

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

In the Matter of

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

**COMMENTS OF GLENN W. PELIKAN**

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I. INTRODUCTION

I have dealt with Part 15 devices in the field of Medical Telemetry. As the Vice President of Research and Development (now retired) for Spacelabs Medical Inc., I worked with FCC, OET and NTIA in resolving interference issues and concerns in shared frequency allocations with industry and government. Allowable medical telemetry emission levels were increased in restricted bands with no harm to licensed or government services. This work was characterized by thorough scientific investigations including testing and analyses before increased radiation levels were allowed. That is not the procedure apparently being used to propel BPL into the marketplace.

I have been a licensed radio amateur for forty years. Like most amateur radio enthusiasts, I have extensive experience in dealing with radio reception and transmission issues. As currently proposed, BPL will render the high frequency bands (2-30 MHz +) unusable. The proposed frequency notching and other forms of BPL agility will not be effective in removing interference from transmissions of Licensed Services to BPL. This interference will often result in BPL being completely unusable.

Extensive comments have been made by many, enumerating issues and extensive interference caused by BPL trials in the US and elsewhere. I have read comments submitted by AMRAD, NAB & MSTV, CQ Communications, Inc and others. While I find a few points I could debate in those submissions, the vast majority of those comments are, in my opinion, valid and need to be seriously considered.

Comment has also been made, particularly by NTIA about areas of concern that have not been evaluated even minimally. Chief amongst those are the long range sky wave propagation of BPL signals and the cumulative effect of ubiquitous BPL implementation.

Part 15 was originally developed for unlicensed intentional radiators that were geographically isolated, narrow band “point” sources operating occasionally for brief intervals at low power with inefficient antennas and having very limited range. Fully implemented BPL likely would result in geographically ubiquitous broadband large-scale radiators radiating continuously over virtually all populated areas of the United States. BPL was not envisioned when part 15 was implemented. BPL requires a thorough reevaluation of Part 15 Rules; are they appropriate for BPL?

## II. PROMISE OF UNIVERSAL BROADBAND ACCESS IS OVERSTATED

Studies have been cited by others to FCC in previous submissions that BPL will be no more cost effective in serving the “last mile” than current in-use systems such as cable and DSL. Restating those studies here would be redundant.

## III. DAMAGE FROM BPL INTERFERENCE TO LICENSED SERVICES IS UNDERSTATED

Some studies cited by others on record to FCC have shown interference levels of S9+. Such interference prevents the use of licensed services. Restating those studies here would be redundant.

## IV. INTERFERENCE FROM LICENSED SERVICES TO BPL IS ALL BUT IGNORED

The majority of interference emphasis in the BPL proceedings seems to have been on BPL’s potential to interfere with Licensed Services. While the Licensed Services’ potential to interfere with BPL has been mentioned, it has not received much emphasis. Even the testing being performed by NTIA is limited to interference caused by BPL. I present the following analysis:

1. Assume the maximum radiation of 30 uV/M permitted by Part 15 in the frequency range of 1.7 – 30 MHz is fully utilized by the provider (this is best case for BPL’s ability to reject interference from other sources). A resulting conducted signal appears at the input of the in-home BPL device. Its receiver must be sensitive enough to detect this signal.
2. Assume nearby overhead power lines are in a near field of 30V/M of an amateur antenna transmitting at 3.8 MHz (not an unusual level for inner-city locations).
3. Assume overhead power lines are antennas with gains in the vicinity of 0 dBi and that the law of reciprocity works in this example. See Table 1 below.
4. The conducted signal resulting from the radiated amateur signal would be 120 dB greater than the conducted BPL signal.
5. In practice, the BPL receiver would have to be able to work with signals at least 20 dB less than the maximum BPL transmission level.
6. I conclude BPL receivers would need at least 140 dB of adjacent channel rejection, much of which would have to be in the receiver proper even if passive pre-filtering were employed.
7. The most advanced and expensive commercial radio receivers are not capable of this degree of adjacent channel rejection. They will become overloaded and incapable of responding to any frequency. Effective

“adjacent” channel rejection at these signal levels is only feasible between bands where frequencies are separated typically by a factor of two.

8. From this I conclude BPL will be useless when in the broad proximity of amateur and other Licensed antennas, regardless of the BPL encoding/modulation technique employed.

In reality, the susceptibility of BPL may be significantly worse than suggested by this example. The test results submitted by AMRAD with their comment response to FCC on the BPL NOI (03-104) suggest much lower Licensed radiated power levels can wreak havoc with BPL.

<b>^Table 1</b>		
Frequency	Power-line model antenna gain	EZNEC File
0.1 MHz	-71.0 dBi	DIPR1.EZ
0.2 MHz	-52.1 dBi <sup>3</sup>	DIPR2.EZ
0.3 MHz	-33.9 dBi	DIPR3.EZ
0.5 MHz	-18.3 dBi	DIPR5.EZ
0.8 MHz	-9.9 dBi	DIPR8.EZ
1 MHz	-7.5 dBi	DIP1.EZ
1.8 MHz	-3.4 dBi	DIP1R8.EZ
2 MHz	-2.2 dBi	DIP2.EZ
3.5 MHz	1.6 dBi	DIP3R5.EZ
5.3 MHz	1.2 dBi	DIP5R3.EZ
7 MHz	6.5 dBi	DIP7.EZ
10.1 MHz	7.4 dBi	DIP10R1.EZ
14.0 MHz	7.7 dBi	DIP14.EZ
18.1 MHz	7.6 dBi	DIP18R1.EZ
21.0 MHz	7.8 dBi	DIP21.EZ
24.9 MHz	10.6 dBi	DIP24R9.EZ
28.0 MHz	7.9 dBi	DIP28.EZ
50.0 MHz	9.2 dBi	DIP50.EZ

<sup>A</sup>ARRL used a well known antenna-modeling program, EZNEC PRO 3.0 with the NEC-2 calculation engine to model a simple medium-voltage (MV) neighborhood-distribution power line. The frequency of the signal was varied from 0.1 to 50 MHz. The number of segments per line was increased as necessary as the frequency was increased.

## V. PROPOSED METHODS FOR DEALING WITH INTERFERENCE ARE INADEQUATE

I quote from the Comments recently submitted by CQ Communications, Inc:

“The Commission suggests in the NPRM that interference mitigation is partially the responsibility of the licensed operator. In paragraph 35, acknowledging that power lines *without* BPL are already a significant source of interference to amateur radio operations, the Commission states that “(w)e therefore would expect that, in practice many amateurs already orient their antennas to minimize the reception of emissions from nearby electric power lines.” This is ludicrous for several reasons. First of all, Part 15 is very clear that in the event of interference between a licensed user and a non-licensed user on a given frequency, the responsibility for resolving the interference lies *entirely* with the nonlicensed user, even so far as terminating operations if the problem cannot be resolved. Suggesting that licensed users bear partial responsibility for mitigating interference from non-licensed users flies in the face of the intent of Part 15 and decades of successful sharing under Part 15.”

There is also an obvious technical flaw in FCC's statement about amateurs orienting their antennas away from "noisy" power lines. Forgetting the fact that not all antennas can be reorientated, and assuming amateurs purchase antennas that can be orientated to accommodate BPL, this strategy simply will not work. The best directional antennas today's technology can produce have a directional characteristic (front-to-back ratio) of perhaps 15dB. BPL interference has been reported at S9+15dB. Rotating antennas to remove 15 dB still leaves interfering signals with strengths of S9, large enough to prevent most communication. And what will the amateur do when the station to be contacted is in the same direction as the power line?

## VI. BPL WILL ENDANGER, HOMELAND SECURITY AND EMERGENCY PREPAREDNESS

BPL as currently defined will compromise and possibly preclude the use of many licensed services. These services include some of the emergency communications of fire, police, the FBI and Amateur Radio and all of the long distance independent communications of the FBI and Amateur Radio. Commercial transoceanic airliners may also have difficulty. Amateurs have responded to many local and regional catastrophes which include hurricanes, floods, forest fires, earthquake, not the least of which was 9-11. Much of Amateur Radio communication is independent of land and satellite based infrastructure. It does not require cable, phone lines, satellites or commercial power for its operation. It is not dependent on any of these to establish reliable communication. It is sure to be there when all else fails. The Amateur Radio Service is all volunteer; it costs taxpayers nothing; it has close ties with the American Red Cross and has become an integral resource for FEMA.

## VII. MIXED RESULTS FROM BPL DEPLOYMENTS IN OTHER COUNTRIES

I approximately quote from the Comments recently submitted by CQ Communications, Inc:

"The NTIA report shows that results have been noticeably mixed with BPL in other countries. For example, NTIA reports (their Appendix B) that in Austria, communication was "massively disturbed" by BPL during a Red Cross emergency exercise, 'with interference levels exceeding the limits by a factor of 10,000.' NTIA also reports that several large companies in Europe (e.g., Siemens in Germany, NUON in the Netherlands) have gotten out of the BPL business. We also understand that Japan has declined to authorize BPL deployment because of interference problems."

## VIII. ONE OR MORE INTERNATIONAL TREATIES MAY BE VIOLATED

I am not familiar with International Treaties to which the United States is signatory, but I know we participate in the World Radio Congresses of the ITU held every three years. It would seem that allowing an implementation of BPL that will in effect "jam" most or all worldwide shortwave radio broadcasts into the US would not be looked upon as responsive to the terms of membership in the ITU.

## IX. RADIO FREQUENCY PROPAGATION AS A NATURAL RESOURCE

Diverting the entire RF spectrum capable of direct point-to-point communication between randomly located geographic positions around the globe to communication between a limited number of geographic positions which already are or can be served by alternate non-spectrum-polluting means is a travesty not unlike cutting down all the trees so the housing industry can build more wooden houses in a world blessed with an abundance of other building materials.

## X. CONCLUSION

I once again quote from the Comments recently submitted by CQ Communications, Inc:

“We remain mystified as to the appeal of the 2-80 MHz segment of the RF spectrum for BPL operation. We have not seen anywhere why these frequencies are technically superior to other possibilities. All we know is that these frequencies are the only ones in the entire electromagnetic spectrum capable of regularly supporting long-distance radio communication via natural means, and that this portion of spectrum is a precious natural resource that must not be polluted with signals that can function just as well elsewhere without causing so much permanent harm. An 80-MHz wide piece of spectrum in the upper UHF and microwave bands will offer the same bandwidth to BPL providers with none of the concerns about ionospheric propagation or interfering with a long-established base of existing users. Wireless networks are already sharing spectrum successfully with other services (including amateurs) on frequencies above 2 GHz. At these frequencies, a frequency segment 80 MHz wide is considered small. Yet in the HF range, it occupies the entire HF spectrum and part of the low VHF spectrum. This is the poorest possible choice of spectrum, from the perspective of its many and varied current users.

We propose relocating the BPL service to frequencies above 2 GHz, where it may coexist much more peaceably with its (far fewer) neighbors and operate without most of the interference concerns that go along with being in the HF and low VHF spectrum.

Finally, we urge the Commission to make no decisions before giving the NTIA ample opportunity to complete its interference study and issue its Phase 2 report. Considering the interference problems already identified in the NTIA Phase 1 report, we believe the Commission should and will conclude that the public interest is best served by relocating the BPL service to frequencies above 2 GHz.”

I agree with and wish to echo these recommendations. The technical issues of implementing BPL in the spectrum of 2-50 MHz + have not been adequately tested or addressed. In addition I recommend the following if BPL remains in the HF spectrum (2-50 MHz +):

1. BPL implementations should not be type qualified; rather, in-situ testing on prototype installations in each target area should be required prior to deployment.
2. Licensed services should be invited and allowed to participate in all phases of that testing.
3. An upper limit on noise floor increase needs to be established, perhaps one S unit (6 dB) except in those cases where the noise floor is already four or more S units in which case no increase would be allowed in order to prevent cumulative increase. This would be a very tough requirement and it suggests “mapping” noise floors in areas prior to testing prototype installations.
4. FCC will need a funded timely and effective interference resolution process. There is not adequate staff in place today. How will FCC deal with all the complaints that surely will result both from licensed services about interference from BPL and from consumers about interference from licensed services? Radio Amateurs will have many, many angry neighbors.

Respectfully submitted,

Glenn W. Pelikan  
2836 NE 54<sup>th</sup> Ave.  
Portland, OR 97213  
Email: g.pelikan@att.net