

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of

Amendment of Part 15 Regarding	)	ET Docket No. 04-37
New Requirements and Measurement	)	
Guidelines for Access Broadband	)	
Over Power Line Systems	)	

To: The Commission

**REPLY COMMENTS**

**Introduction**

1. I am a retired communications engineer with work experience of approximately 44 years, of which 35 years were spent at the Naval Research Laboratory. I received in September 1977 the Superior Civilian Service award for my technological contributions to a military communications satellite system. In my work I became very familiar with the problems and uses of the Navy's high-frequency communication systems, whose use has been reduced considerably by the more-reliable military satellite communication systems. I have been a member of The Institute of Electrical and Electronic Engineers for approximately 50 years. Since the Federal Communications Commission (FCC) has decided to proceed with unusual haste to implement the Broadband Power Line (BPL) system and amend the rules under Part 15 to accommodate BPL, I respectfully would like to provide the following comments.

## **BASIS FOR AMENDMENT**

2. When rules are promulgated for control and operation of a new system, the first question that must be asked is how well is the system defined and what technical information (theoretical and experimental) exist which will provide credibility for the amendment. This information must be in hand prior to approving full operation of the BPL. From the reading of the filings of comment, many justifiable and provable objections have been raised to BPL. Under these conditions, reliance only on the data provided by proponents of BPL is risky. From my past experience, high-powered proponents of a sales pitch for a new system, which on the surface appears most attractive, many times makes loose with or ignores the technical facts. Some of the statements by the BPL proponents on important technical characteristics clearly are wrong. It appears that the lack of solid technical data on which to base the amendment is compelling. The amendment now proposed by the FCC will be based on flawed data or unknown factors and will lead to financial disaster, political problems and social controversy for the public – as well as tarnish the reputation of one of our more respected government bureaus. Essentially, control of BPL's relationship with the high frequency (H.F.) communication systems will be by determination of the maximum allowable radiated interference level.

## **FACTORS TO CONSIDER**

3. The first factor is to determine the shape and intensity of the interfering field. I looked at a simple 2-wire transmission line with dimensions of a power line and perfectly balanced with respect to ground, using a computer program which computes near fields of a radiating structure. In the immediate area of general interest, the field is definitely not that of a point source radiator. Instead, the field from the power line is the near field of a radiator of large dimensions and will not appear like a point source until one reaches a distance from the power line much greater than the overall length of the power line. As one moves, in the areas of interest, parallel to the power line at fixed

distance from the power line, the field remains relatively constant. If one moves away perpendicular from the power line, the field does not decrease as rapidly as expected for a propagating wave of a point source. This condition makes the area considerably larger for interference for a fixed interference level than envisioned. It should be noted that increasing the power line spacing will increase the interference level at any given location. This is the best power line configuration for reduced radiation, but unattainable in practice for BPL. When radiation from the other objects such as transformers, power line junctions, different power line spacing, unbalance of the power line to ground, house wiring, and every site having a different power line configuration, the prediction or determination of the shape and intensity of the interference field over an area becomes chaotic. This condition increases the problems in determining, if possible, meaningful field interference contours. It also should be noted that there are 2-wire and 3-wire power lines. The 2-wire lines with one line above the other with the lower wire grounded at most of the poles are commonly used by the Rural Electrification Act (REA) cooperatives. This line will be a rather efficient interference radiator. Data obtained for one type of line can not be used for other types of lines. The stability of the field with time would be questionable under conditions of line disrepair, repair and weather (rain, snow and ice).

4. A thorough examination of the effect of BPL interference on aircraft H.F. communications needs to be done carefully. BPL noise power on the same frequency from widely separate municipal areas all on direct line of sight of the aircraft will add as interference to the total aircraft communications. If it is found to be a problem, how would one put such a requirement in Part 15 that is meaningful to all the different contributing BPL operators? Similarly, what is the possible aggregate effect of the BPL noise on ionospheric H.F. communications remote from the BPL systems if a very large portion of the United States was implemented with BPL? These effects need to be evaluated factually for a reasonable number of independent BPL systems before any go-ahead is given for a

BPL system.

5. The type of modulation and bandwidth of BPL determines how it will interfere with the narrowband H.F. communications. How is the BPL power distributed over its bandwidth with time?

Can it be treated as wideband noise to the H.F. signal or will some other criteria have to be developed? The natural ambient noise varies with frequency. Will the specified minimum interference level required for Part 15 have to have a factor related to frequency to accommodate the variation of ambient noise power with frequency? All these considerations must be investigated and factored into the Part 15 requirement. Proper data must be obtained, combined with theory and confirmed by experiment for a creditable Part 15 requirement.

6. The interference power level is proportional to the power fed into the power line. The maximum BPL input signal power level will be determined by the noise on the power line arising from power line leakage and radiation loss, household small motors such as drills, mixers, vacuum cleaners and so forth. Also, the power line noise will contain signals being transmitted by licensed H.F stations operating on the same frequency as BPL. All these noises will be random, which will make determination of a maximum allowable BPL signal power level without excess BPL outages difficult.

7. With the haste to turn BPL loose on the country, there is no way to have a credible requirement for Part 15 developed in time. The only alternative is a shut-down of the BPL system when a complaint is received. This gives rise to another question. When a complaint is received, is it caused by BPL interference or some other interference? This puts a burden of proof on the complainant. The operator of the BPL system will no doubt resist doing anything to demonstrate that it is he who is the source of the interference. The FCC, after receipt of a bonafide complaint, must have some mechanism in place that will forestall having a stand off-without putting an undo burden on the complainant. The simplest method is to have the BPL operator interrupt his operation

and have it be determined by an FCC - approved neutral observer that the interference ceases, whereupon the BPL operator ceases operation if he finds no fix for his system.

8. The two H.F .services that are located predominately in residential areas are the short wave broadcast listener and amateur radio. The residential areas are where the power lines will be in very close proximity to the receiving antennas. This is the area where the interference level is high and reception will be severely degraded or made impossible. When an amateur station transmits, he will introduce a large signal in the power line which could disrupt BPL operation. In areas where the local government or an individual has a vested interest in BPL, any interference to BPL or a BPL interference complaint filed with the FCC can subject the complainant to direct or indirect local legal action or other kinds of harassment. The history of the early days of television many times had similar harassment problems due to TV interference by the radio amateur to the poorly-designed TV sets in spite of what the FCC ruled. The same kind of harassment could be expected here for BPL, regardless of the FCC ruling of termination of BPL operation in an area for interference to or from a licensed station. Because of the expense in money and social tranquility, many amateurs in this situation will give up operation. This will put a chilling effect on amateur radio and a weakening or loss of a well-documented resource. What resort does the short wave broadcast listener have?

### **SUMMARY AND CONCLUSIONS**

9. The BPL system is a concept which is great in thought but could be so badly flawed in practice that it should never be put into operation. The system does not radiate like a point source radiator in the immediate areas of interest and will cover larger areas for a given interference level than expected from a point source. With all the different uncontrolled factors that can contribute to the radiated field of a BPL system, prediction of the interference level over an area becomes chaotic. Other factors that must be investigated are: a) The combined interference from many widely-separated BPL systems on aircraft communications and the effect on remote ionospheric

communications; b) Can any part of the BPL signal intercepted by a narrow band circuit be treated as thermal noise for the different H.F. modulations used; c) The different power line configurations need to be examined for suitability, particularly the 2-wire with one wire grounded power line; d) The maximum signal level for maintenance of a viable BPL system under the many varying conditions is necessary in the determination if implementation is practical. There is no way that an amendment to cover BPL in Part 15 can be crafted without considering the above factors, and undoubtedly more will be found. The idea of shutting down a BPL operation in an area, when a bonafide complaint is confirmed, is faulty. It will be apparent that, if the complainant is an individual and the local government and/or individual has a vested interest in the BPL system, the complainant could be subject to all kinds of local legal and other forms of harassment and will take no action in filing a complaint. The present process for BPL approval is bad engineering practice and would receive an "F" in any engineering college. Preliminary approval should not be made on the basis that no complaints have been received because there may be no active licensed H.F. stations in the area. In examining these factors, it may well be found that compatibility of BPL and the H.F. services is not possible under any conditions.. The only approval at this time should be for a thorough study and comprehensive testing of test systems to determine the viability and compatibility design with other H.F. systems for the different types of power lines and various H.F. communication systems. The results should provide the necessary information for the amendment of Part 15, if BPL is found to be practical some cases. This investigation must be open and complete, with all data and methods of tests to be made available to all interested parties.

Respectfully submitted,

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