STAMP & RETURN

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

In the Matter of	)	
	)	
Amendment of Part 97 of the	)	RM- ~~FILED/ACCEPTED~~
Commission's Rules to Facilitate Use in	)	
the Amateur Radio Service of Single	)	
Slot Time Division Multiple Access	)	MAR 15 2011
Telephony and Data Emissions	)	Federal Communications Commission Office of the Secretary

To: The Commission

PETITION FOR RULE MAKING

ARRL, the national association for Amateur Radio, formally known as the American Radio Relay League, Incorporated (ARRL), by counsel and pursuant to Section 1.401 of the Commission's Rules (47 C.F.R. § 1.401), hereby respectfully requests that the Commission issue a *Notice of Proposed Rule Making* at an early date, proposing to modify Sections 97.3(c) (5) and 97.307(f)(8) of the Commission's rules so as to permit the use by Amateur Radio Service licensees of certain digital voice and data emissions in Amateur allocations at VHF and above. The proposed modified rules are as set forth in ***Appendix A*** hereto. This Petition is very narrow in scope, and seeks to facilitate the use of and experimentation by radio Amateurs with existing, narrowband, spectrum-efficient digital voice and data technology. Such technology is now in regular and increasing use in the private land mobile radio services, but its use in the Amateur Radio Service is now apparently unintentionally precluded by two specific Commission rules.[1] In the interests of the Amateur Radio Service in encouraging the experimentation

[1] The use of Time Division Multiple Access (TDMA) digital emissions in certain frequency bands in the Amateur Service is on the increase. There are numerous narrowband UHF repeater facilities now operating using multiple slot TDMA repeaters and single-slot TDMA handheld digital transceivers, principally in the 70 centimeter (420-450 MHz) band. These systems have been installed recently, most especially in the

with and refinement of narrowband digital voice technologies at VHF and above, ARRL states as follows:

I. Introduction.

1. The rule changes proposed in this Petition are necessary in order to facilitate experimentation with and implementation in the Amateur Radio Service of certain spectrum-efficient narrowband digital voice and data equipment and systems in the VHF, UHF and microwave bands. Specifically, the rule changes will permit licensed radio Amateurs to migrate to the use of spectrum-efficient narrowband digital technology and equipment which is now and has been in regular use in the Land Mobile Radio Service for several years. Time Division Multiple Access (TDMA) technology is one technology among several that can facilitate the gradual conversion from analog voice to narrowband digital voice and data technologies in the Amateur Service. It should clearly be *permitted* in Amateur allocations where other digital voice and data emissions are now permitted; but it is not.

2. Though Section 97.307(f) of the Commission's Rules is not entirely clear on this subject, the present rules do not appear to permit *single time slot* TDMA emissions. The rules, however, clearly do permit *multiple* time slot TDMA. This is an anomaly in the existing rules enumerating and defining permitted emission types in the VHF Amateur bands and above. It is beneficial to address this anomaly and to flexibly allow the use of single-channel TDMA without delay. Compatibility with incumbent analog,

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western part of the United States and in the New York City area, but in several midwestern states as well. The legality of the use of these systems, however, was drawn into question only recently. It is urgent to allow these existing systems to continue to operate and to allow the sponsors of them to avoid losing their investment in them. Therefore, contemporaneously with this Petition, ARRL is submitting to the Commission a Request for Temporary Waiver of the same rules sought to be modified in this Petition. This would, if granted, permit these systems to continue to operate (on a non-interference basis), *pendente lite*, subject to the outcome of the instant Petition.

wideband technologies in use in the same frequency bands is provided for through the normal frequency coordination processes successfully utilized in the Amateur VHF and UHF bands. The rules should be modified so as to clearly permit the use of single channel TDMA in the Amateur Service.

II. Background.

3. In September, 2010, an article appeared in an Amateur Radio online publication which addressed the use of "TDMA type APCO P-25 transceivers and repeaters" which were "originally intended for use on the UHF public safety (sic) band" (i.e. 450-512 MHz).[2] The article, in question-and-answer format, asked whether emission type 7K60FXE is allowed in the Amateur band 420-450 MHz (the "70 centimeter" band), thus to permit the use of TDMA radios and repeaters in that band. The author of the article concluded that, though Section 97.305 of the Commission's rules authorizes MCW, phone, image, RTTY, data, SS, CW and test emissions in the entire 70 cm band, Section 97.3(c) of the Commission's Rules does not include FXE among the "terms that are used for specifying emission types." There was no further analysis of the point. The article concluded that (single-slot) TDMA in the Amateur Service is not presently authorized because of the use of the "X" symbol as part of the emission designator for single-slot TDMA, and because of the definition of a "phone" emission at Section 97.3(c)(5) which does not include that symbol.

III. TDMA Narrowband Digital Technology.

4. The use of digital repeater systems in the Amateur Service in the United States is expanding, and, as with other radio services, the conversion from analog to digital

[2] The bands 450-470 MHz and 470-512 MHz are not public safety allocations. They are private land mobile allocations, in which some channels are available for Public Safety applications, per 47 C.F.R. § 90.20.

communications in the Amateur Service is ongoing. Some Amateur licensees use the D-Star or P-25 technology. Others have begun to utilize a Motorola TDMA system that is in regular use in the private land mobile radio service. Motorola's TDMA product conforms to the Digital Mobile Radio (DMR) Tier 2 Standard, which is a published, open standard (See, ETSI TS 102-361, parts 1-4).[3] It incorporates two-slot TDMA technology with respect to the *repeater*. However, the associated portable and mobile transceivers in this configuration use single-slot TDMA emissions. The system uses 12.5 kHz bandwidth to achieve an efficiency of one channel per 6.25 kHz of bandwidth -- a requirement in the land mobile radio service, but not in the Amateur Radio Service. Amateur Radio repeater coordinators have begun to encourage the migration in the Amateur Service to narrowband technology. Though such migration has not been made mandatory by the Commission in the Amateur Radio Service,[4] there is recognition within the Service that crowding in the Amateur 70 cm band[5] necessitates increased spectrum efficiency now and in the future. TDMA technology as exemplified by the current Motorola product is compatible with existing Amateur Radio analog repeater channelization schemes, thus contributing to the ongoing but gradual process of conversion to digital emissions.

IV. Part 97 Rules and TDMA Emissions.

5. The Motorola TDMA product, apparently typical of narrowband TDMA systems, specifies emission designators 7K60FXE in voice mode and 7K60FXD for data.

[3] Other manufacturers have access to this DMR standard as well. Several land mobile radio manufacturers either have or are in the process of designing products that are compatible with the DMR standard. For example, Kenwood and ICOM have developed a different type narrowband product using the NXDN Common Air Interface technology. It is an FDMA (Frequency Division Multiple Access) technology with 4FSK modulation that uses 6.25 kHz channel bandwidths. NXDN is undoubtedly now legal to use on Amateur bands, unlike the Motorola TDMA system or other TDMA systems which incorporate transceivers using single-slot TDMA emissions.

[4] Part 90 VHF and UHF licensees are required to convert to 12.5 kHz bandwidth or equivalent digital efficiency by January 1, 2013.

[5] There are now almost 700,000 licensees of the Commission in the Amateur Radio Service.

The problem with this relative to the present Part 97 rules is that the "X" symbol in the second space (out of three characters defining the emission) is not included in Section 97.3(c) of the Rules defining "phone" (i.e. telephony) or "data." Specifically, with respect to "phone," Section 97.3(c) (5) includes in the definition speech and other sound emissions having the symbols 1, 2 or 3 as the second symbol (and thus excluding the symbol "X").[6] With respect to "data", Section 97.3(c) (2) includes in the definition telemetry, telecommand and computer communications emissions having the symbol 1 as the second symbol (and thus also excluding the symbol "X").[7] [8] Rule Section 97.3 is *definitional* for Part 97 emissions, but it refers to Section 2.201 of the Commission's rules, entitled *Emission, modulation and transmission characteristics* for information on emission designators. Section 97.3 does not prohibit or permit the use of any specific emission. It simply lists what is included in the broad classifications of emissions authorized per Amateur band in Section 97.305, and as authorized by Sections 97.307 and 97.309 of the Amateur Radio Service rules.

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[6] Section 97(c)(5) reads as follows:

> (5) Phone. Speech and other sound emissions having designators with A, C, D, F, G, H, J or R as the first symbol; 1, 2 or 3 as the second symbol; E as the third symbol. Also speech emissions having B as the first symbol; 7, 8 or 9 as the second symbol; E as the third symbol. MCW for the purpose of performing the station identification procedure, or for providing telegraphy practice interspersed with speech. Incidental tones for the purpose of selective calling or alerting or to control the level of a demodulated signal may also be considered phone.

[7] Section 97(c)(2) reads as follows:

> (2) Data. Telemetry, telecommand and computer communications emissions having designators with A, C, D, F, G, H, J or R as the first symbol; 1 as the second symbol; D as the third symbol; and emission J2D. Only a digital code of a type specifically authorized in this part may be transmitted.

[8] Section 97.3(c)(2) is definitional. However, Section 97.307(f)(8) of the Rules provides, on certain frequencies referenced in Section 97.305(c), for the use of data emissions in addition to those enumerated in Section 97.3(c)(2).

6. Section 2.201 of the Commission's Rules (which is taken directly from the ITU Radio Regulations, Appendix 1) includes a chart of classifications of emissions. Emissions are designated according to their classifications and necessary bandwidth. The *second symbol* in an emission designator is, per Section 2.201(b)(2), the "nature of signal(s) modulating the main carrier." The list of second symbol designators is, per Section 2.201(d), as follows:

(1) No modulating signal	0
(2) A single channel containing quantized or digital information without the use of a modulating sub-carrier, excluding time-division multiplex.	1
(3) A single channel containing quantized or digital information with the use of a modulating sub-carrier, excluding time-division multiplex.	2
(4) A single channel containing analog information.	3
(5) Two or more channels containing quantized or digital information.	7
(6) Two or more channels containing analog information.	8
(7) Composite system with one or more channels containing quantized or digital information, together with one or more channels containing analog information.	9
(8) Cases not otherwise covered	X

7. Therefore, the "X" second symbol is a catch-all, rather than a substantive classification of emission type. It is understandable that when the definitional list of emission designators was first created, the Commission may have wished to avoid an open-ended authorization in Part 97 for virtually any modulation scheme. For whatever reason, it did not provide in its definition of either voice or data the authorization to utilize, for example, an FXE or FXD emission. However, an examination of the definitions in Section 97.3(c) and of the broad classifications of permitted emissions per band in Section 97.305 does not reveal any intention to *exclude* single slot TDMA emissions from the Amateur Service at VHF or UHF, and no justification seems to exist now for that exclusion.

8. The anomaly in this case is that TDMA *repeaters* employ multiple time-slot TDMA emissions constituting an F7E or F7D emission according to the Section 2.201(d) table above. F7E emissions are not clearly permitted by Section 97.3(c)(5) as it is presently worded. However, F7D emissions are permitted in the Commission's Rules now by rule Section 97.307(f)(8) and therefore TDMA digital voice repeaters are permitted by the current Commission rules. However, the portable and mobile transceivers associated with the currently available TDMA systems employ single time-slot transmissions which therefore constitute an FXE or FXD emission according to the Section 2.201(d) table, because no *other* "second symbol" listed in Section 2.201(d) applies to those units. The portable and mobile transceivers are therefore, pursuant to that table, "cases not otherwise covered." This anomaly, which allows TDMA repeaters but disallows TDMA portable and mobile transceivers in the Amateur Service, is illogical and is counter to the Commission's well-established intent to provide flexibility in the implementation of spectrum-efficient digital technologies in, *inter alia*, the Amateur Radio Service.

9. In fact, it was determined long ago that such a rigid regulatory classification structure for permitted emissions and digital coding was overly restrictive, and it unnecessarily confined experimentation, development and technological experimentation in the Amateur Service, especially utilizing digital codes. It was decided therefore that unspecified digital codes should be permitted in the Amateur Service at VHF and above, as long as they are confined to domestic communications. The present Rule Sections 97.307(f)(6) and (7) were amended to reflect that flexibility. This same regulatory philosophy was later expanded to the high-frequency bands as well. See, e.g. *Amendment*

of the Amateur Service Rules to Clarify Use of CLOVER, G-TOR and PacTOR Digital Codes, 10 FCC Rcd. 11044 (1995).

10. The Commission's Rules expand on the broad emission classifications found in Section 97.305(c). In Section 97.307, there are found standards and supplemental authorizations for (and in some cases limits to) those classes of emissions listed in Section 97.305(c). With respect to the 1.25 meter and 70 centimeter Amateur bands, for example, the emission standards provisions of Section 97.307(f)(6) are incorporated by cross-reference in Section 97.305(c) in footnote fashion.

11. Section 97.307(f)(6) reads as follows:

> (6) A RTTY, data or multiplexed emission using a specified digital code listed in §97.309(a) of this Part may be transmitted. The symbol rate must not exceed 56 kilobauds. A RTTY, data or multiplexed emission using an unspecified digital code under the limitations listed in §97.309(b) of this Part also may be transmitted. The authorized bandwidth is 100 kHz.

This section permits the use of unspecified digital codes that utilize up to 100 kHz bandwidth, subject to the limitations in Section 97.309(b).[9] Nothing in Section 97.309(b) would preclude the use of single-slot TDMA using the published DMR Tier 2 standard in the Amateur Service in the 70 cm band for domestic communications. However, Section 97.307(f)(6) does not authorize types of *emissions*. It merely permits unspecified digital codes in the 1.25 meter and 70 cm bands, rather than unspecified emissions.

12. Another plainly stated provision listing standards and limitations appliable to the Amateur bands 6 meters and above, which <u>does</u> address permitted *data* emissions, is Section 97.307(f)(8). This Section permits the following emissions in the bands 6 meters and above:

[9] Section 97.307(f)(7) contains a similar provision with respect to unspecified digital codes, and is applicable to the Amateur bands 33 cm and above.

> (8) A RTTY or data emission having designators with A, B, C, D, E, F, G, H, J or R as the first symbol; 1, 2, 7 or 9 as the second symbol; and D or W as the third symbol is also authorized.

Thus, nothing in Section 97.307(f)(8) as it presently reads would authorize single time-slot TDMA in the Amateur allocations at VHF and above. There is nothing in this very specific rule Section that permits a data emission with an "X" as the second symbol of the emission designator. That is the case as well with respect to the definitions in Sections 97.3(c)(2) and 97.3(c)(5). Section 97.307(f)(8) would clearly authorize the use of *multiple* time-slot TDMA, such as the repeaters that are used with the Motorola MotoTRBO system, but again, not the single-slot TDMA portables or mobile transceivers used with those repeaters. [10]

V. Conclusions.

13. The Part 97 Amateur Radio Service rules should not be inflexible with respect to the encouragement of new narrowband digital technologies which improve spectrum efficiency. All radio services administered by the Commission are in the process of transition from analog to digital systems. The Part 90 narrowband equipment, be it NXDN, D-STAR, P-25 or TDMA, is increasingly available for use, adaptation and experimentation in the Amateur Radio Service. The regulations should encourage this adaptation. There is clearly a strong, current interest in such adaptation and in the achievement of narrowband efficiency in crowded repeater subbands at VHF and UHF in the Amateur Service. Implementation of this technology will lead to a seamless transition to narrowband digital technology over time. This can be accomplished compatibly with

[10] Amendment of Section 97.3(c)(2) is neither necessary nor desirable, however, in view of the application of that Section to High-Frequency (HF) communications. The intention is to permit single-slot TDMA in voice and data modes at VHF and above. To do this, it is both necessary and sufficient to amend only Sections 97.3(c)(5) and 97.307(f)(8).

incumbent wideband analog systems, through the use of private sector, voluntary frequency coordination.

14. The present rules clearly envision the use of unspecified digital codes and flexibility in emissions in the bands above 50 MHz. The present rules also permit multiple time slot TDMA emissions in the same bands. It is both unnecessary and illogical to preclude the use of high-quality Part 90 TDMA equipment with those multiple slot repeaters merely because of the historic but unexplained absence of a catch-all emission designator symbol in the definition of two broad categories of emissions. The Section 97.307 rules evince a specific intent to provide flexibility in emission types for domestic communications at VHF and UHF. It is illogical and counterintuitive to maintain a specific technical limitation on the use of single-slot TDMA in bands where multiple time-slot TDMA is permitted by those same rules.

Therefore, the foregoing considered, ARRL, the national association for Amateur Radio, respectfully requests that the Commission modify Sections 97.3(c)(5)[11] and 97.307(f)(8) of the Commission's Rules, so as to include "X" as a second symbol of the emission designator for permitted phone and data emissions in the bands to which Section 97.307(f)(8) now applies. This will allow the use of single time-slot TDMA

[11] The attached appendix reconfigures Section 97.3(c)(5) slightly, in addition to adding single-slot TDMA emissions to the definition of "phone," so as to resolve a lack of clarity in the language of the rule as it now reads.

emissions where multiple time-slot TDMA emissions are permitted: in the Amateur bands at and above 6 meters.

Respectfully submitted,

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APPENDIX A

PROPOSED RULE CHANGES

Part 97 of Chapter I of Title 47 of the Code of Federal Regulations is proposed to be amended as follows:

Section 97.3(c) is amended to modify certain definitions, to read as follows:

§97.3 Definitions.

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(c) The following terms are used in this part to indicate emission types. Refer to Section 2.201 of the FCC Rules, Emission, modulation and transmission characteristics, for information on emission type designators.

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(5) Phone. Speech and other sound emissions having designators with A, B, C, D, F, G, H, J or R as the first symbol; 1, 2, 3, 7, 8, 9 or X as the second symbol; E as the third symbol. Also MCW for the purpose of performing the station identification procedure, or for providing telegraphy practice interspersed with speech. Incidental tones for the purpose of selective calling or alerting or to control the level of a demodulated signal may also be considered phone.

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Section 97.307(f) is amended to read as follows:

§ 97.307 Emission standards.

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(f) The following standards and limitations apply to transmissions on the frequencies specified in § 97.305(c) of this Part.

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(8) A RTTY or data emission having designators with A, B, C, D, E, F, G, H, J or R as the first symbol; 1, 2, 7, 9 or X as the second symbol; and D or W as the third symbol is also authorized.