Before the
Federal Communications Commission
Washington DC 20554

In the Matter of	
Inquiry Regarding Carrier Current Systems, Including Broadband over Power Line Systems	ET Docket No. 03-104

REPLY COMMENTS OF CURRENT TECHNOLOGIES, LLC

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August 20, 2003

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Current Technologies, LLC files these reply comments in response to the Commission's Notice of Inquiry on Broadband over Power Lines (BPL) in the above-captioned proceeding.[1]

A. Summary

BPL is a technology whose time has come. The Commission correctly identified broadband connectivity as an important contributing factor for individual opportunity and national economic growth. Yet today only 16% of U.S. households have broadband access. Most of those subscribe to either cable or DSL service, but economic and technical considerations limit the reach of both technologies. BPL, in contrast, builds on the existing power infrastructure and in principle can go anywhere. It is one of the few technically and economically viable approaches to residential and small-business broadband delivery. The prompt commercial deployment of BPL will significantly further the public interest.

Not surprisingly, telephone and cable interests call for delay and over-regulation in a transparent effort to hinder competition from BPL. Some broadband companies, presupposing that BPL-providing utilities will engage in discriminatory pole attachment policies and other

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[1] *Inquiry Regarding Carrier Current Systems, Including Broadband over Power Line Systems*, 18 FCC Rcd 849 (2003) ("Notice").

anticompetitive behavior, seek advance preventative measures. But there is no basis to expect that such abuses would ever occur; and if they did, the Commission has ample mechanisms to correct them. Anticipatory rules would be burdensome and wholly unwarranted.

Other BPL opponents, particularly amateur radio operators, are deeply concerned about interference from BPL installations. Some 4,000 have filed with the Commission to say, "The sky is falling." But 4,000 wrong filings are still wrong. The amateurs' fears rest on serious misconceptions about the properties of BPL. The amateurs imagine a city's power lines will create a city-size antenna driven by millions of operating BPL devices. But the reality is very different. In Current Technologies' implementation, the electric wires do not radiate at all, except for a short stretch immediately adjacent to an operating BPL device. From a few meters away, the device and nearby power line collectively resemble a point source of emissions, much like a personal computer or CD player. Moreover, along a medium-voltage distribution leg -- typically extending many blocks -- Current Technologies' system allows only one medium-voltage device to operate at a time; and similarly, in the half-dozen or so residences served by a typical transformer, only one modem or other low-voltage device can operate at a time. Because transformers are usually spaced hundreds of feet apart, only a few devices in total can operate simultaneously over a block-sized area. This fact, coupled with the rapid drop-off of signal strength from a point source emitter (due to free-space attenuation), means there is no harmful aggregation of emissions. Current Technologies' implementation of BPL is a safe, non-interfering technology.

With that in mind, we advocate the least intrusive technical rules that protect licensed services from interference. Because medium-voltage devices must be installed either high on a

pole or within a metal transformer housing, they can radiate safely at Class A limits even in residential areas without posing interference concerns to licensed users. There should be no separate limits on conducted emissions (except perhaps in the AM broadcast band), as these have no bearing on interference.

Prompt adoption of BPL rules will benefit consumers and utilities alike. Consumers will gain from additional facilities-based competition in broadband delivery. Many will have access for the first time to their *only* source of broadband service. Utilities will acquire an internal telecommunications facility that provides for better network management and load control, including faster response to emergencies -- capabilities whose importance became dramatically clear in the August 14 blackout.

We urge the Commission to complete this rulemaking as quickly as possible.

B. BPL is Ready to Deploy

The first-round comments offer a clear showing that BPL is ready for the move from trial deployment to commercial service.

The parties to this proceeding include several BPL service providers, technology companies, and BPL-related associations. They show that technical problems that blocked BPL in the past have been solved economically and efficiently. Service providers report successful real-world trials involving hundreds of homes served and thousands of homes passed. (Current Technologies itself has two trial BPL deployments underway serving more than 200 users.) Technology companies offer creative ideas for engineering practical and reliable BPL systems that can compete with other broadband delivery technologies in both price and performance.

To be sure, some providers disagree on certain details of technical regulation. We discuss those issues below, in Part E. But the differences are relatively minor. Taken together, the BPL industry comments evidence a facilities-based broadband technology ready to serve the American public.

Utilities need BPL. Several commenting utilities point out that BPL will improve the safety and efficiency of power distribution in the U.S.[2] BPL enables utilities to offer enhanced power distribution services such as automated meter reading, outage detection, power quality monitoring, load management, and substation monitoring. These capabilities directly support the Nation's homeland security priorities by protecting an important part of U.S. critical infrastructure. There are frequent localized incidents for which improved power outage prevention, detection, and restoration capabilities would significantly benefit energy consumers at the local level. In addition, the August 2003 blackout that shut down several states and parts of Canada highlighted unexpected fragilities in the interstate transmission grid and prompted political leaders to call for more investment and attention to improvement in power distribution generally. BPL is part of that process, as it offers utilities a cost-efficient way to leverage their huge investment in infrastructure to improve and maintain security and reliability of power distribution, as well as the internal communications systems needed to keep electricity flowing to consumers.

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[2] *See, e.g.*, Cinergy Corp. at 3-4; Hawaiian Electric, at 2-3; Southern Company *et al*, at 3-4.

C. The Commission Should Ignore Competitors' Efforts to Obstruct BPL.

Some franchised cable operators and DSL providers seek to delay the introduction of BPL. At the moment, cable and DSL benefit from an effective duopoly in residential broadband services. One or the other has a monopoly in many areas. Rates are high because consumers have few broadband options -- or none at all, outside the limited areas where cable and DSL broadband are available. These providers may seek to preserve their advantage by interposing unnecessary regulatory impediments to BPL.

A clear example of this effort is the suggestion that the Commission not only require BPL industry standards *before* it takes regulatory action, but that BPL's most implacable opponents, including cable TV providers and amateur radio operators, participate in the standards process.[3] No one can seriously believe that BPL providers and those actively seeking to thwart the technology will agree on standards in any reasonable time frame. This is nothing more than a mechanism to eliminate BPL as a competitive threat.

A similar dilatory proposal would postpone authorizing BPL until proponents have "identified and addressed *all foreseeable safety and interference issues*."[4] This plainly impossible task is calculated to achieve nothing but regulatory gridlock. And the reference to safety issues is misdirected: the Commission lacks both jurisdiction and expertise. The same utilities that have provided power safely for over a century will continue doing so while they offer BPL. Safety considerations are paramount in any BPL development or deployment. No

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[3] Verizon at 6-8.

[4] Qwest at 2 (emphasis added).

utility would permit BPL on its network if it posed the slightest threat to safety. In any event, these matters are outside the scope of the present proceeding.

Moreover, such calls for broad regulatory intervention over merely hypothetical interference are misplaced. For decades, the Commission has successfully prevented interference from Part 15 technologies by establishing emissions limits reasonably calculated to protect other spectrum users. That is all the Commission need do here. The Part 15 rules will continue to provide the necessary incentives, penalties, and enforcement tools to induce manufacturers and users of unlicensed devices, including BPL equipment, to comply with the Commission's emissions limits and prevent harmful interference to licensed spectrum users. A request for anything more is simply an attempt at delay.

Claims of anticipated anticompetitive conduct are unfounded. Several cable companies accuse BPL of *possible* anticompetitive behavior.[5] These parties suggest that electrical utilities providing BPL may deny pole access to cable operators or may misuse cable attachment data to design an anticompetitive BPL system.[6] They hint that utilities interested in BPL may already be imposing "unreasonably burdensome" pole requirements on cable operators.[7] One company complains of past pole attachment problems and assumes they may become worse when electric utilities compete with cable companies for broadband customers.[8] One of the largest monopoly

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[5] Joint Cable Operators at 2-4.

[6] Joint Cable Operators at 2-4.

[7] Joint Cable Operators at 5.

[8] Knology at 2-4.

local telephone providers in the U.S. suggests that electric utilities might leverage their electric-power monopoly to benefit BPL, although it does not say how.[9]

Any such concerns about anticompetitive behavior are speculative, to say the least. BPL's non-existent market share renders it harmless as a competitor. Pole attachments are stringently regulated;[10] and any anticompetitive use of pole attachment data would violate the utility's obligation to provide "nondiscriminatory access."[11] Cable operators and CLECs with grievances against utilities enjoy easy access to detailed complaint procedures.[12] Any allegations of burdensome or discriminatory pole requirements belong there, not in this rulemaking. Certainly, one company's proposals designed to counter *anticipated* unlawful behavior are outrageously burdensome and completely unjustified.[13]

One CLEC goes so far as to suggest that the time it to takes to resolve pole attachment disputes gives BPL a head start over cable.[14] The notion of BPL having a head start in the provision of broadband is ludicrous. Cable companies have been offering broadband service for years, last year had 11.4 million lines and 57% of the broadband market, and increased their line count by 61% during 2002.[15] BPL's customer base is presently zero, and it enters the market after

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[9] Qwest at 4-5.

[10] *See* 47 C.F.R. Secs. 1.1401-1.1418.

[11] 47 C.F.R. Sec. 1.403(a).

[12] 47 C.F.R. Secs. 1.404-1.414.

[13] Knology at 4-6.

[14] Knology at 3-4.

[15] *High-Speed Services for Internet Access: Status as of December 31, 2002*, Industry Analysis and Technology Division, Wireline Competition Bureau at Table 7 (released June 2003); *Federal Communications Commission Releases Data on High-Speed Services for*

cable and DSL have presumably already signed up the most motivated and easiest-to-serve customers.

Electric utilities do have a monopoly, but in a business unrelated to broadband. It is ironic to hear telephone and cable providers objecting to the utilities' plan to support a competitive offering on monopoly facilities. Not only do both have long-standing monopolies of their own, in local telephone and cable service, but those monopolies are in related communications businesses. Telephone and cable providers are busy leveraging those monopoly businesses to further their broadband enterprises. In contrast, BPL lacks the huge advantage of a pre-existing communications customer base, let alone the many millions of broadband customers that cable and DSL are serving today, and must first struggle through the regulatory process just to get started. If BPL competes effectively with cable and DSL, it will do so by offering better service at lower cost.

Protecting telephone service. Finally, some of the telephone carriers claim they are concerned about interference from BPL into telephone wiring, particularly into VDSL (which is not yet available in this country).[16] While this issue may warrant study, the telephone carriers have not cited any rule that requires BPL to protect DSL service. Although Part 15 devices are obliged to avoid causing "harmful interference,"[17] that term is defined solely as interference into

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Internet Access at 2 (released June 10, 2003).

[16] Sprint at 3; Verizon at 4-6. Undercutting the case for such interference is the fact that some vendors are collocating DSL and BPL capability *in the same device.*

[17] 47 C.F.R. Sec. 15.5(b).

radio services.[18] DSL (and VDSL) do not come within the range of technologies protected from Part 15. To the contrary, DSL and BPL are competitive services with co-equal status under the rules.

D. Concerns About Interference Rest on Misinformation and Misunderstandings about the Technical and Operational Characteristics of BPL.

At this writing, the docket contains over 4,000 filings alleging potential interference from BPL into amateur radio receivers. All but a small handful of these show near-total ignorance of BPL's real-world technical characteristics -- including the characteristics of Current Technologies' BPL systems -- and simply embrace the unsupported assertions of other filers. These submissions begin with incorrect data and reach wrong conclusions.

Even the anti-BPL filings of well-established associations, such ARRL, suffer from serious errors. Unlike the thousands of one-page filings from individual amateurs, ARRL presents what may appear on the surface to be well-developed, well-explained analyses and simulations. But ARRL's starting assumptions are factually wrong, and that makes its end results wrong as well.

The amateurs' picture of an Access BPL system consists of an antenna the size of a city -- hundreds of miles of transmission line all radiating RF energy.[19] It includes millions of BPL network devices all emitting interference simultaneously. This image postulates emissions from all of the wiring and all the devices accumulating to overwhelm sensitive radio communications.

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[18] *See* 47 C.F.R. Sec. 2.1 (definitions of "harmful interference" and of terms used therein).

[19] *E.g.* ARRL at 2 n.1.

This might be a frightening picture, if it were true. But the facts are otherwise. As we explain below, Current Technologies' real-world BPL networks present none of the dangers the amateurs fear.[20]

1. BPL radiates from isolated points, not from an entire power line.

BPL devices do not use power lines as antennas. They use power lines to *conduct* data signals, not to radiate them. Current Technologies' BPL emissions radiate almost entirely from a short segment of line immediately adjacent to where the BPL device is attached. From a few meters away, the signal closely resembles that from a point source. In that respect it is much like other common sources of radio-frequency noise, such as computers and household appliances.[21]

Figure 1 shows measured data taken directly under a medium-voltage power line with a Current BPL Access unit installed and operating. Lines on the graph compare the measured data to emissions from a point source ($1/R^2$) and to emissions from the entire power line, as in the amateurs' calculations ($1/R$). The plot plainly shows the emissions falling off in point source fashion even directly under the power line itself. This has two important consequences. First, emissions drop off very rapidly away from the BPL device. Second, the common misperception that BPL creates a city-sized antenna is simply wrong. In Current Technologies' implementation, a BPL system radiates from a number of isolated points -- and only a few of those, as we see below.

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[20] The representations below are true of Current Technologies' system. We cannot speak for other providers or equipment vendors. But at the very least, our system provides an "existence proof" that non-interfering BPL is possible.

[21] Even the Commission incorrectly characterizes BPL signals as radiating from the wires as though they were antennas. *E.g.* Notice at paras. 21, 23.

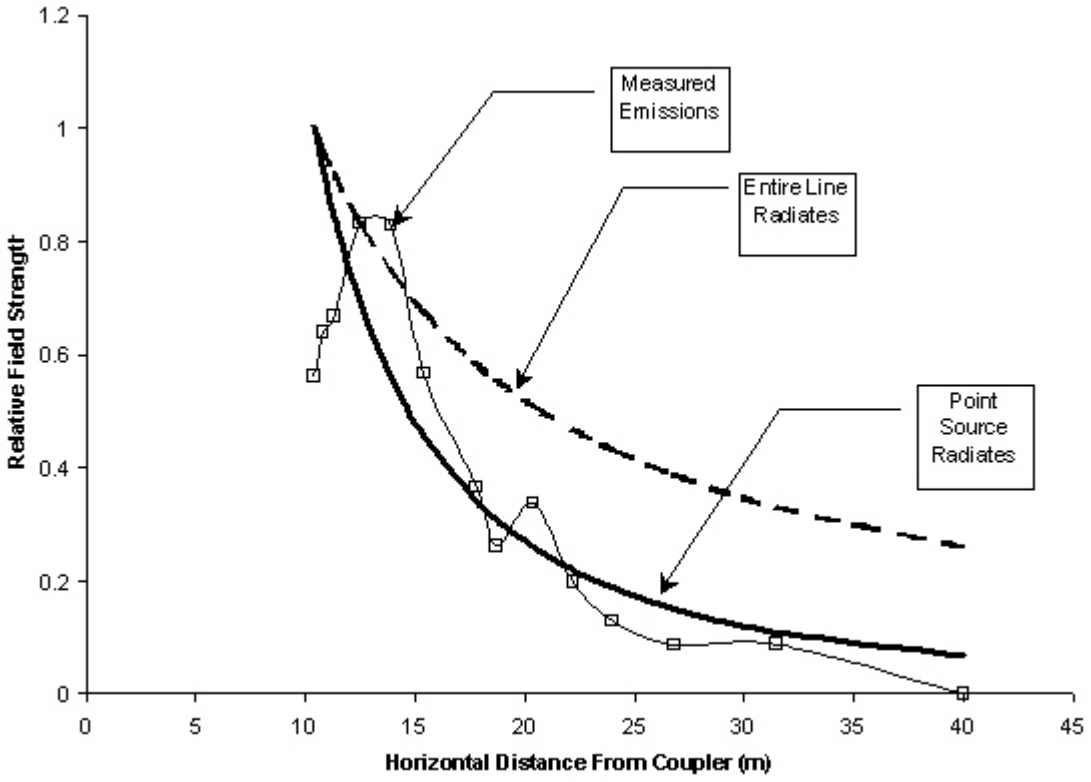

Figure 1

2. Only one interconnected BPL device can operate at a time.

BPL opponents assume that thousands of BPL devices will operate simultaneously over a small area. That, too, is incorrect. In Current Technologies' Access BPL system, only one device on a medium-voltage distribution leg -- typically many blocks long -- can transmit at a time. The total emissions from all devices on medium-voltage wires over a span of many blocks add up to only one device. Low-voltage devices, including end user modems, may be closer together; but the HomePlug standard, which Current Technologies leverages on low-voltage and in-home wiring, likewise allows only one device served by a given transformer to transmit at a time. Again, the total emissions from all devices on low-voltage wires served by one transformer add up to only one device.

In short: *only two BPL devices at most can operate simultaneously in conjunction with a given transformer* -- one medium-voltage device and one low-voltage device. In Current Technologies' implementation, even these operate at different frequencies, so they cannot affect the same receiver. Transformers are typically spaced several tens to hundreds of meters apart. As a result, the geographic density of devices operating at any instant is extremely sparse -- far lower than PCs, power supplies, PDAs, and other popular devices.

3. BPL emissions do not aggregate harmfully.

BPL opponents assume that noise signals from multiple BPL devices will aggregate in such a way that additive emissions will raise the noise floor and interfere with communications. As noted above, however, Current Technologies' BPL devices operating at a given instant are well separated. Only two devices at most -- on different frequencies -- can operate over several tens of meters. And emissions drop off rapidly with distance. As a result, emissions cannot accumulate in a victim receiver. Compared to signals from the nearest BPL emitter, the combined signals from all others are negligible. The "cumulative" emissions from BPL devices are no greater than those from commonplace unintentional emitters.[22]

4. BPL bandwidth has no effect on interference.

Some parties refer to the relatively high bandwidth of BPL signals as exacerbating interference. In fact, however, over the range of frequencies contemplated for BPL -- below

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[22] To evaluate aggregation, we compare the aggregated signal at a victim receiver from several emitters some distance away to the signal from a single emitter nearby. Suppose a BPL-equipped transformer is located on a pole 9 meters above the receiver. We compare its interference potential to that from 10 other BPL-equipped transformers, each 100 meters away (although devices operating simultaneously are much farther apart in practice). The total signal at the receiver *from all 10 distant BPL devices combined* is only 8% of the signal from the device overhead. Thus, only the nearest device produces significant signal at the receiver. There is no relevant aggregation.

about 80 MHz[23] -- the bandwidth of an interfering signal has no significant effect. Most receivers in this range have relatively narrow passbands, typically 25 kHz or less.[24] The emissions outside a victim receiver's passband have no significant effect on interference to that receiver. The overall bandwidth of a BPL system thus has no bearing on its propensity to interfere.

* * * *

In practice, the interference potential of even a city-wide system consisting of Current Technologies BPL equipment is no worse than widely scattered unintentional emitters of the kind found in every home and office. The entire BPL system, miles in extent, comes down to nothing more than isolated point sources, tens or hundreds of meters apart, whose emissions signal strength decays rapidly with distance. Even ARRL concedes that such systems will not contribute significantly to radio interference.[25] Indeed, if the more alarming interference scenarios described in the docket had any validity, then the proliferation of cash registers, PCs, hair dryers, and untold millions of other emission sources would have shut down radio communications long ago.[26]

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[23] Notice at para. 15.

[24] The are some exceptions, such as VHF TV channels 2-5 at 54-72 and 76-82 MHz, which we address below.

[25] "The present Part 15 regulations were designed to protect against interference from devices that would radiate or conduct signals on a localized basis." ARRL at 20.

[26] Overly alarming scenarios from ARRL are not unusual. In one Commission proceeding after another, the amateur radio community has foretold a high risk of interference from whatever technology is under consideration. Just a few recent examples include radio frequency identification systems (ET Docket 01-278); foreign nationals' use of the Family Radio Service (RM-10521); post-WRC rule updates (ET Docket No. 02-305); 24 GHz unlicensed operation (ET Docket No. 98-156); U-NII Devices at 5.74-5.725 GHz (RM-10371); spread

E. Technical Issues

1. Emissions limits

The current regime of Part 15 emissions limits for unintentional radiators has been extraordinarily successful, both in preventing interference and in promoting the development of myriad products that produce small amounts of RF energy as a byproduct. The rules for digital devices -- the category to which BPL couplers and modems belong -- have an extra degree of flexibility. Limits for Class A devices, marketed for use in commercial, industrial, or business environments, are about 10 dB higher than for Class B devices intended for residential use.

Some BPL proponents request departures from the digital device rules. One would extend the limits presently in effect below 30 MHz to all frequencies up to 40 MHz.[27] Another would allow emissions higher than those in effect today by tens of dB.[28] Current Technologies reserves judgment on changes of this magnitude pending interference studies. While we would support rule changes that enable BPL to compete more effectively through the delivery of greater bandwidths over longer distances, we understand that such changes, if they increased the likelihood of interference, could hinder BPL deployment by attracting additional opposition. We look forward to further review and engineering analysis of these proposals to confirm the extent to which they can be implemented without causing harmful interference to licensed users.

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spectrum operation (ET Docket No. 99-231); low-power operation at 2300-2305 MHz (RM-10166); and ultra-wideband (ET Docket No. 98-153). Inevitably, this degree of one-sided consistency invites an air of skepticism in evaluating of ARRL's positions.

[27] Ambient Corp. at 5.

[28] Satius, Inc. at 3-7.

Other parties would permit Class A emissions on medium-voltage lines,[29] or more than 30 meters away from a residence,[30] or anywhere on Access BPL systems.[31] At a minimum, expanding Class A treatment to medium-voltage Access BPL is fully warranted and well supported by basic engineering principles. Class A devices can reach more homes along a medium-voltage leg, and so deliver service at less cost. And Class A emissions are safe if sufficiently distanced or shielded from potential victim receivers. For that reason, we recommend allowing Class A emissions for BPL devices that are either mounted high on a pole or enclosed within a metal curb-side housing on medium-voltage wiring, whether in commercial or residential neighborhoods.[32] As an extra precaution, however, the Commission may wish to hold BPL devices to Class B in the TV and FM bands in residential areas.[33]

2. Protecting other services

Several parties seek special protection for individual services: TV broadcasting;[34] microwave-based broadband delivery at 2.3 GHz (Miscellaneous Wireless Communications

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[29] Main.net at 5; UPLC at 11; Southern Linc. *et al*. at 19-22.

[30] Amperion, Inc. at 6.

[31] Electric Broadband at 8.

[32] Class A emissions high on a pole, 9 meters above a victim receiver, are lower than Class B at 3 meters (within 1 dB). *Compare* 47 C.F.R. Secs. 15.109(a) and (b) (distance conversions pursuant to 47 C.F.R. Sec. 15.31(f)(1)).

[33] Ambient Corporation (at 7-8) proposes to notch out individual frequencies "on the fly," in response to short-term changes in the RF environment. The BPL device would automatically avoid frequencies on which it detects a strong signal. But protection is needed for weak signals, not strong ones. And we see no way of identifying which weak signals in the environment are intended for receivers close to a given BPL device. This proposal does not seem practical.

[34] Association for Maximum Service Television, Inc., and National Association of Broadcasters.

Service), 2.4 GHz (unlicenced), and 2.1 and 2.5 GHz (ITFS and MDS);[35] radio astronomy;[36] amateur satellite operations;[37] and all amateur allocations in the MF, HF, and VHF bands.[38]

Some of these requests are reasonable and can be accommodated while still permitting economic deployment of BPL. For example, we support protection of TV broadcasting allocations at Class B levels. Given the point-source nature and widely spaced dispersion of BPL devices operating at any instant, Class B levels will be as effective in protecting these services from BPL as they are in affording protection from PCs, CD players, and other consumer devices. Similarly, as for services above 2 GHz, we do not foresee BPL posing any realistic threat. Again, Class B limits should suffice.

We are less sympathetic to the extreme requests from amateur radio. ARRL does not specify emissions limits or even the exact bands it wants to protect, but it does claim that Part 15 limits will result in received signals at 34-65 dB higher than ambient noise.[39] Protection at that level is not only wholly impracticable, but unprecedented in the Commission's Rules. Moreover, as explained in detail above, the ARRL analyses rest on a fundamental misunderstanding of BPL device characteristics. ARRL's uninformed requests for protection disserve the Commission and the regulatory process. In the end, the BPL systems using Current Technologies equipment --

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[35] Wireless Communications Association International.

[36] National Academy of Sciences Committee on Radio Frequencies.

[37] Radio Amateur Satellite Corporation at 3.

[38] ARRL at 10.

[39] ARRL at 11-12. ARRL also discusses the interference that amateurs have received in the past from non-BPL power lines. ARRL at 3-4. Whatever may have caused that interference has no bearing on BPL and is not germane to this proceeding.

unlike those hypothesized by ARRL -- are no more likely to cause interference than the hundreds of millions of unintentional emitters already in use.[40]

3. Measurement procedures

As with any new technology, an important part of the regulatory process for BPL is the establishment of efficient measurement procedures that accurately assess interference potential. But we agree that deployment of BPL need not await agreement on those procedures.[41] Continued application of the existing procedures is at least an effective short-term option while the Commission and industry develop techniques for the longer term.[42] Current Technologies also supports a proposal that the Commission delegate the measurement issues to industry.[43]

The Commission should make clear, however, that its limits will be based only on radiated emissions. Conducted emissions have no direct bearing on interference, outside the AM broadcast band, and so should not be regulated at all.[44] Even an implementation that results in

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[40] ARRL's mistaken conclusions are based largely on computer models. Yet ARRL itself concedes that the models give misleading results. ARRL says: "One conclusion that can be drawn from this study is that it is not practical to try to model a complex installation that consists of overhead power lines, all the other lines that are present nearby such as guy wires, telephone and cable television wiring, and all the wiring in nearby buildings, the configuration of which cannot be determined. Added to that confusion are the unknown losses in the transformers, street lamps, and constantly changing electrical loads in the buildings drawing power from the system. *The only reasonable conclusion is that it is not possible to determine the interference potential of BPL wiring with a computer model*." ARRL at 15 (emphasis added).

[41] Electric Broadband at 11.

[42] UPLC at 13-14.

[43] Electric Broadband at 10-11.

[44] Notice at para. 20. Today most plug-in receivers use switching power supplies and filters at the AC input that eliminate any realistic concerns about interference from conducted emissions introduced by way of the power cord.

high conducted emissions should be unobjectionable so long as the radiated emissions stay within limits. Most commenting parties agree with this approach.[45]

Again based on its misapprehension that a BPL system is a "physically large radiator,"[46] ARRL first insists on measurements at short increments along the length of the power line, but then concedes that may be impossible due to restrictions on access to land.[47] Similarly, ARRL rejects controlled laboratory measurements as inadequate, insisting that systems must be measured *in situ*,[48] yet it also rejects the Section 15.31 procedure requiring measurements at three typical or representative installations.[49] In the end, ARRL appears less interested in realistically assessing the interference potential of BPL than in simply obstructing the technology. We hope an improved understanding of BPL's limited interference potential -- as demonstrated in Current Technologies' BPL equipment -- will encourage ARRL's constructive participation.

CONCLUSION

Of the 16% of U.S. homes with broadband service,[50] fully nine out of ten are served by just two technologies: DSL, mostly via the local telephone company, and cable modem service,

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[45] Ameren Energy Communications, Inc. at 13-15; Southern Linc. *et al*. at 23-24; HomePlug Powerline Alliance at 7-9; PowerWAN, Inc. at 4. Main.net favors specifying radiated emissions on medium-voltage lines, but conducted emissions on low-voltage lines. Main.net at 8.

[46] ARRL at 15.

[47] ARRL at 16.

[48] ARRL at 15.

[49] ARRL at 16.

[50] *Federal Communications Commission Looks at Data on Growth of Broadband Subscribership in Rural Areas* at 2 (released Aug. 6, 2003).

via the local cable provider.[51] For both technical and economic reasons, both tend to be concentrated in the more densely populated areas of the country. DSL is presently limited to service addresses within a few thousand feet of a telephone central office, while the cost of upgrading a cable system for high-speed data access shows the greatest return in residential neighborhoods where it passes the greatest number of potential customers. Both considerations encourage broadband deployment where residences are close together.

BPL will be less subject to both technical and economic limitations. BPL rides on the existing electrical distribution infrastructure, which already reaches every computer-using home and business in the country. And the incremental cost of equipping a power system for broadband delivery is relatively low.

Where broadband service is already available, the addition of BPL to a market will improve service and reduce costs. Just as wireless telephone prices came down sharply when PCS providers offered competition to the two cellular carriers in each market,[52] the addition of BPL to the cable-DSL mix will force down prices for broadband access.

In short, BPL will bring the benefits of broadband to many more U.S. homes and small businesses, and can do so at a reasonable cost. As shown in detail above, it will not cause harmful interference to other users of the spectrum.

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[51] ARRL (at 19) claims there is a "multitude, and probably sufficient array, of competitive broadband delivery mechanisms," but declines to identify them.

[52] *1998 Biennial Regulatory Review*, 17 Comm. Reg. 404 at para. 83 (1999); *Petition for Forbearance for Broadband Personal Communications Services*, 13 FCC Rcd 16857 at para. 22 (1998).

The technical problems that impeded BPL have been solved. Now only regulatory issues remain. We urge the Commission to issue a Notice of Proposed Rulemaking and to move toward the adoption of rules as quickly as possible.

Respectfully submitted,

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August 20, 2003

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