

**Before the  
Federal Communications Commission  
Washington, DC 20554**

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

**Comments of  
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INTRODUCTION

1. In the Notice of Proposed Rulemaking (NPRM), FCC Document 04-29, released February 23, 2004, the Commission requests comment upon proposed amendments to Part 15 Rules to adopt new requirements and measurement guidelines for a new type of carrier current system that provides access to broadband services using electric utility companies' power lines. This system is known as Access BPL, and will be referred to herein simply as "BPL". This system operates at frequencies in the HF and low VHF range (in this case approximately 2 to 50 Megahertz).

2. I hold a Bachelor's Degree in Electronics Engineering-Technology from Lake Superior State University, and a professional certificate as an Electrostatic Discharge Control Technician through the National Association of Radio and Telecommunications Engineers (NARTE). I have over 22 years of professional experience in electronics engineering, much of it in RF and related disciplines. I hold Amateur Extra Class license KA8LMC, and am a registered Technical Monitor for international shortwave radio broadcasters NHK World (Japan) and Deutsche Welle (Germany) where I evaluate and report upon transmission quality and interference issues for their scheduled daily broadcasts to North America. I also am a member of the North American Short Wave Association (NASWA), an organization comprised of persons who choose to receive information from licensed international broadcasters that operate on HF shortwave radio frequencies.

3. The following discussion comprises my comments. In filing these comments, I act as an individual, private citizen, and do not represent the interests or views of any commercial, governmental or professional organization.

DISCUSSION

4. My concern is that the Commission's proposal to use Part 15 rules, even in the proposed amended form, will not give established licensed users of the HF spectrum adequate protection from harmful interference. Sufficient consideration has not been given to the laws of physics, which tell us that HF (BPL) signals will radiate when injected into unbalanced transmission lines (power lines). Nor has sufficient consideration been given to a robust scientific approach to studying or modeling the effects that this radiated broadband signal will have on incumbent, licensed users of the HF spectrum. As such, once BPL becomes widely deployed, the result will consist of many unintended and dire consequences.

5. In summarizing the comments to the original Notice of Inquiry, ET Docket No. 03-104, the NPRM indicates that the proponents of BPL have gone to some length to express their opinion that BPL will not interfere with HF spectrum users. In Paragraph 20 of the NPRM, it states that *"...BPL equipment manufacturers and service providers state that Access BPL does not pose an unacceptable risk of increased interference to licensed radio services. They note that there have been no complaints of interference from BPL and that the existing Part 15 rules adequately protect incumbent spectrum users."*

In general, this statement seems to indicate that the philosophy of many BPL proponents is that it is acceptable for unlicensed users to radiate as much RF as they wish, over whatever spectrum they wish, as long as no one complains. This philosophy makes that portion of the spectrum useless to all but the BPL system. Legitimate, licensed users are relegated to the second-class status of having to complain to maintain use of spectrum. Also, the assertion that there have been no interference complaints is due to the fact that deployment of BPL is currently very small. This means there are currently few affected users. It is also likely that those affected users may have experienced interference, but did not realize that it was due to BPL, and did not know how or with whom to lodge a complaint. One cannot extend this to mean that BPL will not cause harmful interference, once it is widely deployed.

6. Due to the digital nature of BPL technology, it will radiate broadband, harmonic-rich RF energy. This puts into question the applicability of Part 15 being used to regulate this technology, whether Part 15 is amended or not. Part 15 was intended to apply to "traditional" radiators. Such traditional Part 15 radiators are point-source, and generally operate only intermittently and for very brief periods. By contrast, BPL is a distributed radiator (using ubiquitous power lines), and operates continuously.

7. BPL's design uses conducted RF energy to perform its function. Therefore the radiated RF energy is "incidental" in that the BPL system design makes no use of it. The radiated RF energy is an unwanted by-product of BPL system operation. However, due to inherent deficiencies of power lines as a transmission medium for RF, it is dubious whether that radiated RF energy can be properly described as "incidental." By design of the BPL system, RF is applied to an unbalanced conductor (power line) that is not designed to act as a transmission line for RF. Basic engineering practice tells us that there is another name for such an arrangement: "antenna."

8. Due to the nature of the HF spectrum, there are many users which may be readily defined as "weak-signal services." These include the Amateur Radio Service, various governmental emergency communication services, international broadcasters, etc.

9. The Amateur Radio Service is one which would be seriously impacted by interference from BPL systems. Amateur operators routinely use very sensitive receivers to listen on HF for weak and distant signals. Many of these are routine communications, but many are also from those in distress. Distress signals are often the weakest, even from nearby transmitters, because they are usually operating using damaged antennas and emergency power sources. Amateur radio has provided vital communications on HF during natural disasters, search and rescue operations, wars, and terrorist attacks. Increasing the noise floor by allowing BPL radiation into the amateur HF spectrum would represent a threat to life and safety in such instances.

10. In paragraph 21 the NPRM states that *"HomePlug contends that joint testing by the ARRL and HomePlug has demonstrated a very low probability of interference between its devices and amateur radio use."* This statement is true, but misleading because it does not indicate the complete background. HomePlug devices did not interfere with amateur radio use in the trials **only after** HomePlug incorporated notch filtering techniques in their RF spectrum corresponding to specific amateur radio bands. Previous to the use of the notches, HomePlug devices were found to produce interference harmful to amateur radio. Unless all BPL service providers and equipment makers act in a similar way and design-in notching capability to protect incumbent users, serious interference problems will occur.

11. Regarding governmental emergency communication services, in paragraph 16 of the NPRM, it is stated that NTIA is conducting engineering efforts to develop means of accommodating BPL while protecting government HF radio operations from interference. The American Radio Relay League (ARRL) is conducting similar interference studies on behalf of operators in the Amateur Radio Service. The Commission should extend the NPRM comment period and defer any rule changes until these studies can be completed. To do otherwise would be to ignore good scientific and engineering practices.

12. International broadcasting occurs throughout the HF spectrum. Commonly known as "shortwave radio," such broadcasting is carried out on regular schedules by numerous governmental and

licensed commercial broadcasting organizations world wide. These broadcasts are generally regulated by the International Telecommunications Union (ITU). ITU Radio Regulations, Section II, Article 15 states: "Administrations [FCC] shall take all practical and necessary steps to ensure that the operation of electrical apparatus or installations of any kind, including power and telecommunications distribution networks, does not cause harmful interference to a radio communications service." This spells out the international treaty obligation of the United States to protect from harmful interference international shortwave broadcasts, among other services.

13. Many people currently enjoy the free flow of information provided by international broadcasting. Once a modest investment is made in a receiver, one may enjoy news, cultural programs, etc., broadcast directly from many countries, free of censorship or any charges or fees. Widespread interference from BPL would put an end to this free information source. It is ironic that one of the advantages of BPL brought forward by the Commission is that of increasing people's access to information, when in actuality BPL will require the user to pay a fee to access information, while an alternative source of free information would be eliminated.

14. In paragraphs 33 and 34 of the NPRM, the Commission states its intent to apply existing Part 15 emission limits to BPL. However, this is inadequate to protect the above-discussed weak signal services from harmful interference. Current Part 15 limits allow a field strength of  $30\mu\text{V/m}$  at a distance of 30 meters from the radiator (power line). On a typical amateur radio or international broadcast HF receiver, this would produce a signal as much as 70dB greater than the intended received signal. This would completely eliminate reception of the intended signal from an incumbent licensed service. In actual practice, the level of the interfering BPL signal would be even higher, because on a typical residential property it is impossible to erect an antenna that would be 30 meters or more distant from a power line. The antenna would be closer than that in most cases.

15. In paragraph 35 of the NPRM the Commission states that amateur operators in practice orient their antennas to minimize reception of emissions from power lines. This statement does not represent the practical reality of the situation, especially where BPL may be expected, per statements by its proponents, to emit at the maximum permissible Part 15 levels as described above. As stated above, it is nearly impossible to locate an antenna 30 meters or more from a power line. Even if it were, because of the high field strength of BPL emissions as permitted by Part 15, no practical antenna design exists that would have enough directionality to attenuate such a strong, nearby field.

16. A similar problem exists for the shortwave broadcast listener. The typical receiver uses a simple non-directional antenna. The typical user of this licensed service is non-technical and it would be beyond their capabilities to construct an antenna to null such strong interference, even if such an antenna design could be realized.

17. In paragraphs 40 through 43 the NPRM describes a plan for adaptive "on the fly" interference mitigation techniques and a system of informing the public about the characteristics of BPL systems deployed in their areas and the means of lodging an interference complaint with the BPL operator. This concept is entirely incompatible with the existing uses and unique applications of the HF spectrum. In an emergency, it will be totally unacceptable to establish clear communications by first taking the time required to identify and report to the BPL operator about interference, and then to have the BPL operator act to remedy that interference. In many cases, amateur operators and government emergency services spend much time just listening to the HF spectrum for weak-signal distress and emergency radio calls. These may appear at any time on any frequency. Such emergencies calls cannot somehow be planned ahead of time to allow HF radio users to first convince the BPL operator to change their system parameters to eliminate the interference that is prohibiting communications.

18. Because of the unique propagation characteristics of the HF spectrum users typically move their transmitting / receiving operations from one end of the spectrum to the other, seasonally and even daily. Therefore, a wide range of frequencies must be made available to sustain round-the-clock

availability of usable HF spectrum. Will BPL operators be willing and able to adapt, on-the-fly, to these ever-changing needs of the licensed, incumbent users? It seems extremely unlikely.

19. The proposed interference mitigation plan turns the whole concept of protecting licensed users from harmful interference upside-down. It makes the licensed user secondary to the Part 15 device. This is unacceptable.

## PROPOSALS

20. In view of my above comments, I offer the following proposals.

21. The Commission must embrace and respect the laws of physics and good scientific and engineering practices with regard to the harmful interference potential of BPL. To this end, I respectfully request that the Commission extend the Comment Period of this NPRM from the current 45 days to 180 days to allow completion and full and impartial evaluation of on-going interference studies by such organizations as NTIA, ARRL and others.

22. Because of the unique characteristics of BPL and of the HF spectrum, Part 15 will very probably not provide sufficient interference protection to licensed incumbent spectrum users. The Commission therefore should regulate BPL and its radiated emissions under an entirely new set of regulations, uniquely suited to BPL, and based upon the outcome of the current on-going interference studies.

23. The Commission should consider entirely disallowing BPL operation on the HF and low VHF frequencies, and instead limit BPL operation to microwave frequencies. Such a system has been demonstrated by Corridor Systems, and others, to deliver significantly faster data rates than HF BPL while producing no interference to licensed incumbent spectrum users.

24. If the Commission decides to allow BPL operation at HF and low VHF frequencies, then the BPL systems must be configured to give **full-time**, complete interference protection to weak-signal services such as amateur radio, emergency communications frequencies, and international broadcasting. Such protection would require BPL systems to limit their radiated emissions on and near all such frequencies to a maximum level that is 70dB **below** the current limit allowed by Part 15.

Respectfully submitted by:

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