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

In the matter of	)	
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Carrier Current Systems including	)	ET Docket No. 04-37
Broadband over Power Line Systems	)	
	)	
	)	

COMMENTS OF
WILLIAM A. TYNAN, W3XO

I INTRODUCTION

1. Pursuant to Section 1.405 of the Commission's Rules and Regulations, I respectfully submit these comments in response to the Commission's Notice of Proposed Rule Making, ET Docket No. 04-37, released February 23, 2004. I'm happy 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

2. I was first licensed in 1945, and received the call letters, W3KMV, a few month later. I obtained my Class A license (later renamed, Advanced) in 1946. At that same time, I passed the examination for First Class Radiotelephone. I obtained my Extra Class Amateur license in 1974 and, in 1976, was issued my present call letters. I graduated from Rensselaer Polytechnic Institute in 1950 and began a thirty-six year career at the Johns Hopkins Applied Physics Laboratory soon thereafter. At the Laboratory, I attained the position of Senior Engineer and worked several U.S. Navy guided missiles, including Talos, Standard Missile and Tomahawk. In 1961, I was a principal in the company which was the first to bring FM stereo to the

Washington area (WHFS Bethesda, MD). For eighteen years, from 1974 through 1992, I authored the QST column, "The World Above 50 MHZ." In 1969, I was one of the original founders of the Radio Amateur Satellite Corporation (AMSAT). Later, I was appointed AMSAT's Vice President for Manned Space Programs, and drafted the proposal aimed at allowing amateur operation from the Space Shuttle. This proposal, which was jointly submitted to NASA by AMSAT and ARRL, led to Owen Garriot's operation on STS-9 and amateur operation on many other Shuttle missions in the ensuing years. In 1986, I was elected to the AMSAT Board, and, in 1991, was asked to become its President. I served in that role until 1998, at which time I became Board Chairman. I chose not to run for re-election in 2003 and have since been designated one of AMSAT's Senior Advisors. My on-the-air amateur activities have principally been focused on the higher frequencies, currently 50 MHz through 2304 MHz. I have also been active on the AO-1, AO-13 and AO-40 satellites.

III

BACKGROUND

3. Along with thousands of other licensed radio amateurs, I filled comments on the Notice of Inquiry (NOI) which the Commission issued in 2003.[1] In my comments, I pointed out the

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likelihood of harmonics being generated by HF BPL systems, and noted this as a potential source of interference to VHF and UHF communications. I note that AMSAT, and others, also pointed out this potential threat in their responses to the NOI.

IV DISCUSSION

4. In light of the above, I was surprised to see no mention of harmonics in the Docket. I would have thought that the Commission, which I always considered to be the guardian of the radio spectrum against interference, would have responded to my comments, and those of others regarding this potential interference threat, as well as the threat posed by the mixing of Access BPL signals with strong local signals and with themselves. Since filing my NOI comments, I have learned that such mixing of BPL signals with strong local signals to produce intermodulation products, has been observed in Europe. Since some BPL systems envision

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multiple carriers, it is not impossible that they might mix with themselves in non- linear devices, such as bad joints in power lines. Bad joints are known to be rampant in power lines. But, in only one place does the Docket make reference to frequencies, other than fundamental Access BPL frequencies. This 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."

This is a factor of **FIFTY.** Obviously, in this instance, the Commission was concerned with harmonics. But, this concern was not reflected in the Docket. I believe that **ALL** Access BPL installations must be tested for radiation of harmonics as well as spurious signals generated by mixing.

5. It is harmonics and higher mixing products which will be radiated even more effectively from the power lines carrying Access BPL signals than will the fundamentals. And, it is these harmonics and higher mixing products which pose a threat of interference to amateurs involved in VHF and UHF activities, especially those engaged in weak signal operation as I am. The same is true of other VHF and UHF users including government; particularly aircraft, police, fire and other emergency services. Thus, interference to licensed systems operating at frequencies outside of the Access BPL band, threatens to disrupt many vital radio services. However, no such outcome is addressed, in the Docket. This is despite the concerns voiced by me, AMSAT and others in comments on the NOI. It is also noted that none of the testing in areas where Access BPL is being used, has looked at any frequencies higher than 30 MHz. Therefore, the extent to which harmonics or mixing products caused by BPL systems, threaten licensed spectrum users has **NOT** been thoroughly evaluated. Yet, the Commission proposes to go ahead with allowing such potentially disruptive
systems.

6. I have had only a limited opportunity to review the recently released NTIA report submitted to the Commission concerning Access BPL.[2] However, even from this cursory examination, I note several important considerations. First, the cover letter, which accompanies to report cites benefits of Access BPL and appears to support it. However, the report itself

[2] Potential Interference from Broadband over Power line (BPL) Systems to Federal Government

brings up many concerns which appear to be at odds with the cover letter. For example, the report notes that, because of interference concerns, **a number of countries have decided NOT to implement BPL systems;** and those that have authorized such systems, **have imposed radiation levels considerably lower than those proposed in the Docket.**. In addition, NTIA calculates radiation angles from power lines carrying Access BPL signals, as well as distances from these lines, which are **NOT** considered by any of those proposing Access BPL, nor acknowledged by the Commission in the Docket. Radiation at these higher angles may be capable of causing sky-wave interference at HF frequencies over distances of hundreds and perhaps 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 mixing products. I note that this higher angle radiation may also cause interference to the uplinks of amateur satellites. The NTIA report also calculates interference levels capable of causing interference at distances far beyond those cited in the Docket, or admitted by Access BPL proponents.

7. 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.

8. Much space is devoted, in the Docket to discussion of how Access BPL systems might "notch out" amateur bands, or take action when a signal is detected to avoid a particular frequency which is in use at the time. But such measures even if they work, will obviously have

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Radiocommunications at 1.7-80 MHz, Phase I Study, NTIA Report 04-413, April, 2004.

no impact on interference at harmonic frequencies. or emissions resulting from mixing with strong local stations, or between the various BPL signals themselves.

9. The comments of Current Technologies on Docket No. 03-104[3] are quoted in the Docket as characterizing power lines as “somewhere between a waveguide and an antenna." Anyone who knows anything about radio, knows that, at higher frequencies (shorter wavelengths), radiation becomes more prevalent than at lower frequencies (longer wavelengths). All harmonics, and many mixing products, will be at higher frequencies - perhaps well into the VHF and even UHF range.

[3] Comments of Current Technologies at 14.

10. Several of those advocating Access BPL, cite the "point source" radiation characteristic of their devices. One of these is Ameren Energy Communications (AEC).[4] 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." It is plain that it is AEC's statement that is not supported by scientific measurements. Years of experience by radio amateurs, and other radio spectrum users, with noise from power lines is all the proof the Commission should need of that. As no party to this proceeding did, including the Commission, AEC did not address the existence of, much less the radiation of, signals caused by Access BPL harmonics or these signals mixing with strong local stations; or among themselves. Despite what any of those commenting on Docket No. 03-104 may say, power lines **DO radiate well at HF, VHF and even UHF frequencies**. This is clearly demonstrated by the fact that one type of test instrument used by power companies to detect and locate power line noise, operates at around 350 MHZ.

11. One claim made by those proposing Access BPL is that their devices can "listen", then not use frequencies being used at that moment. It is obvious that, in addition to not being effective at harmonic frequencies or on emissions generated by mixing, such a measure does not help when the amateur, or other radio user, is **listening to** (monitoring) a frequency or band of frequencies. Such is the case with amateurs using satellites, who listen for the downlink on one band, but transmit on another band.

12. I submit that It should be up to those proposing **ANY** new system to demonstrate that the it will **NOT** cause harm to existing systems, not be the responsibility of those operating existing systems to make the case that the proposed system will, or will not cause them harm. **Those proposing Access BPL, have NOT made such a case.** Tests conducted by ARRL and

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[4] Reply comments of AEC at 2

AMRAD have shown significant interference to amateur installations from Access BPL. However, I do not know of any testing which has included frequencies above 30 MHZ, which might detect the presence of harmonics and/or mixing products.

13. Extensive testing of the impact on other radio services, including the effect of harmonics and mixing products, must be made by those proposing Access BPL **BEFORE** any new rules for operation of such systems are put into effect and **BEFORE** such system be 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; but the cost born by those proposing the Access BPL systems. Neither those operating already-in-place systems, such as the amateur community, nor the U.S. Government, should be required to expend resources to demonstrate the existence, or non-existence, of interference from **ANY** new proposed system, including Access BPL.

IV CONCLUSION AND RECOMMENDATIONS

14. For the reasons cited in these comments, I urge 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 a revue has been made of **ALL** of NTIA's analysis, including that to be contained in the Phase II report. Also, radiation limits proposed in the Docket should be re-examined in the light of NTIA's information with respect to levels allowed in other countries.

15. In light of the NTIA report and the additional work it plans, further testing should be conducted by access BPL proponents, at their own expense. Furthermore, the Commission

should NOT allow any further deployment of Access BPL systems until these steps have been taken; and until it (the Commission) has a an opportunity to assess **ALL** the aspects of Access BPL, including the potential interference threat posed by harmonics and mixing products. **In the meantime, existing Access BPL systems should be shut down pending the outcome of this assessment.**

16. If, following the above, Access BPL systems are ultimately authorized, the test procedures the Commission mandates for them should incorporate the considerations cited in these comments regarding harmonics and mixing products, up to **FIFTY TIMES** the highest fundamental frequency used by the system. In addition, Access BPL testing must reflect the concerns expressed by NTIA relative to angles of radiation and distances from power lines.

Respectively Submitted,

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