

**Before the
Federal Communications Commission
Washington, DC, 20554**

In the matter of

TECHNOLOGICAL ADVISORY
COUNCIL (TAC)
TECHNICAL INQUIRY INTO
REFORMING TECHNICAL
REGULATIONS

ET Docket No. 17-215

COMMENT OF BRUCE PERENS

26-October-2017

1. Author Introduction

A biography of the author of this comment is on the Wikipedia at https://en.wikipedia.org/wiki/Bruce_Perens

2. Introduction

This comment concerns the Amateur Service. Amateur Radio is unique in that it promotes self-education, experimentation, and participation in technology by individuals on a non-commercial basis. As a service that inherently requires a technical participation of the licensee, I believe the basis and purpose of the Amateur Service and all of its rules are potentially within the mission of the TAC's study.

I am not in general asking for rules to be merely *simplified*. Rather, I am asking for **modernization** of rules, some of which have remained **unchanged for 65 years or more**. My comments present proposed new text in some cases.

My comments are arranged by the rule number, all are in Part 97.

3. §97.1 Basis and Purpose

3.1 Introduction

The basis and purpose of the Amateur Service, at §97.1, might not be considered a technical rule and thus within the purview of the TAC or subject to this proceeding. However, this section provides the basis for Amateur Radio's use of precious radio spectrum, and the justifications for the use of that spectrum are technical in nature.

Radio spectrum is administered by FCC in the public interest, and does not *belong* to Radio Amateurs. Rather, its use is granted to Amateurs as a privilege. The spectrum currently allocated to Amateur Radio is desirable to many potential users, and thus is continually the subject of requests for reallocation.

So much valuable spectrum would not be allocated simply to facilitate the operation of a private club of tech nerds. The Amateur Service, and its use of radio spectrum, must serve the public interest, and *must continue to do so*, for there to be a justification for Amateur Radio to exist. Thus, §97.1 specifies a basis and purpose of the Amateur Service which goes beyond the simple definition of Amateur Radio in §1.56 of the ITU *Radio Regulations*.

However, §97.1 has remained unchanged for at least 65 years¹, and the present version was published in the 1953 edition of the *Code of Federal Regulations*. The field of telecommunications has changed immensely during the past six decades, and thus there has been great change in the public-interest role of Amateur Radio. I believe it is thus necessary to re-define §97.1 to better justify the Amateur Service and its allocation of radio spectrum, within the context of society's needs today rather than in 1953.

3.2 ITU Radio Regulations

These ITU rules read upon what should be present in §97.1:

§1.56 *amateur service*: A radiocommunication service for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.

§25.9A Administrations are encouraged to take the necessary steps to allow amateur stations to prepare for and meet communication needs in support of disaster relief. (WRC-03)

3.3 §97.1(a)

This presently reads as:

Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.

The emergency services mission of Amateur Radio remains important, as has especially been demonstrated during the recent disaster in Puerto Rico. However, that mission is in decline. When this rule was written, during or before 1953, most people did not have access to any form of two-way radio. Now, very many people have access to a cellular telephone, and the cellular telephone service often remains in operation during a disaster. For example, the recent Tubbs Fire in Santa Rosa, California destroyed over 8000 structures and has killed at least 43 people at this writing. That fire never became a communications emergency requiring the activation of more than a handful of Amateur Radio resources, because cellular communications continued to operate in the region although the system was impaired due to destruction of local facilities.

¹ Code of Federal Regulations, version of 1953, title 47, part 12.0, <http://loc.heinonline.org/loc/Page?handle=hein.cfr/cfr1953013&id=1&size=2&collection=journals&index=cfr/1953#707> at page 707.

There is also the project to build *FirstNet*, a national cellular communication system specifically for first-responders, meant to be hardened to survive emergencies. FirstNet is theorized to solve the interoperability problem between different departments and jurisdictions, and to reduce but not eliminate the use of other forms of land-mobile radio by first-responders.

Thus, the emergency services role of Amateur Radio is diminished, and will continue to diminish while it may remain significant for some time.

3.3.1 Recommendation

The text of §97.1(a) should remain as it is, however we should recognize that emergency services will *not* remain a sufficient justification to support the allocation of precious radio spectrum for use by Amateurs. The rest of §97.1 must provide increased justification to support the Amateur spectrum allocation in the modern age.

3.4 §97.1(b)

This presently reads as:

Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.

This statement is especially deficient in that it refers *only* to the *radio art*. Much recent innovation in Amateur Radio is in the field of computer science.

In 1953, it was still the case that Amateur Radio drove the development of radio, and that radio innovators generally reached their capability through a path including participation in Amateur Radio. It was also the case in 1953 that most amateurs hand-built some aspect of their stations, if not the entire station, due to the expense and unavailability of commercially-manufactured equipment. For example, the illustration shows a hand-built 220 MHz station.

While some Amateurs still build their own equipment, many today are “appliance operators”, who do not build their own devices and communicate exclusively using commercially-manufactured equipment. Since the 1960’s it has been difficult to see how Amateur Radio has improved the radio art, while innovation by commercial wireless manufacturers has proceeded rapidly. We saw the rise of the transistor and integrated circuits, the internet, global positioning satellites, smartphones that operate with a robust distributed wireless network and astonishing miniaturization, high-definition television, and both commercial and personal data networks. These were not Amateur innovations *per se*, although some of the innovators had built their skills through Amateur Radio.

Fortunately, the advent of digital communications technology has spurred a renaissance of innovation within Amateur Radio. One example is the *WSJT* digital communications technology introduced by Joe

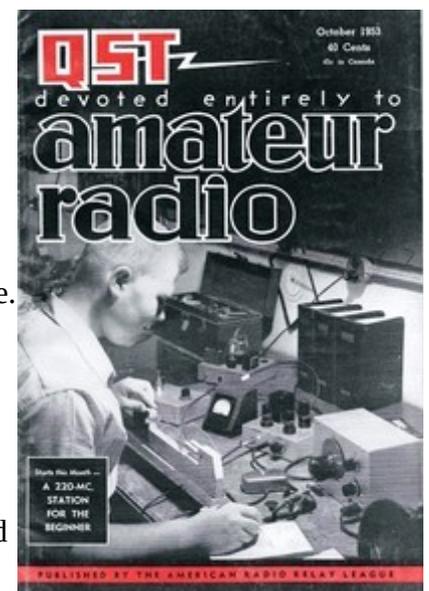


Illustration 1: A Homebuilt 220 MHz station. QST Magazine Cover, October 1953. Copyright (C) 1953 American Radio Relay League, Used under the Fair Use doctrine.

Taylor, a Nobel-prize-winning astrophysicist and Radio Amateur². Another is the digital voice technology introduced by the Codec2 and FreeDV projects³, which have created an ultra-low-bandwidth digital voice codec as Open Source software, significantly improving the state of the art of digital voice codecs, and a suite of software modems and communication software to employ their codec over the air.

We can restate this mission in a way that's much more relevant today. But we can not justify the allocation of spectrum for Amateur Radio *solely* for its innovation, which is still a far second to that carried out within the wireless industry.

3.4.1 Recommendation

The text of §97.1(b) should be modified to read:

Scientific and technological research, experimentation, and development carried out for the public benefit, using the unique access to radio spectrum and technology provided by the Amateur Service.

There is an Experimental Radio Service defined in Part 5, but this is mainly for commercial development. Amateur Radio rules, in contrast, exclude pecuniary interest and thus experimentation in the Amateur Service will continue to be for education and non-profit research and development. The Part 5 Experimental Service requires a much greater administrative overhead of the participant than experimentation within the Amateur Service.

3.5 §97.1(c)

This presently reads as:

Encouragement and improvement of the amateur service through rules which provide for advancing skills in both the communication and technical phases of the art.

This is oddly written, since it calls for improvement *of the amateur service*, perhaps for its own sake rather than to perform a service *to the public*.

The statement implies an educational purpose, but only obliquely states one. Surprisingly, the word “education” doesn’t appear in §97.1, and there is no tie-in to the oft-promoted need to educate young citizens in STEM (Science, Technology, Engineering, Mathematics)⁴. That should change now. Education must be mentioned explicitly, and must be a prime justification of Amateur Radio if Amateurs are to retain access to radio spectrum.

3.5.1 Recommendation

The text of §97.1(c) should be modified to read:

² <https://physics.princeton.edu/pulsar/k1jt/>

³ <https://freedv.org/>

⁴ https://en.wikipedia.org/wiki/Science,_technology,_engineering,_and_mathematics

Education in Science, Technology, Engineering, and Mathematics through participation in the design, investigation, construction, modification, testing, and operation of wireless technology through the Amateur Service.

3.6 §97.1(d)

This presently reads as:

Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.

The word *reservoir* is critical to understanding this statement. The U.S. was at war in Korea as this statement was written, and World War II had concluded less than a decade before. The military had a need for a *reservoir* of trained radiotelegraph operators who could *go to war*. Practical experience in Morse code operation took time to build, and the Amateur Service provided that experience. Similarly, the Amateur Service provided a reservoir of trained technicians and electronics experts (scientists and engineers) who could go to war.

Without the context, this would appear to be simply another oblique reference to education.

Amateur Radio no longer provides this reservoir to the military. The military has evolved beyond radiotelegraphy and has sophisticated communications systems and its own training programs to staff them.

Perhaps this statement is still useful if read in a different context, we might need a *reservoir* to serve the need of emergency communications discussed under §97.1(a). But an explicit statement regarding STEM education, as recommended above for §97.1(c), makes much more sense today.

3.6.1 Recommendation

§97.1(d) can be deleted or allowed to stand as it is today.

3.7 §97.1(e)

This presently reads as:

Continuation and extension of the amateur's unique ability to enhance international goodwill.

Reference to the context of 1953 is again necessary to understand this statement. Direct dialing of long-distance calls *within* the nation had only appeared two years previously, in 1951. There were no transatlantic telephone cables. So, Radio Amateurs were the only people who regularly had casual conversations with people overseas.

It's clear that many, many more people today converse with those far away using the internet. So, while Amateur Radio still cultivates international goodwill, this mission would not justify allocation of spectrum to the Amateur Service.

3.7.1 Recommendation

§97.1(e) can be deleted or allowed to stand as it is today.

3.8 Summation of §97.1 Argument

We're down to the education and experimentation missions as a continuing justification of spectrum allocation to the Amateur Service, as our emergency services role continues to diminish and the other currently-stated missions of Amateur Radio have already reached irrelevance. But young people are severely under-represented among Radio Amateurs globally today, and thus we may not achieve the success in education, or even induction of licensed Amateurs, necessary to continue the Amateur Service worldwide.

The elimination of a Morse Code requirement in the U.S. caused a significant increase in the number of Radio Amateurs, and apparently an overall increase in the number of (competent but untested) Morse code users. But the number of licensed Amateurs in the U.S. appears to be leveling off at about 750,000, and was not matched in other countries, where Amateur Radio licensing numbers mostly continued to decline unchecked.

Change to regulations is not all that's necessary to assure the continuation of Amateur Radio. The very culture of Amateur Radio must change if Amateur Radio is to be preserved. The International Amateur Radio Union has convened a committee to explore what is necessary to attract more young people to Amateur Radio⁵.

4. §97.25 License Term

The inquiry requests comments on rules that should be *retained* in order to protect from interference. In this case, *modification* of a rule is necessary to protect from interference.

The current term of Amateur Licenses is 10 years and there is no fee for renewal.

This is a tremendous problem because *it provides FCC with no source of funds for enforcement of the Amateur Service*. The almost complete lack of enforcement, perhaps coupled with a general breakdown of social norms that has been a trend in the U.S., means that there is a lot of unlawful, interfering, uncivil and obscene operation within the Amateur spectrum, such that it has become difficult to have a session on the air without hearing such an offense. There are continual requests for enforcement from ARRL and radio amateurs nationwide that are not acted upon, or are acted upon only after a great delay. Amateur Radio needs some new sheriffs.

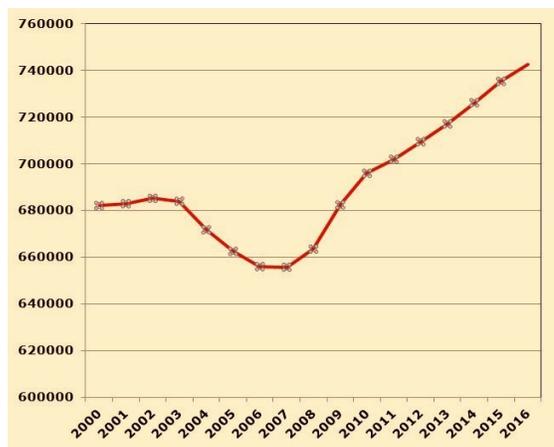


Illustration 2: Number of licensed Radio Amateurs in the U.S. over recent time. The dip corresponds roughly with penetration of an internet connection to homes, and the rise to the end of Morse code testing. Copyright (C) 2017 ARRL, used under the Fair Use doctrine.

⁵ <http://www.arrl.org/news/iaru-president-traditional-aspects-of-ham-radio-may-not-be-attractive-to-newcomers>

FCC formerly derived enforcement funds for the Amateur service from its general funding. As such funding has declined and FCC has been called upon to spend its limited budget elsewhere, FCC has allocated very few resources to enforcement within the Amateur service and has closed field offices and listening stations that facilitated enforcement of multiple services.

I believe that the best solution would be for Amateurs to pay FCC more, in order to sponsor sufficient enforcement of the Amateur Service. A higher fee for Amateur license renewal, coupled with shorter license terms, would provide sufficient funding for enforcement.

The only other change I can think of is to offload the operation of enforcement to Amateur Radio organizations, such that they could bring enforcement matters before an administrative court rather than simply collect information in the hope that FCC would eventually bring enforcement.

To have no change is unacceptable, in my opinion. This problem makes Amateur Radio less fun and less useful for all Amateurs, and may eventually reduce participation in Amateur radio sufficiently to endanger the viability of the Amateur service.

4.1 Recommendation

I propose that Amateur license terms be shortened to one year, that the fee for renewal be set at \$50, and that 90% of this amount be dedicated to enforcement of the Amateur Service. For those licensees who can not afford this, for example children and those with limited incomes, there would be a fee waiver request form with an automatic grant. This would provide 30 to 40 Million dollars annually to FCC for enforcement and administration of the Amateur service. This amount would fund sufficient field staff and their offices and equipment, administrative staff and the operation of the administrative court.

In addition, the shorter renewal period would facilitate greater regulatory flexibility in enforcement, as proceedings that currently result in suspension of license could instead be operated on the basis of denial of renewal or an off-air period after which a request for renewal would be honored.

Government services that are paid for by their user communities are commonplace. One example is the “Migratory Bird Hunting and Conservation Stamp”, commonly known as the “Duck Stamp”, operated by the U.S. Fish and Wildlife Service. This is a federal waterfowl hunting license which pays for ecological conservation of waterways used by migratory birds. The government has even added a “feel-good” aspect to this program, in that the stamp is a collectable work of art and the purchaser is told how their fee pays for beneficial work exceeding the needs of hunters alone.



Illustration 3: Federal "Duck Stamp". Not copyrightable as a product of the U.S. Government, but protected by law. Used for illustration only.

Finally, “lifetime licenses” as proposed by some Amateurs are the wrong direction, since they provide FCC with no means of collecting fees for enforcement and operation of the Amateur service.

5. §97.317 Standards for Certification of Power Amplifiers

This section contains two rules that were enacted to prevent use of amplifiers represented as being for the Amateur Service that are actually marketed for and deployed by unlawful operators in the Citizens Radio Service.

5.1 §97.317(2)

This currently states:

Not be capable of amplifying the input RF power (driving signal) by more than 15 dB gain. Gain is defined as the ratio of the input RF power to the output RF power of the amplifier where both power measurements are expressed in peak envelope power or mean power.

This rule came about when the emitted power of commercially manufactured Amateur transceivers was in general around 100 watts, while Citizens Band transceivers were limited to 5 watts. Thus, it was thought that a gain limitation would not be a problem for Amateurs while cubing the use of unlawful amplifiers in the Citizens Band.

More recently, highly-sophisticated and ultra-portable but low-emitted-power radios like the Elecraft KX3 have become very popular among Amateurs. This radio might emit 3-5 watts in normal operation and a maximum of 15 watts with an external power supply and the possibility of overheating. Its spectral purity is suitable for high levels of amplification.

Thus, it has become desirable for amplifiers of higher gain than 15 dB to be used when radios like the KX3 are used for base operation rather than the portable operation they are mainly designed for. An amplifier providing only 15 dB gain would reach less than one third of the legal power limit with the KX3 transceiver driving it at its theoretical maximum power, and might not work at all with the transceiver at its normal power level.

This rule is no longer needed, because modern amplifiers can be disabled for the Citizens Radio Service dependent on frequency, with high precision in the measured frequency due to the use of inexpensive microprocessors and crystal-controlled digital frequency counters. Many modern amplifiers already measure frequency with high precision as part of their normal operations, thus all that is needed for such amplifiers is a software change.



Illustration 4: Elecraft KX3 Transceiver. Image under CC BY 2.0 license. (C) Dave Clausen.

5.1.1 Recommendation

Delete this rule.

5.2 §97.317(3)

This currently states:

Exhibit no amplification (0 dB gain) between 26 MHz and 28 MHz.

This is again a rule intended to prevent use of amplifiers with Citizens Band transceivers. This specification is unnecessarily broad for today's amplifiers, in that the exact frequency limits of the Citizens Radio Service and nearby commonly-abused frequencies can be specified for locking out, without interfering with other services. As written, the gain restriction reaches the lower edge of the Amateur 10-Meter band.

As above, modern amplifiers can be disabled for the Citizens Radio Service dependent on frequency, with high precision in the measured frequency due to the use of inexpensive microprocessors and crystal-controlled digital frequency counters. Many modern amplifiers already measure frequency with high precision as part of their normal operations, thus all that is needed for such amplifiers is a software change.

5.2.1 Recommendation

Reduce the 0 dB gain band to the practical minimum necessary for lockout of Citizens Band radios, and commonly-abused nearby frequencies, but allowing:

- Frequencies legally used by Radio Amateurs.
- Frequencies that Amateurs might legally use while traveling in other nations.
- NTIA-allocated frequencies used by the Civil Air Patrol and the Military Amateur Radio Service, services in which Radio Amateurs often participate.

6. §97.305 Authorized Emission Types, §97.307 Emission Standards, and §97.309 RTTY and data emission codes.

6.1 Rules Incorporating Modulation Designator Letters Which Specify the Payload or Mode are Obsolete

The present rules in §97.305 through §97.309 spell out a limited set of modes, modulations, and digital data codes which Radio Amateurs can use on the air. They date back to the analog age, and limit innovation because they do not permit the use of modern modes and modulations in the Amateur Service. A new rule-making is required to add any new proposed modulation or mode, and this administrative load further stifles innovation. I propose to replace these rules with much simpler regulation based on the *bandwidth of the transmission*, rather than the modulation type and mode. This

regulation-by-bandwidth plan has been implemented in Canada for at least a decade, without reports of interference by US Amateurs who share most Amateur Frequencies with Canada and are within easy range of their communications.

Under a regulation-by-bandwidth scheme like that of Canada, any modulation, mode, and type of data payload would be allowed as long as it fit the specified bandwidth. In contrast, the present rules in §97.305 through §97.309 require the use of a particular mode or data payload: television, radio, telegraphy, etc. They specify that mode as a modulation designator letter.

In the analog radio age, the type of communication accommodated by a system was necessarily much more fixed than it is today. Radios, televisions, teletypes, and telegraphs were separate physical objects, and it was appropriate to use a single modulation designator letter to express the continuous program content being carried by those devices.

Of course a single computer can encompass the function of all of those devices today. It is possible for a single transmission to incorporate data packets containing many different payloads. Under the old scheme, each of these payloads would have a different letter in the modulation designator, and each would be a different modulation under the law. The time when modulation designators could reflect the continuous content of a communication is past. Amateur regulations should reflect that fact.

6.2 Digital Communication Breaks FCC's Amateur Band-Planning

A main thrust of the FCC-enforced Amateur band-plan enacted in §97.305 through §97.309 has been to protect narrow-band modes, primarily radiotelegraphy (defined as a digital mode), from interference by wide-band modes, primarily voice communications. Voice is allowed in limited sub-bands, while telegraphers can operate in both the exclusively digital (meaning telegraphy) sub-bands and the voice bands. With the advent of digital communication this plan is broken, because “voice” modulations are limited to be used in voice band segments, while “digital” modulations, which can carry voice as well as many different kinds of information, are admitted to band-segments that were previously the protected domain of telegraphy.

While FCC could reformat the band plan to separately authorize and allocate band segments for digital-television, digital-voice, digital-text, telegraphy, etc., the reality is that a single digital communication should be expected to carry many of these modes simultaneously. Regulating the type of payload just doesn't make sense any longer. If a protected sub-band is required for telegraphy, excluding voice modes, that sub-band should be specified for operation with a narrow bandwidth, for example 100 Hz, rather than a particular modulation designator.

6.3 Why Do We Have The Current Regulatory Framework, Anyway?

The micromanagement of Amateur modulation modes and sub-bands in §97.305 through §97.309 arose from the desires of Radio Amateurs, rather than any need of the public or the United States Government.

In the past, FCC operated many field offices, devoted significant human resources to Amateur enforcement, and proctored Amateur license examinations in its offices using its own staff. Back then, it might have made sense for FCC to manage the Amateur band-plan and to enforce it with Federal officers, and FCC was persuaded to enact a set of regulations that protected radiotelegraphy from radiotelephone interference.

Later, Federal management of the band-plan was extended to implement a privilege hierarchy for incentive licensing of Radio Amateurs, in which higher grades of licensee were granted increased privileges over lower grades. This left FCC in the position of having to enforce the Amateur band-plan in order to maintain incentive licensing. In 2000, FCC partially dismantled the incentive licensing scheme by ending new applications for the Novice and Advanced license classes, leaving Amateur Radio with three license classes: Technician, General, and Extra.

Today, FCC can not, does not, and in fact does not need to devote significant resources to managing a band-plan for Radio Amateurs. FCC has entirely offloaded Amateur testing to volunteers, except for rarely ordered re-examinations in connection with enforcement. FCC has offloaded repeater frequency coordination to Amateurs. It is unlikely that FCC can continue to support the administrative load of approving new modulation types piecemeal as they are proposed.

The United States is unusual in having its telecommunications regulator enforce an Amateur Radio band-plan. Most nations implement these as policies of a national Amateur Radio society, which takes the lead in maintaining them. The United Kingdom telecommunications regulator Ofcom, for example, leaves Amateur band-planning for England, Wales, Northern Ireland, and Scotland to the Radio Society of Great Britain. That Amateur Radio society implements the band plan agreed to by the International Amateur Radio Union (IARU) with a small number of local changes. IARU arrives at its band plan by agreement of the world's national Amateur Radio societies. IARU is administered by the American Radio Relay League (ARRL) as its perpetually re-elected International Secretariat. Thus, ARRL, the *United States* Amateur Radio society, is already active in producing the Amateur Radio band plan that is observed by many nations *other than the United States*. It can certainly perform this task for the U.S. if desired.

6.4 Canada's Plan

Canada's regulation-by-bandwidth very simply specifies frequency bands and the maximum permissible transmitted bandwidth within those frequencies. Within this framework, the Canadian Radio Relay League (CARRL) further specifies a band-plan which suggests sections of the bands which

are to be used for particular modes. CARL’s band-plan is a “gentleperson’s agreement” rather than a hard rule, thus allowing innovation within the existing spectrum.

Below is the band and bandwidth table used by Canada. Where the maximum bandwidth is “Not Specified”, the width of the entire band would be the maximum.

Some implicit preferences for modes and modulations do exist in this table. For example, the 100 Hz bandwidth specified for the 135 kHz band would allow telegraphy and digital modulations such as PSK31⁶ and some WSJT⁷ modes, but would not admit radiotelephone. The 1 kHz bandwidth specified for the 10 MHz band would in general exclude voice communications, although ultra-low-bandwidth digital voice is possible. The 2.8 kHz bandwidths specified fit single-sideband voice transmissions and FreeDV digital voice. The 6 kHz bandwidth would admit additional modes and modulations. All bandwidths would admit some form of digital data transmission, with a data rate roughly corresponding to the bandwidth.

	Frequency Band	Maximum Bandwidth
1	135.7-137.8 kHz	100 Hz
2	1.800-2.000 MHz	6 kHz
3	3.500-4.000 MHz	6 kHz
4	5.332 MHz	2.8 kHz
5	5.348 MHz	2.8 kHz
6	5.3585 MHz	2.8 kHz
7	5.373 MHz	2.8 kHz
8	5.405 MHz	2.8 kHz
9	7.000-7.300 MHz	6 kHz
10	10.100-10.150 MHz	1 kHz
11	14.000-14.350 MHz	6 kHz
12	18.068-18.168 MHz	6 kHz
13	21.000-21.450 MHz	6 kHz
14	24.890-24.990 MHz	6 kHz
15	28.000-29.700 MHz	20 kHz

6 <https://en.wikipedia.org/wiki/PSK31>

7 <https://physics.princeton.edu/pulsar/k1jt/>

	Frequency Band	Maximum Bandwidth
1	135.7-137.8 kHz	100 Hz
16	50.000-54.000 MHz	30 kHz
17	144.000-148.000 MHz	30 kHz
18	219.000-220.000 MHz	100 kHz
19	220.000-222.000 MHz	100 kHz
20	222.000-225.000 MHz	100 kHz
21	430.000-450.000 MHz	12 MHz
22	902.000-928.000 MHz	12 MHz
23	1.240-1.300 GHz	Not specified
24	2.300-2.450 GHz	Not specified
25	3.300-3.500 GHz	Not specified
26	5.650-5.925 GHz	Not specified
27	10.000-10.500 GHz	Not specified
28	24.000-24.050 GHz	Not specified
29	24.050-24.250 GHz	Not specified
30	47.000-47.200 GHz	Not specified
31	76.000-77.500 GHz	Not specified
32	77.500-78.000 GHz	Not specified
33	78.000-81.000 GHz	Not specified
34	81.000-81.500 GHz	Not specified
35	122.250-123.000 GHz	Not specified
36	134.000-136.000 GHz	Not specified
37	136.000-141.000 GHz	Not specified
38	241.000-248.000 GHz	Not specified
39	248.000-250.000 GHz	Not specified

6.4.1 Recommendation

Strike the rules in §97.305 through §97.307 and replace them with a regulation-by-bandwidth plan like that of Canada. Industry Canada's bandwidth-based Amateur Radio regulation is available on the web at <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01226.html#t1>. Of course, frequency allocations are somewhat different for the United States and a new band table must be written. The bandwidths chosen for Canada appear to have worked for them, and should be duplicated for the similar bands within the United States.

6.5 §97.309 Data Transmission Codes

97.309 (1) through (4) list authorized data transmission codes, all of which are obsolete in current computer usage. ASCII has been replaced by UNICODE, and the 5-level Baudot code is an antique with little remaining use outside of Amateur Radio.

All of the stated codes are textual, and are thus inapplicable to non-textual data such as the binary representation of numeric data, images, and digital voice encoding.

6.5.1 Recommendation

Strike the current rule, and replace it with this one:

Radio Amateurs are authorized to use any data transmission code that is documented in a disclosure that is readily available to the general public. The disclosure must be sufficient for a knowledgeable person to construct a computer program to encode and decode the digital code.

7. Offloading Routine Amateur Administration Onto Amateur Organizations

FCC has already offloaded all Amateur license testing except for enforcement-related re-examinations onto the National Conference of Volunteer Examiner Coordinators (NCVEC). The process of offloading routine Amateur administration onto Amateur organizations should continue.

FCC presently operates the Amateur license database as part of the Universal Licensing System, and runs the license renewal process. Operating the license database hinders administrative flexibility for FCC, because a rule change that requires a change in the database fields must be let out as an engineering contract, with all of the administrative complication of government contracting for services. Contrast this to the practice of organizations and technology companies that operate their own databases, keep programmers on staff, and can routinely make a database field change in half an hour, including backups and testing.

FCC has been transitioning to all-online license management, rather than the use of printed licenses. Despite their online availability, FCC but still mails out paper licenses or paper “official copies” of online licenses today, at the taxpayers expense.

Amateur administration necessarily involves data entry. NCVEC has already taken on the task of data entry for new licensees, but not for other administrative tasks.

As is the practice with many nations, FCC should offload the license database and the license renewal process to an Amateur organization. An extension of NCVEC would be appropriate for this task. Such an organization could collect the fees for Amateur licenses (under my proposal, above, for Amateur license fees to pay for Amateur enforcement), passing them on to FCC to use for enforcement.

ARRL presently operates the Logbook of the World (LOTW).⁸ This is a database of Amateurs worldwide and the log of their contacts. LOTW contains its own cryptographic certificate authority which issues a certificate to each authenticated Radio Amateur and thus facilitates digitally-authenticated internet data communications by Radio Amateurs. LOTW maintains a continuously updated database of Amateur radio contacts (the actual Logbook) with many millions of entries.

Operating LOTW is a larger technical task than operating the Amateur licensing database and its grant and renewal process would be. It is not necessary for FCC to perform routine administration of Amateur licensing with its own staff in order to administer the Amateur Service. Amateurs would be better served if this process was offloaded to Amateur organizations, and if FCC focused resources on Amateur enforcement.

8. In Closing

Many aspects of the Amateur Radio rules are outdated an in sore need of modernization. Please consider the initiation of rule-makings to address the issues I’ve brought up. A general rule-making for modernization of all of Part 97 might be an appropriate way to address these issues.

Respectfully Submitted

Bruce Perens

8 <https://lotw.arrl.org/lotw-help/>