to warn the public of tornadoes, flash floods, and similar localized disasters. This natural evolution paralleled that of the overall Civil Defense programs, which evolved into today's comprehensive emergency management programs. While EBS was far more workable than CONELRAD, it too suffered from the occasional failure including a high-profile false alarm in the early 1970s.

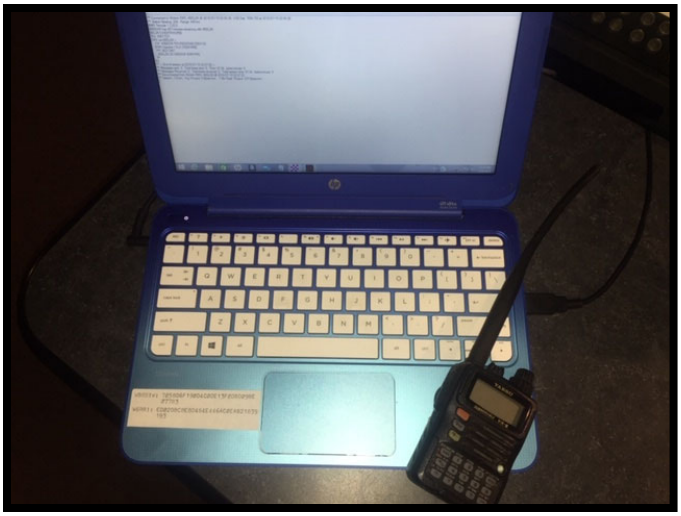
The author would eventually serve on the FCC Proposed Rule Making Committee that developed policies for implementing the current "Emergency Alert System." EAS was designed to function automatically. Digital encoding and automation had become essential in a rapidly evolving environment of media consolidation and in response to the broadcast industry's rapid drift away from localism and community service. By the early 1990s, it was becoming obvious that many broadcast facilities were no longer staffed on a 24-hour basis. Automation was already becoming widespread. Furthermore, new media platforms and IT networks were rapidly emerging. Cable television was already well established and had never been effectively integrated into the old EBS program.

EAS remains in operation today, allowing emergency bulletins to be distributed automatically while propagating between various networks and media platforms without human intervention. One can even receive EAS alerts on one's cellular telephone as society moves more toward the widespread use of cellular data networks. While EAS is still configured to warn of enemy attack, it is now used for emergencies of all types.

While much has changed during the evolution from CONELRAD to the current Emergency Alert System, broadcast stations remain at the center of the program. In some cases, the EAS primary station serving an operational area may remain the same clear channel AM stations that served as "basic key stations" in the CONELRAD era. Even AM radio, now approaching it's 100th birthday, remains relevant well into our current era.

It will be interesting to witness the next evolution of public alerting as our media landscape continues to evolve.

-30-



Shouldn't we design our methods and practices to allow messages to move between any mode or network? Are there any EMCOMM groups that do NOT use voice methods? Is there any active EMCOMM volunteer who doesn't occasionally use a handheld radio? Shouldn't a message be structured so that it can be transferred between voice, CW and digital methods intact? Think about it!

Hesston Steam Museum Telegraph Office
By James Wades (WB8SIW)

Using instruments donated by your Editor and members of the Morse Telegraph Club, we built a historically accurate telegraph office at the Hesston Steam Museum at Hesston, Indiana. If you are in the Chicago, SW Michigan or Northern Indiana area, why not stop by and visit. One can ride the three different gauge trains, see an operating steam powered saw mill, an early electrical generating plant and so on. More information at: www.hesston.org.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 97 of the	)	**RM-11708**
Commission's Amateur Radio Service	)	
Rules to Facilitate High-Frequency	)	
Data Communications	)	

To: The Chief, Wireless Telecommunications Bureau
Via: Office of the Secretary

Comments to the Federal Communications Commission regarding WT Docket No.16-239; RM-11708 by Radio Relay International.

Submitted May 4, 2019

Executive Summary of this Filing

Radio Relay International (hereinafter "RRI") supports F.C.C. RM-11708 and endorses the ex-parte comments submitted by the Amateur Radio Safety Foundation on March 30, 2019. With this filing we contribute our summarized experience operating and maintaining networked Pactor relay stations, including recent exercises and drills that were quantitatively analyzed and assessed. RRI recommends amendment of part 97 of the rules to allow for use of Pactor 4 in the US Amateur Radio Service.

About Radio Relay International

RRI is an IRS recognized 501(c)(3) public benefit corporation, chartered in 2016 in the State of California, to manage and promote formal message traffic relay in the amateur radio service. RRI is supervised by an executive board of directors elected by our constituent member nets. Such nets conduct radiotelegraphy, radiotelephony, and digital waveform amateur message traffic operations in the Western, Central, and

Eastern areas of the United States and Canada. These areas are further organized into ten operating regions that represent states, provinces and territories. Operations extend beyond continental North America into the Caribbean, Alaska, Hawaii, Oceania, and Europe. More than two-hundred and fifty amateur radio operators are registered with RRI, comprising the most active of the several thousand operators that regularly join our affiliated nets. Attachment "A" appended hereto illustrates the present Digital Traffic Network topology of RRI.

RRI sponsors the publication QNI: the Independent Newsletter for Amateur Radio Traffic Handlers and hosts the "TFC-OPS" and "RadioRelay" on-line discussion groups for the amateur radio traffic handling community. RRI publishes field and technical manuals, training programs, operating aids, and other material at our main website, ***www.radio-relay.org*** . This site demonstrates our expertise in the field.

Digital Traffic Network

RRI maintains the Pactor-based Digital Traffic Network hereinafter ("DTN"), direct descendant of the amateur radio based, experimental AX.25 networks of the 1970s and 1980s and formerly affiliated with the American Radio Relay League as the NTSD. The network backbone operates in the high-frequency ACDS sub-bands using the Pactor 3 waveform under automatic control conditions. Many system operators offer local vhf access using standard packet radio equipment and techniques.

In a typical month, DTN relays between fifteen and twenty thousand radiograms to scores of state and local level stations. We estimate DTN and its predecessors relayed several million radiograms over more than thirty years of operation.

Pactor in Operation

Many published comments in the present proceedings and related proceedings discuss Pactor's technical features, especially as implemented in hardware by its inventors, Germany's SCS GmbH & Co. Our comments pertain to its use on the air,

particularly during band-congesting amateur radio sport (contest) weekends and under real and simulated emergency conditions, and how Pactor contributes to satisfying the Part 97 public service mandate to provide emergency communications and to the advancement of skills in both the communication and technical phases of the art. Certainly RRI itself is dedicated to increasing the reservoir of skilled radio operators, technicians, and electronics experts. We believe new digital modes enhance this goal.

Concerning the mode Pactor, our digital operators have expertise with industrial, commercial, military and government communications and enjoy operating a variety of hardware and soundcard implemented data modes. Such modes include those offered by a leading expert in the field who is well published and celebrated, Professor Joseph H.Taylor Jr., (amateur call sign K1JT). A number of our DTN hub stations also use the digital mode Winmor to maintain interoperability with the Winlink message service, the subject of much of the present filings in this matter. Also, before standardizing on Pactor, DTN hub stations operated AMTOR, Clover and Pactor allowing for detailed observation and study of their relative performance. On the merits, Pactor 2 was selected as our backbone standard. Most hubs upgraded to Pactor level 3 within a few years, an endorsement of the waveform's increased capability.

Our accumulated experience gives RRI a broad institutional perspective of the relative merits of common waveforms, how amateur implementations stack up to industry standards, and the practical effectiveness of communicating messages under many propagation and operating conditions over a variety of technologies. We have arrived at our present position based on our experience.

Several RRI operators already use Pactor 4 in U.S. government service or foreign amateur radio services and remark on its superior performance. Improved performance has been observed even in Pactor modes 1, 2, and 3 attributable to improvements in the modem's design implementation. Simply put, RRI argues Pactor works and works well for written message operations. Accordingly, full consideration by

the Commission to Pactor 4's use as a legally authorized amateur radio mode of operation is urged.

Discussion

RELIABILITY: The SCS modem itself is constructed to commercial standards and performs reliably and robustly, requiring no maintenance beyond its initial installation. Interfacing with modern transceivers with dedicated data ports and high-quality cables means Pactor stations are physically stable and innately immune to RFI, voltage variation, and mis-wiring errors.

AUTOMATED OPERATION READY: SCS modems include automated adaption algorithms for Busy Channel Detection, Transmit Power, Frequency Correction and Protocol Fallback that make automated operation practical. As a practical matter, P3 initializations often fall back to P2 and on rare occasions to P1. Power levels are similarly reduced for good circuits. Anecdotally, we have many reports of successful P2/3 connections inaudible to human ears.

NARROW BANDWIDTH REQUIREMENTS: Communication emergencies and simulated drills quickly fill the data sub bands, especially the segments reserved for automatically controlled digital stations. Pactor's narrow bandwidth, automatic adaption, combined with easily scripted polling policy allows us to establish useful circuit throughput under seemingly impossible conditions. Only continuous wave ("CW") Morse code amateur operations rival Pactor in this ability even as we note our most capable CW radio operators are falling silent as time progresses and such skilled operators are not replaced.

NOTE: Part 97.221 strictly limits waveform bandwidth to 500Hz outside the ACDS sub bands. We strongly urge the FCC to restore automatic control sub band allocations as they existed prior to 2006 and RM-11759. For example, the current 40m

ACDS allocation supports only two concurrent Pactor 3 connections.

AVAILABILITY AND SUPPORT: As a commercial product, Pactor's developers hold a vested interest in its stability and continued support, leading to its widespread distribution and large installed base of SCS modems at consumer level pricing. Its nearest rival in the amateur radio market is HAL Communication's CLOVER waveform and devices, no longer marketed to hams and generally unavailable to consumers at any price. While Kantronics still supports its G-Tor waveform, it is not widely used despite its origin in the automatic link establishment ("ALE") protocol.

TRAINING AND MAINTENANCE: Because it is implemented in hardware, Pactor requires little training or maintenance for basic message traffic relay. This is an obvious advantage of its use for emergency communication. Field-deployed Pactor stations in a communications disaster can be operational in a matter of minutes with a high expectation of reliability. Further, it is long-standing DTN policy to review and modify operating plans each year. DTN managers are in regular communication to discuss network management. They produce frequency files for the Airmail software client, distributed widely among hub stations and local DTN liaison stations. Thanks to internal communication and coordination, DTN stations are kept in good operating order. Poor performance is identified and remediated as it is noticed and the result is a well operating system that minimizes interference while maintaining a full-time, year-round operational capacity.

OBSERVED AND QUANTIFIED PACTOR PERFORMANCE UNDER EXERCISE CONDITIONS: While operating under the aegis of the ARRL's National Traffic System, before the formation of RRI, many of the current RRI operators participated in the 2016 FEMA exercise "Cascadia Rising" at the invitation of the director of the Disaster Emergency Communications Division in Washington, D.C. Then-NTSD had never before been tested in simulated emergency conditions and we were keen to see how it performed under pressure. Despite an unexpected glitch revealed by poor radio

propagation during the exercise, requiring direct intervention by the sysop, we were extremely impressed with Pactor's overall performance and accuracy under adverse, real-world conditions.

Performance of the radiotelegraph and digital relay networks is discussed in a document entitled "CRE Evaluation Report Final 2016-7-11", available at http://radio-relay.org/about/publications/ . The NTSD (today's DTN) achieved 99.997% accuracy with only 16 non-fatal errors in more than 7,000 data points. The glitches prevented relay of a large fraction of messages within the exercise period. While correctable problems were addressed with revised procedures, we speculated Pactor 4 may have alleviated the bottleneck by virtue of its improved sensitivity and higher throughput even when connecting to legacy Pactor equipment.

Overall, the network's results compared favorably to our concurrent radiotelegraphy operations which achieved a remarkable 99.998% accuracy over 10,000 measured data points.

NO ILLICIT OPERATION HAS BEEN OBSERVED: At the RRI April 2019 board of directors teleconference, which includes the three DTN area managers and many hub sysops, no one could recall an identified instance of illicit Pactor operation. Several instances of incorrectly configured Hub and MBO stations were recalled, each of which led to immediate remediation of the problem. We should note that our Pactor hubs process all messages in plain text despite our ability to accommodate binary files as desired. We maintain binary capability while we reserve it for emergency use.

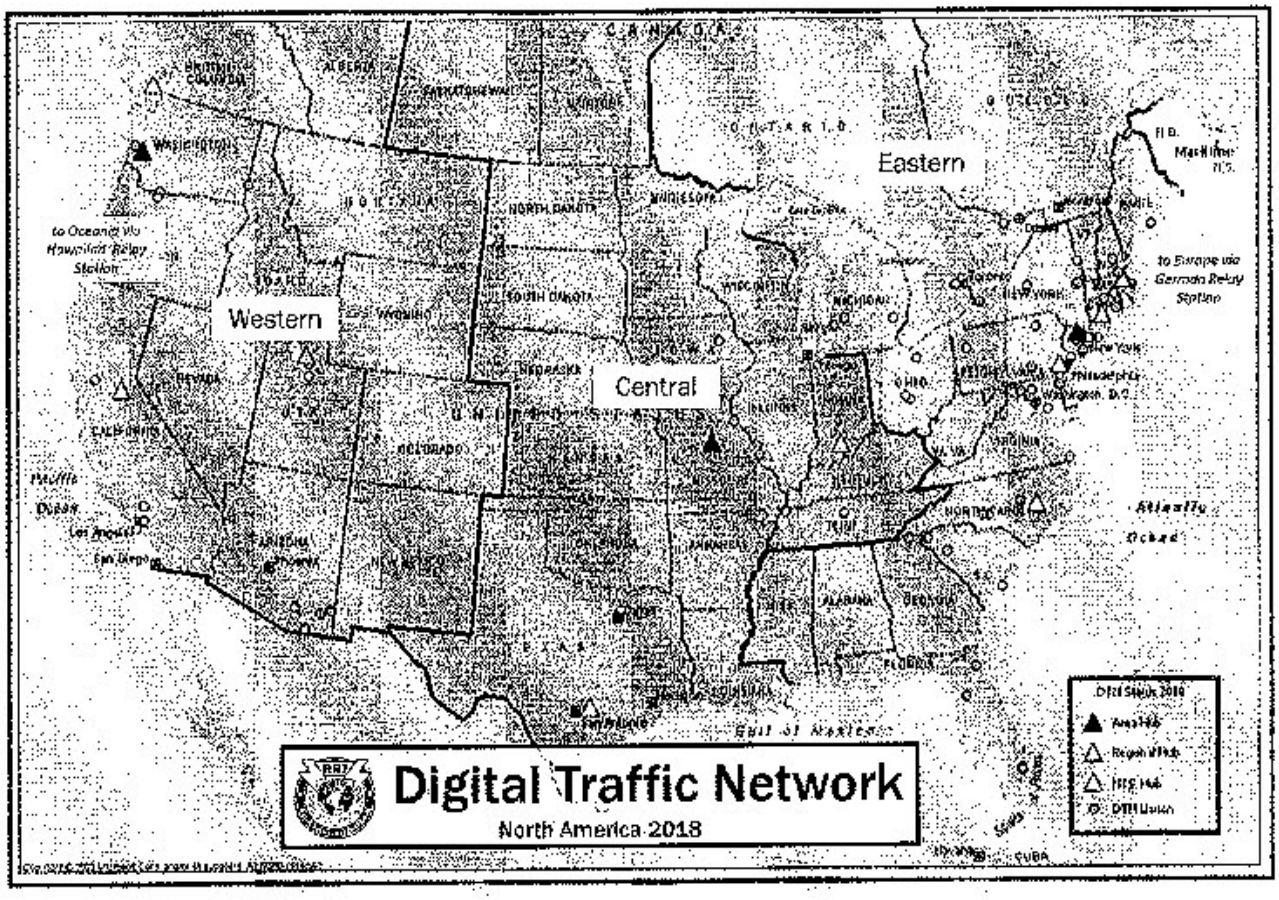
Conclusion

RRI recommends Pactor 4 as an amateur radio mode of operation and urges the Commission's proposal to make it available to the U.S. amateur radio service by appropriate amendments of part 97 of the Amateur Radio Rules.

Radio Relay International

by its Board of Directors:

Joseph Ames W3JY *chairman*
Grant Hays WB6OTS
Larry Jones WB9FHP
James Michener K9JM
Jeffrey Miller WB8WKQ
Steve Phillips K6JT
Marty Ray N9SE
Lee Painter-Smith N7EIE
David Struebel WB2FTX
Chuck Vernon W5KAV
James Wades, WB8SIW *secretary*



ATTACHMENT "A"

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 97 of the	)	
Commission's Amateur Radio Service	)	RM-11831
Rules to Reduce Interference and	)	
Add Transparency to Digital Data	)	
Communications	)	

To: The Chief, Wireless Telecommunications Bureau
Via: Office of the Secretary

Comments to the Federal Communications Commission regarding WT Docket RM-11831 by Radio Relay International.

Submitted May 15, 2019

Executive Summary of this Filing

Radio Relay International (hereafter "RRI") supports the comments submitted by the Amateur Radio Safety Foundation, Inc. and respectfully requests that the Commission dismiss the above captioned Petition for Rulemaking, RM-11831 for the reasons specified below. With this filing, we contribute our summarized experience operating and maintaining an automated network of Pactor relay stations, which are operated with the express purpose of ensuring the operational readiness of the Amateur Radio Service to fulfill its statutory obligation under CFR47, Part 97.1 (a) defined as, "recognition and enhancement of the value of the amateur service to the public as a voluntary, noncommercial radio service, particularly with respect to providing emergency communications."

About Radio Relay International

RRI is an IRS recognized 501(c)(3) public benefit corporation, chartered in 2016 in the State of California, to manage and promote the systematic transfer of formal, record message traffic in the Amateur Radio Service. RRI is supervised by an executive board of directors elected by our constituent member nets. Such nets utilize a variety of modes and methods, including radiotelegraphy, radiotelephony and digital waveform methods, to convey record message traffic throughout North America and to selected overseas locations. RRI networks relay between fifteen and twenty thousand radiogram messages throughout its layered networks each month. Furthermore, the RRI system conducts periodic internal emergency communications exercises and participates in a variety of local, state and Federal emergency management exercises on a regular basis.

RRI sponsors the publication of QNI: The Independent Newsletter for Amateur Radio Traffic Operators and hosts two on-line discussion forums for radio amateurs involved in traffic handling and public service communications. Furthermore, RRI publishes field and technical manuals, training programs, operating aids and other material, all of which is offered free-of-charge at our website, *www.radio-relay.org*. This site demonstrates our expertise in the field.

Digital Traffic Network

RRI maintains the Pactor-based Digital Traffic Network (hereinafter "DTN"), direct descendent of the amateur service based, experimental AX.25 networks of the

1970s and 1980s. DTN was formerly affiliated with the American Radio Relay League as the NTSD. This network backbone operates in the high-frequency ACDS sub-bands using the PACTOR-3 waveform under automatic control conditions. In addition, a number of VHF gateways offer local access using standard packet radio equipment and techniques. The DTN network also interfaces with the Winlink system, thereby facilitating the origination of radiogram traffic via Winlink for automatic transfer to the RRI network. This method of interoperability adds an additional layer of flexibility to the public service mission of both organizations. DTN is available twenty-four hours per day, each day of the year. It is accessible to individual radio amateurs and emergency communications organizations via the "Digital Traffic Station" function for routine and emergency communications purposes.

Support Of ARSF Filing

RRI substantially agrees with the substance of the technical and legal arguments presented by the Amateur Radio Safety Foundation. Our comments discuss the deleterious burden RM-11831 would impose on RRI operations if adopted. In addition, we address several key assertions made by RM-11831 which we believe to be fallacious.

Claims of Interference

The title of RM-11831 purports to "reduce interference" caused by digital operations. This is unjustified in our experience. In April 2019, RRI searched available records and queried our current Area Digital Coordinators, all of whom have extensive experience operating digital networks in commercial, military or

government systems in addition to DTN. We were unable to reveal any case histories of interference complaints directed at our DTN despite over two-decades of operation.

To the contrary, our collected experience as operators of the DTN as well as users of the Winlink system operated by the ARSF, demonstrates both systems to be efficient users of the RF spectrum; operating within a narrow range of frequencies designated for automated control; and carefully selected based on a systematic frequency analysis. Great care has been taken to avoid sections of the amateur service bands commonly used for other communications purposes.

DTN protocols include hardware and software methods to inhibit automated transmit when a frequency is determined to be busy. Also, our state-level Digital Traffic Stations (DTS) are not automatically controlled and manually access DTN. As a matter of course, a DTS control operator must listen to the frequency before transmitting a connect request in consequence of the mechanics involved.

In discussions with our DTN control operators we asked specifically about interference unintentional or deliberate. Note the scope of these discussions was limited to DTN not including WL2K operations. While no statistical analysis has been conducted, casual observation indicates the level of unintentional interference occurring in association with automated Pactor based systems is de minimis. In fact, other amateur service activities including radio-sport (contests), casual operating, and manual digital modes cause significant disruption to on-going communications

of all types. Unlike DTN and Winlink, which utilize a published set of frequencies with the minimum time-domain required to exchange message traffic, these latter activities tend to respond to occupancy pressure in an ad-hoc, dynamic manner, seemingly without prior analysis or in-process concern of co-channel or adjacent channel communication.

Considering our institutional experience, RRI holds current automated Pactor networks to be well engineered, well maintained, and situated in such a manner that interference is not a significant issue. Furthermore, we question the reliability of interference claims attributed to Pactor operations by default. Numerous novel and innovative digital modes are employed in the amateur radio service at any given time. Many are variations of earlier inventions and sound alike to the human ear. None can be positively identified without some level of technical analysis. We believe Pactor is unfairly disparaged having become a bête noir while its actual complicity is far from established.

Transparency

The requirement for transparency is also misleading. In reality, the vast majority of radio amateurs are incapable of decoding every mode currently authorized in the amateur service. Without additional hardware or interface devices, the stock, commercial communications equipment operated by most radio amateurs is capable of only radiotelephone (ssb) and radiotelegraph (cw or Morse code) communications. For example, most radio amateurs cannot decode the long-standing frequency shift keying Baudot code used for radioteletype communications.

Likewise, many operators cannot decode manually keyed Morse code. While both methods are ostensibly open source, this fact does little to improve transparency.

Precedent for other digital methods developed by commercial manufacturers also exists in the Amateur Service. Examples include the common D-Star, APCO-25 and similar digital voice modes now gaining popularity in the VHF spectrum. These modes cannot be decoded with the common VHF-FM transceivers in widespread use yet they often play an important role in emergency communications. This is particularly true for intra-county hospital networks or other emergency communications functions in which an extra layer of confidentiality is desired.

That some Pactor communications relies on equipment using proprietary software does not logically extend to a form of de facto encoding or encryption. There is no expectation of communications security for stations using Pactor. Furthermore, the fact not all amateur service operators can decode Pactor is insufficient justification for placing limits on its use, any more than the fact that not all, or even a majority, amateur service operators can decode radioteletype or Morse code would justify limits their use.

Security Issues

Some have expressed concerns about the potential for abuse of automated Pactor networks for nefarious purposes. In decades of operating an automated digital network, unauthorized intrusion has proven not to be an issue. The operational structure of DTN is such that manual interface occurs at the point of

origination and delivery and unauthorized or inappropriate message content would be immediately flagged by this natural gate keeping. The inherent interoperability of RRI networks further limit the potential for abuse because message traffic can be transferred from automated to manual modes at any stage to effect "last mile" connectivity.

RRI believes the Petition's security concerns are grossly overstated theoretical constructs lacking a basis in evidence. Furthermore, we believe true cases of Pactor interference are best handled by amateur radio's traditional manner, direct contact with the offending station's control operator.

Regressive Consequences

Firstly, the open source, free software clause is regressive. It discourages future research and development by vendors supplying the amateur service with new technology and it discourages individual technological evolution in the Amateur Radio Service.

Secondly, the withdrawal of widely used Pactor modes will effectively terminate the operation of our Digital Traffic Network, greatly diminishing the ability of the amateur service to provide an effective emergency communications capability.

If approved, RM-11831 will not decrease the frequency of unintentional interference. It is unjustified because the level of unintentional interference caused by automated Pactor networks is de minimis and likely far below the average interference caused by other, long-established modes and activities in the amateur service.

Conclusion

Given RRI's experience and assessment of the Petitioner's claims and proposed remedies, RM-11831 is not only regressive but harmful to the ability of the Amateur Radio Service to fulfill its statutory obligation as a resource for public service and emergency communications.

Radio Relay International respectfully asks the Commission to dismiss RM-11831 with prejudice.

Radio Relay International

by its Board of Directors

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Some Humor

"So your daughter's married, I hear. I expect you found it very hard to part with her."

"Hard! I should think so. Between you and me, my boy, I began to think it was impossible!"

"Can't the Democrats of this town get together?" Inquired a political candidate in Kentucky.

"Get together!" Answered the local Sheriff. "Why, it takes eleven deputies to keep 'em apart"

A Republican candidate, in a house-to-house canvass was trying to persuade a voter to ballot for the Republican ticket.

"No," said the voter. "My father was a Democrat, and so was my grandfather, and I won't vote anything but the Democratic ticket."

"That's no argument," said the candidate. "Suppose your father and your grandmother had been horse thieves; would that make you a horse thief?"

"No," came the answer. "I suppose in that case I'd be a Republican."

Teacher: "Johnny, spell gravy"

Chicago politician's son: "G-R-A-F-T"

REPORTING THE YACHT RACES—1927

Radio operators C.W. Hancock and C.J. Hartley showing the 64-meter (4.6 MHz) shortwave transmitter designed and manufactured by the A. H. Grebe Company to report on yacht races. The transmitter was installed on Grebe's personal yacht, the "MU-1," the name of which was chosen to honor of the "Grebe Synchrophase" broadcast receiver, which made Grebe a wealthy man.