

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

<b>In the Matter of</b>	)	
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	)	
<b>Carrier Current Systems, including Broadband over Power Line Systems</b>	)	<b>ET Docket No. 03-104</b>
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	)	
<b>Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems</b>	)	<b>ET Docket No. 04-37</b>
	)	
	)	

**To: The Commission  
Reply Comments to Notice of Proposed Rule Making (04-37)**

Reply Comments by to the Notice of Proposed Rulemaking  
by Benjamin S. Gelb

I have been a licensed Amateur Radio operator for eight years, completed multiple physics and electronics courses and have countless hours of hands-on experience experimenting with radio and electronics equipment. I am a graduating senior at Thomas Jefferson High School for Science and Technology in Alexandria, Virginia and will be attending MIT in the fall.

The following are reply comments to various comments on the NRPM (04-37) by Current Technologies and Ambient Corporation.

**Current Technologies asserts that "Current Technologies implementation of BPL is non-interfering."**

I dispute Current Technologies' assertion that "Current Technologies implementation of BPL is non-interfering." There seems to be a great division between those who believe BPL will be a source of harmful interference, and those who do not. I contend this division is not a result of "misunderstandings about how BPL works" on the part of amateur radio operators and many other individuals and organizations but rather a misunderstanding of basic physics on the part of both the Commission and Current Technologies.

**Current Technologies states on page 14 that "Access BPL devices do not use power lines as antennas. They use power lines to *conduct* data signals, not radiate them."**

I'm sure that Current Technologies' goal is to conduct signals rather than radiate them.

Unfortunately, Current Technologies, no matter how much they wish to deny it, is bound by the same laws of physics as every one else. When an RF current is coupled into a conductor, that conductor will radiate. Period. This is because of the electric and magnetic fields created by the charge and current on the conductor.

In coaxial cable the fields are contained by a shield at ground potential. In balanced line, equal and opposite fields from correctly spaced parallel conductors mathematically cancel. Power lines have RF characteristics that are irregular and variable, and do not resemble either type of feed line. Therefore, BPL systems that couple RF to the power line will cause the power line to radiate. Period.

This has been shown to be true in the real world. A video<sup>1</sup> produced by the American Radio Relay League demonstrates actual received interference in four trial areas, one of which is operated by Current Technologies.

Because of the great disagreement between BPL promoters and those who stand to be impacted by the implementations of BPL systems, it seems that the Commission ought to be obligated to, at the very least, conduct some sort of real world testing of its own to determine the radiation characteristics of power lines. To date, no effort to validate the claims of either side has been made by the Commission.

So far, the Commission's attitude seems to be to accept the word of BPL manufacturers as fact, no questions asked, despite the fact that many statements made by BPL proponents and subsequently parroted by the Commission are embarrassingly nonsensical to someone with even the most rudimentary technical education (e.g. stating that the characteristics of a power line are "somewhere between a waveguide and an antenna" in the NPRM). Meanwhile, the Commission has dismissed actual testing and analysis conducted by many technically adept individuals, as well as organizations such as the ARRL, AMRAD, and the NTIA as "unsupported claims" that cannot "stand in the way of such an innovation as BPL."<sup>2</sup>

**Current Technologies states that the debate has been "complicated further by the existence of several different technical approaches to BPL, each of which works differently."**

Current Technologies seems to say that while some implementations of BPL may cause power line radiation, its own implementation does not. This cannot be for the reason addressed previously - all BPL systems will cause power line radiation - but assuming for a moment that Current has found a way around the laws of physics, it is clear that each of the "different technical approaches" to BPL needs to be addressed individually in the new rules, because even if Current Technologies' implementation may not cause interference, other implementations will.

More curiously, no sufficient detail has been provided regarding the operations of ANY of the "different technical approaches" or what technical property gives Current Technologies' system the ability to prevent power lines from radiating. It boggles the mind to think that the Commission plans to implement effective new rules without evaluating such technical details.

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<sup>1</sup> ARRL BPL Video. [http://216.167.96.120/BPL\\_Trial-web.mpg](http://216.167.96.120/BPL_Trial-web.mpg).

<sup>2</sup> The statement of Commissioner Adelstein on the NPRM.

**Current Technologies' assertion that "BPL bandwidth has no effect on interference" is incorrect.**

This is not a matter of science, but one merely of common sense. A wider signal bandwidth means that BPL signals will occupy a greater set of frequencies. Therefore there are more frequencies where interference may occur. An isolated interfering signal of narrow bandwidth often does not constitute harmful interference because, while annoying, it can be easily avoided by simply moving to another frequency. A broad band BPL signal, on the other hand, could quite easily consume an entire **BAND** of operating frequencies, which are normally only a few hundred kHz wide in the HF range. There is a grave difference between a single narrow band signal and a broad band one like BPL.

**In its comments, Ambient cites President George W. Bush's recent speech on broadband technology.**

*"So how is some guy in remote Wyoming going to get any broadband technology? Regulatory policy has got to be wise and smart as we encourage the spread of this important technology. There needs to be technical standards to make possible new broadband technologies, such as the use of high-speed communication directly over power lines. Power lines were for electricity; power lines can be used for broadband technology. So the technical standards need to be changed to encourage that.*

**Ambient strongly supports the President's conclusion that '... technical standards need to be changed to encourage ...' the use of high-speed communication directly over power lines."**

Ambient supports the conclusion that "technical standards need to be changed," but what about that guy out in Wyoming? Ambient seems to have artfully chosen its words so it can later deny promises of rural broadband. This is because, as I explained in my original comments to the NPRM, Access BPL is no more viable in a rural area than cable or DSL service. For the benefit of the Commission, I have reproduced those earlier comments here (paragraph references refer to paragraphs in the NPRM).

*Access BPL will not provide service to rural areas for the same reasons that cable and DSL are not available in rural areas. As is stated in paragraph 3, access BPL is a means of "last mile" delivery." A BPL signal can only travel a few thousand feet down a power line. Neighborhood distribution lines still must be connected to the Internet via fiber optic cable, as is outlined in paragraph 4. This is viable in an urban or suburban setting, where the number of potential customers can justify the cost of the fiber backhaul, but will not float in a rural environment.*

*The Commission seems to subscribe to a misconception that the national power grid can be magically connected to BPL and turn every outlet in America into an Internet connection. This is not the case. A substantial amount of new infrastructure must be*

*constructed in the area of BPL service, and therefore will not promote BPL in rural areas any more than other broadband technologies.*

As the promise of rural service is the sole pretense for the Commission's blind rush to deploy BPL at all costs, perhaps it might behoove the Commission to consider BPL for what it really is and reconsider its motivation for promoting it so relentlessly.

**Ambient states that it “believes that such coexistence of BPL with other critical uses of spectrum is a goal which can be achieved.”**

The coexistence of Access BPL with other critical uses of spectrum is not a goal to be achieved; it is a **BEDROCK REQUIREMENT** for operation under the non-interferences conditions of the Part 15 rules. Compliance to this condition must be demonstrated **PRIOR** to operation of Access BPL systems. To apply regulatory power in any other way would simply turn Part 15 on its head.

To quote from the Part 15 label on the back of a small electronic device on my desk, “this device may not cause harmful interference.” This is a stark contrast from the interpretation of the rules regarding BPL, which goes something like, “BPL systems may cause interference, as long as some effort is made to correct said interference once it is identified by a party receiving interference.” This is simply backward. The responsibility of identifying and initiating corrective action for interference must not fall on the licensed user of spectrum. Access BPL equipment must be conclusively proven to be able to operate under non-interference conditions through a thorough, documented technical analysis. To date, no such analysis exists.

There is a growing body of evidence, however, that suggests that Access BPL systems cannot be implemented without causing interference. Technical analyses by AMRAD, the ARRL and the NTIA point to a severe interference problem. An official interference complaint<sup>3</sup> has been filed by E. Alan Crosswell, a resident who lives in the area of Ambient's BPL trial in New York.

In the interest of protecting licensed users of spectrum, the Commission must undertake some effort to more thoroughly evaluate the interferences risks of BPL. To date, no thorough technical analysis exists that suggests BPL can be implemented in a manner consistent with the non-interference conditions of the Part 15 rules, and many analyses, as well as real world observation and simple physics, suggest the contrary.

Respectfully submitted,  
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<sup>3</sup> E. Alan Crosswell. “Harmful interference from experimental license WD2XEQ.”  
<http://www.columbia.edu/~alan/bpl/complaint-fcc.pdf>.