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July 15, 2019

To: ARRL Board of Directors  
From: David Siddall (K3ZJ), ARRL Washington Counsel  
Re: Report on FCC and Related Regulatory Matters January-July, 2019

## **Introduction**

It is a privilege to join you as ARRL's Washington regulatory counsel. I look forward to getting to know each of you individually as we work together to promote and protect amateur radio interests in Washington.

This report is on regulatory matters that occurred after the January Board meeting or that are pending as of July 12.

The past six months have been an experience learning of the many Washington interests and concerns of amateurs. After my appointment on January 25, substantial work was quickly accomplished to assess the matters that are the most pressing while simultaneously collecting data on FCC and other related proceedings. My thanks to everyone who provided me with earlier reports and other relevant information. This was invaluable to my almost immediately focusing on the issues of immediate concern.

I note that there are Washington matters that affect the amateur service but that are in the hands of others. These matters include (1) international (ITU) conference matters, on which Jon Siverling (WB3ERA) long has worked. I know that he is heavily involved with preparation for the WRC-2019 conference that will be held this autumn in Egypt; (2) the Volunteer Monitor program, being stood up and managed by former ARRL vice director Riley Hollingsworth (K4ZDH); (3) legislative matters, which are being addressed by the Board's Legislative Committee; and (4) representation on the

FCC's Technological Advisory Council (TAC) by Doug Lapin, N9GL. I monitor these matters lightly and am available to provide advice as needed, but I am not involved in the details of this work unless or until such matters are brought to or are being addressed at the FCC on a policy level.

As a longtime radio amateur and life member of the ARRL, and also a former FCC legal advisor and attorney, I look forward to helping navigate the regulatory paths in Washington for a service that we all love.

## **Regulatory Pause in FCC Docket 16-239 (RM-11708) Symbol Rate Proceeding**

### **Introduction**

The biggest item over the past six months has been the symbol rate proceeding. Below is an account of the negotiations *cum* discussions held in late June and early July. Since some substantial aspects of the discussion and filings dispute what the FCC rules say and how they are applied by the staff, in a separate paper I have summarized the relevant provisions and given the interpretation accorded them by the FCC staff. Even if the reader disagrees with some aspect of this formulation, my personal opinion is that attention should be directed at what the ARRL *wants* the rules to say. Once that is decided, it is a detail to work it into a pleading or request. No time is needed to debate what the rules are in order to set out what ARRL thinks they should be.

Individual filings made by hams from around the country spawned a rancorous debate among amateurs in full view of the FCC and the larger public. Obscured communications using digital codes, passing of illicit third-party messages, encryption such that the national security is endangered, automatic operation interfering with on-going QSOs, threats of Congressional investigations -- all and more are within the smorgasbord of issues and arguments placed in the public record of this and several related rulemaking proceedings in March.

Notably, the above-listed issues are mostly outside the scope of Docket 16-239. This docket addresses removal of the 300 baud symbol rate limit and whether a maximum bandwidth for RTTY/data signals should be adopted in their sub bands. If the FCC staff decides to consider changes related to the plethora of other issues raised in the comments, the Administrative Procedure Act likely requires issuance of an add-on or new Notice of Proposed Rulemaking (NPRM). Several rounds of additional public comment then would be required before a final FCC decision.

Ron Kolarik, K0IDT, submitted a petition requesting that the FCC address two of the issues raised by commenters in Docket 16-239 but outside of its scope. Kolarik requests (1) a requirement that new data modes be used only if open source software is available with which to decode the signals, and (2) limit all automatically controlled digital stations (ACDS), regardless of signal bandwidth, to the identified ACDS sub bands that currently must be used by modes with bandwidths exceeding 500 Hz. The

FCC accepted his petition in March, RM-11831, and the comment cycle has run. More than 600 comments were filed and they continue to trickle in.

## **Background**

In 2013, the ARRL petitioned the FCC to request two changes to its rules:

- (1) eliminate the 300 baud limit for digital transmissions that currently applies to digital operations on HF below 28 MHz., and
- (2) limit the bandwidth of digital signals to 2.8 kHz below 30 MHz.

In the subsequent Notice of Proposed Rulemaking (NPRM) issued in 2016, Docket 16-239, the FCC proposed to adopt the ARRL's request to eliminate the HF symbol rate limit but declined to propose any overall bandwidth limit.

A final FCC draft Report and Order in Docket 16-239 resolving these two issues reportedly was completed in late 2018 and submitted for the final review before it would be sent forward to the Chairman's Office to begin Commissioner consideration. During the extended delay in its consideration – caused at least in part by the January federal government shutdown– the filings steadily became shriller and potentially more damaging to the amateur service.

By March 27, it was clear that the FCC would address the additional issues brought into the proceeding by commenters and that in the record had become the focus of many differing opinions. Notable issues raised included over-the-air monitoring capabilities for digital modes, compliance with third party traffic rules, and interference among and between digital stations and CW/RTTY stations. Some of the issues most hotly debated by commenters in the proceeding had not been explicitly addressed in the ARRL petition nor in the subsequent FCC Notice of Proposed Rulemaking and are at best tangentially related to baud rate and bandwidth limit.

After discussion with the FCC staff and within the EC, the ARRL requested a 90-day pause in the proceeding within which to identify common ground among the opposing parties and, if possible, reach a mutual understanding on some, if not all, of the issues being discussed. The FCC staff agreed to the 90-day proposal. Members of the EC contacted parties on both sides to ask that they meet with the EC.

June 11 finally was set for an all-parties meeting in Washington. In the meantime, multiple conversations were being held among various interested parties, including ARRL directors with their constituents and other interested hams.

Most of the individual amateurs contacted agreed in principal to such a meeting, but scheduling proved to be difficult. Eventually representatives of opposing groups – the Amateur Radio Safety Foundation, Inc. (ARSFI) (developers of the Winlink email software) and a group that included Ted Rappaport (N9NB) – agreed to meet with

ARRL EC representatives to try to find common ground on two issues: (1) “transparent monitoring” of data versions that employ ARQ and compression techniques that make over-the-air monitoring difficult or impossible, and (2) rules to alleviate interference from automatic controlled data stations (ACDS).

Scheduling difficulties delayed an actual face-to-face meeting being set until June 11. Ten days before the scheduled meeting, Ted Rappaport announced that he would not attend personally and that his employer, New York University (NYU), had secured legal representation through NYU’s Washington, DC law firm – Hogan Lovells – which has a known communications law group. Ari Fitzgerald (partner) and John Castle (associate), were engaged to represent NYU and Rappaport’s interests. NYU or Rappaport also engaged a technical consultant, former FCC staffer Michael Marcus (N3JMM), to work with Ari and John. NYU’s media relations department (or consultant) also was observed to begin working on these issues, which resulted in several public press releases and articles.

The decision of Rappaport to not participate personally in discussions and meetings even accompanied by his lawyers, coupled with the direct involvement of NYU, meant that actual negotiation and trade-offs “at the table” to address his concerns were not possible. The involvement of outside lawyers also triggered concern among EC members on a number of levels, including the use to which discussion details would be put, particularly given an apparent NYU media engagement. Consequently, a draft confidentiality agreement was sent parties that would require all positions and information be kept confidential and not used against the originating party in any way, including at the FCC. But with only a short time before the scheduled meeting, neither party accepted the agreement. The meeting scheduled for June 11 was postponed, to be reset.

At this point it was clear that conclusion of the meetings within the FCC-allotted 90 days was unlikely and that information about the meeting’s postponement was likely to find its way into the public domain and back to the FCC staff. Accordingly, ARRL filed an interim report with the FCC.

Members of the Executive Committee already had committed travel to Washington for the scheduled all-day June 11 meeting with the parties, and also for a second day of meetings related to Legislative Committee matters. This made it difficult or impossible schedule-wise for directors to fit a second trip in before the July Board meeting. When discussions resumed and parties committed to a verbal “no disclosure” agreement, I was delegated responsibility to convene meetings with the parties and to report to the EC.

On June 27 I met in person for almost three hours with Winlink representatives: Lori Kutchins (W3QA), Tom Lafleur (KA6IQA), and by teleconference with Ross Merlin (WA2WDT). On June 28 I met for an equivalent amount of time in person with NYU’s attorneys Ari Fitzgerald and John Castle, and consultant Michael Marcus (N3JMM); and by teleconference with Dan White (W5DNT) and Ron Kolarik (K0IDT).

Both sides suggested areas of possible compromise, with the NYU group conveying a prepared presentation focused on new sub band limits for automatic data stations (ACDS).

With the 90-day period at its end, the ARRL requested the FCC to allow an additional 60 days with which to conclude discussions and for the ARRL Board of Directors to consider the issues at its July meeting. The FCC staff informally agreed to this request.

After the separate in-person meetings, both groups asked about next steps. Without dissent, all agreed that progress was possible at least on some of the identified issues. Consequently, an “all parties” teleconference call was held on the evening of July 3. Present on the call were Lori Kutchins (W3QA) and Tom Lafleur (KA6IQA) for the Amateur Radio Safety Foundation, Inc. (ARSAFI) and Winlink; and Ari Fitzgerald, John Castle representing NYU, with Dan White (W5DNT), Janis Carson (AB2RA), & Ron Kolarik (K0IDT) joining the “NYU” side.

The July 3<sup>rd</sup> call ended with a tentative agreement on an ACDS and digital band plan to address interference issues, subject to revision and review over the holiday weekend.

There also was an agreement in principle to consider Winlink’s web viewer (where all messages originating or destined to U.S. stations are viewable) as a substitute or supplement for real-time over-the-air monitoring, subject to assurances that all messages to-and-from U.S. licensees could be reviewed without deletions and made directly available to those who wanted the information. The web viewer aspect was conditioned upon reducing into writing the web viewer details that Lori Kutchins and Dan White (primarily) had discussed in on the call, and was to be crafted to answer Dan’s concerns with the web viewer’s data transparency and other related assurances.

At all times the “NYU” contingent emphasized their position that without a comprehensive agreement on all issues, they reserved the right to not agree to *any* proposal going forward (all-or-nothing”). Ted Rappaport’s lawyers were on the entire call, and at the beginning had emphasized his view that the current FCC rules require the ability for amateurs to monitor all transmissions for self-enforcement purposes, and therefore open source software had to be provided to enable such monitoring when otherwise monitoring was difficult or impossible. During the final discussion on the web viewer no condition or other objection was made.

The attached band plan subsequently was agreed to by all on July 8. **IT REMAINS CONFIDENTIAL AND IS NOT TO BE FURTHER DISCLOSED OR DISCUSSED OUTSIDE OF THE ARRL BOARD.** This band plan would expand somewhat the sub bands within which current FCC rules limit ACDS stations employing bandwidths greater than 500 Hz. The new band plan also would require all digital stations operating with bandwidths greater than 500 Hz, and all ACDS stations regardless of bandwidth, to also limit their operations to within the same sub bands. It also was

agreed that within the ACDS sub bands there was no need for any bandwidth limit. (Outside the ACDS sub bands, data signals would be limited to 500 Hz and no ACDS operation.)

With regard to the Winlink web viewer ([https://www.winlink.org/content/us\\_amateur\\_radio\\_message\\_viewer](https://www.winlink.org/content/us_amateur_radio_message_viewer)), several days after the attached viewer description was sent to the NYU side it was rejected without any counter-offer or suggestion, other than that it did not provide for over-the-air real monitoring. Arguments that for enforcement purposes a record of *all* communications was far superior to itinerant monitoring of what often would be a single side of a communication on HF (due to propagation “skip”) were not answered, other than by repeating the assertion that “the FCC rules require real-time over-the-air monitoring.”

### **Conclusion**

Notwithstanding the outcome of the discussions, without a doubt this process will benefit future long term relations with the staff at the FCC. It is apparent that difficult as it may be, the ARRL is acting in a positive manner and trying to be part of a solution in reasoning through application of old regulations to new technologies. Discussions that I have had throughout this process with several members of the FCC staff have confirmed for me that the delay and further discussion among the parties is viewed only as beneficial to an ultimate resolution of these issues.

The relationship of ARRL with the FCC is especially important at this particular time because there no longer is a veteran radio amateur handling amateur-related issues at the FCC. This makes predictable outcomes more difficult and less certain when differing views are presented. Our work with the FCC staff is of increased importance in the interest of continuing appropriate regulation while avoiding unwise decisions that can stem inadvertently from a lack of knowledge or depth of understanding about the amateur radio. Many FCC staff members handle multiple issues and services at the same time, which today is true for our service at the FCC.

At the end of the day, the FCC is both the expert quasi-legislative agency that crafts the Part 97 rules and the quasi-judicial agency that interprets and enforces the same rules. It is a single agency, and the staff coordinates with each other in performing these functions today just as closely as they did when I was on their side of the street. In order to be effective in advocating proposals beneficial to the amateur service, whatever they may be, it is essential that our advocacy be based on an accurate understanding of the rules as they exist and as the FCC staff itself views them.

For further reference on the symbol rate proceeding, attached to this report are the four main documents provided by the parties at the negotiations. Please note the extreme importance in keeping these “directors eyes” only, as ARRL agreed when it entered into the discussions. Given the rancorous debate, there is are strong desires by some to see what is being discussed and, judging from past submissions to the FCC, to paint the League in the most unflattering light possible.

(I need only note, for example, that in 2013 it was the ARRL that opposed some of its members in the Emcom community and forcefully advocated at the FCC against allowing any encryption of data in the amateur service (beyond longstanding exceptions for various types of control signals). The FCC agreed. Yet today, just reading some of the pleadings, I would be misled to believe that the ARRL is a leading force for encryption – the opposite of the facts.)

**Confidential** documents attached for reference (*further disclosure prohibited, subject to oral confidentiality of negotiations agreement among the parties*):

- (1) spectrum agreement as of July 8 – not agreed to because no agreement on over-the-air transparency issue;
- (2) Web viewer description and commitments – initial submission invited by NYU side, but rejected without further negotiation on grounds that no over-the-air reception capability;
- (3) NYU attorney’s outline of the legal case;
- (4) Winlink description and argument.

## **Washington Activities January-June 2019**

### **FCC Filings**

During this period the ARRL made the following filings at the FCC.

- Pursuant to Board resolution at its January 2019 meeting, the “Amateur Radio Parity Act” (ARPA) petition filed on December 17, 2018, was withdrawn from FCC consideration without prejudice before the FCC staff acted to accept or release it publicly.
- Comments were filed comments in a proceeding in which the FCC is addressing future regulation of satellite debris. ARRL’s comments support and reflect AMSAT’s conclusions that certain options being discussed would be extremely difficult or impossible for amateur satellite entities to meet.

At an appropriate future time the ARRL and AMSAT, either individually or separately, likely should meet with FCC staff on this matter. Adoption of the FCC proposals and application to amateur satellites potentially could preclude

launch of future amateur satellites under U.S. auspices because of a financial guarantee that would be imposed related to the potential for debris being left in space.

- ARRL filed comments in opposition to comments filed by the Community Associations Institute (CAI) in a Biennial Review proceeding. CAI had used the opportunity to address matters related to PRB-1. CAI's filing was out of place in this proceeding since the Commission had not requested comment on any amateur (Part 97) rule, but it appeared that CAI's filing may have been intended as a shot across the ARRL's bow with regard to the ARPA petition filed on December 17, above, that was still pending when CAI filed its comments.
- Comments on spectrum strategy were filed with the NTIA on January 22, 2019, before my appointment. Since that time, David Redl, head of NTIA and its principal spectrum policy architect, has resigned and acrimony between the FCC and NTIA has erupted over certain spectrum disputes between the two agencies. This casts some degree of doubt on future NTIA spectrum positions, but nevertheless, the report to the President to be associated with this proceeding is due at the end of July.
- Two letters were filed with the FCC requesting a pause and an extension to the pause in Docket 16-239, discussed above. Brief interim and a final reports also were filed.

### **Additional Filing**

On March 22, the ARRL filed comments with the Office of Emergency Communications in the Department of Homeland Security (DHS) on the National Emergency Communications Plan. The plan describes emergency communications plans and preparations in the United States, and ARRL's brief comments describe the amateur readiness and contributions to emergency communications.

### **FCC Petitions and Proceedings of Note**

#### *RM-11831 -- Digital Mode Monitoring and Automatically-Controlled Digital Stations*

Ron Kolarik, K0IDT, proposed to solve or alleviate two of the issues discussed above, interference and digital mode transparency. The petitioner would accomplish these objectives by (1) eliminating 97.221(c), with the net effect to require that all automatically-controlled digital stations (ACDS) operate within the sub bands identified for ACDS stations using modes with greater than 500 kHz bandwidth; and (2) require that developers of digital data modes to provide as open source software the means to



fully decode the content of signals using their transmission protocols in the amateur service.

*RM-11828 – Technician Class Privileges*

In February 2018, the ARRL filed a petition to upgrade the Technician license by providing digital and voice privileges on 80, 40, and 15 meters. This petition was accepted put out for comment in March. Anti-ARSFI/Winlink parties have filed objections to extending digital and other privileges to Technician class licensees, as do some who believe that the ARRL's proposal would grant too many privileges to the beginners for a variety of reasons (QRM, lessen incentive to upgrade, etc.).

ARRL filed reply comments directly stating that its petition is related solely to Technician class privileges and should not be included as part of the consideration of digital issues in Docket 16-239 and its progeny. It also noted that the digital issues being raised to object to increased Technician class privileges are likely to be resolved before this item moves forward, given that we are at only the preliminary stage on this one and the digital one already is drafted and expected to proceed after the pause requested by the ARRL.

*RM-11759 – Rebalancing 80-Meter Subbands*

The ARRL petitioned to amend 80 meter subbands in early 2016. The filing was accepted for comment and remains pending. In its petition, the ARRL requested that the lower edge of the phone band, currently 3.600 MHz, be shifted up to 3.650 MHz; that RTTY/data be permitted in the 3.500 – 3.650 MHz subband; that the ACDS subband be shifted upward to 3.600-3.615 MHz to correspond with IARU band plans; that Novice and Technician class licensees be authorized to use CW, RTTY and data modes in the 3.600-3.650 MHz segment and that General and Advanced class licensees also be granted access to the 3.600-3.650 MHz segment.

*RM-11785 – Implementation of WRC-2015 Allocations at 5 MHz*

In early 2017, the ARRL petitioned the FCC to implement the WRC-2015 allocations for the 5 MHz band. The League requested a 100-watt power limit for the band as a domestic exception to the WRC decision to limit power of 15 watts in the area encompassing the United States. In support of allowing more power than adopted at WRC-2015, the ARRL noted, among other things, that 100 watts had been used successfully without any reports of interference to the U.S. Government stations with which the band is shared.

Since the time when the petition was filed, Canada is understood to have adopted rules that permit more power than provided under the WRC-2015 treaty. A check at the FCC indicated that this item is not near the front of the queue for consideration. I do plan to ascertain the Canadian details and file an additional pleading to try to re-start active consideration at the FCC.

*Docket 16-243 -- HF Amplifier Proceeding*

The Commission issued a Notice of Proposed Rulemaking (NPRM) in response to a Petition for Rulemaking filed by Expert Linears America, LLC (SPE) requesting elimination of the rule limiting the gain of HF amplifiers to 15 dB be eliminated. This rulemaking continues to be pending. It is likely that it will be acted upon favorably, but is competing with other items for attention.

*RM-11775 – Retention of Vanity Call Signs*

Once relinquished, a call sign is not re-issued for a minimum of two years. This petition alleges that some amateurs switch vanity call signs so often that the pool of available call signs is unnecessarily depleted. The Petitioner proposes to require that vanity callsign holders be required to keep their callsign for the full ten-year license duration before being allowed to change. This petition awaits action, possibly inclusion in a future rulemaking that proposes other changes to the amateur rules.

*ET Docket 13-84 – RF Exposure Limits*

In 2013, the FCC initiated a general re-examination of its RF Exposure limits. Continued attention to the possible biological effects of radio waves keeps the issue in the public eye. Also, there have been minor changes in the industry exposure limits. But the real issue for amateurs is that the Commission proposed to delete its current categorical exemption of amateur stations from routine RF exposure evaluation. This would subject many more amateur stations to the requirement to evaluate RF exposure.

This proceeding has been dormant for a number of years, but periodically attracts Congressional attention. At some point it is likely to receive renewed attention, and at that time we must also engage to represent Amateur interests on this issue.

**FCC Decisions***Small Satellite Order (Docket 18-86)*

On July 12, the FCC released its draft Report and Order (R&O) detailing its new streamline procedures for “small satellite” applications. The R&O is scheduled for Commission consideration on August 1. The ARRL filed comments last year in which it argued that the FCC should adopt a “bright line test” to define and distinguish satellites properly operated under the amateur rules (Part 97) and satellites that should be authorized as experimental satellites (Part 5).

In the recent past, certain satellites that should be considered legitimately amateur – such as some constructed at academic institutions with amateur control operators and purposes consistent with the amateur rules – have been classified by the FCC as ineligible for Part 97 authorization based upon the pecuniary interest rule, even though that rule

contains an explicit exception for teachers in an academic environment. Conversely, the ARRL argued for “discouraging” experimental satellites from operating in amateur spectrum when they do not have an amateur as control operator nor a mission and purpose consistent with Part 97 definitions.

The draft R&O to be considered on August 1 indicates that the FCC will decline to address this subject, stating that the topics are outside the scope of this proceeding.

*Above 95 GHz Spectrum Rules Order (Docket 18-21)*

In March, the FCC adopted rules to govern frequencies above 95 GHz. The Commission adopted rules that open the entire width of spectrum for experimental and regular licensing, including two primary amateur allocations as well as amateur secondary allocations.

The ARRL filed comments in which it opposed issuance of experimental licenses in two bands with primary amateur radio allocations (134-136 GHz and 248-250 GHz) on the basis of interference concerns. Alternatively, ARRL argued that applications for the frequencies should be coordinated with the ARRL. The Commission rejected these arguments. I do note that experimental licensing by definition includes all spectrum regardless of allocation status for all bands, except for the restricted frequencies on which no operations are permitted by any entity. (These are specified at Section 15.205 of the Commission’s Rules.)

The Commission did decide not to issue regular licenses in these bands, opting to take the matter up at a later time when there has been more experience with unlicensed and experimental operations in this spectrum range.

### **Enforcement Issues**

#### *General*

K5UR and the FCC Enforcement Bureau chief signed the long-awaited Memorandum to formally establish the ARRL/FCC new Volunteer Monitor program. Riley Hollingsworth has been retained to work on the program, and there has not been need for my involvement. Riley and I have had several discussions, however, and we are keeping in touch. On July 15 the window for applications is closed.

There are several enforcement actions awaiting FCC action. Riley recounted to me his belief that FCC staff work has been completed and that they await review.

On June 11, I spoke with Enforcement Bureau Chief Rosemary Harold and Investigations and Hearing Division Chief Jeff Gee about two actions that Riley reported as having been drafted last fall but not yet reviewed in the front office. Rosemary and Jeff readily agreed to check on the status of any amateur items in their “front office.” As of July 15, no items have been released. Of course, we do not address the merits of any

complaint, but just timing. I will check on these again.

There is another enforcement decision that reportedly has been awaiting Commissioners' approval for six or more months. I have made inquiries of several Commissioner assistants. Without reference to the merits in any fashion, I asked if they would see if anything could be done to resolve the case "up-or-down", citing the Volunteer Monitoring Program that is soon to start as a reason to "clear the decks." I think that it lacks one vote in one office, but so far it has not been acted upon.

*Use of non-Certified Equipment in the Amateur Service – DA 18-980*

On September 24, 2018, within a Public Notice "Enforcement Advisory," the FCC Enforcement Bureau indicated that radio amateurs are not permitted to use or modify equipment capable of operating in the UHF/VHF amateur bands that has not have FCC equipment authorization and is capable of transmitting outside the amateur bands. Equipment used in most other radio services must receive equipment authorization from the FCC before it can be used, but this is not the case with amateur radio equipment. ARRL consulted with the FCC Enforcement Bureau on this matter in October, but without resolution. Since that time no further action has been taken. I have made some inquiries without result, and intend to follow up in consultation with the EC.

**76-81 GHz**

There is pending with counsel a request from several amateurs interested in microwave for ARRL help in obtaining an experimental license for more power at 76-81 GHz. Their initial request was made last fall. I met with several of the interested parties when they attended a VHF/UHF conference near Washington and am waiting to hear from the interested parties with the details of their request.

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# HF Digital Spectrum Subcommittee Final Consensus July 8, 2019

Lor Kutchins, W3QA, Janis Carson, AB2RA, Ron Kolarik, K0IDT, and Dan White, W5DNT

## Current FCC 97.221(b) vs. 7-8-19 Consensus\* ACDS/Wideband Sub Bands

Band	Current ACDS FCC 97.221(b)	Current FCC 97.221(b) Allowance, KHz	July 8 <sup>th</sup> Proposed* ACDS/Wideband	Proposed* Allowance, KHz	Delta, KHz
160	0	0	0	0	0
80	3.585-3.6	15	3.595-3.635	40	25
40	7.1-7.105	5	7.100 - 7.120	20	15
30	10.140-10.150	10	10.140-10.150	10	0
20	14.095-14.0995 & 14.1005-14.112	16	14.095-14.0995 & 14.1005-14.145	44	28
17	18.105-18.110	5	18.105-18.110	5	0
15	21.090-21.100	10	21.100-21.150	50	40
12	24.925-24.930	5	0		-5
10	28.120-28.189	69	28.120 - 28.150	30	-39
<b>Total</b>		<b>135</b>		<b>199</b>	<b>64</b>

\* 2.8 KHz bandwidth allowance for ACDS/Wideband Data. Non ACDS RTTY/Data limited to 500 Hz “peer to peer” operations

## Summary of Progress

- We have reached general agreement on the bulleted items described on the “Recommendations” page as to RM 16-239 changes and implementation
- Consensus reached on Spectrum Only, ACDS/Wideband Segments as shown on the previous page
- Concensus Agreement to an omnibus solution requires reaching agreement on “over the air data transparency”
- Nothing received to date from ARSFI or David Siddall related to the major issue of “over the air data transparency”
- This represents an isolated negotiation of “spectrum” issues, contingent upon final resolution of “over the air data transparency” issue

## **Recommendation (All in Agreement\*)**

### ***“Win-Win Proposal for Amateur Radio”***

- Expand Part 97.221(b) to, “ACDS/Wideband Sub Bands”, as proposed herein, to accommodate increased spectrum demand from ACDS stations and other wideband data and experimentation
- Eliminate 300 baud symbol rate limit in RTTY/Data sub bands. Establish a 2.8 KHz bandwidth limit in the newly defined Part 97.221(b) ACDS/Wideband sub bands and a 500 Hz bandwidth limit in the remaining RTTY/Data sub bands, thus protecting narrowband modes while accommodating increased ACDS data throughput, along with technology development, other wideband modes and experimentation
- Eliminate Part 97.221(c) and confine ALL store and forward or unattended data systems to newly expanded ACDS/Wideband sub bands, thus protecting narrowband modes
- Proposal resolves longstanding interference issues between ACDS, wideband and narrowband modes, by bandwidth segmentation. Symbol rate limit is no longer a factor in regulation

\* “This represents an isolated negotiation of “spectrum” issues, contingent upon final resolution of “over the air data transparency” issue still pending, no proposal received from ARSFI or ARRL as of 07-08-2019



## Winlink Message Handling

1. **How can messages be obtained?**
2. **Who handles the messages?**
3. **Additional means messages may be obtained.**
4. **Trust: how is the accuracy, timing, and veracity of the messages assured?**
5. **Conclusion**

### 1. **How can messages be obtained?**

Every Winlink user is provided software that includes a means to maintain a database of the messages sent and received on every computing device used at their station. Additionally, QSO logs provide timelines and metadata. Gateway station operators similarly maintain local logs. Gateway station operators also have access to a web application to inspect in detail the messages transiting their stations. These inspections are required by FCC rules.

The most direct way to monitor messages for someone not using Winlink radio email or participating in gateway station or system administration is to use the US Amateur Radio Message Viewer. This is a web application that allows searching and inspecting messages that transit US-licensed stations operating on the amateur spectrum. It originally was designed for the ARRL Volunteer Monitor Program and is available online at [https://winlink.org/us\\_amateur\\_radio\\_message\\_viewer](https://winlink.org/us_amateur_radio_message_viewer). Details are described on the linked web page. The web app displays timestamped messages within minutes of their transmission or reception from any station in the network, whether the transmitting station is located in the U.S., or outside the U.S. and whether communicating with a U.S.- or foreign-licensed station.

This system provides a means for reviewing all such messages and reporting any messages that may violate FCC rules. All messages are presented automatically on the viewer. Any message indicated for a possible violation of FCC rules or Winlink's standards is sent to a permanent archive as described below. Such a message is removed when an initial evaluation indicates a possible violation and sent to an administrator for further action. This is done so that administrators do not waste time duplicating the work on multiple reports of the same message. **Every message removed for further review is preserved in a permanent gmail account with all associated actions, as described below.**

### 2. **Who handles the messages?**

If a message is reported as a possible violation, it is sent to a volunteer Winlink administrator and copies of the message, correspondence, and subsequent notifications and replies are stored in a permanent gmail archive (and sent to the reporter if they so elect).

The message viewer app receives its data directly from the master CMS (Common Message Server) database that is maintained in the ‘cloud’ by Amazon Web Services and at ScaleMatrix, Inc. using a cluster of redundant servers, with enterprise-level and industry-standard backup, failover and server image recovery capabilities. Volunteer Winlink Team (licensed ham) IT engineers, developers and administrators manage these resources. How the Winlink Team functions, and who they are described below. We welcome additional, committed ham volunteers to join the team and participate in running the system, including the hams on the July 3rd teleconference.

### **3. Additional means messages may be obtained.**

From this central database, we can additionally provide near-real-time message content, and message and radio path metadata in a variety of formats, via a variety of pathways.

For developers, we present a public API (Application Programmer Interface), which is publicly documented at <https://api.winlink.org>. These are comprehensive tools for accessing and manipulating the Winlink databases. Access is granted to developers who demonstrate an honest contribution to amateur radio with viable application software. Many ham software products interface with the Winlink system using this interface, and with it a competent programmer can develop a custom application to meet many different requirements. Almost anything is possible.

Custom streamed, near-real-time data feeds can be provided using RSS, ATOM, MQTT or other formats to allow messages to be received on other systems as might be desired. The Winlink Team would be pleased to provide this to any group or organization who can provide the service of inspecting content and responsibly carrying out self-regulation in compliance with the ARRL’s VM Program or the FCC Enforcement Bureau’s requirements. The same results can be achieved using the Message Viewer web app or by software using the online API, but this may be a desired alternate delivery technology.

### **4. Trust: How is the accuracy, timing, and veracity of the messages assured?**

As Ronald Reagan said, “...trust but verify...”

Every message is preserved for 21 days in the viewer or, if reported as a possible violation, in the permanent gmail account with the history of its handling.

Trust may be gained through audit and by actual active participation. ARSFI and the Winlink project both are products of a worldwide community of ham radio licensees who care about the service and tools they provide to other amateurs. Team participation is open at different levels and is actively encouraged, just like other facets of our hobby. Participation demonstrates to a user that what is put in can be tracked and seen coming out. Our experience is that anyone who uses the system will

see that it works as described above. Alternately, formal, independent IT audit procedures could be used to verify truthfulness, and we are open to that should that help clear up any distrust that may exist.

The Winlink Team consists of licensed Hams at different levels:

Clients or Users

Gateway Station Sysops

Support and System Administrators

Network, Server, Database, Web Engineers and Administrators

Architects, Designers, Developers

Different levels of radio, and computer expertise are needed at various levels, but there is a task for anyone who takes an active interest and contributes. All enjoy working with more experienced hams to learn and advance. Satisfaction comes from measurable accomplishment and by sharing thanks that arrives from those directly affected by the profound good Winlink users often do. The Winlink Development Team is identified and credited at the bottom of every web page at winlink.org.

## 5. **Conclusion**

Unlike over-the-air monitoring, which is hit-or-miss at best due to propagation vagaries and such, the system described above provides a complete audit trail of **every** message transmitted by a U.S licensee passing through the Winlink system from anywhere in the world.

We agree that monitoring messages sent by amateur radio is important to the self-policing nature of amateur radio. The modes used by Winlink are designed and used for their communications efficiency, effectiveness, and to assure their machine-readability. This can make them difficult to copy over the air. Recognizing this, we have expended considerable resources to provide one hundred percent monitoring for all messages transmitted by an F.C.C. licensee using our system. It must also be noted that such monitoring is not suggested by any other country, and the hams in those countries will continue to be heard on our HF bands.

Digital radio mode and modem technology will continue to advance no matter what may be decided here in the U.S., as the hams around the world are using this and similar systems.

We firmly believe that our monitoring system described above, which relates to Winlink specifically, provides far superior monitoring results and voluntary enforcement than exists for any other system under any conditions.

Lor Kutchins, W3QA, President,  
Amateur Radio Safety Foundation, Inc.  
Winlink Development Team

**Amateur Radio Service: Talking Points for Meeting with ARRL  
WT Docket No. 16-239; RM-11708; RM-11831**

***Winlink's use of PACTOR 2-4, WINMOR, ARDOP, and VARA does not comply with critical Amateur Radio Service rules.***

Winlink's use of PACTOR 2-4, WINMOR, ARDOP, and VARA violates **Section 97.113(a)(4) ("Prohibited Transmissions")** of the Commission's rules.

- Section 97.113(a)(4) prohibits the transmission of “messages encoded for the purpose of obscuring their meaning, except as otherwise provided [in the rules].”
  - The Commission's rules do not generally contemplate PACTOR 1-4. Instead, the rules contemplate PACTOR 1 and 3 in specific contexts only.
    - *PACTOR 1.* Section 97.309(a)(4) discusses use of PACTOR and would therefore ostensibly trump Section 97.113(a)(4)'s general prohibition. *See Amendment of the Amateur Service Rules to Clarify Use of CLOVER, G-TOR, and Pactor Digital Codes*, Order, 10 FCC Rcd 11044 (WTB 1995) (“1995 Order”).
      - BUT: Section 97.309(a)(4) was implemented in 1995, when PACTOR 1 was the only version of PACTOR available. *See Reply Comments of Professor Ted S. Rappaport, RM-11831*, at 11 (Apr. 29, 2019).
      - PACTOR 1 could be monitored for true meaning and therefore complied with Section 97.113(a)(4).
      - The Commission's reference in the *1995 Order* to public documentation of PACTOR 1's “technical characteristics” makes clear that Section 97.309(a)(4)'s reference to PACTOR cannot make permissible use of PACTOR 2-4 *until* PACTOR 2-4's “technical characteristics have been documented publicly” (*i.e.*, users can monitor communications for true meaning). This documentation has not occurred, so use of PACTOR 2-4 is not permitted.
        - Winlink admits that PACTOR 2-4 “are proprietary to SCS and only available on [the] SCS PTC range of products,” which makes the communications modes inextricably linked to commercial products. *See Winlink, Glossary, “Pactor 1, 2, 3, 4,”* <https://winlink.org/glossary>.
        - SCS has stated that it “is willing to develop and provide a free PACTOR monitoring tool,” thereby conceding that a monitoring tool currently does not exist. *Comments of SCS, RM-11831*, at 2 (Apr. 25, 2019).
    - *PACTOR 3.* Section 97.307(f)(14)(i) references PACTOR 3 in the context of emission requirements in the 60 meter band (*i.e.*, 5.332, 5.348, 5.3585, 5.373, and 5.405 MHz).

- The Commission has acknowledged PACTOR 3’s utility for public safety, which prompted the adoption of a rule that permits use of PACTOR 3 in one band only. *See Amendment of Parts 2 and 97 of the Commission’s Rules to Facilitate Use by the Amateur Radio Service of the Allocation at 5 MHz*, Report and Order, 26 FCC Rcd 1655, ¶¶ 20 (discussing use of PACTOR 3 in the context of public safety), 25 (authorizing PACTOR 3 emissions in the 60 meter band) (2011).
- Given Section 97.113(a)(4)’s general prohibition “except as otherwise provided,” the Commission’s rules permit use of PACTOR 3 in the 60 meter band only. *See* 47 C.F.R. §§ 97.305 (listing frequencies in the 60 m band), 97.307(f)(14)(i) (discussing “PACTOR-III”).
  - *PACTOR 2 and PACTOR 4*. PACTOR 2 and PACTOR 4 are not discussed in the Commission’s rules at all and therefore are prohibited under Section 97.113(a)(4)’s general prohibition on “messages encoded for the purpose of obscuring their meaning.”
    - The Part 97 rules do not discuss WINMOR, ARDOP, and VARA, so these communications modes also are prohibited under Section 97.113(a)(4).
    - Winlink may not rely on any communications mode that fails to comply with Section 97.113(a)(4)’s general prohibition on “messages encoded for the purpose of obscuring their meaning.” In other words, Winlink must rely on communications modes that can be monitored for true meaning.
- The FCC implemented Section 97.113(a)(4) to “amend the amateur service rules to conform to the language of the international *Radio Regulations*.” *Don Rolph Petition for Rulemaking to Amend Part 97 of the Commission’s Rules Governing the Amateur Radio Service to Provide for Encrypted Communications*, Order, 28 FCC Rcd 13366, n.3 (WTB 2013) (“2013 Order”); *see also Amendment of Part 97 of the Commission’s Rules to Implement Certain World Radio Conference 2003 Final Acts*, Order, 21 FCC Rcd 278 (WTB 2006) (implementing Section 97.113(a)(4)).
  - In the *1995 Order*, the Commission made clear that “[t]he HF bands are widely used for international communications.” To comply with international regulations, Section 97.113(a)(4) “prohibits amateur stations from transmitting messages in codes or ciphers intended to obscure the meaning thereof.” *1995 Order* n. 6.
  - Therefore, decades-long requirements have stressed the need for open communications in the amateur bands. Winlink does not comply with these requirements.
    - ARRL advertises Winlink’s use of more advanced communications modes as improving privacy of communications sent over its system. ARRL, *Winlink 2000 Radio-Email System Overview*, <https://bit.ly/2v3KgQU> (June 8, 2019) (“WL2K system radio-email is also compressed to reduce spectrum use and *to enhance privacy*.”) (emphasis added).

- SCS, which manufactures modems, has admitted that PACTOR 4 “utilizes advanced algorithms for HF channel equalization, *channel coding and data compression*.” Comments of SCS, RM-11831, at 2 (Apr. 25, 2019) (emphasis added).
- Winlink states that certain service codes for RMS stations “are used by groups who wish to keep gateway information private” and that “[t]he Winlink Team does not distribute that information.” Winlink, *Tools*, “RMS Map,” available at <https://winlink.org/RMSChannels> (June 19, 2019). Such privacy creates a private email network over the amateur bands, with no ability for other operators to effectively police the bands.
- The record already demonstrates that Winlink’s combined use of fading channels and “*differential encoding or compression* that uses the instantaneous channel state information shared between a specific connected transmitter and receiver to encode successive packet data transmission during a connection” creates “secure, effectively encrypted communications.” Reply Comments of Professor Theodore (Ted) S. Rappaport, RM-11831, at 6 (Apr. 29, 2019).
- Winlink’s service overwhelmingly relies on advanced communications modes for current communications, so the overwhelming majority of messages communicated violate Section 97.113(a)(4). See Winlink, *Tools*, “Traffic,” available at <https://winlink.org/RMSChannels> (June 8, 2019).
  - As of June 8, 2019, 99.9% of Winlink emails from May and June 2019 relied on PACTOR 2-4, WINMOR, ARDOP, or VARA.
  - It is impossible to determine what percentage of PACTOR 3 messages complied with the use restriction contained in Section 97.307(f)(14), further complicating users’ self-policing efforts.
  - Only 1 email message used open-source PACTOR 1.
- Everyone understands the importance of Winlink to public safety communications and its utility for certain recreational uses. BUT it is important that users of Amateur Radio Service frequencies comply with the Commission’s rules.
  - Frequency bands that do not require transparency or openness under the FCC’s rules are available to support Winlink’s service.
    - Maritime Services, which are regulated under Part 80 of the Commission’s rules.
    - Private Land Mobile Radio Services, which are regulated under Part 90 of the Commission’s rules.
  - Therefore, current Winlink operations must either: (1) be modified to comply with FCC rules, or (2) rely on service allocations and frequencies other than the Amateur Radio Service frequencies.

Because of amateur users' inability to self-police Winlink communications, Winlink users' violation of Section 97.113(a)(4) leads to *many other* rule violations.

- **Section 97.105(a)**'s requirement that control operators ensure "the immediate proper operation of the station, regardless of the type of control." Given the numerous rule violations, the control operators of Winlink's individual RMS stations fail to comply with this requirement.
- **Section 97.113(a)(3)**'s prohibition on "[c]ommunications in which the station licensee or control operators has a pecuniary interest, including communications on behalf of an employer."
  - We have evidence that emails traveling through Winlink's system violate the prohibition on messages in which the licensee or control operator has a pecuniary interest.
    - In April 2019, an amateur sent an email through a U.S.-based Winlink gateway to a marina regarding the price for long-term storage of a sailboat.
    - In March 2019, an insurance agent and Winlink user sent multiple emails that traveled through a U.S.-based Winlink gateway and involved the pricing and terms of an insurance policy. (The Winlink user had initially contacted the insurance agent through Winlink's system.)
  - The above examples do not qualify for any of the exceptions to the general prohibition. *See* 47 C.F.R. §§ 97.113(a)(3)(i)-(iv).
  - Additional evidence can be provided upon request. (Such evidence contains sensitive personal information that will need to be redacted.)
- **Section 97.113(a)(5)**'s prohibition on "[c]ommunications, [made] on a regular basis, which could reasonably be furnished alternatively through other radio services."
  - Winlink transmits regular email communications – including commercial email communications – over the amateur frequencies.
  - There are other services available for regularly sending these data communications, and the rules governing these radio services do not require the same level of transparency to all users of the spectrum. *See, e.g.,* OCENS, Inc., OCENSMail, <https://www.ocens.com/email.aspx> (June 24, 2019) ("Complete email solution for satellite and other low bandwidth connections").
- **Section 97.115(a)(2)**'s restriction on third party communications to stations in only certain, specified jurisdictions.
  - The FCC lists the countries with which U.S. amateur stations may transmit messages for a third party. *See* FCC, Wireless Bureau, Mobility Division, Amateur Radio Service, *International Arrangements*, <https://bit.ly/2Ndu1OX> (June 19, 2019).
  - We have evidence of emails that traveled through the Winlink system that violate the third party restrictions.

- For example, in May 2019, a Norwegian amateur on a sailboat sent an email to another sailboat through a U.S.-based Winlink gateway. There is no third party agreement between the United States and Norway.
- Additional evidence can be provided upon request. (Such evidence contains sensitive personal information that will need to be redacted.)
- **Section 97.115(b)(1)**'s requirement that, with regard to third party communications, the "control operator [be] present at the control point *and is continuously monitoring and supervising the third party's participation.*" (emphasis added) Winlink's control operators are not continuously monitoring and supervising to determine whether that third party participation complies with the amateur rules. Winlink's gateway station operators are therefore violating Section 97.115(b)(1).
- **Section 97.101(b)**'s prohibition on exclusive use of a frequency. The use of an ACDS to operate part of the Winlink system will commandeer certain frequencies, effectively shutting out other amateur users and making exclusive use of the frequency.

Self-regulation and self-policing are hallmarks of the amateur radio service and essential for avoiding FCC enforcement actions.

- The FCC has recognized the "long tradition of self-regulation and a strong commitment to maintaining the unclouded distinction between the amateur service and other radio services." *2013 Order* ¶ 6.
  - Self-policing is a part of this long tradition. *See 2013 Order* n. 19 ("We note that a hallmark of enforcement in the amateur service is 'self-policing,' which depends on an amateur station hearing a message being able to determine whether message[s] violate the amateur service rules.") (citing *Waiver of Sections 97.80(b) and 97.114(b)(4) of the Amateur Rules to Permit the Retransmission of Third-Party Traffic in Certain Situations*, Order, 59 Rad. Reg. (P&F) 1326, ¶ 2 (PRB 1986)).
  - The FCC has stated that "[t]o ensure that the amateur service remains a non-commercial service and self-regulates, amateur stations *must be capable of understanding the communications of other amateur stations.*" *Id.* ¶ 6 (emphasis added).
  - Winlink's use of PACTOR 2-4, WINMOR, ARDOP, and VARA undeniably "clouds" the distinction between the amateur service and other radio services because these communications modes prevent effective self-policing.
- Following this "long tradition," we are making every effort to resolve problems without relying on FCC enforcement actions, which may carry financial penalties and revocation of licenses.

***Accordingly, unless parties can reach an agreement about use and implementation of Winlink, we intend to file in WT Docket No. 16-239, RM-11708, and RM-11831 and encourage the***



***FCC to enforce its Amateur Radio Service rules, which would jeopardize the licenses of control operators operating U.S.-based RMS stations in the Winlink system.***

The FCC's adoption of the proposals in RM-11831 would update its rules to eliminate the ambiguities and confusion created by technological development. It would also represent a compromise that allows automatically controlled digital stations ("ACDS") to operate in a number of frequencies while protecting narrowband operations in others.

- The FCC should eliminate 47 C.F.R. § 97.221(c). *See* Ron Kolarik, Petition for Rulemaking, RM-11831, ¶¶ 6-9 ("*Kolarik Petition*").
  - Elimination of Section 97.221(c) would align US law with the International Amateur Radio Union's ("IARU's") Region 2 band plan. *See* IARU Region 2 Band Plan, <https://bit.ly/2uTkQHy> (Oct. 14, 2016).
    - IARU Region 2 band plan permits wideband ACDS communications while protecting narrowband operations.
    - Wideband transmissions create harmful interference to narrowband transmissions.
  - Elimination of Section 97.221(c) will not harm ACDS activity, since Section 97.221(b) provides a number of frequency bands within which ACDS may operate. *See* 47 C.F.R. § 97.221(b).
  - Elimination of Section 97.221(c) will prevent ACDS from interfering with narrowband amateur operations and effectively violating Section 97.101(b)'s cooperation requirement and prohibition on exclusive use of a frequency. *See* 47 C.F.R. § 97.101(b).
- The FCC should modify 47 C.F.R. § 97.309(a)(4). *See Kolarik Petition* ¶¶ 10-14. Modification of the rule would:
  - Eliminate confusion created by technological developments (*e.g.*, the use of PACTOR 2-4, WINMOR, ARDOP, VARA);
  - Establish clear rules without discouraging the development of innovative, new communications modes; and
  - Reaffirm the FCC's longstanding position that "a hallmark of enforcement in the amateur service is 'self-policing,' which depends on an amateur station hearing a message being able to determine whether message[s] violate the amateur service rules." *2013 Order* n. 19.

Alternatively, Winlink can modify its operations to comply with the Commission's rules.

- Winlink can rely on communications modes that comply with Section 97.113(a)(4) and can be monitored over-the-air for true meaning.
  - For example, Winlink could release open-source software so that any user of the Amateur Radio Service can police use of the band, in accordance with enforcement traditions recognized by the FCC.

- Such a change would allow amateur users to self-police by monitoring the airwaves and ensuring compliance with Commission rules.
- Winlink could move its operations out of the Amateur Radio Service bands into other radio service bands. The rules governing these other services could accommodate Winlink's current operations and reliance on PACTOR 2-4, WINMOR, ARDOP, and VARA.



**Complex Messaging With or Without the Internet**



Developed and Supported by  
The Amateur Radio Safety Foundation

# What is Winlink?

- Worldwide free **system** for sending complex messages via radio with and without the internet.
- Supported and run since 2006 by the Amateur Radio Safety Foundation Inc., a 501(c)(3) Florida public benefit corporation.
- For *Amateur radio*, the Winlink opportunity is literally worldwide.
- Provides vital communications for tens of thousands of remote *Hams*.
- Adopted for contingency emergency communication by many service entities to include *Amateur radio*.
- Used by many governments, **all** who support the use of qualified volunteer *amateur radio* communicators.
- Community is rich with third-party software/hardware developers to enhance the radio art.
- Winlink exists by volunteer control operators and sysops who provide and maintain their own radio equipment.

# How did Winlink Start?

- 1987. Vic Poor W5SMM (SK) developed APLink (AMTOR/Packet Link).
- The APLink effort evolved to include HF Pactor and Clover along with VHF Packet delivery of messages.
- 1998. Vic assembled a team of programmer and engineer hams to expand, code and support an all-amateur free system with internet interoperability.
- 1999. Winlink 2000 was launched and has been in continuous operation since.
- 2006. The Amateur Radio Safety Foundation, Inc. was founded.
- Today the system handles approximately 55,000 messages per month (<https://winlink.org/RMSChannels>)
- Since 1998 the Winlink Team has about 41 man-years of volunteer effort invested in developing, enhancing and managing the system.

# Winlink Operating Modes

There are three methods of transporting messages:

1. **Conventional or “Classic”** – Bridges the internet using radio sending messages to a Common Message Server (CMS) “backbone” system.

User > RMS > CMS

2. **Automatic “Hybrid” or “radio-only”** -- HF mesh network if the internet is out.

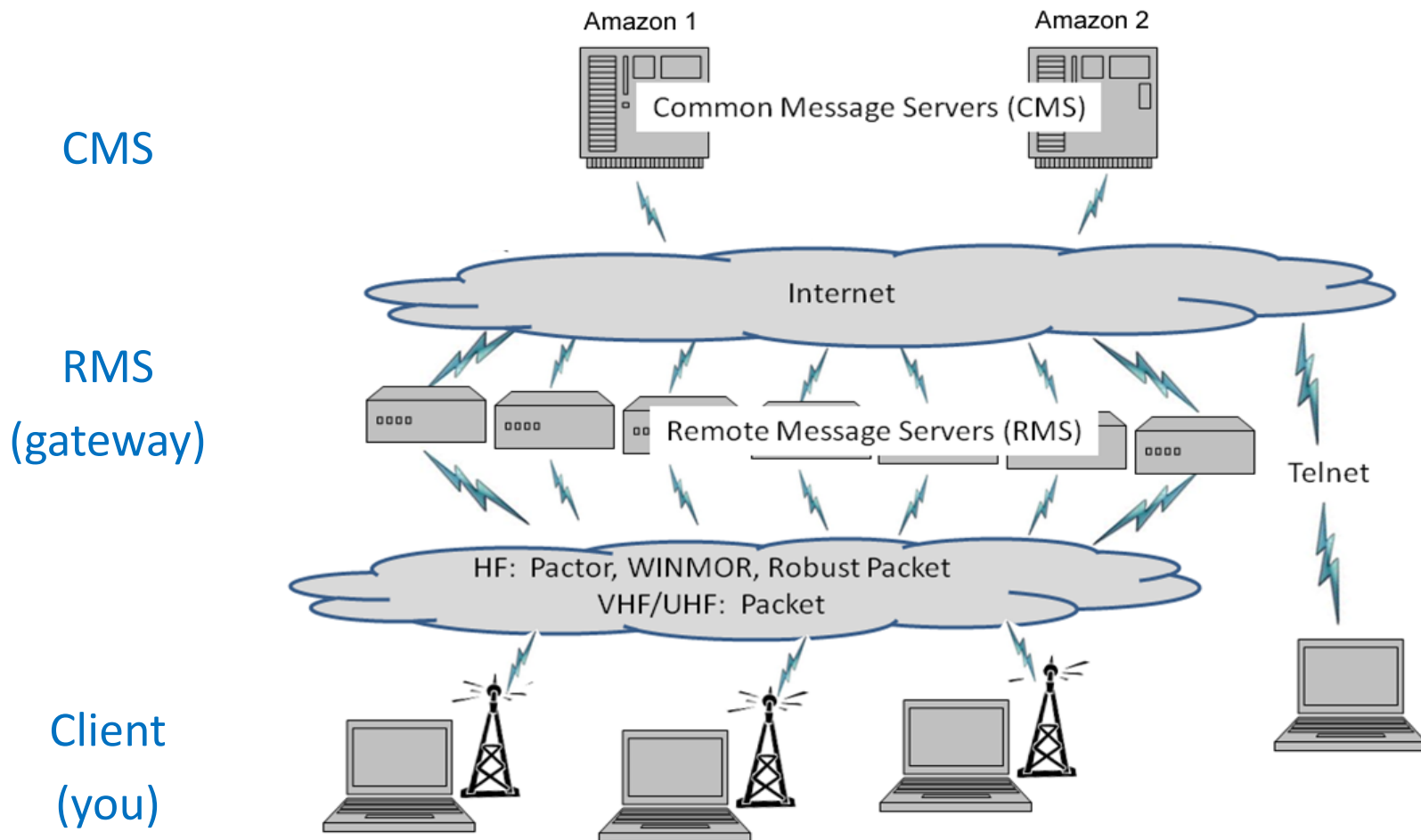
User > RMS > RMS... > MPS or CMS

3. **“Peer-to-Peer”** -- direct connections between two client stations

User > User

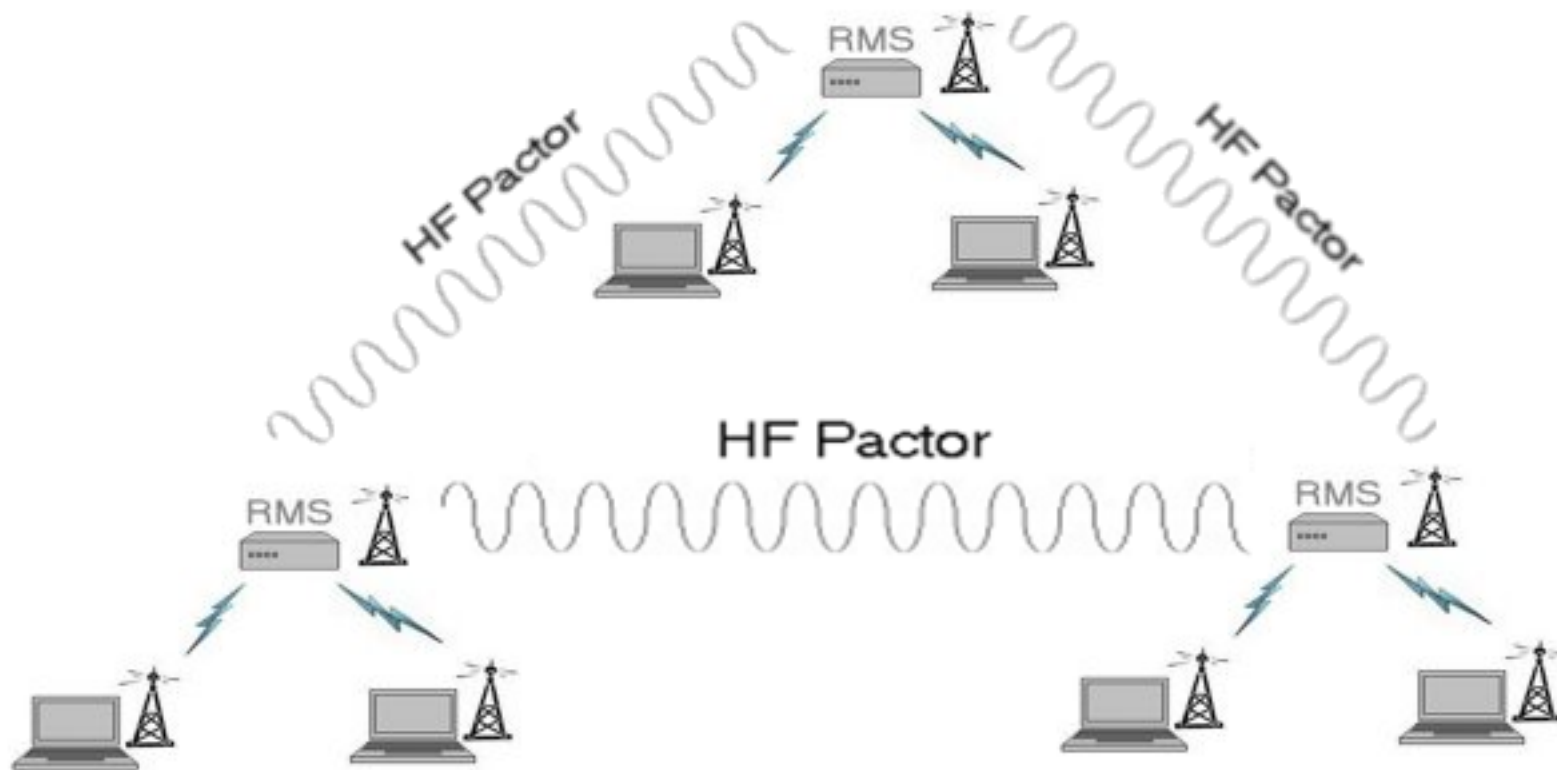
Users decide on the method depending upon their objectives.

# Conventional Mode



# Hybrid Mode Network

What if the Internet is Down?





# Hybrid Mode Details

- **Advantages:**

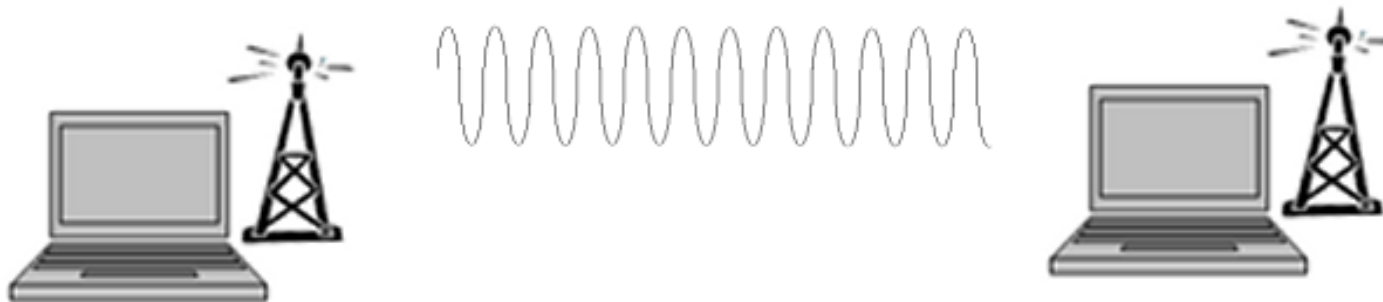
- Independent of the Internet.
- Fully automatic intelligent routing and forwarding.
- Automatic routing around unavailable RMS.

- **Disadvantages:**

- Messages must be picked up from designated Message Pickup Stations (MPS).
- Cannot send messages to Internet e-mail addresses.
- Forwarding takes up bandwidth in narrow US Part 97.221 spectrum.

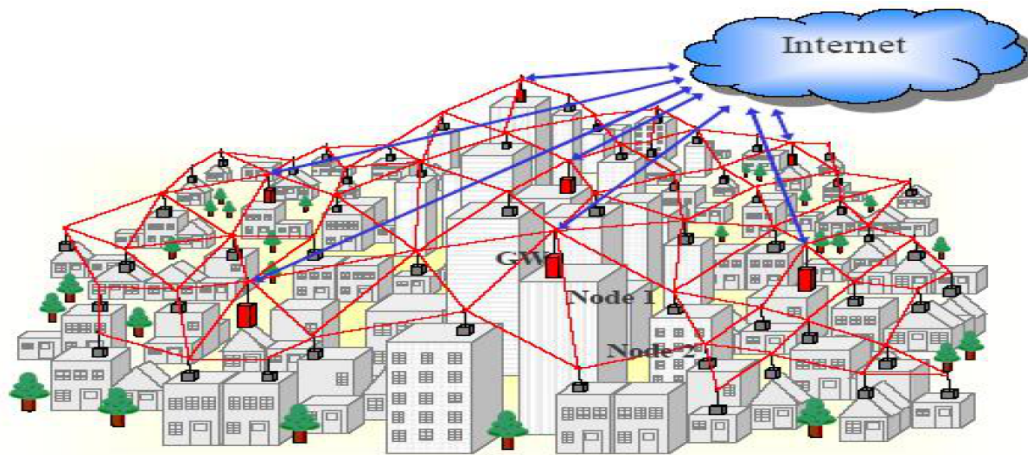
# Peer-To-Peer Mode

- Direct, real-time radio connection between end-users. FEC-ARQ, 100% error-free transmission.
- The Internet is not used; all message transport by radio.
- Still, messages are logged on system when Internet is there or returns; kept on the central server 21 days.
- Only two client stations are involved.

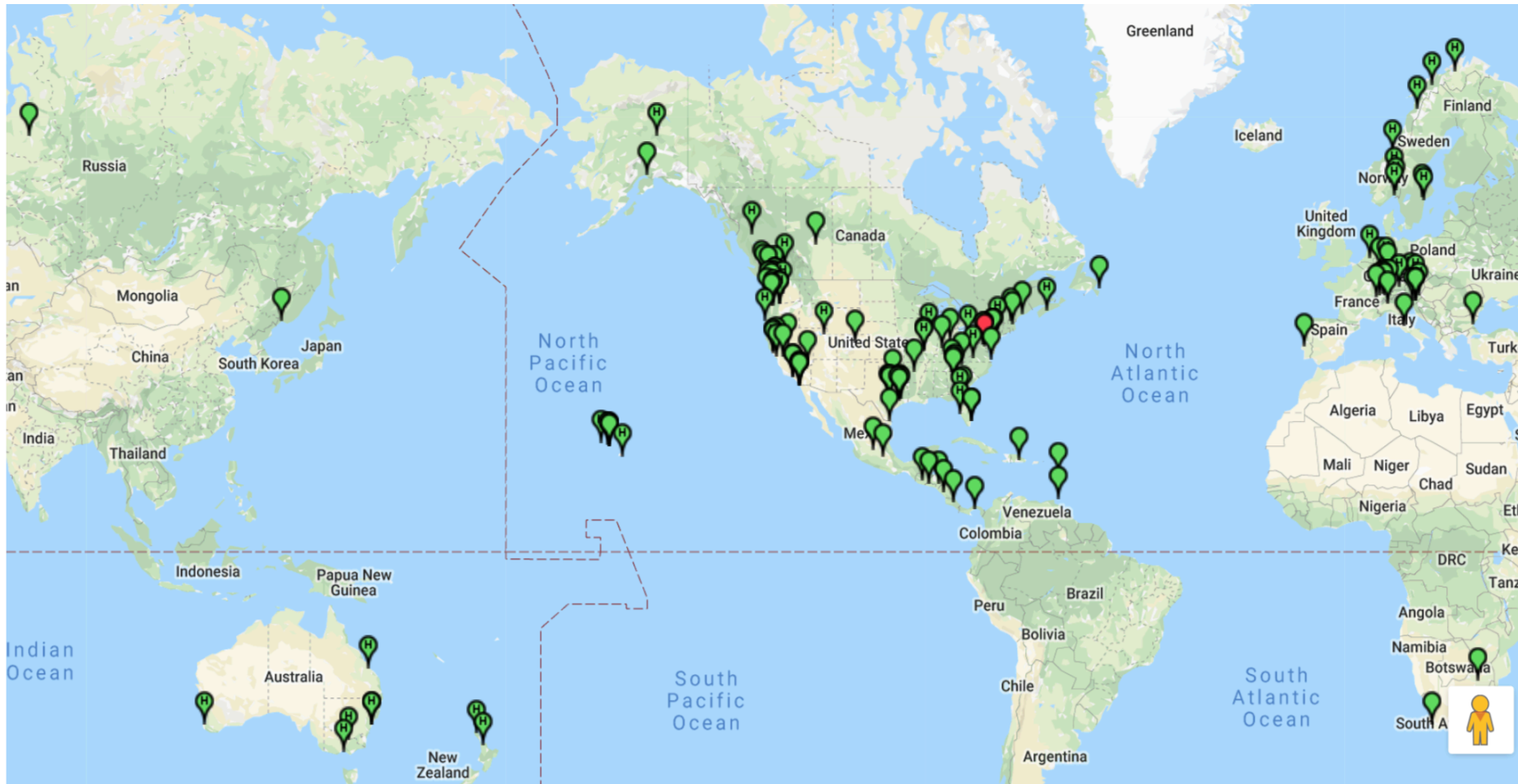


# Winlink and Wi-Fi/Microwave MESH Networks

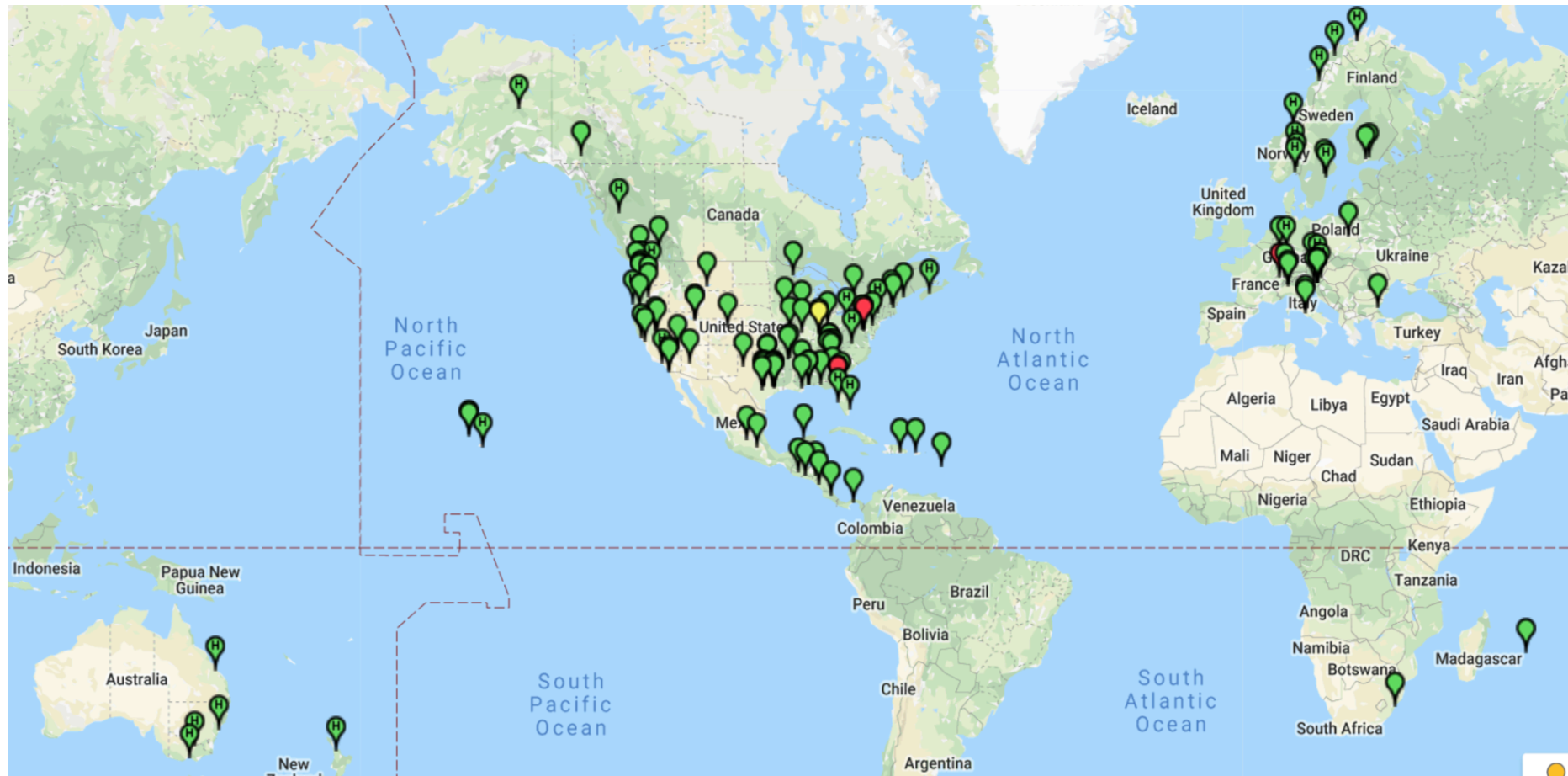
- Rapidly growing among amateur radio operators and developers. Alternative to VHF Packet.
- Provides Internet speeds using inexpensive microwave Wi-Fi equipment.
- AREDN, HAMNet integrated using the Winlink team's RMS Relay software.



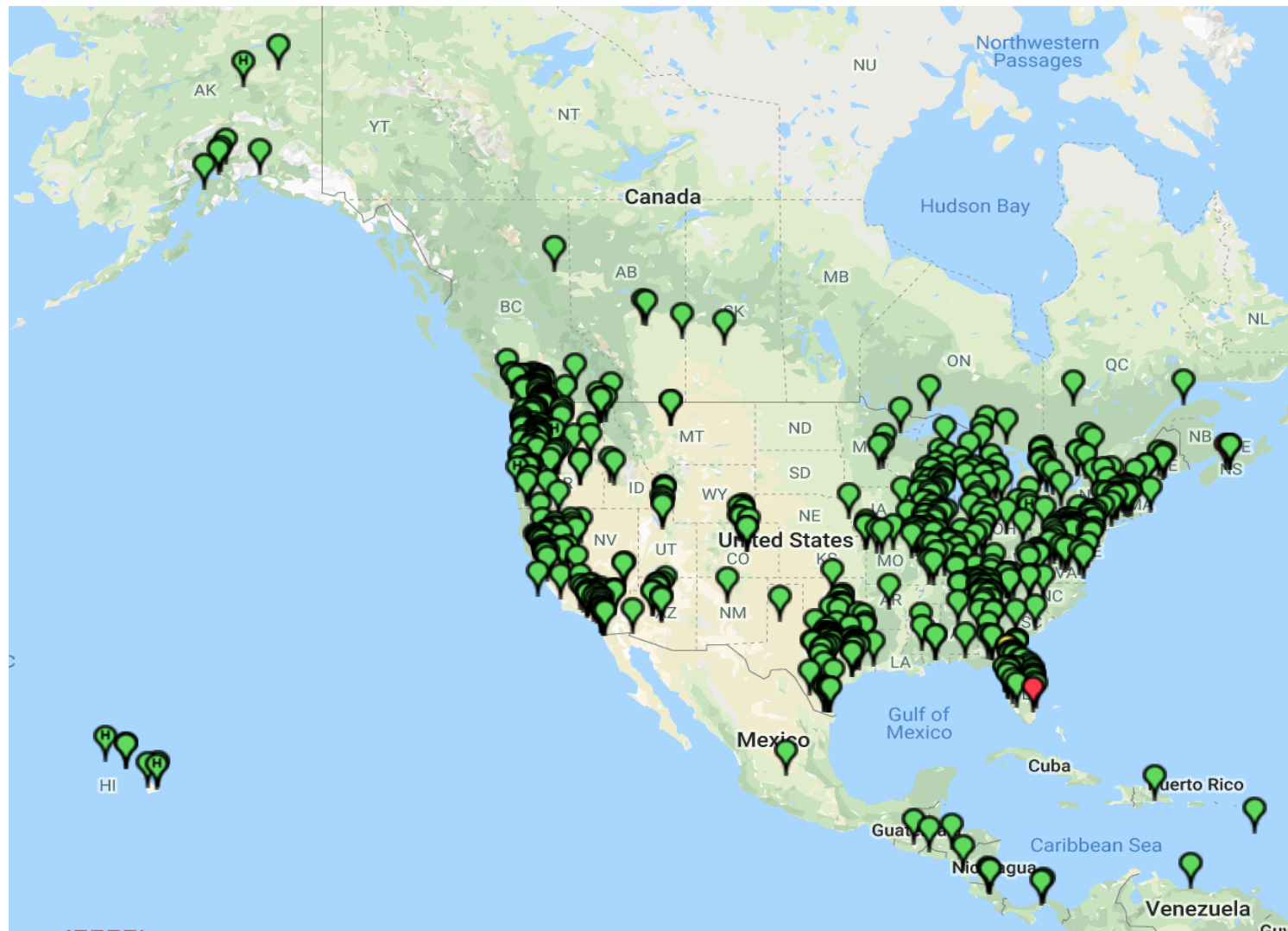
# HF *PACTOR* Radio Message Servers (RMS)



# HF *WINMOR* Radio Message Servers (RMS)



# UHF/VHF *Packet* RMS in US



# Most Active *Independent Developers*

BPQ32 BBS system  
LinBPQ BBS system  
JNOS2 BBS system  
Linux RMS Gateway

PiGate RMS  
Paclink Unix  
Pat  
Outpost  
Airmail  
PiGate  
ARIM  
VARA  
iOS client

John Wiseman G8BPQ  
John Wiseman G8BPQ  
Maiko Langelaar VE4KLM  
Hans-Juergen Barthen DL5DI,  
Brian Eckert W3SG,  
Basil Gunn N7NIX  
Mark Griffith KD0QYN  
Basil Gunn N7NIX  
Martin Pedersen LA5NTA  
Jim Oberhofer KN6PE  
Jim Corenman KE6RK  
Mark Griffith KD0QYN  
Bob Cunnings NW8L  
Jose Alberto Nieto Ros EA5HVK  
Mark Scott-Nash ACORN

# Winlink Evolution & Interoperability

- On *Amateur radio*: evolving from maritime to EmComm, worldwide.
- Trend: New Hams get licensed to be involved in EmComm. Especially young Hams.
- On and off the ham bands: EmComm growth is phenomenal due to the amateur volunteer participation to assist their communities.
  - US: DHS NCC SHARES, FEMA, TSA, State and local civil authorities & their critical infrastructure NGO partners (hospitals, FedEx, AT&T, ARC, etc.)
  - Canadian Military, Australia (civil), UK (Military), Austria (Int'l Red Cross, WW), Netherlands, Germany, etc.
- Built-in interoperability between entities is key to success.
- **Knowledge and experience from daily Amateur Radio usage is the key component in the ability to provide EmComm on and off Amateur spectrum.**



# EXAMPLE: *DHS NCC SHARES* Hybrid Network



# Why Winlink Appeals to Emergency Managers

- Standard e-mail format with many features:
  - Binary file attachments (pictures, pdf, spreadsheets, standard templates (NIMS forms))
  - Automatic message (open) compression/decompression
  - Ability to read each message header over the air to determine “delete, delay, or download now”
- Time independence:
  - Ability to send anytime; collect messages while unattended.
- Reliable operation at low power levels.
- Not limited by station-to-station propagation.
- Message logging, and automatic ICS report generation.
- Hams can be engineers and administrators of a local system while users can deal with the messages directly – it’s email.

# Examples of Events and Incidents

A few high-profile cases where Ham Radio and Winlink mattered

- Mexican Wildfires, 2019
- California Wildfires 2019
- US Western Wildfires of 2018: Carr wildfire, ARRL article, Waccasassa Wildfire, Camp and Woolsey fires
- Hurricanes Katrina, Rita, Wilma, Dolly, Dennis, Jeanne, Ivan, Frances, Charley, Isabel, Irene, Sandy, Irma, Katia, Maria, Florence and Michael.
- DHS NCC Director comments to FCC on 2017 hurricane season (Puerto Rico).
- Puerto Rico and Virgin Islands Hurricane Disaster Recovery, 2017
- ARRL 'Force of Fifty' Helps Puerto Rico After Hurricane Maria
- Mexico City Earthquake, September, 2017
- Slovenian Weather Disaster
- HMS Bounty Rescue
- Haitian Earthquake Disaster
- The Asian Tsunami
- Western US Flood and Fire Relief
- Tennessee Tornado Outbreak 2008
- North Carolina Agency Fiber Optic Cable Failure
- Failure of IntelSat 804
- Indian Coastal Weather Disaster
- Chilean/Peruvian Weather Disaster
- Assisting the US Coast Guard; locating lost and overdue vessels
- Australian Outback Communications
- Assisting NOAA National Weather Service, and their MAROB Program
- Gulf War "The Last Voice from Kuwait"
- Connecting doctors and remote patients during medical missions, and often at sea

# A High-Profile Published Example

*“... we got nothing when we tried calling out on HF. We tried calling the Maritime Mobile Net, but nothing was out there. As a last-ditch effort, we used Winlink to e-mail the Coast Guard for help. Within an hour, we heard a C-130 plane, and later, a helicopter overhead.”*

Doug Faunt, N6TQS, HMS Bounty survivor

- 14 of 16 crew rescued



# Disaster Assessment Picture Sent Via Winlink

Public  
safety  
systems  
do fail.



# How A Contest SuperStation Participates to Save Lives and Property

- Winlink bridges borders to aid emergency communications.
- Tom Whiteside, N5TW, Georgetown, TX



# What We Already Do for the Control Operator

- Message storage for **all** control operators who use Winlink programs: Conventional, Radio-Only, Peer-to-Peer.
- QSO and message logs. A complete paper-trail for audits and inquiries.
- Automated license verification.
- Administrator lock-out of any violating control operator or station.
- Real-time, accurate, public-accessible station frequency lists.
- Whitelist for inbound SMTP mail restrictions.
- Password protection mitigates callsign piracy.
- Location information for emergencies.
- Message precedence (US Military Standard: 4 levels)
- Channel “busy detector” alert to control operator.
- On-line training via Reflectors, YouTube videos, classes and real-time support. Extensive HELP in each program.

# What We Have Recently Added

- We have made CW ID mandatory again.
- Web app built for the VM program. Provide public access to all message content that flows through the FCC Part 97 spectrum from US stations. Includes a review and reporting mechanism for administrators.
- The previously optional “busy detector” option that prevents transmission on a busy channel is now required of ACDS gateways.
- An automatic profanity filter bounces any message containing vulgar words.
- Additional AI-based message filtering is being investigated.



# What we have not done:

- Eliminate open B2F Compression
- Examples of compression (B2F and B1)
  - FBB B1 has been in amateur radio use since mid 1980's
  - B1 and B2F both use the open source LZW algorithm (similar to ZIP)
  - Text messages reduced over 50 percent.
  - DOCX, XLS, type "word" format files are reduced up to 80 percent.
  - PDF reduced at least 20 percent.
- Elimination of ARQ
  - 100% error free reception is necessary to insure machine readable interoperable mail:  
(Email addresses, Call signs, File Attachments, Documents, Data bases, Incident report forms, Spread sheets)

# What we have not done:

- Ask legally-operating stations to move into Part 97.221(b) sub bands

*(b) A station may be automatically controlled while transmitting a RTTY or data emission on the 6 m or shorter wavelength bands, and on the 28.120-28.189 MHz, 24.925-24.930 MHz, 21.090-21.100 MHz, 18.105-18.110 MHz, 14.0950-14.0995 MHz, 14.1005-14.112 MHz, 10.140-10.150 MHz, 7.100-7.105 MHz, or 3.585-3.600 MHz segments.*

*(c) Except for channels specified in § 97.303(h), a station may be automatically controlled while transmitting a RTTY or data emission on any other frequency authorized for such emission types provided that:*

- (1) The station is responding to interrogation by a station under local or remote control; and*
- (2) No transmission from the automatically controlled station occupies a bandwidth of more than 500 Hz.*

# Prohibit ARQ Protocols?

- Opponents of FEC-ARQ data transfer protocols argue that *only* FEC protocols should be used. (Virtually *all* ARQ Protocols use some level of FEC)
- Amateur HF and VHF/UHF packet have been using FEC-ARQ legally since mid 1980's)
- Forward Error Correction (FEC)
  - FEC decoding must be 100 percent. (This is theoretically impossible without Acknowledgements and repeat requests.)
  - 100% error correction at receiving station cannot happen *WITHOUT* ARQ
  - Transmission speeds are a fraction (e.g. 10-50%) of modern FEC-ARQ protocols.
    - FEC only : can't adjust to changing channel conditions, propagation
    - FEC with ARQ : 100 percent accurate, adapts to changes

# Karn's Law of Radio Monitoring

*Anything you can do to improve efficiency is going to make a radio communication harder to monitor."*

-- Phil Karn, KA9Q

# Conclusion

- FEC-ARQ protocols used by Winlink and others continues to grow, especially for EmComm.
- The Winlink Development Team and other independent developers continue to evolve radio modes and enhance store-and-forward digital capabilities.
- Winlink is a single component of the digital “revolution.” If it goes away, the vacuum will quickly be filled by already existing independent developers.
- The majority of modern communications are now digital store-and-forward messaging. It makes no sense to limit or prohibit efficient connected FEC-ARQ protocols in exchange for monitoring ease. To do so will undermine emergency communications tools, the radio art, and with them much of amateur radio’s purpose and relevance to society.

# A 16-238 Solution

- Remove the 300 baud symbol rate restriction.
- Have a bandwidth restriction (offer 6 kHz, same as AM voice, negotiate down to 3 or 2.8 if necessary).
- All above under a blanket waiver for ONE YEAR to allow time for observation of the impact (instead of trying to write rules based on competing predictions of Armageddon or Nirvana).
- FCC could modify or terminate the waiver before the one year is up if necessary.
- If not a total failure the waiver might be extended at the one year mark to allow for review of the experiment and proposals for rule changes.

# An RM-11831 Solution

- Retain the current FCC standard (definition) and prohibition of encryption: *“intent to obscure meaning.”*
- Reject monitoring software or “open source” requirements of 11831.
- Regardless of radio mode used, require that ACDS or networks publish message content with a 21 day life after transmission. Provide access to Volunteer Monitors and verified AR licensees.
- Require QSO and message logs to be preserved one year by all digital stations.
- Require all digital stations to transmit CW or FSK ID in addition to native mode ID.
- Require accessibility to logs by FCC, Volunteer Monitors and verified AR licensees.
- Allow removal of 97.221(c) only if 97.221(a) sub-bands are expanded to 25KHz on all bands.



Detailed information: <https://winlink.org>

Thank you!



Amateur Radio Safety Foundation, Inc.