

RM-11831 Response Arguments

Petitioner states this petition for rulemaking is to address two alleged issues with changes to rules Part 97.221(c) and 97.309(a)(4). These are Digital Mode Transparency, and Interference Reduction.

Digital Mode Transparency (Monitoring of transmission content)

Technical Background:

Pactor modems, when used by Winlink stations, switch off SCS proprietary compression and pass information using clear ASCII, a permitted code per 97.309(a)(3). The message payload is wrapped in the Pactor envelope according to the open, published B2F protocol (winlink.org/B2F), and the payload is compressed using open-source LZH compression (github.com/arsfi) before being sent to the modem. The receiving process is exactly in reverse. This technique is open and documented, legal under existing FCC rules. As is common with all sophisticated techniques, it is difficult for an unconnected eavesdropping station to copy all but message headers containing station identification. It is not, however, impossible. Off-the-shelf commercial programs exist to decode the Pactor envelope, and B2F and LZH are openly documented, allowing a skilled developer to prepare a program to decode overheard transmissions. The undertaking would not be trivial. We feel the effort is not needed because rules are currently met, stations can be identified on-air, and messages and their data are available for all to access and read. Winlink uses same handling when using other transporting protocols, e.g. WINMOR, ARDOP, VARA, AX.25, VARA FM and Pactor 1-4.

Arguments:

Every known method to improve radio mode communications efficiency has the side-effect of making a communication harder to monitor by an unconnected third party listener. This is a limit of natural laws; logic, physics and math. Automatic Repeat Request (ARQ), data compression, directionally-controlled antennas, power control and other techniques increase the workload on the eavesdropper to achieve success in understanding an intercepted communication. Proponents of this proceeding use the term “effective encryption” to refer to at least ARQ and compression. This is deliberately disingenuous.

Proponents of this proceeding object to dynamic compression techniques, where the sender and receiver exchange information to build a data-history-dependent state used to encode and decode subsequent data. Any loss of data between transmitter and a non-participating eavesdropping station can make it impossible to successfully continue decompression.

Amateur radio data systems like Winlink provide a more efficient, less expensive, and

fully documented method to monitor communications than listening on-air. This has been accessible by the control operators, administrators, and enforcement bodies for many years, and recently, beyond the mandate of FCC rules, has been opened to the public (see https://winlink.org/content/amateur_radio_message_viewer). Stations transmit callsigns in FEC headers and by CW before and after all on-air sessions, allowing adequate opportunity for an eavesdropper to identify an offending station. Full message content, including all attached files are available to view with documented date and time, source, gateway and destination, software used, etc. Since message content is openly available, this is proof of no “intent to obscure”, which defines “encryption” according to the FCC. Even “effective encryption” is a false claim if all content is easily available and readable by anyone. Furthermore, this entirely meets the requirements of Parts 97.113(a)(4) and 97.119(a).

The petitioner questions adequate vetting by control operators of Message Forwarding Systems of messages origination from the internet for transmission on the amateur bands, and likewise originating from an operator for delivery to the internet, for content and sender identity, as required by Part 97.219(d)(1)(2). He also wants assurances the amateur radio service will not be used to bypass commercial internet services or be used for commercial purposes as required by Part 97.1, 97.3(4), 97.113(a)(5). The on-air ID transmissions by Winlink stations, together with online inspection of fully documented messages meet these rule requirements.

Dynamic payload compression coding is standard in efficient modern communications. Every widely used data compression scheme is dynamic (e.g. open-source zip, gzip, bzip2, xz, lz4). Banning them from hams, as this proceeding would do, is overly restrictive, unnecessary, and in direct conflict with the mandate to use spectrum efficiently and to contribute to the state of the radio art.

Bulk data transfers are just as legitimate on the amateur bands as the callsign + signal report modes like FT8. Their utility is important for the mandate of amateur radio's emergency communications role (97.1).

Doing away with ARQ and compression is not necessary to the stated goal of 'monitorability'. A publicly documented compression format can still be monitored given a reliable RF path from transmitter to 'eavesdropper'. The FCC used to do this by sending a van to the transmitter's location. Then a capable developer familiar with the documentation of the modes and techniques in question can prepare a program for successfully decoding ARQ modes using compression. The proposed rulemaking would require this to be provided free and open-source, which is overly restrictive, and violates many principles and values of our society.

Open-Source

The petitioner calls for restricting data modes to those that can be eavesdropped with

free, open-source software. This has far-reaching side-effects.

Open-source may well violate the 'takings' clause of the 5th amendment to the US Constitution, which states that “private property [shall not] be taken for public use, without just compensation.”

A healthy commercial economy surrounding amateur radio as a hobby, and as a service, is immensely important. Unlike the past, where amateurs would construct their own equipment and write their own software, today we benefit from the compounded efforts of others (“advanced technology” as a result of “advancement of the radio art”) and can buy, at a reasonable cost, commercial radios, equipment and programs that out-perform anything an individual can construct for himself. Requiring advanced radio modes to be decodable with open-source programs will force the intellectual property of any developer or modem manufacturer to be exposed, or cause them to withdraw from the US marketplace. For economic reasons, they will choose the latter. This is unhealthy for the entire amateur radio community, not just in the USA, but worldwide. Ultimately, it also goes against many of the mandates of the amateur service given in Part 97.1: discouraging the advancement of the radio art, discouraging utility in emergency communications, and discouraging the development of a pool of technical experts.

The open-source requirement is overly restrictive and unreasonable, when a proprietary program for monitoring would be sufficient to satisfy demands for amateur radio self-policing. Proprietary decoders are already available. Open-source requirements will remove many useful and effective tools from the amateur radio community in the USA.

The open-source requirement will also be problematic for currently-available proprietary software and firmware used on the amateur HF bands that support radio modes, such as digital phone vocoders, that are constrained by patent rights. Some built-in firmware of commercially available radios and modems used on HF will similarly be affected.

The FCC has permitted patented and proprietary communications technology in the amateur radio service, even SSB, FM, TDMA, etc. The requirement of an open-source restriction here is inconsistent.

Proponents of this rulemaking want an open-source eavesdropping program provided to them at no cost. The inability of an individual from obtaining the required equipment or technology to prepare one for themselves is not a justification from allowing others to do so, as long as the methods and techniques are known and equipment and technology can be readily obtained, whether via free software or commercial license. Proprietary closed-source software is used at virtually every amateur radio station, from embedded firmware in the transceiver or SDR, to the logging software in the PC, and of course, in modems.

Amateur-Amateur Interference

The petitioner fails to acknowledge that an ACDS station is only activated to transmit by a human operator (client station) who is bound to listen on frequency for activity, and call the ACDS station when clear. He also fails to acknowledge the busy-detectors used in software of both client and ACDS stations, where transmissions are prohibited unless the software detects a clear channel. He also does not acknowledge the FEC and CW transmission of ID by all stations. These negate his arguments.

Identification of all transmissions is already required in the rules. Requiring free, open-source software for monitoring is not necessary to identify those who may cause harmful interference.

The deletion of Part 97.221(c) will force all US ACDS stations into the narrow subbands provided in 97.221(b). Though the petitioner and his proponents think this will reduce the potential for interference, the ITU rules and the rules of other countries do not limit emissions like the US does, and the potential for interference is not alleviated by any change of US rules. US rules don't well conform to the rules of it's neighbors with regard to digital stations. Adjusting USA amateur frequency allocation rules to better align with ITU recommendations is badly needed, not this poorly thought patch to dysfunctional US rules.

This proposed rulemaking would impose changes only on amateur operations within the USA and it's territories. The rest of the world will not be restricted. The international nature of HF propagation will mean that the problem the petitioner seeks to resolve will continue to exist.

The proposed action will displace ACDS signals less than 500 Hz in bandwidth from operating with other highly compatible signals of similar narrow bandwidths, to operate among incompatible wideband (2.4 kHz) signals inside the 97.221(b) subbands. This action only increases the potential for interference within the subbands and leaves vacated spectrum underutilized. This is entirely counter-intuitive to the principle of keeping signals of similar bandwidth together to reduce mutual interference and increase spectral utility. Narrow-band ACDS operation will be made unusable. This will seriously hinder amateur radio public service and disaster communications. Such WINMOR narrow-band communications were used in the aftermath of 2017 hurricanes in Puerto Rico, and are credited with lives saved.

Despite the petitioner's and proponent's complaints of interference and congestion, there are no formal complaints the FCC has ever acted upon. If such interference was truly of the magnitude described by the commenters on past proceedings for 23 years since PR Docket No. 94-95 was issued, there certainly would have been actionable incidents of interference reported and acted upon by the FCC by now. The amateur radio community is famous or complaining about incidental interferences cause by modes other than the one used by the one who perceives the interference. This is only a perception because the listener is not properly decoding troubling transmissions and regards it as 'noise' relative

to his own communication and mode. There should be no assumption that one mode allowed on a subband is any more or less important than another mode in the same allocation.

If Prof. Rappaport, the petitioner, and past commenters in their support are correct in their frequent characterization of Winlink users as a “tiny fringe of the hobby”, and if they are responsible for all the alleged complaints, how can their rhetoric about supposed spectrum crowding be real?

Summary Points

We agree that data formats, protocols, coding, and modulations used on the amateur bands must be openly published, that commercial usage be forbidden, and actual encryption not allowed, as the rules clearly and adequately require. However, making over-the-air monitoring of advanced digital modes, in heavy use for 23 years, should not trump the efficient use of spectrum, the continuing advancement of the radio art, building the pool of technical experts, and the availability of valuable tools for emergency communications. Part 97.113(a)(4) has it correct by specifically referring to the intent to obscure the meaning of a communication.

There is no intent to obscure content, proven by convenient online access to all Winlink message content, attached files, and metadata with full documentation. Together with easily copyable on-air ID from each digital station using Winlink, this conforms to all current FCC rules to prevent abuse of the amateur radio spectrum. This, and the success of formal and informal “intruder watch” programs within amateur radio, and the new Volunteer Monitor Program by the ARRL and Riley Hollingsworth, suggest that the ability of amateurs to self-police the amateur spectrum is already effective without the free and open-source restriction, and shows signs of great improvement. This begs the question of the necessity of such a costly constraint.

If forced by this rulemaking, Winlink and others can comply by using uncompressed data in its message payloads to allow easier monitoring on-air. Without compression, transmission times will be 2-10 times longer using all radio modes. That will be a heavy loss of efficiency, leading to additional interference and congestion as operators compete for spectral use. This will be the price to pay in the USA to be able to “read the mail”. Meanwhile, operations using compressed data will continue along US borders and around the world.

Forcing incompatible narrowband and wideband ACDS operations together in the 97.221 subbands will increase interference and congestion there, while leaving vacated spectrum underutilized. There is no net improvement, only decline to be gained by this proposal.

The amateur radio community today enjoys a clever implementation of signal theory and DSP in current radio email service, developed steadily over the last 23 years. It has

permitted an increase of spectrum efficiency of HF data communications by an order of magnitude, and made possible utility otherwise impossible by other means in amateur radio. The impact of this proposal upon emergency communications at all levels and upon service to licensed amateurs in remote places will certainly be severe if adopted. It would be a pity if short-sighted provincialism would make such progress unusable for a large fraction of the world's radio amateurs. The USA will not be well-served by banning or restricting advanced HF data communications in regular use throughout the rest of the world.

Banning Pactor and other proprietary modes in the US will disenfranchise all with a substantial investment in equipment. These numbers are substantial, and affect not only individual US amateur licensees, but the civil and government equipment owners. Radio email operations conducted for the benefit of civil and government authorities off the amateur bands will diminish because volunteer amateur licensees operate and maintain these stations. The pool of trained, technical operators for these operations will diminish if they can not train and practice with their communication tools.

Within the USA, this removes all incentive for creative amateurs to evolve and create digital modes for data-delivery utility or for any automated communications system. This is exactly where the future of data communications lies.

The amateur radio rules should attempt to be as non-restrictive as possible to give individuals the opportunity to learn and train, use new modes, codes and modulation schemes, and develop improvements to them. This proposal does exactly the opposite, with restrictions on legally practiced operations that have been coexisting adequately world-wide with other amateur operations for over 20 years.