COMMENT BY A PRIVATE CITIZEN ON THE
DESIRABILITY OF MODIFYING THE RULES
OF PART 15 FOR SPREAD SPECTRUM RADIOS

In 1991 I was a Research Scientist at Massachusetts Institute of Technology, engaged in research in theoretical physics applied to problems of controlled thermonuclear fusion. I became interested in applying the powerful advanced communications technologies available to me as a scientist in a large Federally funded research program to effect improvements in education. My first endeavor in this direction was to develop and teach, from my office at MIT, a high-school-level course on the mathematics and science of chaos to students in Colorado, Montana, Wyoming, and California. In this endeavor I collaborated with Col. David R. Hughes, a pioneer in the use of computer communications for community development, economic development, and education in rural and urban areas, and a principal of Old Colorado City Communications.

By today's standards our endeavor was primitive, involving as it did informal telephone-based networks and BBS (Bulletin Board System) software on personal computers. Nonetheless, it brought to students in rural and urban schools an exposure to topics in mathematics and science that enabled them to use and extend the concepts, skills, and problem-solving techniques that they were learning in their regular mathematics and science courses. Two of the students in the course later applied, and were admitted, to MIT.

Subsequently, after my retirement from MIT, I participated as a Co-Principal Investigator of the NSF Wireless Field Tests, of which Col. Hughes is the Principal Investigator. My principal function in that program was to develop and teach a university-level on-line course for teachers entitled "Selected Topics in Mathematics and Science Education." The available technical resources included the Internet and spread-spectrum wireless communications. Through this experience I have gained further insight into problems of communications in rural and urban education and possibilities for their solution through advanced communications technologies.

The need for continuing education of teachers, especially those in rural areas, is becoming an increasingly pressing concern because of the national trend toward more demanding academic standards for both students and teachers. As the on-line course in the NSF Wireless Field Tests demonstrated, powerful and affordable communications technology can play a significant role in meeting this need. The total range of needs for improved communications in education is, of course, much broader than that of continuing education of teachers, but teacher education provides a specific and compelling example of that broader range of needs.

It is worthy of note that, by the time Col. Hughes and I began to collaborate on the chaos course, he had already developed, in collaboration with Mr. Frank Odasz, Big Sky Telegraph, a telephone and BBS based network for the re-certification of teachers in Montana, as well as for rural community and economic development in that state.

The technology that was used in the NSF Wireless Field Tests and the more advanced technology and further technical possibilities that the program examined point the direction to practical and affordable solutions of many of the needs for improved communications in education. A combination of ultra-high bandwidth, high processor gain, lower frequency, and variable

power appropriate to a particular application can eliminate many of the restrictions of current technology and the current regulatory environment that were encountered in the NSF Wireless Field Tests.

Current regulatory restrictions on transmitter power result in maximum ranges that are inadequate to meet the needs of rural education. Current regulatory restrictions on bandwidth limit the ability of equipment to meet the needs of schools and libraries for high bandwidth transmissions. Current regulatory restrictions on minimum frequency result in disabling line-of-sight and wall penetration limitations.

The solution for concerns about possible interference that might result from higher power and bandwidth and lower frequency is higher processor gain, selective limitation of power in urban regions, and appropriate selection of such transmission options as antenna placement and antenna pattern. Under Part 15 the obligation to avoid interference is on the transmitter.

The legislative mandate for widespread affordable communications exists and the technology by which it can be achieved is available. Through appropriate rule making, the F.C.C. can place the technology in the service of the mandate.

Respectfully submitted,

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