Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington DC 20554

In the matter of:	)	
	)	
ADMENDMENT OF PART 97 OF THE	)	**RM-11392**
COMMISSION'S RULES GOVERNING THE	)	
AMATEUR RADIO SERVICE TO		)
IMPLEMENT CHANGES TO SECTION 97.3(C)(2),	)	
97.221 AUTOMATICALLY CONTROLLED	)	
DIGITAL STATION	)	
97.305 AUTHORIZED EMISSION TYPES,	)	
97.307 EMISSION STANDARDS, AND	)	
97.309 RTTY AND DATA EMISSION CODES	)	

Comments Regarding the Petition to modify Part 97 Rules and Regulations for automatically controlled digital stations, authorized emission types, emission standards, and RTTY and data emission codes.

My name is James G. Gorman, Amateur Radio callsign WA0LYK, and I am a licensed amateur radio operator I have been active in amateur radio since 1964. I graduated from the University of Kansas in 1972 with a BSEE.

INTRODUCTION

I fully support the goals of this petition and wish to provide additional background as to why the FCC should consider this petition carefully. There are important ramifications to deal with both in this petition and in many of the "cookie-cutter" comments made concerning it.

I am sad to see that many amateur operators have succumbed to the requests by a few amateurs to "spam" the FCC's very fine ECFS system with comments that are emotional at best and factually incorrect at worst. As amateur radio operators required to pass technical tests, most amateurs should be able to read the petition and decipher its technical details. It appears obvious though that many amateurs are either incapable of understanding the technical details or are hoping that the FCC will treat the petition process as a popularity poll or as a simple voting process.

The technical issues in this petition are not complex but the ramifications are indeed complex. Operators in the Amateur Service should read and understand these ramification entirely before making inane and factually incorrect claims.

BANDWIDTH SEGREGATION

The FCC has addressed this issue in a peripheral manner in its Report and Order FCC 06-149 Adopted: October 4, 2006, Released: October 10, 2006. The following statement was made.

"We understand ARRL's concern, but we note that eliminating or relaxing the bandwidth limitation would de facto eliminate the separation of narrow bandwidth and wide bandwidth emissions.[88] We believe that separation of emission types by bandwidth is accepted in the amateur service as a reasonable means to minimize interference on shared frequencies and bands[89] and, therefore, we will

not replace the 500 Hz bandwidth limitation with a 3 kHz bandwidth limitation."

While the FCC is under no stricture to not change accepted regulatory policy at a moments notice, it is generally accepted that once a policy is set that it continue to be followed until proceedings are held that address the policy issue directly. Consequently, this statement by the FCC indicates that current regulatory policy is to have a separation of "narrow" and "wide" bandwidth emissions.

It is neither logical or consistent to call phone/image wide bandwidth emissions at 2.7 kHz and call rtty/data emissions narrow bandwidth at 2.7 kHz. It is perhaps not even logical to call 1.5 kHz narrow bandwidth. However, as Mr. Miller has so aptly pointed out, the traditional rules that have been in effect for decades on the HF bands below 28 mHz have the effect, when using necessary bandwidth calculations, of placing an un-codified limit of 1.5 kHz on narrow bandwidth emissions. However, since this bandwidth limit is only implied and is only enumerated with the 300 baud or 1 kHz shift for FSK, there exists a loophole in the actual verbiage when using newer forms of modulation.

Some Amateur Radio Operators have exploited this "loophole" and are now using rtty/data bandwidths that exceed the "spirit" of the regulations even if they don't exceed the exact codified restrictions in the rules. It is time for the FCC to eliminate the loophole and specify the exact necessary bandwidth that rtty/data emissions are required to meet. This petition construes the rules in a factual and technically correct manner to place a reasonable limitation on these emissions that benefit all Amateur Radio Operators as a whole.

NECESSARY BANDWIDTH

I have seen some Amateur Radio Operators argue that measuring the necessary bandwidth of rtty/data signals requires complex equipment and therefore no strict limit should be applied. This is not the case when using necessary bandwidth to characterize rtty/data emissions. Rtty/data emissions have the extremely nice characteristic of requiring tightly controlled parameters in order to operate properly. Therefore, knowing the symbol rates, number of tones, frequency shifts, phase shifts, etc. makes it very easy to calculate the necessary bandwidth of a given transmission technique. In addition, everyone comes up with the same answer, every time. This is in comparison to voice emissions where microphone characteristics, amplifier rolloff characteristics, preemphasis, filter bandpass curves, etc. all combine to make the necessary bandwidth extremely complicated to calculate and predict accurately.

As a result, specifying the necessary bandwidth of 1.5 kHz for rtty/data emissions will cause no one to require additional measuring equipment. They will only need to know the characteristics of the transmission technique being used in order know if they are within the limitation. Developers can simply set their parameters to achieve this limit without any necessity of complicated measurements.

Ultimately, because of the ease in determining necessary bandwidths of data emissions, little enforcement will be required of the FCC. Self-policing by Amateur Radio Operators should suffice to identify those who inadvertently use the wider modes and warn them that they are exceeding the bandwidth limits. In addition, with the majority of amateurs only using data emissions within the proscribed bandwidths, ultimately, those who would use too wide a bandwidth will simply find no one to communicate with, thereby self-limiting the use of the wider modes.

TECHNICAL INNOVATION

Many of the comments made to the FCC on this petition and on internet forums relate to the fact that this bandwidth limit will somehow stifle technical innovation on the amateur bands. The basis for claiming this is that the current use of wide bandwidth, high speed commercial modems is somehow

being technically innovative. How someone can claim that using off the shelf, commonly available, commercial modems is somehow innovative is beyond my sphere of understanding. It is nothing more than plugging a newly purchased modem into an HF transceiver's transmit and receive jacks.

Most of these modems use a scheme of parallel tones modulated at a given speed. To increase the speed one must wait for more capable and faster DSP chips and then simply add more tones in parallel. While the engineering is a bit more complicated, it is far from innovative to accomplish this. It is more like plugging a faster processor chip into a personal computer. Few would call this being technically innovative.

Technologically, the use of commercial high speed modems such as the SCS Pactor 3 capable modem is actually a throwback to the late 1970's as far as data communications is concerned. These modems all use a dedicated session protocol that means one and only one communications can take place on the frequency at a given time. It is comparable to using dedicated RS-232 cables between each terminal and a central computer as was done in the early days of computing. This technique was replaced in the late 1970's by ethernet and token ring technologies. The advent of these technologies allowed sharing one transmission media (i.e. amateur frequency) among many terminals.

If Amateur Radio operators desire innovation, then developing a protocol that allows sharing one frequency among several users is the most spectrum efficient. As mentioned above, a collision detection scheme like ethernet is one possibility as is token ring or a master/slave scheme. A bandwidth limit such as proposed in this petition may provide an incentive for this type of development. If so, it would increase spectrum efficiency dramatically.

INTERFERENCE MITIGATION

One of the primary users of the amateur network is a “service” called Winlink2K. They use SCS Pactor modems primarily at P II and P III speeds as discussed in the petition. This network is quickly becoming one of the most despised users of amateur radio spectrum for two reasons and is a perfect example of the interference possibilities the FCC worried about when it authorized the use of automatic stations in the Amateur Service.

In P III mode, these modems automatically and without operator intervention contract/expand their occupied bandwidth depending upon conditions by using the different “speed levels” described in the petition. The manufacturer readily admits in their documentation that this modem was designed to be used in a commercial environment where 3 kHz dedicated “channels” are the norm. Because of the commercial environment, if the “middle” of the channel is unoccupied, one can accurately assume the remainder of the channel is unoccupied also. Consequently the contraction/expansion of the bandwidth within the channel presents no problem. This assumption simply can not be made when using this modem in a shared spectrum environment like the Amateur Service. There are many occurrences in the amateur bands when communications taking place near to one of these signals and the signal swells to encompass the ongoing communications. As a result, harmful interference occurs many times each day when these modems are used.

The only method for implementing ANY interference mitigation with a modem such as this is to limit its total bandwidth. As shown in the petition, the 1.5 kHz limit **will not** prevent the use of such modems. Therefore, the claims by many commenters that existing investments will be junk are simply incorrect. However, the limit will provide a modicum of interference mitigation to the remainder of amateur operators.

The FCC has previously stated that it hoped a busy detection scheme could be implemented in amateur

radio that would provide sufficient interference mitigation to allow automatically controlled stations to coexist peaceably with locally and remotely controlled stations. The Winlink2K system has subverted this by implementing a policy of "turning off" busy detection in the modems they use. This policy is unabashedly available on their internet forums. The rationale is that they receive "jamming" preventing the use of their system. One only has to monitor the frequencies used by their automatic stations for a short period to see that at least some of the "jamming" occurs from multiple clients trying to access either the same automatic station or another one that monitors the same frequency. So, in essence, they are providing their own reason for not using any busy detection scheme whatsoever. The only method of implementing any interference mitigation techniques for this type of situation is to require **ALL** automatically controlled stations to operate in the proscribed automatic sub-bands as this petition recommends.

The FCC recently concluded a Cognitive Radio Technologies Proceeding and it occurred after allowing automatic stations to operate in the amateur bands. One of the conclusions from this proceeding was that there is no adequate method to accurately assess if a passive receiver will be interfered with by a transmitter that can not also hear the station the receiver is monitoring. This occurs quite frequently on the HF amateur bands due to varying propagation zones. The only method for applying interference mitigation techniques is for all automatic stations to operate in the proscribed automatic sub-bands as this petition recommends.

NEED FOR SPEED

Ultimately, the Amateur Radio Operators desiring higher and higher speeds at HF are focused entirely on what I call the "need for speed". Achieving higher and higher speeds becomes a goal all unto itself and ignores the effects upon others using the HF spectrum. Many have seen ethernet speeds climb from 1 Mbit to 5, 10, 100 Mbit and now 1 Gbit. They believe that amateur radio is falling behind and must also implement faster and faster data transmission speeds. This is documented in some of the comments made to this petition. However, this presents the problem that traditional users will be displaced as faster speeds, especially with OFDM type modems, also require wider bandwidths. This is a law of physics, yet many people making comments fail to address the issue of how to handle displaced users at all.

One example, which illustrates the spectrum efficiency of the different SCS Pactor modems and one that advocates for higher speeds and wider bandwidths fail to recognize is the aggregate data that can be sent by several users versus one user at a time while using the same spectrum. Five (5) Pactor II emergency stations could be used in a 3 kHz bandwidth whereas only one 2.2khz PIII station can be used. At +20db SNR, PII speed is about 150cps and PIII is about 600cps, therefore, PII could actually transfer more data (150 x 5 = 750cps) than a single PIII station. Obviously, one individual station may see a longer transmission time but overall the system will work faster. Even in an emergency situation, the ability to share our spectrum is a prime concern, especially when that sharing results in faster overall speeds. If the state EOC, the ARC, the Salvation Army, and two hospitals are all attempting to use Winlink 2000 on HF, it *really* would provide better overall efficiency if everyone was using PII.

The need for speed is also being driven by those who would change the very soul of Amateur Radio, that is, who amateur radio operators communicate with. Traditionally, Amateur Radio has been defined as stated in Part 97.3(a)(4) "Amateur service. A radiocommunication service for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest."

The intercommunication of amateur radio operators interested in radio technique has always been

interpreted to mean amateur to amateur communications and it is the heart and soul of the service.

However, a minority of amateurs have been attracted to communicating to/from third parties on the internet by using automatic stations connected to the internet by gateway computers. This has the very good chance of changing the definition of Amateur Service to one that reads: "A radiocommunication service for the purpose of allowing amateur radio operators to communicate with non-amateur third parties via radio links to the internet or for allowing non-amateur third parties to directly communicate with other non-amateur third parties via amateur radio links at both ends." Users of connections to the internet via automatic stations with internet gateways will demand faster and faster speeds. This has occurred in the commercial marketplace as DSL, Cable, Satellite, and Wi-Fi internet access have all systematically increased their usable speeds over the years in order to meet customer demand. There is simply no reason to believe that the same will not occur in the Amateur Service.

The currently allocated HF bands simply cannot support this growth of internet traffic without negatively impacting traditional users of the spectrum. The only way to prevent this is for the FCC to implement a bandwidth limitation upon spectrum used for this purpose. Mr. Miller has proposed simply codifying the traditional bandwidth limit and making all automatic stations operate in the automatic sub-bands. Both of these together will place a limit on internet connection speeds and the amount of traffic until the effects on the Amateur Service can be more adequately addressed

TRAGEDY OF THE COMMONS

In 1968 Garrett Hardin wrote an article in *Science* magazine called "The Tragedy of the Commons". It deals specifically with the issues at hand when determining how the "commons" amateur spectrum can best be managed for the good of all.

Wikipedia has a few sentences that are exactly pertinent.

"The metaphor illustrates how free access and unrestricted demand for a finite resource ultimately structurally dooms the resource through over-exploitation. This occurs because the benefits of exploitation accrue to individuals or groups, each of whom is motivated to maximize use of the resource to the point in which they become reliant on it, while the costs of the exploitation are distributed among all those to whom the resource is available (which may be a wider class of individuals than that which is exploiting it). This, in turn, causes demand for the resource to increase, which causes the problem to snowball to the point in which the resource is exhausted."

We are witnessing a minority of hams determined to expand "amateur to third party" (and vice versa) communications via the internet by using higher and higher speeds with the corresponding wider and wider bandwidths. We already have amateur email "services" deployed that are not used for amateur to amateur communications but strictly for amateur to third party (and vice versa) consuming an ever expanding number of frequencies used for the required automatically controlled stations. Recently the capability to send/receive text messaging to/from cell phones via the internet has been introduced. The demand for more and more internet access for additional features such as chat rooms and instant messaging all the way to full blown web browsing, WILL keep expanding until it consumes all of Amateur Radio's common resource, that is, currently allocated frequency spectrum.

The current allocation of amateur spectrum was not based upon the usage these types of communications can generate when done on a regular basis. Amateur spectrum was allocated based upon the usage generated by amateur to amateur communications. The currently allocated spectrum is simply inadequate for the task of also adding **regular** communications to and from third parties via internet gateways.

There are only a few ways to prevent the tragedy of the commons from occurring. One of them is for an administrative entity to set rules that prevent a minority of users, i.e. exploiters, from taking over the commons at the expense of all other users. This is the task of the Federal Communications Commission and this petition is asking for the FCC to return a modicum of planned, orderly growth to the Amateur community.

CONCLUSIONS

Many commenters have made claims that a bandwidth limit will stifle experimentation and implementation of wide bandwidth data emissions. What these commenters fail to deal with is the effects of allowing unrestricted growth of wide bandwidth signals and automatically controlled stations without any busy channel detection schemes upon the remainder of the amateur community. And, there is no doubt there will be ramifications. While researching information on "The Tragedy of the Commons" one article was interesting. The author of the article knew that the author of the original essay, Garrett Hardin, was a devoted pacifist. Because of this he pointedly left out one of the most serious effects that occur when the commons are being overused. This effect was war between the exploiters and the average users!

It may only be coincidental and is certainly anecdotal, but recently there have been an increasing number of postings on amateur radio internet forums by operators interested in using high power amplifiers for the narrow data modes. One conclusion from this is that amateur radio operators interested in these modes are preparing for what can only be characterized as war with the automatically controlled stations not using busy channel detection schemes and those using wide data emissions.

This will be sad for it will also destroy the inherent spectrum efficiency and interference mitigation these very narrow modes enjoy. Currently used receivers in the amateur service simply can not handle the close spacing of one of the more popular keyboard to keyboard modes, psk31, when some signals are many times louder than others. The use of high power amplifiers with this mode will require many more times the separation between signals than what is currently used and as a result, drastically decrease the spectrum efficiency of this popular mode.

This commenter feels the time is ripe to institute the changes requested in this petition. It will provide time for the amateur community to discuss in detail and digest the ramifications of the movement to wider and wider bandwidths upon the community. With the advent of a new solar cycle, it will be important to have the usage data available during a peak of propagation in order to assess the impacts on the Amateur Service HF bands.

The very fact of limiting access to spectrum could also have the benefit of providing impetus to the "services" using automatically controlled stations and wider bandwidths to develop a technique of frequency sharing among multiple users. This opportunity to drastically increase spectrum efficiency using newer techniques would certainly be innovative.

I respectfully request that the FCC implement the changes requested in this petition.

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