

April 10, 1996

By Hand

Mr. William Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

Re: Tucson Amateur Packet Radio Corporation
Request for Special Temporary Authority

Dear Mr. Secretary:

The Tucson Amateur Packet Radio Corporation ("TAPR"), by its attorneys, hereby requests Special Temporary Authority ("STA") for TAPR to conduct an experimental program to test Code Division Multiple Access ("CDMA") spread spectrum emissions over amateur radio facilities, as described in greater detail below. The STA is requested beginning as soon as possible and continuing for a period of one year. Except for the addition of one frequency band, as noted below, TAPR is requesting identical authority to that granted to Mr. Robert A. Buaas (K6KGS) on April 17, 1992.

TAPR was founded in 1982 as a international organization with interests in the areas of packet and digital communications. Today, TAPR continues as a membership supported non-profit amateur research and development organization, and currently has more than 2,000 members worldwide. TAPR continues to develop kits for the amateur community and is working actively on publications and communications standards.

TAPR's members have participated in a number of experimental programs designed to investigate the value of spread spectrum emissions for the packet radio community, including experiments that later provided the basis for authorizing spread spectrum modulation in the amateur service. TAPR plans to continue its leading role in developing standards for spread spectrum

communications for the amateur community through discussion groups, cooperative efforts and experimental programs such as would be permitted by the requested STA. In particular, because of the rapid development of communications hardware and software, TAPR believes that the use of hybrid spread spectrum emissions, as well as spreading codes not envisioned by Section 97.311(d) of the Rules can be employed without causing harmful interference to other amateur operators.

TAPR proposes to implement an m-sequence as specified in Section 97.311(d)(1) of the Rules as a "generating function." Spreading codes will be selected from continuous segments of bits produced in the output of the generating function based on their suitability to provide uniformly distributed spectral density, code orthogonality and maximum coding gain. Each spreading code will represent one symbol in the data to be transmitted. Only the selected spreading codes will be transmitted, and each will be transmitted in its entirety.

Direct-sequence spread spectrum generators using inexpensive surface acoustic wave matched filters with fixed spreading codes not related to the m-sequences specific in Section 97.31(d)(1) will also be used.

Frequency hopping may be evaluated as a means for further distributing the transmitted energy. Additionally, frequency synthesized homodyne and single hetrodyne transceivers will be evaluated on each of the frequency bands proposed, time and resources permitting.

TAPR is requesting STA to fully evaluate the transmission, reception and processing techniques of CDMA spread spectrum emissions. Specifically, TAPR will:

- Assess the strengths and weaknesses of the proposed systems;
- Evaluate the potential of spread spectrum overlay on conventional FM systems;
- Study the interference potential of CDMA spread spectrum emissions, if any, to existing users of the specified frequency bands;
- Evaluate the resistance of spread spectrum emissions to multipath interference;

- Evaluate the ability of spread spectrum emissions to improve spectrum efficiency;
- Evaluate the performance improvements potentially offered by CDMA technology;
- Gain operational experience with CDMA spread spectrum techniques; and
- Evaluate the proposals contained in the RM-8737 (Amendment of Part 97 of the Commission's Rules Governing the Amateur Radio Service to Facilitate Spread Spectrum Communications).

The participants in this experimental will initially be various members of TAPR who are amateur radio licensees. TAPR requests authority to add participants, including licensed amateurs who are not members of TAPR, during the course of the experimental program upon notification to the Commission of such additions. The experiments will be carried out from the fixed stations listed on the station licenses of the participants, plus any portable operations as are permitted under Part 97 of the Commission's Rules. All participants hold a minimum of a Technical Class license.

TAPR requests authority to operate on the following frequencies: 50-54 MHz, 144-148 MHz, 219-220 MHz, 222-225 MHz, 420-450 MHz, 902-928 MHz, 1240-1300 MHz and 2390-2450 MHz.¹

The maximum transmitter output power will not exceed 100 watts, and CDMA spread spectrum emissions will be used.

TAPR expects that the antennas used for this experimental program will include dipoles, as well as collinear and Yagi arrays with gains of 0 to 12 dBi, at heights up to 30 meters AGL. Only existing, licensed antennas will be used for this experiment; no new stations will be constructed.

¹ The operational frequencies requested herein are identical to those granted to Mr. Buaas, except for the 219-220 MHz band, which was not allocated to the Amateur Radio Service at the time Mr. Buaas filed his STA request. To the extent that the addition of the 219-220 MHz band will significantly delay Commission grant of the instant STA request, TAPR requests that the STA be granted as soon as possible for all frequency bands other than 219-220 MHz, and that the 219-220 MHz request be processed separately.

In order to conduct the tests discussed in this letter, TAPR requests the following Rule waivers:

- (1) Waiver of Section 97.305(c) of the Rules is requested to permit emission type SS in the bands 6m, 2m, and 1.25m;
- (2) Waiver of Section 97.311(c) of the Rules is requested to provide for transmission of hybrid spread spectrum emissions;
- (3) Waiver of Section 97.311(d) of the Rules is requested to permit the use of other spreading codes.

Accordingly, for the reasons stated herein, TAPR respectfully requests Special Temporary Authority to conduct an experimental program to test CDMA spread spectrum emissions over amateur radio facilities, as described in the instant STA request.

Questions with respect to this matter should be directed to the undersigned.

Respectfully submitted,

Henry Goldberg
Attorney for
Tucson Amateur Packet Radio Corporation

cc: Mr. Robert H. McNamara