BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

In the Matter of:

Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems	))))	ET Docket No. 04-37

To: The Commission

COMMENTS OF THE
RADIO AMATEUR SATELLITE CORPORATION

I INTRODUCTION

1. The Radio Amateur Satellite Corporation (AMSAT®), pursuant to Sections 1.415 and 1.419 of the Commission's Rules and Regulations, respectfully submits these Comments in response to the Commission's Notice of Proposed Rule Making, ET Docket No. 04-37, released February 23, 2004, {the "NPRM").

2. AMSAT is pleased to offer technical comments regarding the nature of the rules that might be adopted as well as respond to some of the questions raised in the NPRM.

II PRELIMINARY STATEMENT

3. Currently representing over four-thousand members, AMSAT was founded in 1969 and chartered in the District of Columbia. It is recognized by the Internal Revenue Service as a 501(c)(3) entity. In its 35 years of existence, AMSAT has been involved in the construction, testing, launch and operation of ten amateur radio satellites, the latest being AMSAT-OSCAR-40 (AO-40), launched in November of 2000.

III BACKGROUND

4. Along with thousands of licensed radio amateurs, AMSAT filed Comments on the Notice of Inquiry (NOI) which the Commission issued in 2003.[1] In these Comments, AMSAT specifically cited the likelihood of harmonics being generated by HF BPL systems, and noted this, as a potential source of interference, was not addressed in the NOI.

IV DISCUSSION

5. AMSAT is distressed to see that harmonics are still not addressed in the Subject Docket. Additionally, since filing our NOI Comments, AMSAT has learned that trouble has been experienced in Europe with intermodulation products generated by BPL-type signals mixing with strong radio signals. It is common knowledge that bad joints, frequently encountered in power lines, readily produce mixing, and hence, intermodulation products. It is noted with dismay that the concepts of "harmonics" and “intermodulation products” appear nowhere in the NOI nor in the Subject Docket. This lack of attention is surprising from a Government agency as attentive as the Commission has been in the past in guarding the radio spectrum against harmful interference. AMSAT notes that the only place in the Docket where a reference to frequencies, other than those being proposed for Access BPL systems, appears, is in Footnote 9 under Paragraph 7. This Footnote cites 47 CFR Sections 15.109, 15.209 and 15.33 and states,

> “To determine compliance with the radiated emission limits, if the highest frequency generated or used in the device, or on which device operates or tunes is 10 MHz, the upper frequency to be examined is 500 MHz.”

It is obvious that 500 MHz is **FIFTY TIMES** 10 MHz. Clearly, in this instance, the Commission was concerned with harmonics, and possibly other out-of-band emissions. But no such concern is expressed in the Subject Docket regarding proposed rules for Access BPL

[1] Commission document ET Docket No. 03-104

systems, including the specification of procedures for the testing of such systems. AMSAT contends that attention must be paid to testing for harmonics as well as intermodulation products. To test for intermodulation products, ambient strong signals from nearby transmitters, such as TV, FM and AM broadcast stations should be present, or such signals should be generated in the test vicinity.

6. How the Commission was able to ignore the likelihood of harmonics from RF generators producing digital data signals in the range of 2 to 30 MHz, or higher, is beyond AMSAT's understanding. The same is true of intermodulation products, both above and below the band of frequencies used by Access BPL systems. It is these harmonics and higher intermodulation products which will be radiated even more efficiently from the power lines carrying the Access BPL signals than will the fundamental Access BPL frequencies. And, it is these harmonics and higher intermodulation products which pose the greatest threat of interference to satellite-using amateurs as well as amateurs involved in other VHF and UHF activities, especially those engaged in weak signal operation. The same is true of other VHF and UHF users including government, particularly aircraft, police, fire and other emergency services. Thus, the specter of interference to licensed systems operating at frequencies outside of those used by Access BPL systems threatens to disrupt many vital radio services, though no such outcome has even been mentioned, much less addressed, in the Docket. This is despite the concerns voiced by AMSAT and others in Comments on the NOI. It is also noted that, to the best of our knowledge, none of the testing in areas where Access BPL is being used has involved investigation of any frequencies higher than 30 MHz. Therefore, the extent to which out-of-band emissions from BPL systems threaten licensed spectrum users, has been completely neglected by both BPL proponents and the Commission.

7. Much space is devoted, in the Subject Docket to discussion of how Access BPL systems might "notch out" amateur bands, or take action when a signal is detected to avoid that frequency. But clearly, such precautions, even if they are effective otherwise, will have no effect on interference generated at harmonic frequencies of Access BPL systems or signals generated by their mixing with strong local stations, or any other type of out-of-band emissions.

8. The Comments of Current Technologies on Docket No. 03-104[2] are quoted in the Subject Docket as saying that power lines have, "a characteristic somewhere between a waveguide and an antenna." AMSAT contends that power lines are much more likely to act as antennas than as waveguides, at higher frequencies (shorter wavelengths) associated with the harmonics and many intermodulation products. Thus, even this avid proponent of Access BPL admits that radiation will occur, although they do not quantify it or acknowledge the potential for any out-of-band emissions.

9. The "point source" radiation characteristic of Access BPL systems is cited by several of those commenting on Docket No. 03-104, including Ameren Energy Communications (AEC).[3] AEC states, "The notion that power lines will act as efficient antennas and pollute their surroundings with harmful interference is not supported by scientific measurements." AMSAT contends that it is AEC's statement that is not supported by scientific measurements. In fact, it is refuted by years of experience which radio amateurs, and other radio spectrum users, have had with noise from power lines. As no party to this proceeding did, including the Commission, AEC did not address the existence of, much less the radiation of, out-of-band signals. Despite what any of those commenting on Docket No. 03-104 may say, power lines **DO radiate all too effectively at HF, VHF and even UHF frequencies**. As proof that radiation of power line noise

[2] Comments of Current Technologies at 14.
[3] Reply Comments of AEC at 2

takes place, even at UHF frequencies, at least one type of test instrument used by power companies to locate powerline noise (receiver with small Yagi antenna), operates in the vicinity of 350 MHz.

10. AMSAT contends that it should be up to those proposing any new system to show conclusively that the proposed system will **NOT** produce harm to in-place systems. It should not be incumbent on those operating in-place systems to make the case that the new proposed system will, or will not harm them. **Proponents of Access BPL have NOT made the case that existing systems, including many vital services, will not suffer significant interference, and thus, be harmed.** To the contrary, testing by ARRL, and others has revealed significant interference from Access BPL systems, though AMSAT is unaware of any such testing examining frequencies above 30 MHz.

11. AMSAT contends that extensive testing of the effects on other radio services, including out-of-band measurements, be made by Access BPL proponents, **BEFORE** any new rules for operation of such systems are put into effect and **BEFORE** such systems are allowed to operate. **Also, existing systems should be shut down until the results of such testing become available.** Of course, such testing should be observed and certified by an independent agency; the cost borne by those proposing the new system – in this case Access BPL proponents. Those operating, already-in-place systems such as the amateur community, or the U.S. Government, should **NOT** be required to expend resources to demonstrate the existence, or non-existence, of interference from **ANY** new proposed system, including Access BPL.

12. A claim made by Access BPL proponents is that their devices can "listen", then not use frequencies being used at that moment. AMSAT notes that, in addition to not being effective at harmonic frequencies, or those generated by intermodulation products, such a technique does

not help when the amateur, or any other radio user, is merely **listening to** (monitoring) a frequency or band of frequencies. Such is the case with amateurs using satellites. One listens for the downlink on one band, but transmits on another. Is it envisioned that amateurs and others must transmit periodically in order to keep a frequency clear of Access BPL interference? This would seem counter to all historic radio practices with respect to unnecessary transmissions. In the case of satellites, such transmissions at the downlink frequency might also cause harmful interference to the downlink itself.

13. There are two other concerns regarding Access BPL which AMSAT has, but which have nothing to do with interference. One is a safety issue and the other is economic. As a technical organization, we feel that we should bring these to the Commission's attention, though neither affects AMSAT or its members directly. The first of these stems from a decision by the Commission not to require conducted emission measurements of Access BPL installations. AMSAT understands the Commission's reasoning behind this decision, and agrees that the risk to personnel and equipment posed by such a testing requirement would be significant. However, if such testing poses a risk because of the high voltages involved, AMSAT believes that a similar, and potentially greater, risk could be present by the existence of "couplers" or similar devices installed across transformers. If a short-circuit should occur in one of these devices, dangerously high voltages could be conducted to homes and offices, with potentially fatal results. It would appear that this potential hazard should be thoroughly investigated **BEFORE** operation of any Access BPL system is authorized.

14. The other concern AMSAT has is strictly economic. To us, Access BPL seems, at best, a "stop-gap" measure aimed at quickly bringing broadband into homes and offices. From the standpoints of security, significantly higher performance, and its lack of producing any

interference, fiber optics presents a much more satisfactory approach. AMSAT fears that the mere existence of Access BPL may well delay, or eliminate altogether, the eventual deployment of fiber cables to end users. Thus, this ultimate, and most satisfactory, solution may be denied to the American people forever.

15. Due to its very recent release, AMSAT has had only a limited opportunity to study the NTIA report submitted to the Commission concerning Access BPL.[4] However from our cursory review, we note several important considerations. First, the cover letter which accompanies the report cites benefits of Access BPL and appears to support it. However, the document itself identifies many concerns, seemingly at odds with the conclusions expressed in the cover letter. For example, it notes that a number of countries, because of interference concerns, have decided **NOT** to implement BPL-type systems; and those that have, impose **radiation levels considerably lower than those proposed in the Docket.** In addition, NTIA calculates radiation angles from power lines carrying Access BPL signals, which are **NOT** considered by any of the Access BPL proponents nor the Commission. AMSAT contends that radiation at these higher angles may be capable of causing sky-wave interference at HF frequencies over distances of hundreds or even thousands of miles from Access BPL sites. In addition, interference to radio reception on aircraft flying above one or more Access BPL networks is a distinct possibility. Such aircraft interference may occur at HF frequencies within the intended Access BPL band, or at VHF or UHF frequencies caused by harmonics or intermodulation products. The NTIA report also calculates interference levels capable of causing interference at distances far beyond those cited in the Docket, or admitted by the Access BPL proponents. AMSAT notes that this higher-angle radiation, from aggregated BPL sources,

[4] Potential Interference from Broadband over Power line (BPL) Systems to Federal Government Radiocommunications at 1.7-80 MHz, Phase I Study, NTIA Report 04-413, April, 2004.

may cause interference to the uplinks (Earth to Space transmissions) of a number of amateur satellites.

16. The NTIA report recommends testing of Access BPL systems in accordance with their conclusions with regard to angles of radiation and distance from power lines. NTIA states that they will be further investigating the interference potential posed by Access BPL and issuing a second report.

IV CONCLUSION AND RECOMMENDATIONS

17. For the reasons cited in these Comments, AMSAT urges the Commission **NOT** to allow Access BPL systems, even at current Part 15 radiation limits, and certainly not at higher ones as many of its proponents urge, until it has had a chance to review all of NTIA's analyses, including that to be contained in its Phase II report. Also, radiation limits proposed in the Docket should be reexamined in the light of the NTIA report, particularly with regard to what other countries allow.

18. In addition, in light of the NTIA report and the additional work it plans, further testing should be conducted by access BPL proponents, at their expense, but with government oversight. AMSAT urges the Commission **NOT** to allow any further deployment of Access BPL systems until these steps have been taken and until the Commission has had an opportunity to assess **ALL** the aspects of Access BPL, including the potential interference threat posed by harmonics and other out-of-band radiation. **This assessment should, of course, include a thorough review of the NTIA Phase II report. Furthermore, existing Access BPL systems should be shut down pending the outcome of this assessment.**

19. If, following the above, Access BPL systems are ultimately authorized, the test procedures the Commission mandates should, in addition to the considerations cited by AMSAT

regarding out-of-band emissions, reflect the concerns expressed by NTIA relative to angles of radiation and distances from power lines.

RESPECTFULLY SUBMITTED,

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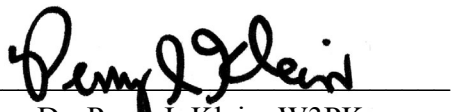
By 
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