

**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)
And measurement guidelines for Access Broadband)
over Power Line Systems)

ET Docket No. 04-37

REPLY COMMENTS OF
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Dated 5-18-2004

The writer received a BSEE and MSEE from UCLA, 1977 and has been employed as an electrical engineer involved in the power electronics and industrial electronics industries for 30 years, mainly in product development. This experience includes numerous encounters with FCC emission requirements including designing, building and testing equipment for compliance. The writer has also been issued 9 patents and currently holds the call sign N0JCG as a member of the Amateur Radio Service.

These reply comments are in response to comments from the following to the instant NPRM;
Ameren Energy Communications, Inc.
Powerline Communications Association
American Public Power Association
Hawaiian Electric Co. Inc.
Main.net Communications
Current Technologies, LLC
Southern LINC
Consolidated Edison Company of New York, Inc.
United Power Line Council
Duke Energy Corporation
Progress Energy, Inc.
AT&T Corp
PPL Telcom, Inc.
Ambient Corporation
Cinergy Corp.

I again appreciate this opportunity to add to my comments to the Commission on the referenced Proposed Rulemaking in the form of these reply comments.

INCONSISTENCIES

I must say that I found that the comments of the above referenced parties contain a number of inconsistencies. What were most instructive were the inconsistencies between the pro BPL parties and the recent NTIA report (NTIA Report 04-413).

Ameren claims that "emissions from Access BPL systems will occur more from the individual devices and less from the power lines that carry the BPL signals" and that "measurements need not be maximized with respect to the vertical dimension". Southern claims that the BPL devices will radiate as point sources and that there is no accumulation of signals. Current claims that their data shows the field falls off as a point source directly under the power line. None of these claims was supported with actual data and all of these claims are in direct contradiction with the NTIA report. The NTIA field tests clearly demonstrated radiated emissions from the power line itself, sometimes at a distance from the device and in a different polarity. The NTIA data also demonstrates that the strongest field would actually be at the height of the power line itself, and varied so widely from the 1 meter high loop antenna reading as to make the latter meaningless. The NTIA also reports that their measurement team found evidence of aggregation of BPL signals and that the offending emissions do not fall off with distance as rapidly as the proponents claim.

As an engineer, these contradictions would lead me to question any data from the BPL proponents (if any actually exists). I would also question the competency of the BPL proponents to be able to make the measurements and would definitely require demonstration of any performance claims they may make.

Another serious contradiction occurs in the BPL proponents' claims of "no reported interference" and that part 15 emission limits are sufficient to prevent harmful interference. Ameren and Southern make the same "no reported interference" claim they made in their NOI comments, when there are now at least 41 documented interference complaints filed against BPL operators. Progress Energy, PPL, and the City of Mannassas have all had to employ frequency shifting to try to move BPL RF energy from the frequencies of local users, thus proving that there are interference reports. The NTIA report documents levels it determines constitute harmful interference some distance from BPL power lines, despite the fact they met part 15 emission levels. None of the BPL providers have produced any evidence to the contrary. The UPLC claims BPL passes 'hundreds if not thousands' of homes without interference, but presents no evidence. In light of the measurement contradictions noted above, the Commission should require public evidence of the claims of the BPL industry. This is not 'proving a negative' since presence or absence of interference can easily be determined simply by turning the BPL device on and off, just as with any other part 15 device. It is crucial that they demonstrate this because many of the changes to the proposed part 15 amendment hinge on this assumption. Ameren, HECO, and the UPLC all use the lack of interference claims as justification that shutdown is unwarranted. HECO and CONED even go so far as to claim that shutdown is at odds with utility use and investment, implying a dangerous over reliance on a part 15 device; a device that is subject to the strict 'no interference' provisions of part 15.

INTERFERENCE IDENTIFICATION

The text of the NPRM at paragraph 43 states "The objective of the proposed notification would be to establish a publicly accessible database for Access BPL information to ensure that the

location of Access BPL systems and their operating characteristics are identified if harmful interference occurs and to facilitate interference mitigation and avoidance measures.” The proposed part 15 amendment neither requires the database to be public nor accessible. However, the use of the database as an identification device is completely worthless if it is not accurate, available and accessible on a real time basis. I note that many BPL proponents took exception to the database as envisioned by the Commission. The PLCA claims a database is unfair relative to cable and DSL modems, which do not have to register the locations of customer modems; although the accesses BPL devices that would require registration are devices on the MV distribution lines, not customer modems. The APPA, Mainnet, Southern, UPLC, Duke, ATT, PPL, and Cinergy all claim that the locations of the BPL devices are ‘secret’ and a public database will be a security concern. This is despite the fact that all the pole-mounted equipment will be in plain sight and the fact that BPL areas are easily located with a shortwave radio. Ameren simply claims that a database is unnecessary because there are “no reports of interference”.

Several BPL proponents go on to reluctantly agree with a database, but seek to impose a variety of Byzantine procedures for getting useful information from the it. This is a clear attempt to obstruct the enforcement of the strict part 15 “no interference” clause, which the Commission referred to five times in the instant NPRM. Under the guise of ‘security’ and avoidance of ‘illegitimate complaints’, the BPL providers would like to have the Commission grant them qualification authority over what constitutes ‘harmful interference’. This would have the effect of elevating the BPL providers, alone among unlicensed part 15 unintentional radiators, to a priority basis over licensed services. This is an action, which is clearly contrary to US law, international treaty, and the very charter of the FCC.

With all the controversy that limited database access would entail, I would like to propose to the Commission a simple alternative. I propose that Access BPL have a very clear, unambiguous, over the air ID mechanism. There is much precedence in FCC rules for this, beginning with the very purpose of the founding of the FCC. Until the proliferation of part 15 devices, all emitters were required to provide some sort of identification. Even Campus Radio installations are encouraged to provide some sort of ID so transmissions could be traced back to their source. More recently, NPRM FCC 04-100 Proposing to allow wireless broadband operations in the 3650 to 3700 MHz band would amend part 15 with the following;

(f) Within any one-second interval of signal transmission, each unlicensed device must transmit a transmitter identification at least once. The identification must be confined to the 3650 – 3651 MHz portion of the band. Each application for equipment authorization must declare that the equipment contains the required transmitter identification feature and must specify a method whereby interested parties can obtain sufficient information, at no cost, to enable them to fully detect and decode this transmitter identification information. Upon the completion of decoding, the transmitter identification data block must provide the following fields.

- (1) User/owner contact information.
- (2) Current physical location of the unlicensed device.

The grantee must implement a method that makes it possible for users to specify and update this data.

If this rule is necessary for the 3650 to 3700 MHz, which is geographically limited by the physics of microwaves, it certainly should apply to energy on the power lines in the HF spectrum. Furthermore, part 15 itself is currently very specific about using shutdown as an interference diagnostic technique. In the context of a touch lamp or possibly even an in-house BPL system, power to the device is under the control of the individuals on the scene and this is quite appropriate. However, it is very difficult to apply to access BPL since the means of shutdown is not under the control of the victim.

As to the nature of this identification, I would propose something very simple. Simple on-off keying of the entire carrier constellation at very specific times would not only provide a clear, unambiguous ID, but would allow use of the shutdown diagnostic without actually shutting down the system. International Morse Code has a duty cycle around 50%, so the max throughput of a leg using Morse for the ID would fall to half for the 90 seconds or so necessary. Alternatively, there is no reason that the BPL provider couldn't shift to a different constellation during the off time, not only providing ID in another band segment (kind of an inverse Morse), but also providing the ID without any hit in baud rate.

Implementing an on off keying ID on an OFDM system borders on the trivial. BPL providers have already indicated that they have the ability to turn carriers on and off at will, and this is further discussed in paragraph 42 of the NPRM. All that needs to be done is to define a standard protocol. I would suggest 5WPM International Morse sending an identifying number sequence, repeated at least four times a day at standardized, regular intervals.

A standardized over the air ID mechanism that does not interfere with system operation, as I have described above, also allows the BPL operator to very quickly 'close the loop' on an interference complaint. Upon receipt of a complaint, the BPL operator can activate the systems ID software on the BPL device. The interfered party can then immediately verify whether or not that is the cause of his interference. This ID mechanism also solves the 'legitimate' complaint problem. If the HF user can't hear the ID, there can't be any interference. If the user can hear the ID, he or she then contacts the central database administrator with the ID and immediately is put in contact with the BPL provider. No 'secure' information need be at risk.

Then there is the problem of timeliness. The NPRM is completely silent on an acceptable interval between the identification of harmful interference and the elimination of the interference. History teaches us that utilities are quite slow in resolving existing RFI noise problems. I can appreciate that part of that delay is in identifying the actual fault and engineering a solution, but neither should be an issue for BPL interference, particularly with an over the air ID. The flexibility present in OFDM technology allows the shifting of the carrier frequency as quickly as the frame rate. This means that the BPL operator can begin frequency shifting within moments of receiving notification. It would be reasonable to allow some time to achieve this, but if it is not successful the BPL device should be shut down, as provided for in Part 15. I would suggest that 10 minutes is a reasonable time to achieve the shift before shutdown. The BPL device should not attempt to reuse the abandoned spectrum without communicating with the interfered with service. It further follows that this provision needs a monetary incentive to insure compliance. I would propose a penalty of \$10,000 per day per device upon failure to comply. This time requirement would also avoid the issue of a utility "dragging their feet" in order to stall eliminating an interference issue, as they clearly intend to do.

As an additional aid to identification, part 15 is very clear that both the part 15 device and the accompanying literature must contain specific notices about interference. This requirement must also apply to BPL and must be provided to all affected parties. Obviously, nobody is going to

climb a pole to read a notice, so I propose that all parties within a mile of an electric line carrying BPL receive the BPL specific part 15 notice, whether they subscribe to the service or not. Also, since there is customer turnover in any utility service, the notice should be repeated monthly, or at least quarterly. I don't think any of the notices included in Part 15 applies best to BPL, so the Commission needs to propose a new notice containing the following points;

1. BPL is a service dependent on part 15 and has no priority to the frequencies it uses.
2. BPL must not cause harmful interference. BPL interference may be identified by an on/off pattern at the following times; _____ . If any harmful interference is experienced, contact the BPL operator at _____ for immediate resolution.
3. BPL must accept any interference from any licensed service. Any disruption of BPL service from a licensed service is the sole responsibility of the BPL operator and the licensed service cannot be held liable and should not be contacted.
4. Updated information on the location, frequencies, modulation and ID times of the BPL devices may be found at _____, or by calling _____.

All subscribers to the BPL service should be required to sign this notice to indicate that they have read and understand it.

INTERFERENCE ELIMINATION

As long as part 15 has been in existence, the determination of whether interference is harmful enough to seek elimination has always been at the discretion of the receiver. This has always included non-licensed receivers of signals from licensed transmitters, such as TV and shortwave broadcast as well as licensed receivers. The standard practice has been to determine the source of the interference and then contact the owner or operator of the offending device. Working together, the interference source can then be verified and eliminated. However, a number of the BPL proponents would prefer putting up unprecedented barriers to this process. HECO would like a third party to handle interference-related concerns. Current wants a way to identify 'legitimate' complaints. Southern proposes a Byzantine gauntlet users must run to file interference complaints. Duke would like complaining parties to be 'qualified'. Cinergy advocates a third party to help resolve interference complaints with targeted information. Ambient goes a step further and requests the Commission set boundaries for what is considered harmful interference.

Progress Energy makes the largest leap of all. In singling out Amateur Radio operators saying they use sophisticated and sensitive equipment, Progress would like the commission to impose four constraints to qualify interference as harmful;

Interference should have to occur in the normal course of complainants operations.

Interference should be more than momentary, for example, a mobile could drive elsewhere.

Interference should cause communications to be practically unintelligible.

Sensitivity of equipment must be standard (and apparently an insensitive standard).

The Commission has dealt with RFI from power lines for many years. All of those cases form a standard, which must be adhered to. It does not matter whether the RF is on the powerline from an arcing insulator, or intentionally injected from a BPL device. The standard must be consistent. Each of the BPL operators is obligated to eliminate BPL interference to the satisfaction of the receiver, just as they are now obligated to eliminate RFI from any other sources on the power line.

Implementing any or all of the conditions advocated by the BPL proponents will have the effect of legitimizing BPL as a spectrum user, in contradiction of the General Conditions of Operation (paragraph 15.5) of part 15 itself;

“Persons operating intentional or unintentional radiators shall not be deemed to have any vested or recognizable right to continued use of any given frequency by virtue of prior registration or certification of equipment, or, for power line carrier systems, on the basis of prior notification of use pursuant to 90.63(g) of this chapter”

Since the BPL manufacturers insist that their equipment can completely avoid transmitting RF energy on any frequency, the commission should accept nothing less than elimination of all BPL generated RF in the frequency range of complaint. The Commission is relying heavily on the ability of BPL operators to deal with interference issues through power reduction and frequency notching. Thus I also propose that each BPL device, after installation and before network operation, be required to demonstrate the ability of the notching mechanism to remove all RF energy in 100Khz increments throughout the frequency range in use. The BPL providers should welcome this acceptance test as an opportunity to demonstrate the ability of their equipment to meet the requirements of the Commission.

CONCLUSION

Alan Shark, President & CEO of the Power Line Communications Association said in a 3/24/04 letter to the Wall Street Journal "ham operators will continue to operate as if we didn't exist". Despite my skepticism of Mr. Shark's remark I respect the BPL industry's efforts to try to reach that goal. However, public results to date have not achieved an acceptable level of compliance. It would be irresponsible to not put in place requirements to insure that there is no interference with licensed services. This is not an increase in regulations, it is a codifying of a performance standard the BPL industry itself has insisted it can meet.

Again, I thank the Commission for the opportunity to present my reply comments.

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