Corrected/Improved Version: After my submission to W3WN, *Washrag* editor, I recognized I had made an error--Mr. Kolark had not himself claimed WINLINK was "effectively encrypted" -- thus I retract that incorrect statement in the original version and the corrected version below is more specific about proponents who did make that claim. Secondly, I recognized that Mr. Kolarik's position on 97.309 was mercurial. That can be a recognition of new facts/understanding, or just tryng to negotiate what one can, but it requires that I address more than one position. The corrected version below attemmpts to deal properly with these new issues. This material may be copied freely in whole.

EDITORIAL: RM-11831 & Avoiding Damage to Amateur Radio While Maintaining Openness

by Gordon L. Gibby MD KX4Z

Disclaimer: I am not part of the WINLINK Development Team; my positions are my own. A fully referenced copy is available here: https://qsl.net/nf4rc/ResponseEditorial.pdf

Ron Kolarik K0IDT petitioned the FCC asking for changes to 97.221(c) and 97.309(a)(4)[1] and a firestorm of debate resulted. I was invited to write an editorial explaining why the items Ron asked for were not the best way forward for amateur radio. After I had finished the first submission of this editorial, I realized that Ron's positions have been somewhat fluid, as he encountered various discussions, leading me to have to adapt this paper to try and better address the range of his positions.[2] [3]

Citing several instances of anecdotal evidence, Ron (1) has consistently asked for 97.221(c) to be stricken from the FCC regulations,

> 97.221
> **(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 500Hz.

and (2) originally asked for 97.309(a)(4) to be re-written in what he termed a "[p]roposed language simplification":

> (4) An amateur station transmitting a RTTY or data emission using a digital code specified in this paragraph may use any technique whose technical characteristics have been documented publicly, ~~such as CLOVER, G-TOR, or PACTOR~~, and the protocol used can be be monitored, in it's entirety, by 3 rd parties, with freely available open source software, for the purpose of facilitating communications.

The ARRL Board of Directors then took action *to go even farther than Ron's request #1* – to recommend not only the effective elimination of 97.221(c), but also that no digital signals of any type wider than 500 Hz be employed anywhere outside the 97.221(b) slivers of frequencies-- by anyone, human or computer.[4] That would

1 https://ecfsapi.fcc.gov/file/100918881206/PETITION FOR RULEMAKING.pdf
2 https://forums.qrz.com/index.php?threads/huggins-did-it.667817/page-56#post-5178136
3 https://forums.qrz.com/index.php?threads/huggins-did-it.667817/page-56#post-5178207
4 http://www.arrl.org/files/file/2019%20Board%20of%20Directors/Final%20Minutes%20July%202019.pdf See Item 31, page 16ff.

put strict new limits on literally scores of modes that amateurs had been previously enjoying in FLDIGI or Ham Radio Deluxe.[5]

These proposals are completely unwarranted by the actual data, and damage both current and future amateur radio.

First, *anyone can come up with a list of incidents of interference*. We call such complaints "anecdotal" and all of us encouter them in our daily lives. To determine if they require significant effort or change, we ask the simple question -- "How often does this occur-- how damaging is it really?" Since Ron's petition didn't answer that question, I went to work, by examining records of *exactly how many minutes* WINLINK 97.221(c) narrow-500-Hz stations were actually transmitting in a 2-week sample. Recall that these stations do not broadcast *at all* on their own -- they only answer when an amateur calls them. They don't give the "time" or ID spontaneously like an automatic 2-meter repeater does. An amateur, having listened for use of the frequency by regulation, *has to call them*. The WINLINK system even checks on its own, and points out if the frequency appears to be in use. But let's assume worst-case that in EVERY instance the amateur failed to check. It turns out that of the available time/bandwidth in two weeks, the entire usage of all American winlink 97.221(c) stations were **0.012 OF ONE PERCENT** on the 40 meter band and **0.000319 OF ONE PERCENT** of the 20 meter band. In other words -- *near absolute zero*.[6] These data have been tacitly accepted by the proponents of RM-11831, without argument. The anecdotal evidence that there is any real interference issue is demolished. What was bothering Ron and others? Possibly it included foreign stations (not affected by USA regulations) or maybe something they simply couldn't identify. New regulations will only affect USA 97.221(c) stations.

BENEFIT LOST: The existence of those stations serves as a pre-arranged "safety valve" in the event of large disaster where the 97.221(b) tiny slivers were overwhelmed. That will now disappear. Sure, "*cries for help*" on 20 meters do need to be in voice or cw -- but more and more, disaster reponse is moving to far higher organization, with defined communication techniques, not addressed by the proponents. [7] [8] [9]

MORE DOWNSIDE: Eliminating 97.221(c) has significant unrecognized untoward effects on existing and future exciting developments completely apart from WINLINK, JS8 (for example) also relies on 97.221(c) for its very useful **AUTO features, allowing the auto-Heartbeat response, and even utilization of other stations to relay your message to a distant station that you can't hear yourself** (somewhat like a digipeater). [10] Those stations are only 50 Hz wide --- but now they will be forced to move in with "the big boys" and there will be dramatically more problems for both. Who will want to develop in this environment?

So – there wasn't a problem in the first place, and Ron's request, and the ARRL's request will only cause new problems. Good idea?

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5 https://winlink.org/content/what_was_arrl_thinking

6 https://ecfsapi.fcc.gov/file/10408063816674/FCCRM11831-2.pdf

7 Defined connections with multiple partners: http://www.arrl.org/files/file/Public Service/ARES/ARES Plan - rev 01-30 -19.pdf

8 ICS-205 frequency plan for disaster response: https://training.fema.gov/EMIWeb/IS/ICSResource/assets/ICS Forms//ICS Form 205, Incident Radio Communications Plan (v3).pdf

9 An example of an argument that perhaps applies to emergencies, but does not appear to apply to **modern disaster response techniques**: "Also, by obscuring the meaning of their data transmissions over the air through ARQ and compression (e.g. effective encryption) as is done currently, ARSFI and Winlink are actually endangering its user base by precluding the listening public or other amateur operators from being able to respond to emergency traffic, and precluding others from jumping in to lend help in a rescue when needed. " https://ecfsapi.fcc.gov/file/10429199250117/FCC%20Letter%20Reply%20to%20Comments%20RM%2011831.pdf

10 "Responses to directed queries by non-automatic stations fall under §97.221.C.1 exemption " from the answer to the FAQ Does BEACON mode violate FCC 97.221 Automatically Controlled Digital Station rules in the United States? in http://js8call.com/faq/

97.309 Emissions: The changes Ron urged for 97.309 have very bad outcomes also. First, many may not realize that CLOVER and G-TOR were actually **proprietary**![11] [12] [13] FCC and amateurs were quite happy with them and explicitly wrote them into their regulations because ***hams were using them***. Ron would have that precedent erased. In Ron's originally requested new world, you will no longer get anything developed by any hams or companies whose development requires anything more than a PC for computing. Advanced protocols like RTTY[14], Packet, Slow-Scan[15] all clearly benefited from advanced (and at the time, expensive) hardware [16] because the existing PC's were simply not capable, yet those signals were a huge advance for amateur radio. Analogous **developments will never happen again if that initial position is upheld.** If you can't run it on an existing pc or cell phone.....and give it away for free -- it will never be developed. Do you favor that precedent? Could that precedent be later applied to transceivers? What if no one could purchase an ICOM, or KENWOOD, or BAOFENG -- because the precedent got generalized to radios as well -- nothing allowed that isn't open source and freely available. That view would seriously damage any company attempting to provide a product in the competitive amateur market. In subsequent writings and filings, Ron has modified that position, from demanding free open-source, to "ideally open source"[17] and at one point even acknowledging "owning" both software and hardware able to read transmission[18], .and at other points accepting free software reader without source code access.[19] Some of these firms *were started by amateurs*, and there is little to gain by damaging them; I would encourage simply having a way to monitor the digital technique, and leave it at that.

NO BASIS. But the true facts don't well support Ron's complaints, even though there *were* problems. Proponents alleged large amounts of violations in the WINLINK system, and a national security risk, and **an inability to do self-policing --** some of that even after the WINLINK Development Team responded properly with an interface to the first-ever publicly-available worldwide, distributed, networked, multi-modal receiver[20]--- but the resulting self-enforcement revealed an initial incidence of "objectionable" (possibly not even violative) emails of **1.1%.** [21] Within three months it had dropped an order of magnitude, and in another month it dropped yet another order of magnitude. Most recent: 1 out of 15,000.[22] Impossible to self-police? **Credit goes to Ron, Janis and others** who took the time to identify objectionable traffic -- and also to the WDT and particularly Tom N5TW who wrote the majority of the enforcement emails. This was a collaborative self-policing of astonishing successfulness.

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11 http://www.halcomm.com/?s=CLOVER CLOVER is a proprietary product of HAL Communications.
12 http://www.arrl.org/clover
13 https://www.sigidwiki.com/wiki/G-TOR G-TOR is a proprietary product of Kantronics.
14 https://forums.qrz.com/index.php?threads/capturing-winlink-fc-em-pactor-messages-over-the-air-decoding.670930/page-2#post-5175239 noting HAL proprietary FSK modem for RTTY with equivalent today's dollars price of $2800
15 An advertisement for early Slow Scan proprietary hardware: https://forums.qrz.com/index.php?threads/capturing-winlink-fc-em-pactor-messages-over-the-air-decoding.670930/page-3#post-5175316
16 http://www.smecc.org/rtty_ratt_radio_teletype.htm Demonstrates multiple proprietary hardware systems and their prices in the dollars of that day.
17 https://ecfsapi.fcc.gov/file/10428309711643/Reply to comments.pdf
18 https://ecfsapi.fcc.gov/file/1071758880862/Reply to Gibby comments.pdf
19 " We simply propose to accept Helfert's above offer of such a monitoring tool, and require it as Part 97 rule of SCS and all other emission or proprietary system now existing or in the future. This monitoring tool should be a vital component of a “disclosed code”, as detailed in RM11831" in https://ecfsapi.fcc.gov/file/1071958608259/July 18%2C 2019 Ex Parte Filing.pdf
20 Available to all amateurs: https://winlink.org/content/us_amateur_radio_message_viewer
21 https://ecfsapi.fcc.gov/file/10723230403421/IncidenceCalculations.pdf
22 https://ecfsapi.fcc.gov/file/10822196770221/ReAnalysisOfWinlinkObjectionableMessages.pdf

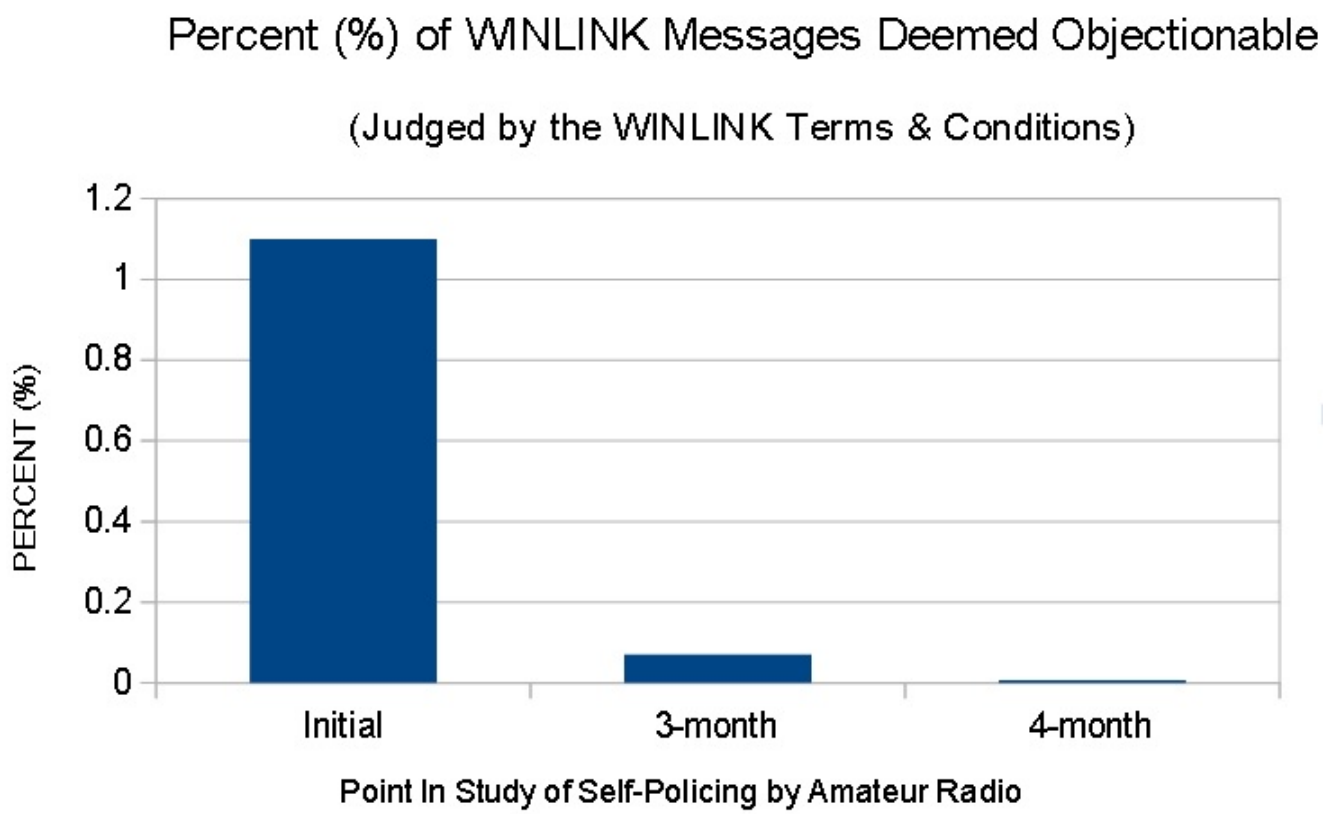

Figure. Demonstration of wildly successful self-policing, self-enforcement actions taken by collaborative effort of proponents of RM-11831 and Winlink Development Team. [23] The "1" is ONE PERCENT.

Serious Allegations. The original Petition expressed concern over methods of modulation that "can not be decoded by amateur operators with open source decoding tools or available software."[24] Ron seemed to primarily address digital **techniques** (e.g., PACTOR or future techniques). Other, even famous, proponents more targeted what the FCC labels as "**systems**" and have alleged that WINLINK is "effectively encrypted" and thus *cannot be read*. [25] [26] [27] The latter views would be startling news to the Frenchman who first developed these protocols, Jean-Paul Roubelat F6FBB![28] He began in 1986 and his public source code of 1999 can still be downloaded. *At any point, anyone could have developed reader software.* To

23 From: https://ecfsapi.fcc.gov/file/10822196770221/ReAnalysisOfWinlinkObjectionableMessages.pdf

24 https://ecfsapi.fcc.gov/file/100918881206/PETITION FOR RULEMAKING.pdf paragraph 11.

25 https://spectrum.ieee.org/tech-talk/telecom/wireless/is-ham-radio-a-hobby-a-utilityor-both-a-battle-over-spectrum-heats-up

26 Admiral Edmund P. Giambastiani, Jr. U.S. Navy (ret)"ACDS robots have been operating illegally, by using proprietary encryption, which cannot be monitored by anyone, including the FCC. " https://ecfsapi.fcc.gov/file/10606634021673/FCC filing re RM-11831 6 June 2019.docx cited by https://ecfsapi.fcc.gov/file/10724035705944/NYU%20Ex%20Parte%20Filing%20-%2007.24.19.pdf (Footnote 54)

27 "If an eavesdropper experiences a different channel state (e.g. has different fading conditions, which is certain to be the case over many packets) than the connected transmitter and receiver, the eavesdropper cannot fill in the proper information to intercept over-the-air data, since it is missing the precise channel state information needed to decode the successive transmissions properly. The eavesdropper sees gibberish, as has been reported widely for over a decade. " https://ecfsapi.fcc.gov/file/10429199250117/FCC%20Letter%20Reply%20to%20Comments%20RM%2011831.pdf

28 Full protocol information and source code available at: http://www.f6fbb.org/

prove the error of some of these assertions, John Huggins KX4O used brute-force keyboard cut and paste (with a small bit of advice from me) **to prove that a WINLINK message could be read**, succeeding after 17 weeks. [29] [30]I'm a nearly retired anesthesiologist, not a professional programmer, but I then built on his work, and **created freely available reader software on a $35 raspberry PI that connects to Pactor 7400 or 7800 and read WINLINK** -- in 25 days. [31] Interested persons can take this code[32] and begin to apply it to any WINLINK inexpensive soundcard mode. I had to read 20 year old information to succeed. [33]

As for **techniques**: I have *never* attempted to claim that PACTOR can be read without purchasing their publicly available modems, despite some confusion in the writings of some. [34] I am personally happy with any digital technique for which hams can purchase off-the-shelf gear, or download software to monitor. PACTOR modems have, from the beginning, included a "hostmode" invented years and years ago by WA8DED[35], which would allow reading of any other PACTOR signal with the necessary software. This was an absolute requirement by the German government. [36] More recent versions have further included PMON which allows simple terminal reading of P1, P2, P3 or P4 (but requires software such as what I wrote, in order to decode compressed WINLINK.)

So in conclusion -- The WINLINK **system** is now the *only* portion of amateur radio with documented, and astonishing adherence to regulations (compare that to your local repeater or 75 meter band), and when using the PACTOR **technique** (or any other mode that people seriously wish to read and are willing to make the monitoring connection) *can* (and always could theoretically--the necessary information was public) be read right off the air.[37] Of course, it is far easier to use the freely available distributed receiver viewer. There are no data proving any wide-spread interference problem from 97.221(c) and the proposed "cure" causes really bad problems, more than I can discuss in these short pages. The proposed attempts to derail the 30-year history of successful advances in amateur radio signal development, by limiting it to "free software" (**no hardware) would be a particularly bad demand,** as it would significantly damage the future of amateur radio advancement, and would have made impossible the very hardware advances that spurred RTTY, packet, slow-scan and other modes' early development. Merely requiring *some* method of monitoring to be extant (as did the German government with all PACTOR devices) would be much more in keeping with the goals of amateur radio.

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29 https://ecfsapi.fcc.gov/file/1073182572879/KX4O_Demonstration_OTA_Winlink_Decoding.pdf

30 https://ecfsapi.fcc.gov/file/108140794324824/KX4O_Demonstration_OTA_Decoding_Addendum.pdf

31 https://forums.qrz.com/index.php?threads/capturing-winlink-fc-em-pactor-messages-over-the-air-decoding.670930/

32 https://forums.qrz.com/index.php?threads/decode-off-the-air-winlink-message-request-for-programming-help.668470/page-10#post-5174896

33 The information needed is within the Technical Info section of http://www.f6fbb.org/ and the B2F documentation from WINLINK: https://winlink.org/B2F

34 In https://ecfsapi.fcc.gov/file/1071958608259/July 18%2C 2019 Ex Parte Filing.pdf the writers appeared to believe that my pactor-modem-based initial experiments proving WINLINK is not encrypted were somehow claiming that no modem was needed to decode the transmissions. That was never claimed.

35 https://www.qsl.net/oe8djk/pr4host.html -- document from 1986.

36 Personal communication, Hans-Peter Helfert DL6MAA

37 The necessary PMON command may potentially in the future be available for earlier versions of PACTOR products by firmware upgrade, beyond that already extant on the DRAGON series. Personal Communications, P. Helfert. DL6MAA