

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

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

To: The Chief, Wireless Telecommunications Bureau
Via: ECFS

REPLY to COMMENTS

The Board of Directors of the Amateur Radio Safety Foundation, Inc., Loring Kutchins, W3QA, Tom Lafleur, KA6IQA, Rick Muething, KN6KB, Steve Waterman, K4CJX, Lee Inman, K0QED, Phil Sherrod, W4PHS, Tom Whiteside, N5TW, and Scott Miller, K6SKM, pursuant to Section 1.405 of the Commission's Rules (47 C.F.R. §1.405), hereby jointly and respectfully provide our reply to selected comments on Petition for Rulemaking, RM-11831.

Reply to Comments in Favor of RM-11831

1. Reply to Prof. Theodore Rappaport
<https://ecfsapi.fcc.gov/file/10429199250117/FCC%20Letter%20Reply%20to%20Comments%20RM%2011831.pdf>

In section III of Professor Rappaport's comments of April 27, he notes events since RM-11831 was published and says that ARSFI shows signs that it is willing to provide data transparency in amateur radio. He acknowledged that we have published to the public a web application designed and intended for the new ARRL Volunteer Monitor program but misunderstands its operation and intent, and casts it in the light of mistrust and suspicion. The application is not a "Winlink Window" but a tool to encourage individuals to identify and report to administrators message content that potentially violates any amateur radio rule or the Winlink Terms and Conditions of Use. Previously unreported messages that have been transmitted from or to US-licensed amateur stations in the last 21 days are displayed for inspection and may be searched for words, phrases and metadata. 21 days is an arbitrary choice and can be altered as the FCC or ARRL might require. If a violation is suspected, the viewer may become a reporter, provide their email address for inclusion on administrative emails for the matter, and forward the subject message to an administrator for processing. The subject message is moved to another archive of cases in process and then removed from the application's display/search database so that repetitive reports on the same case are minimized. Administrators then engage the violator in correspondence that probes the situation and warns the violator that continued similar behavior will have both account and enforcement consequences. If compliance to FCC rules and Winlink Terms and Conditions is not agreed, administrators make a report to the FCC. We feel this process is in the spirit of amateur radio self-policing.

Rappaport says this handling casts doubt on the trustworthiness of the public postings. He reports that his associates sent a complaint to Laura Smith of the FCC Enforcement Bureau. They copied apparent violating messages without reporting them from the app to administrators, posted them on a different public forum with mocking comments, and reported them directly to the FCC without supporting circumstantial information or responses from the message originators or the licensee, bypassing the designed process. We trust the FCC sees this for what it is.

FCC rules hold licensees responsible for the proper operation of their stations and to use good amateur practice like 'listen before transmit' to avoid interference. CW ID and an automated software 'busy detector' have always been options in the programs that the Winlink Team publishes. They are now forced on all US licensees, both automatically-controlled gateway stations and manually controlled client stations. Lawful callsign identification in the FEC portion of the protocols has always been employed. We have encumbered all US operators with these forced actions to answer our critics. However, certain spectrum-time efficiencies are the price of these in place of

allowing the licensed operator the free-will to properly operate under the rules.

Rappaport advocates that Forward Error Correction (FEC) technology is the solution to open and easy on-air monitoring, and pretends that it alone is suitable for the mission of reliably transporting data payloads of significant size and complexity across typical HF channels. The facts of physics dictate otherwise: While FEC is already an important component of all the protocols Winlink uses, broadcast FEC alone only functions as long as a signal can be continuously copied above an appropriate signal-to-noise threshold on a marginal or better channel. Below that, data is lost. Automatic Repeat Query (ARQ) is simply asking for a repeat, and is necessary to restart a failed data stream. Applications that require low error rates, such as transporting documents that are interoperable with computer and internet applications, must use ARQ, as is commonly understood by information theorists. The different kinds of NASA deep space and orbital missions that have been conducted suggest that trying to find a "one size fits all" error correction system will be an ongoing problem for some time to come. Trying to fit all HF applications into FEC-only solutions as Professor Rappaport recommends have significant penalties for complex data transport—to the point of making our application impossible. There are numerous citations where this is explained.¹

Rappaport, as a University Professor of Communications, surely knows this is all communications theory 101. FEC without ARQ is a best-effort delivery mechanism, while FEC *with* ARQ is a 100% delivery mechanism. We believe he disingenuously relies on the lack of this technical knowledge by the average ham and FCC personnel to convince them this is a matter of an ARSFI/Winlink design choice to purposely "effectively encrypt" transmissions. We certainly can remove compression and ARQ from the protocols we use. Monitoring will become much easier. But the consequences will be that transporting the same size messages will take from 2-10 times longer to transmit, and will contain errors unacceptable for use in computers and other interoperable modern applications. This makes Winlink's mission unattainable.

Professor Rappaport either doesn't understand this, or doesn't care, believing that radio email and other utilitarian applications of advanced modes do not belong on the HF amateur bands and should not be part of the 'amateur radio culture' he and RM-11831 advocates enjoy. We firmly believe that the youth of today are interested in modes that can deliver the robust applications they use in daily life, like email, and transporting documents interoperable with computers. FT8, PSK31, and other non-ARQ FEC-only modes have entirely different applications in amateur radio. We should not be limited to applications with limited 'hobby' utility.

Phillip Karn, Jr., KA9Q, eloquently explains that all methods of improving the efficiency of spectrum and time in a

¹ https://en.m.wikipedia.org/wiki/Automatic_repeat_request
https://en.m.wikipedia.org/wiki/Error_detection_and_correction
<http://www.qvidium.com/ARQWhitepaper.pdf>
<https://www.eecs.umich.edu/techreports/cse/99/CSE-TR-402-99.pdf>

Rappaport implies that FEC and ARQ are exclusive. The fact is that virtually all HF data transmissions (except perhaps old FSK radio teletype) use FEC. In Forward Error Correction technology there is embedded in the digital transmission some degree (minimal to massive) of error correcting code. The ARQ part allows the receiving station to send a reply back that tells the sender "I got it all," e.g. ACK, "I got nothing," e.g. NAK, "I got part, to here" e.g. a more complex ACK. The basic idea is simple. Adding massive FEC beyond what is needed for the propagation and power levels used slows down the data transfer and makes poor use of the channel. Adding too little FEC means many repeats, or without ARQ lost data. The optimum amount of FEC is one that maximizes the net throughput after all repeats. All modern HF modes for reliable, machine-readable data transport use this design (MilSTD 188/STANAG, WINMOR, ARDOP, VARA, PACTOR, etc.) This makes optimum use of a channel with dynamic characteristics. It is a dynamic process since the conditions of propagation and interference on an HF channel are typically changing from second-to-second. FEC alone does not allow *every* listener the ability to receive, even if there is massive FEC. There is no amount of FEC that can ensure error free reception over every channel. Shannon's 1948 theorem predicted that and is now a well-proven fact.

ARDOP and Pactor already support FEC-only operation by a) allowing the sender the opportunity to choose the modulation type, bandwidth and degree of repeats (0, 1, 2, 3 etc.), b) providing the mechanism at the decoding modem to identify the repeated data and filter it so the final output does not show repeats, but c) FEC can not ensure absolute accuracy since by definition there is no 'back channel' so the receiver can not request: i) another repeat of a data frame, ii) a change in the FEC modulation level (e.g. going from 8 PSK to a more robust 4 PSK or including more FEC), iii) a change in the power level or number of carriers (this changes the energy/bit) and hence the probability of successful decoding.

radio protocol makes it harder to monitor.² Gordon Gibby, KX4Z, demonstrated that on-air monitoring of LZW-compressed Winlink messages, using the B2F transport protocol utilizing both FEC and ARQ, is indeed possible, and can be developed further using available open-source code by seriously interested talent.³ We encourage others to reproduce his experiment.

Professor Rappaport also continues to confuse the difference between the Pactor modem and its native on-board compression, and Winlink messages being transported with Winlink application software over Pactor modems, using outboard compression. The former can be readily decoded by a third-party monitor using a third Pactor modem in 'MON' or 'PMON' mode. The latter can be decoded using Winlink software as demonstrated by Gordon Gibby.

2. Reply to W. Lee McVey

<https://ecfsapi.fcc.gov/file/10411081336564/RM-11831-Addendum%20to%20Comments.pdf>

The motive and basis of Mr. McVey's responses are apparent in his addendum to comments regarding what he calls a 'Winlink Window': "And, I feel it is important to discuss what such a device, and its apparent characteristics would represent for other amateurs, the Commission and other federal agencies seeking to observe or monitor *ARSFI/Winlink activity*." It is our intent to display the activity and message content of individually licensed control operators using the Winlink system. Mr. McVey's toxic language makes ARSFI/Winlink a subject of suspicion by saying "ARSFI/Winlink has a vested interest in avoiding culpability in scrubbing their records of offending, inappropriate message content after the fact, to avoid possible enforcement actions by the Commission or other enforcement agencies." Again, it is our interest to expose to the public any *individual FCC licensed control operator* who violates the rules. We welcome the public's participation to help identify users who operate without regard to or being mindful of the rules. Mr. McVey states clearly ARSFI/Winlink is responsible for violations. We are not the bad guy. The online application was developed for the ARRL Volunteer Monitor program, and we anticipate it will soon be operated entirely, and independently by them.

Mr. McVey says our practice of maintaining aged records to 21 days "has the built-in characteristic of automatically destroying what could later prove to be evidence showing violations of Commission regulations by users." As explained above in comments on Professor Rappaport's filing, when identified, possible rule-violating messages are removed from the 'display' database to prevent duplicate reporting to an administrator. They are archived separately with associated administrative correspondence. There is no timed deleting or maintenance of the administrative archive to manage its size, and thus the subject messages are available for later enforcement action. Mr. McVey states in a footnote that the reporting button is "Designed to assist in early scrubbing of unlawful content so as to avoid detection." Such inflammatory remarks and negative characterizations only reveal the motives of filers like Mr. McVey. We very much look forward to turning over our web application to the ARRL Volunteer Monitor program so we can stand apart from the accusations of RM-11831 supporters.

Conclusion

The FCC must decide if the ease of on-air HF digital monitoring trumps the utility and efficiency of ARQ and data compression as used in advanced HF modes on the amateur bands for twenty years. And, does the online tool and process ARSFI have supplied to the public and the ARRL's Volunteer Monitor program to more easily and inexpensively monitor user's communications meet the self-policing mandate of the FCC and the amateur community? Must all amateur radio modes be easy and free of expense to monitor on-air? The FCC must also decide whether it is sufficient for a mode-creator to meet the requirements of the current amateur rules--documenting to enable others to develop on-air means of monitoring, or to impose additional development requirements on protocol authors to provide free monitoring software, which still will be hard to effectively and practically use.

Please dismiss RM-11831.

Respectfully submitted,

/s/ Loring Kutchins, W3QA
President,
Amateur Radio Safety Foundation, Inc.

2 <https://ecfsapi.fcc.gov/file/10422455216228/rm11831.pdf>

3 <https://ecfsapi.fcc.gov/file/10410170249078/FCCRM11831-4.pdf>

For the Board of Directors