

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

In the Matter of )  
)  
AMENDMENT OF PART 15 REGARDING )  
NEW REQUIREMENTS AND )  
MEASUREMENT GUIDELINES FOR )  
ACCESS BROADBAND OVER POWER )  
LINE SYSTEMS )

ET Docket No. 04-37

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To: The Commission

Federal Communications Commission  
Office of Secretary

**REPLY TO OPPOSITION  
TO PETITION FOR RECONSIDERATION**

ARRL, the National Association for Amateur Radio, also known as the American Radio Relay League, Incorporated (ARRL), by counsel and pursuant to Section 1.429(g) of the Commission's rules [47 C.F.R. § 1.429(g)], hereby respectfully submits its Reply to the *Opposition to Petitions for Reconsideration* filed in this proceeding by CURRENT Technologies, LLC (Current) on or about March 23, 2005.<sup>1</sup> Current's Opposition defends the Commission's *Report and Order*<sup>2</sup> in the captioned proceeding. In reply to the arguments set forth in the Current Opposition, ARRL states as follows.

1. Current points to what it refers to as "even-handed rules" for BPL that advance BPL while "fully protecting the legitimate interests of licensed users." Let's examine that summary premise. Here is a summary of what the *Report and Order* actually did from the perspective of the Amateur Service, with respect to Access BPL distributive systems:

<sup>1</sup> ARRL is contemporaneously filing a separate Consolidated Reply to the Opposition filed by Ameren Energy Communications, Virginia Electric and Power Company, and Tucson Electric Power Company (AEC/VEPCO/TEPC); the Opposition of Homeplug Power Line Alliance (Homeplug); and the Opposition of Intellon Corporation (Intellon). ARRL will also separately and contemporaneously submit replies to the oppositions filed by United Power Line Council, and Ambient Corporation, which address different or additional arguments.

<sup>2</sup> Carrier Current Systems, including Broadband over Power Line Systems, *Report and Order*, ET Docket No. 04-37, 19 F.C.C.R. 21,265 ("*Report and Order*").

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- (a) It adopted the standard, but inapplicable, Part 15 radiated emission levels developed for point-source radiators which utilize bandwidths and duty cycles far different from BPL. These limits are insufficient to preclude interference to typical Amateur Radio stations, according to both the NTIA study and numerous ARRL technical showings, none of which have been rebutted by any technical analysis.
- (b) It refused to exclude Amateur Radio allocations from those used by BPL systems, while at the same time excluding aeronautical, maritime safety and government frequencies due to interference considerations, despite the typically closer geographic proximity of Amateur Radio stations to overhead power lines carrying BPL signals than other types of services whose stations are typically much further away.
- (c) It warned against “frivolous” complaints of BPL interference upon threat of sanctions, and failed to define the term objectively, thus chilling any interference complaints.
- (d) It applied coordination area limitations on BPL facilities, listed excluded bands, and exclusion zones for certain non-Amateur stations, but did not limit BPL locations, or even require coordination, with Amateur stations, despite a specific finding that Amateur stations stand to suffer a higher potential for interference from Access BPL than do other licensed services.
- (e) It created requirements for “consultation” (including detailed disclosures) between BPL systems and certain licensees, so as to allow those services to identify, determine the interference potential of, and perhaps avoid interference from BPL systems at startup, but failed to require BPL systems to “consult” with radio amateurs or amateur groups.
- (f) It failed to create any specific obligation on the part of BPL systems to respond to interference complaints registered by radio amateurs that are different from those dealing with other Part 15 devices, and required no timetable for a response to Amateur Radio complaints, but at the same time established a 24-hour response time limit for complaints from public safety entities of BPL interference.
- (g) It established that the obligation of BPL systems to shut down in cases of actual harmful interference is only as a “last resort,” without defining when there is an obligation on the part of the BPL system to do so.
- (h) It failed to require the use of shutdown features of BPL devices, except upon FCC order, which will occur only when other efforts to “reduce” interference have failed.
- (i) It failed to mandate “notching” of Amateur bands, but required only the ability to notch certain band segments when, apparently in the sole discretion of a BPL system, such is determined to be reasonable. Notching is in any case difficult to implement effectively and has repeatedly proven insufficient as an interference resolution technique at BPL test sites.

(j) Even when notching is required, the amount of reduction of undesired signal strength required by the *Report and Order* to be incorporated in BPL equipment is only 20 dB, which is clearly insufficient to protect against repeated disruption or outright preclusion of Amateur Radio HF communications..

(k) Adopted an 18 month date, after which only rule-compliant systems must be installed, so that BPL facilities installed before July 7, 2006 never have to come into compliance with the new rules.

(l) Required maintenance of a publicly accessible database of BPL operations, which need contain only the location of BPL facilities by zip codes served, type of modulation, frequency bands used, and a contact person available only during business hours. This is useless in connection with interference to mobile facilities, and the information is insufficient to assist in identifying and resolving interference cases.

(m) It fails to address the long-pending, serious interference complaints filed by radio amateurs and supported by on-site measurements, which in the aggregate clearly establishes a severe interference potential of BPL. None of the interference cases have been solved by other than voluntary shutdown of the systems by the BPL operator, or by non-use of Amateur spectrum.

2. Given the foregoing, the 650,000 licensees in the Amateur Service have been left wondering in what respect the Commission's *Report and Order* in this proceeding does anything at all to preclude interference. In ARRL's view, the *Report and Order* denies the interference potential, and does virtually nothing either to prevent interference in advance or to remedy it after the fact. BPL providers are the beneficiaries of the *Report and Order*. Radio Amateurs must bear the burden it creates, despite the fact that the Amateur Service is a licensed, allocated radio service. Unlicensed users, on the other hand, have no right to the spectrum. Current's claim that the Commission's rules are "even-handed" is, in this case, not even in the ball park. Nor does the *Report and Order* "fully protect" the "legitimate" interests of radio Amateurs.

3. Amateurs did not "assume" at the outset that "compliant BPL devices" would cause interference. ARRL calculated, using accurate and objective NEC modeling (which has been used and validated by the Commission's Office of Engineering and Technology

and in the telecommunications industry for years as an objective basis for interference predictions) that BPL technology using unshielded overhead power lines was unsuitable at HF and low-VHF frequencies due to the extensive interference potential. The experiences at the same BPL test sites touted by former Chairman Powell,<sup>3</sup> validated the concerns of the radio Amateurs. The Commission, having already made up its mind that BPL would be authorized regardless of the interference potential *vis-à-vis* Amateur Radio, ignored the interference complaints and the technical submissions. The adverse data from field studies conducted by OET staff was scuttled, and even now has not been fully disclosed to the public. *Nothing on the Amateur Radio side of this issue has been "assumed."* It has all been validated by reliable calculations, measurements, and empirical observations. The "assumptions," rather, have all been on the Commission's side.

4. Current continues to argue the unsupportable claim, which even the Commission has abandoned, that BPL systems are point source radiators. The record has determined conclusively that power lines radiate like antennas. No matter how often Current states the contrary, it cannot undo the laws of physics. The following is but one of many examples from FCC, NTIA, ARRL and other data in this proceeding that show that power lines are not point source radiators.

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<sup>3</sup> ARRL invites both the Commission and Current to address the actual BPL harmful interference complaints documented by ARRL and filed long ago, and repeatedly in some cases, with the Commission involving test sites at Cedar Rapids, Iowa; Allentown, Pennsylvania; Raleigh, North Carolina; Briarcliff Manor, NY; Irving, Texas; Cape Girardeau, Missouri; Cottonwood, Arizona and Lee's Summit, Missouri. And there are more pending. None of these complaints were or are, as Current blithely states at page 9, "overstretched." What is astounding, and quite irresponsible, is Current's absolutely false statement that "in those instances where actual interference occurred, the Commission addressed the allegations and where necessary, directed the experimental license holder to take corrective action..." There is no instance where that series of events occurred. The Commission has failed to remedy any interference problem at any BPL test location.

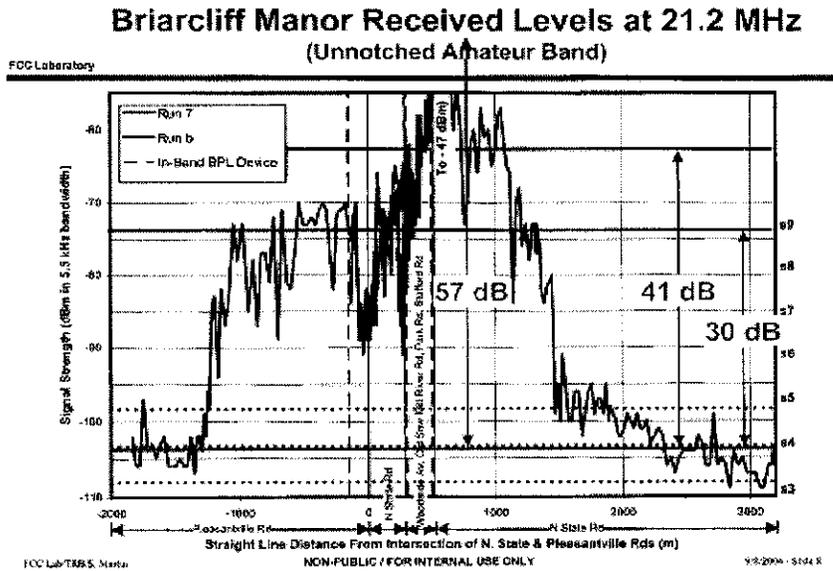


Figure 1 – This is one of many examples in the record that show that power lines radiate as antennas. Although the emissions are somewhat stronger at the injection point, strong BPL signals are heard for over 1 km along this power line. The record shows that the antenna modeling that predicted just what was found in this FCC test result is an accurate representation of how power lines behave.

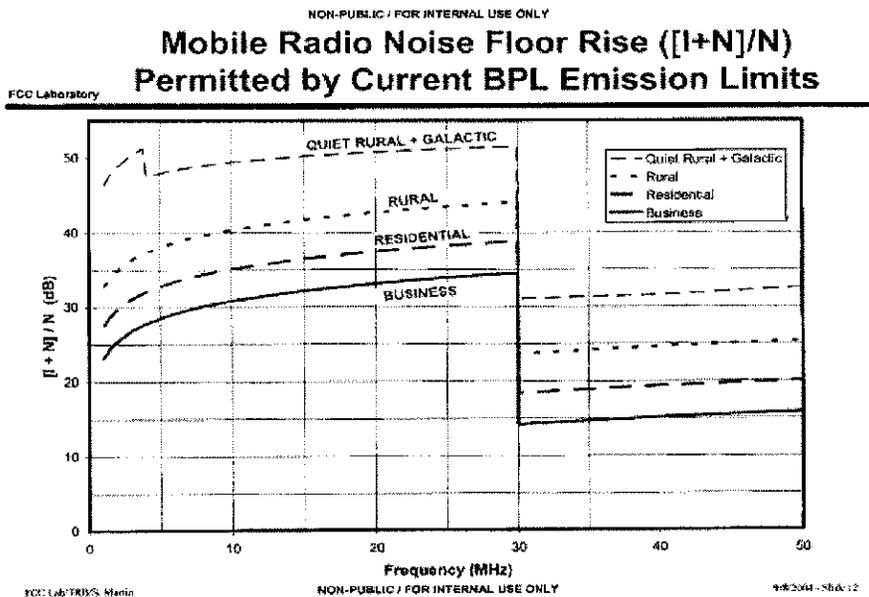
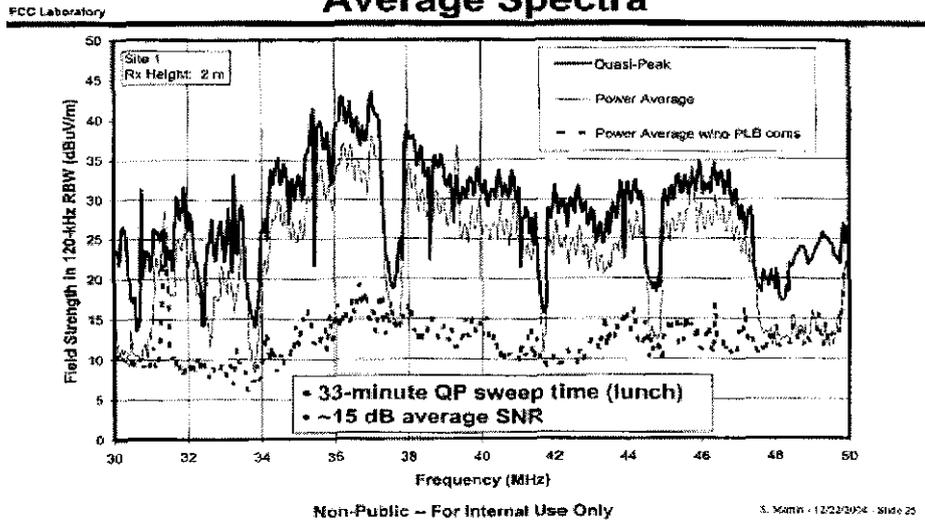


Figure 2 – This chart prepared by FCC OET staff shows that at the current BPL emission limits, the noise floor will rise between 23 and 50 dB in the bands below 30 MHz. Thus, the FCC's own work does not support Current's claim that BPL will not increase noise levels.

The following figure shows the FCC's measurements on a Current Technologies system operating in Potomac, MD. This is a measured increase in noise floor when BPL is operating.

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## Site 1—Full-Band Quasi-Peak and Average Spectra



5. Notwithstanding the foregoing, Current claims at page 3 of its Opposition that radio Amateurs want “near-absolute” interference protection. Not so. ARRL readily acknowledges that some periodic man-made noise in the HF and low-VHF bands is present and does not necessarily constitute harmful interference. However, ARRL’s experience at BPL test sites validates the conclusions dictated by its computer modeling: BPL systems which make high duty cycle use of Amateur allocations cause preclusive interference within distances of up to a mile from a BPL-carrying MV line. The interference received in these instances makes it impossible to hear all but the strongest desired signals. This is harmful interference using any accepted definition: it repeatedly disrupts or precludes all communications on entire frequency bands, on a near-continuous duty cycle. The precise problem with use of HF spectrum for BPL is that normal variations in propagation sometimes results in otherwise usable signals with a modest noise margin. Even with the -20 dB notches, BPL signals obstruct these, and BPL signals at the legal limit locally obliterate all but the strongest HF signals. BPL has to take the

interference victims as it finds them. It is an unlicensed application and cannot operate while at the same time causing harmful interference. ARRL has never claimed that amateur radio is entitled to the same protections from interference from other licensed radio services as are public safety licensees, for example. However, relative to Part 15 devices, which are unlicensed and have no entitlement to cause harmful interference to any licensed service at all, the licensed services cannot be discriminated against, consistent with the obligations of Section 301 of the Communications Act. See, ARRL Petition for Reconsideration, pages 12-14.

6. Current boasts of the lack of interference potential of its own system configuration. ARRL recognizes that a system that intentionally excludes spectrum allocated to the Amateur Radio Service has less interference potential than do other systems. This is its only “interference mitigation” technique, however. This does not mitigate interference for any of the spectrum that is allocated to any other radio service except for Amateur Radio. It does, however, point up the fact that omitting Amateur spectrum from BPL systems, which the Commission could have easily required in the *Report and Order* but did not, could go a long way toward remedying an otherwise overwhelming interference source.<sup>4</sup> At page 9 of its comments, Current discusses its Cincinnati installation. The absence of interference complaints asserted by Current is in no wise attributable to the Commission’s rules, which protect Amateur Radio not at all. It is, rather, attributable to the use of low band VHF frequencies on the MV lines, and

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<sup>4</sup> At page 9 of its Opposition, Current cites the fact that there have been no complaints from the operation of their Ohio system as proving that BPL system “in compliance with the Part 15 limit” will rarely cause interference. With respect to the Amateur bands, the conclusion does not follow from the premise, because the Current system does not operate at the Part 15 limit; it operates considerably below it. What the Ohio site proves is that the emission limits for Access BPL systems should be set 30 dB lower than they are, because this is the one type of system that has not caused interference to Amateur Radio (in most HF allocations).

otherwise to the use of the HomePlug standard, which does not make use of Amateur allocations (save for the 5 MHz allocations). Exclusion of the Amateur bands from BPL systems should have been, but was not, mandated by the Rules adopted in the *Report and Order*. What Current proves here is that there is *no reason* why the Commission cannot mandate lower emission levels for access BPL in Amateur bands, or exclude the use of them altogether. Obviously, as Current has established, BPL systems would be unaffected by such a limitation. Current proves no more than that.<sup>5</sup> Nor is its system in universal deployment. Other systems which make use of Amateur allocations create harmful interference which has proven virtually impossible in most instances to remedy.

7. Though Current is critical of the NTIA measurement data as an indicator of interference potential, ARRL's measurements and calculations are consistent with NTIA's regarding real world systems, as is the data that the Commission refused to disclose to the public prior to issuance of the *Report and Order*. However, Current indicates a lack of understanding of measurement techniques in its various critiques of NTIA's methods. For example, it states that "The duty cycle (percentage of on time) for each device in the model greatly overstates the reality." In the BPL systems that have been tested and documented by ARRL, FCC and others, the duty cycle of BPL emissions have been nearly continuous during peak-usage times. The Part-15 measurement methods require that a quasi-peak measurement be made. This test method has universal consensus as a reasonable test method to assess the EMC aspects of emissions, and the duty cycle time that affects these measurements is well under a second. It is over this

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<sup>5</sup> Current claims at page 21 of its Opposition that its equipment permits "all spectrum usage" within 200 meters of its equipment. Other than its 25 dB notches for amateur radio allocations, however, it offers no interference prevention mechanisms, and therefore provides no protection at all for other radio services.

time period that emissions from BPL must be evaluated. Current further states that “[f]urthermore, in evaluating its results, NTIA assumed that a 0.1 dB increase in noise level would cause harmful interference, where in practice, this level is far too low to have any effect.” In reality, as shown in the above FCC graphs, the increase in noise level from BPL is much greater than 0.1 dB, and interference under the actual circumstances is inevitable if there are local receivers using the same spectrum that BPL is using. Throughout the proceeding, neither Current nor any other BPL advocates indicated what specific amount of degradation they consider acceptable for radio users. However, it is clear that BPL noise levels present at test sites exceed any level that would be considered acceptable under any reasonable circumstances. Finally, at page 7, Current states that “[t]here is no reason to expect more interference in a rural environment.” That claim is simply wrong. The graph above shows that man-made noise levels are much lower in rural areas than they are in urban areas, so the amount of degradation of the noise levels will be much greater. This statement is one of many that shows that Current either does not understand, or simply denies, the adverse impact of the radiated emissions from BPL on radiocommunications systems.

8. At page 17 of its Opposition, after denigrating the utility of the Amateur Service and suggesting that it should be protected to a lesser degree from interference from unlicensed, at-sufferance BPL systems than should other licensed radio services, Current attempts to bolster the importance of BPL versus critical infrastructure industry services by claiming that BPL transmissions “will carry both emergency communications by consumers and utility company management of critical infrastructure.” ARRL would urge Current and any other BPL provider to seriously revisit this idea, as it would be

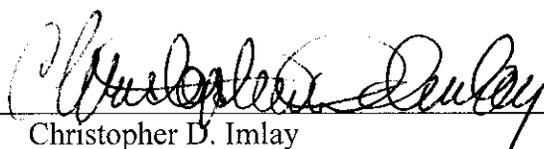
unwise indeed. BPL is entitled to no protection from interference at all and it can neither expect nor claim any such protection. In fact, laboratory tests conducted by ARRL's technical consultants and other Amateur groups reveal that even low levels of RF will disrupt BPL transmissions. See, <http://www.arrl.org/tis/info/HTML/plc/degrade.html>. For this additional reason, any investment in BPL as a reliable communications medium, much less one that will carry critical infrastructure communications is dangerously misplaced.

Therefore, for all of the above reasons, ARRL, the National Association for Amateur Radio, again requests that the Commission reconsider, rescind and re-study in further proceedings the rules governing Access Broadband Over Power Line systems in accordance with ARRL's Petition for Reconsideration, and in this case specifically the issues discussed hereinabove.

Respectfully submitted,

**ARRL, THE NATIONAL ASSOCIATION FOR  
AMATEUR RADIO**

By: \_\_\_\_\_

  
Christopher D. Imlay  
Its General Counsel

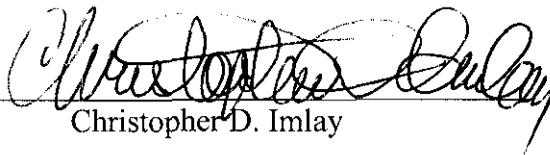
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April 1, 2005

**CERTIFICATE OF SERVICE**

I, Christopher D. Imlay, do hereby certify that I caused to be mailed, via first class U.S. Mail, postage prepaid, a copy of the foregoing **REPLY TO OPPOSITION TO PETITION FOR RECONSIDERATION**, to the following, this 1<sup>st</sup> day of April, 2005.

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