

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

In the Matter of:

Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies	) ) ) )	ET Docket No. 03-108
Authorization and Use of Software Defined Radios	) )	ET Docket No. 00-47 (Terminated)

To: The Commission

**COMMENTS OF THE RADIO AMATEUR SATELLITE CORPORATION**

The Radio Amateur Satellite Corporation (AMSAT<sup>®</sup>) hereby respectfully submits its comments in response to the *Notice of Proposed Rulemaking and Order*, (“the Notice”), ET Docket No. 03-108, adopted December 17, 2003, and released December 30, 2003. In response to some of the questions contained in the Notice, AMSAT states as follows:

1. AMSAT is a scientific and educational corporation established in the District of Columbia thirty-five years ago as a non-profit educational and scientific organization. Most of our members are licensed amateur radio operators. Our mission is to design, construct, test and operate satellites in the Amateur-satellite Service, often in cooperation with radio amateurs in many other countries. We also make available a variety of publications, computer software, and Internet services to advance space science education among radio amateurs and students worldwide. Further information on our organization and our programs can be found at our Web-site, [www.amsat.org](http://www.amsat.org).

2. AMSAT-OSCAR 40, our most advanced spacecraft to date, was launched by an Ariane-5 rocket in November 2000. Radio amateurs from more than a dozen countries

cooperated in its design and construction. Additionally, together with ARRL, NASA and cooperating radio amateurs from other nations, we are maintaining and expanding an amateur space station aboard the International Space Station (ISS) for use by astronauts and cosmonauts and for educational outreach involving scheduled communications with students in schools throughout the world.

3. In Paragraphs 37 through 47 of the Notice, the Commission discusses the feasibility of allowing unlicensed devices to operate at higher powers than is currently authorized under Part 15 rules, in what is termed "rural areas". Since three of the bands in question, 2400 - 2450 MHz and 5725 - 5875 MHz and 24.0 - 24.25 GHz are also available for use by the Amateur-satellite Service, AMSAT has a keen interest in them and offers comments on the Commission's proposals. We are also pleased to answer the various questions the Commission poses regarding impact on Amateur Radio satellite operation.

4. First, it should be said that Part 15 devices, notably wireless LANs, already represent a significant source of interference to amateurs attempting to use the AMSAT-OSCAR-40 satellite downlink at 2401 MHz. In some areas, the interference is so severe as to preclude operation altogether. When the Commission has been informed of such situations, the response has been for the amateur to determine the source of the interference, and then action might be taken. This is despite the fact that Part 15 rules stipulate that the devices must not cause interference to licensed services. Locating the source of spread spectrum signals often requires special equipment, not normally possessed by amateurs, thus the task is especially daunting. If there are dozens of interfering sources in the vicinity, which is frequently the case, it becomes essentially impossible.

5. In Paragraph 39, the Commission specifically asks if the segment 2400 – 2402 MHz should be excluded from operation by the proposed higher power Part 15 devices. AMSAT believes that such an exclusion is definitely called for. In fact, the segment 2400 - 2417 MHz should be so excluded. This segment is allocated to the Amateur Service on a Primary basis and thus should be afforded protection from higher power Part 15 devices. In addition, to limit such protection merely to 2400 - 2402 MHz, fails to take into account future amateur satellites, which may require greater bandwidths than is currently employed. Such higher bandwidths are absolutely vital if Amateur Radio satellites are to take advantage of modern digital techniques.

6. In the same Paragraph, the Commission states, "we believe implementation of this proposal would not significantly increase the interference potential to licensed services...." AMSAT contends that such a conclusion has no basis in fact. If interference is already being experienced, how can increased power of the interfering devices by as much as 8 dB help but result in increased interference? It may be contended that, since rural areas are being singled out for the increased power, few cases of interference can be expected. This argument has two flaws. One is that ANY interference to licensed spectrum users is supposed to be contrary to Part 15 rules, so concluding that only a few licensed users would be affected is invalid on the face of it. These few should be afforded the same protection as the many. The other flaw is that it would only be a matter of time before pressure is brought on the Commission to extend the higher power authority to non-rural areas. Arguments such as the existence of buildings and other obstructions, common in urban areas, make higher power necessary for effective usage of the devices. In telephone conversations our then Board Chairman, William Tynan, W3XO, had with Mr. Carl R. Stevenson, Chairman of the IEEE 802.18 Radio Regulatory Technical Advisory Group in August of 2002, Mr. Stevenson assured Mr. Tynan that higher power for 802.11

devices is unnecessary. Now Amateur Radio and the Amateur-satellite Service are confronted with the prospect of increased interference by this proposal for higher power in "rural areas".

7. In Paragraph 44, the Commission deals at some length with listen-before-transmit techniques as a means of preventing interference to both licensed and unlicensed spectrum users. AMSAT contends that such techniques, in the case of Space to Earth links, will fail to prevent interference to amateur satellite operation. All such amateur downlink signals are extremely weak and their presence will not be detected by any means, especially the 30 dB threshold the Commission suggests.

8. A similar situation obtains when it comes to any band or frequency used by amateurs participating in weak signal operation. Many such amateurs monitor a "calling frequency" waiting for a signal to appear. In many instances, that signal may be quite weak. This monitoring is often done without the amateur transmitting on the frequency for hours and perhaps days, at a time. It is obvious that no listen-before-transmit technique on the part of unlicensed devices will detect this type of amateur activity. The same might be said for channels used for emergency communication which may not come into use until an emergency occurs.

9. Paragraph 81 and succeeding paragraphs address the potential misuse of high speed Digital to Analog Converters (DACs). Implementation of such a rule-change directly affects all radio amateurs, including those who will be using Amateur Radio satellites in the future. Radio amateurs in general, and especially those engaged in satellite work are keenly concerned with the advancement of technology. A rule such as that proposed by the Commission will, in our opinion, severely inhibit development and introduction of devices which might otherwise prove beneficial to radio amateurs and the general public. AMSAT contends that a better way to deal with infractions committed by those misusing such high speed DACs, or any other transmitting

device, would be on an individual basis, rather than penalizing everyone merely to head off infractions which can only be speculated on at this time.

10. Paragraph 90 specifically asks about the inclusion in software defined radios, of “features in hardware to prevent operation outside of amateur bands.” It is difficult to conceive of such a hardware “feature” other than a filter. AMSAT has two objections with and such an approach. First, it is not possible to implement hardware filters with a sufficiently steep slopes to prevent transmission on frequencies adjacent to amateur bands without degrading the performance inside amateur bands. The other problem is that limiting the transmission ability to amateur bands, prevents HF software defined radios from being used as wideband IFs in conjunction with transverters to access the microwave bands. Such transverters are frequently used in connection with both terrestrial and satellite applications for reception and transmission on various microwave bands. Future amateur satellites may very well employ significantly wider bandwidths than has been used heretofore. Thus, HF software defined radios used in conjunction with transverters to access such wideband satellites must be capable of transmitting, although with very low powers (milliwatts to a few Watts), on bands of frequencies considerably wider than the HF amateur assignments.

11. AMSAT recommends that, if the Commission determines that higher power should be authorized to Part 15 devices operating in “rural areas”, the band of frequencies 2400 to 2417 MHz be excluded from such higher power authorization. In addition, for the reasons cited, AMSAT urges that the Commission not impose any restrictions on the development and marketing of high speed DACs or require that hardware devices to prevent transmission outside amateur bands, be required to be installed in software defined radios.

RESPECTFULLY SUBMITTED,

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