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

In the Matter of	)	
	)	
Carrier Current Systems, including Broadband over Power Line Systems	)	ET Docket No. 03-104
	)	
	)	
Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems	)	ET Docket No. 04-37

COMMENTS ON NOTICE OF PROPOSED RULE MAKING (NPRM)

Introduction

1. While I support the goals of the FCC and the current United States' administration in providing broadband connections for the people of this country, I have concerns about a widespread implementation of Broadband over Power Lines (BPL), or Power Line Communications (PLC) as it is known in the rest of the world. This comment on the NPRM for ET Dockets 03-104 and 04-37 regarding Access BPL (and related In-House BPL) is written from the standpoint of a Shortwave Listener, as a FCC-licensed Amateur Radio operator (K9IUA), and as an end-user of broadband at home (Mediacom cable service). I appreciate very much the FCC declaring all current implementations of BPL as falling under Part 15 of FCC rules, which covers low-powered, unlicensed devices, and therefore defines the necessary testing and identifies the need for BPL to accept any and all interference caused to it by licensed services. At the same time, however, I am still very concerned about the level interference that Access BPL devices, and the related In-House BPL devices, will cause to nearby radios, regardless of whether BPL/PLC becomes a widespread reality or just limited in scope. Of particular concern to me is the effect on important utility services, such as Maritime, Aviation, and all health, welfare, and emergency response agencies, and to listeners of licensed international broadcasting.

Regarding Part 15 (Paragraphs 1, 5, 6, 33, 34, 36, 39, and others)

2. I acknowledge that Access BPL and In-House BPL are currently permitted under Part 15 rules on permissible power/emission limits. I want to congratulate the FCC on their wisdom of keeping BPL/PLC within Part 15 as an unlicensed, low-power service. This indicates that the FCC desires to protect existing licensed services in the HF and low-VHF frequencies. This also should be a clear warning to current and prospective Access BPL providers that they must abide by these rules, that they must protect the incumbent licensed services, and that they must be prepared to accept any and all

interference to the broadband service as ingress from an FCC licensed user.

3. This should also mean that all BPL service providers need to make it clear to their subscribers that the possibility of interference, and therefore interruption to broadband access, is real and that their service could be subject to intermittent and longer term slow-downs and interruptions. It should be in the best interest of the BPL providers to protect themselves by having **all Access BPL subscribers sign a waiver form** that acknowledges that they, the user, understand these problems and will accept the interference and interruptions to service. This should also serve to warn current and potential Access BPL providers that they must proceed with caution as they implement service to an area and that they must both design their system to be as clean and interference-free as possible, and to deal with issues of interference pro-actively.

Regarding Reporting Needs (Paragraph 43)

4. I want to congratulate the FCC on requiring further identification and reporting needs for providers of Access BPL, and I thank the FCC for asking for comments on how this should be done.

5. It is my belief that Access BPL providers should have their reporting needs implemented as a three-level system:

(1) that a **unique identification number and contact information** must be provided **at eye-level at each site**, whether it be a power pole containing Access BPL equipment on the overhead power line or on the outside cover of a ground-level transformer for underground installations;

(2) that **a central database** designated by the FCC contain a record for each Access BPL device, including Lat/Long. coordinate location information, the unique identification number for that site, the equipment type, owner, and basic operational information on type of transmission method used (e.g., OFDM, etc.);

and

(3) that a **utility or provider-based database**, accessible over the Internet and containing **real-time, dynamically updated information,** specifies the **current range of frequencies being used by each Access BPL device**, both for distribution of broadband data to end-users and that it is monitoring for upload of data from the user.

The latter database is particularly important, especially its nature of being dynamically and immediately updated in real-time. Any person should be able to go to the power pole or transformer box providing Access BPL and then be able, using the provided identification number, access this database and be able to verify whether this device is

indeed the device potentially providing interference or not. The Access BPL providers will need to have this information in a database anyway for their own operational needs – they should be required to make it accessible in real-time to the public as well. A side benefit of this being public information is that the customer service representatives for the Access BPL may actually get fewer complaint calls.

Regarding International Treaty Obligations (Paragraph 14 and others)

6. I appreciate the attention that the Access BPL providers are paying to meeting the interference-free needs of amateur radio, and thankful for the work of the ARRL and other groups in identifying interference and working with the Access BPL providers on methods to mitigate. But while amateur radio interference is getting much of the attention (and I am such a licensed amateur radio operator, on-the-air regularly, almost exclusively, in the HF frequencies of the 80 to 10 Meter bands), I must note that they are not the only licensed users to be concerned about. Another significant group are shortwave listeners, whose numbers are not known because the users themselves are not licensed by the FCC, but who could in all reality exceed the number (especially if measured world wide) of licensed amateur radio operators. These are people who listen to, and often rely upon, news and programs from international broadcasters. I have been doing so since the mid-1970s, regularly listening to two or more hours each and every evening, plus often on Saturday mornings. I regularly listen to the world-renowned BBC World Service, Radio Netherlands, Radio Canada International (including their associated CBC programs), Radio Japan, Radio Australia, and countless other stations to get news and programs from an international perspective. All of these broadcasters operate from licensed services in each of their respective countries, and therefore collectively represent a licensed service.

7. The FCC is required to observe the rights of other nations to broadcast without interference to listeners in the United States on frequencies allocated by the International Telecommunications Union (ITU) exclusively for this purpose. The United States is a member of the ITU, an international organization within the United Nations system. [1]

8. ITU Radio Regulation 4.11 reads: "Member States recognize that among frequencies which have long-distance propagation characteristics, those in the bands between 5 and 30 MHz are particularly useful for long-distance communications; they agree to make every possible effort to reserve these bands for such communications. Whenever frequencies in these bands are used for short-range or medium-distance communications, the minimum power necessary shall be employed."

9. ITU Radio Regulation 15.12 reads: "Administrations shall take all practicable and necessary steps to ensure that the operation of electrical apparatus or installations of any kind, including power and telecommunication distribution networks, but excluding

[1] This paragraph, and the restatement of ITU Radio Regulations 4.11 and 15.12, are from the NASWA draft comments to Docket ET 04-37, http://www.anarc.org/naswa/bpl/nprm_comments.html

equipment used for industrial, scientific and medical applications, does not cause harmful interference to a radio communication service and, in particular, to a radio navigation or any other safety service operating in accordance with the provisions of these Regulations."

10. While I appreciate the efforts of Access BPL system providers to avoid the amateur radio frequencies, Regulation 15.12 also indicates that they must be avoiding the international broadcast frequencies as well. I understand that many of the Access BPL and In-House BPL equipment providers are designing devices with the capability whereby their equipment can recognize when a nearby carrier is present that affects the broadband traffic and take steps to avoid that frequency. This is all well and good for dealing with interference to the BPL system from a licensed service, but how does that help in the case of shortwave listeners? A shortwave radio does not generate a carrier, at least not one that should be noticeable on the frequency being received. So how is Access BPL and In-House BPL equipment (such as HomePlug Alliance equipment) supposed to know how to mask out a range of frequencies?

11. From what I can tell, the equipment won't. Therefore I am particularly concerned about the potential for BPL to interfere with, if not significantly eliminate, the ability of shortwave radio listeners to hear signals on the international broadcasting frequencies unless these frequencies are also "masked" from use by the BPL equipment.

Regarding ITU Treaty Frequencies to "Protect" (Paragraphs 5, 16, 40-42)

12. U.S.-based Access BPL providers and their equipment must be prepared to protect (i.e., not interfere with) the following ranges of frequencies that are likely to be in use by amateur radio operators and shortwave listeners in broadband service areas. These are the ITU treaty-specified frequency ranges for ITU Region 2, which covers the United States (contiguous 48 states), Canada, and Mexico:

Amateur Radio: 1.80 to 2.00 MHz ("160 Meter band"), 3.50 to 4.00 MHz ("80 Meter band"), 7.00 to 7.30 MHz ("40 Meter band"), 10.10 to 10.15 MHz ("30 Meter band"), 14.00 to 14.35 MHz ("20 Meter band"), 18.068 to 18.168 MHz ("17 Meter band"), 21.00 to 21.45 MHz ("15 Meter band"), 24.890 to 24.990 MHz ("12 Meter band"), and 28.00 to 29.70 MHz ("10 Meter band"), plus five specific frequencies (each 3+ kHz wide) at 5332, 5348, 5368, 5373, and 5405 kHz (the "60 Meter band").

International Broadcasting ("shortwave radio"): 2.300 to 2.495 ("120 Meter band"), 3.200 to 3.400 MHz (90 Meters), 3.900 to 4.000 MHz ("75 Meter band"), 4.750 to 5.060 MHz ("60 Meter band"), 5.900 to 6.200 MHz ("49 Meter band"), 7.100 to 7.350 ("41 Meter band"), 9.400 to 9.900 MHz ("31 Meter band"), 11.600 to 12.100 MHz ("25 Meter band"), 13.570 to 13.870 MHz ("22 Meter band"), 15.100 to 15.800 MHz ("19 Meter band"), 17.840 to 17.900 MHz ("16 Meter band"), 18.900 to 19.020 MHz (15 Meters band",

21.450 to 21.850 MHz ("13 Meter band"), and 25.670 to 26.100 MHz ("11 Meter band")

13. I personally use all of the Amateur Radio frequency bands from 80 Meters through 10 Meters, and regularly listen to international broadcasters in the 49 Meter to 16 Meter bands. Major international broadcasters, such as the BBC World Services, Radio Australia, and Radio Japan, utilize most of the major HF shortwave bands for their broadcasts that are intended for and receivable in the United States, with the 49 Meter to 16 Meter bands being the most utilized.

14. Access BPL providers need to understand and appreciate how these frequency bands are used, and how their usefulness can vary dramatically throughout the day, from day by day, throughout the year, and even from year to year as propagation and the sunspot cycle varies. For instance, they need to realize that amateur radio operators, by the changing nature of propagation and target areas to communicate to/with, can easily use all bands in any given day. It will not be unusual for an amateur radio operator to be on 10 Meters or 15 Meters during the day, and then 40, 80, or even 160 Meters a few hours later once the sun sets. And they will vary their frequency used, changing frequencies as often as once a minute or less, both within and between bands. Shortwave listeners will be similar. For instance, in one evening's time, I may be listening to Radio Canada International on 13.710 MHz in one hour, and then switch to the BBC World Service on 11.835 MHz for the next hour, and maybe also switch Radio Sweden on 9.435 MHz at the half hour, all within a two-hour span. The next night, because propagation and sunspots have changed, the same broadcasts may now only be heard on 11.990, 9.825, and 6.010 MHz respectively. What a difference one day can make, let alone a hour. And then six months later, as we have shifted from the summer to the winter season, the appropriate frequency bands for a given hour of the day will be entirely different, and the broadcasters themselves will be using an entirely different set of specific frequencies.

Are Access BPL providers prepared to deal with such a dynamically changing environment? I doubt it, but they need to be!

15. There are additional licensed radio services, and therefore frequency ranges, that Access BPL providers need to be prepared to protect, which again represent ITU treaty obligations, including (but not limited to):

International time stations, typically at 2.5 MHz, 5.0 MHz, 10 MHz, 15 MHz, 20 MHz, and 25 MHz, including our own WWV and WWVH NIST stations

Maritime: 2.000 to 2.107 MHz, 2.170 to 2.194 MHz, 4.000 to 4.438 MHz, 6.200 to 6.525 MHz, 8.100 to 8.815 MHz, 12.230 to 13.200 MHz, 16.360 to 17.410 MHz, 18.780 to 18.900 MHz, 19.680 to 19.800 MHz, 22.000 to 22.855 MHz, 25.070 to 25.210 MHz, and 26.100 to 26.175 MHz.

Aeronautical: 2,850 to 3.155 MHz, 3.400 to 3.500 MHz, 4.650 to 4.750 MHz, 5.450 to 5.730 MHz, 6.525 to 6.765 MHz, 8.815 to 9.040 MHz, 10.005 to 10.100 MHz, 11.175 to 11.400 MHz, 13.200 to 13.360 MHz, 15.010 to 15.100 MHz, 17.900 to 18.030 MHz, 21.924 to 22.000 MHz, and 23.200 to 23.350 MHz.

16. Given the health/safety concerns regarding the Maritime and Aeronautical radio uses in particular, I would suggest that those frequencies must specifically be notched from use by any Access BPL or In-House BPL device within a "safe distance" of a fixed licensed site in those radio services. (For instance, I would suggest no BPL on those frequencies within 5 miles of a site, unless FCC tests can show a safer, closer distance for limitation.)

17. Also, given the limited nature of the receivers, and particularly the filtering, used in any of the above radio services, I would conservatively suggest that all of the above frequencies ranges for the amateur radio service, international broadcasting, time, maritime, and aeronautical radio services need to be protected or guarded by an additional window of 5 to 10 kHz beyond the stated edge of the frequency band. International shortwave signals, being amplitude modulation, are easily 5 kHz wide on both sides of the stated frequency. The reality is that few radios will have DSP filtering, let alone "brick wall" filtering, that is able to handle noticeable interference within 5 kHz or less plus/minus. Therefore you need to get the BPL signals outside of the filtered passband of the radio to not be interfering. This should be especially so for the licensed services that deal with health and safety traffic, such as the maritime and aeronautical services – you would hate to learn that a Mayday or SOS call for help was missed due to interference from an Access BPL or In-House BPL device or service provider!

Regarding Adaptive Interference Mitigation (Paragraphs 40 and 41)

18. I appreciate the need for Access BPL (and In-House BPL) equipment to "adapt" to their operating environment, both in minimizing interference to licensed services and in being interfered to from these services. As discussed above, Access and In-House BPL equipment need to be adjusted to "notch" frequency ranges from use, including a sufficient extra amount (such as 5 to 10 kHz) as a guard, in order to not provide interference to existing licensed users. Known ranges of frequencies need to be notched out, including all amateur radio bands, international shortwave bands, and international time signal frequencies. In addition, as needed locally, the maritime, aeronautical, and other fixed stations frequencies (such as those utilized by government and military users) must also be notched.

19. At the same time, however, I am concerned about adaptive methods that only deal with detected carriers or implement only "on-the-fly notching." As noted in my discussion above, I can appreciate the ability of the BPL equipment to detect a local

carrier interfering with the BPL device, and remove that particular frequency from use. I understand that the HomePlug Alliance products use this methodology. This adaptive approach will certainly help protect BPL users from interference by the mobile ham radio or CB radio operator, which are short-term users. But it won't protect for the long-term.

20. I see three problems or issues with this methodology: (1) adaptive filtering doesn't provide sufficient protection with a wide enough protected area; (2) adaptive filtering does not help shortwave listeners one bit, and (3) the need for adaptive controls on both the Access BPL (download) and home upload devices.

21. The notching of a single frequency will not help much for interference to licensed users if the adjoining frequency spots used by the BPL device, each 1.1 kHz away in some implementations of BPL, are still too close. The adaptive methods need to be wider than a single spot frequency to not cause interference.

22. Shortwave listeners will not be detected by this methodology, as we don't generate radio signals of our own. How will the Access BPL or In-House BPL equipment detect the fact I'm listening to the BBC on 5.975 MHz? It won't. Therefore this approach will not solve this interference problem unless the entire international broadcasting bands are notched out.

23. What the NPRM fails to distinguish sufficiently, nor does the limited public information available on BPL from manufacturers and providers seem to note, are the specifics on both directions of broadband traffic and the fact that there are really two (2) devices involved. Most attention seems to be focused on the Access BPL equipment and the frequency ranges it will use to provide broadband <u>to</u> the home. That equipment is more easily controlled by the Access BPL provider. But what about the equipment in the home, and in particular the upload or return path of broadband traffic from the end-user? The home equipment must equally be controlled to prevent interference, both by it's own adaptive techniques (such as that used in HomePlug Alliance devices) and by service provider control. Two (not one) ranges of frequencies are involved – the range of frequencies used to provide data to the users <u>and</u> the range of frequencies used to get data back from the user. Two devices need to be notching and adapting frequencies. If the Access BPL should suddenly need to change its frequency range to account for interference, will the in-house device automatically know how to find the new frequency range without the home user needing to restart their computer or the BPL device? If a specific frequency gets notched by either BPL device, is that change automatically detected by the other device without interruption to service?

24. The lack of information from the BPL equipment designers on how adaptive measures will be implemented leaves too many questions unanswered, and leaves too much room for speculation and concern that the BPL is in fact not suited for the task at hand with respect to required Part 15 protections to licensed users.

Regarding Benefits of Access BPL (Paragraphs 10 – 12)

25. I don't deny the perceived benefits for Access BPL by the power utility companies and limited expense involved in setting it up and running. No one denies the ubiquitous nature of the power grid. The "holy grail" of broadband has been the goal of high-speed connections to the home for the "last mile." Power lines, by already being in place, certainly appear as a ready-to-use and convenient method.

26. But just because power lines and BPL equipment exists doesn't mean they are truly the best means to provide broadband. None of the power utilities who have tested BPL have explained the economics. And just like other current broadband providers that have initial subscription rates that appear low, and Access-BPL seem no different that I can tell, the system hasn't been around long enough to know if the long-term economics will match.

27. While I certainly appreciate the thought of providing broadband to "rural and other underserved locations" (Paragraph 12), I am dismayed that none of the current tests for BPL are in such areas. Instead all seem to be in suburban and urban areas, many of which are already served by existing broadband services. If competition with existing services is really the desire, then I believe the utilities would find it better to add a new service that provides significantly more capability for the end-user. Instead they seem to be providing a broadband service that is likely to be no faster and quite possibly less reliable (due to interference to the BPL distribution system from outside licensed services) than existing broadband services. Rural areas, and smaller communities, are in my mind actually much better locations to provide broadband by methods such as Wireless ISPs (WISP) with newer networking techniques such as "mesh net."

Regarding Access BPL Improving Power Distribution/Reliability (Para. 13)

28. The stated goal, if implemented by Access BPL, of managing distribution systems over power lines, quite frankly, has me nervous. I can understand and appreciate the desire for power utilities to improve on their monitoring and switching controls. The recent power shutdown in the Northeastern United States, as well as the rolling blackouts in California during the power crisis, are ample evidence that such improved systems are needed. I can understand the value, for instance, of running fiber-optic cable to their substations and major distribution points to improve on the direct communications and power-switching needs. But if they plan to use Access BPL signals themselves, which can be interfered with or otherwise go down with a loss of power on the grid, to in turn control the system, then they'd better be prepared for further disasters to happen.

29. Important power-control systems must run independent, with all the built-in redundancy needed, to insure reliability and functionality. When the power does go down, so does Access BPL. If Access BPL traffic of home and office users is being degraded by interference from outside the system, then so too are the power control

signals being interfered with, which are suggested in Para. 13 to be broadband traffic. Interference to the BPL system will not discriminate based on the type of broadband traffic being transmitted. I would not want the important control features of the power grid subject to interference problems. Unreliable control is not a means for meeting MEVA requirements!

Regarding Amateur Radio Antennas and Power Lines (Paragraph 35)

30. I hate to say it this way, but the statement by the FCC that amateur radio operators will have already adjusted their antennas to account for nearby power lines (Paragraph 35) is almost "laughable" (to use one particular word). Yes, in general that is true, but two important points need to be made:

(1) The FCC, of all agencies, should be able to appreciate the need for antennas to be adjustable to maximize propagation and transmission of a signal to/from a target area. That means for many operators who contact stations in all 360 degrees around their house that their antennas must rotate or otherwise be able to radiate in any or all directions as needed. Either way, the goal is communication with target areas of interest, not avoidance of interference. Most shortwave listeners will have the same goals.

(2) Properly working, "clean" power transmission lines do not generate that much interference most of the time. What causes interference are power lines that not clean and not properly functioning. Bad transformers, arcs across gaps with broken insulators, wires rubbing, and broken street lamps are what cause noise and interference from power lines!

31. What is frustrating about BPL is that folks are now talking about placing wideband HF frequency signals on these power lines. Signals that are, according to measurements by the ARRL and other organizations, going to heard with potentially a level of S9+16dB (a -86.4 dBW signal within the 30 microvolt/meter limit for measurement).[2] That is now something entirely different than simply a power line and its normal noise!

Looking Forward, not Backwards

32. In my opinion, the widespread implementation of broadband should be utilizing new technology and techniques, not stepping backwards. I would much rather have the power utilities explore the use of new standards, such as the proposed 802.16x WMAN or WiMax technologies. These higher powered, licensed and unlicensed systems in the 5 Ghz frequency range would be better, especially if they can be paired with 802.11x systems networked using "mesh net" protocols of sharing and routing traffic from device

[2]Estimated power level from ARRL calculations,
http://www.arrl.org/tis/info/HTML/plc/files/C63NovPLC.pdf

to device to serve a community.[3] The BPL system being developed by Corridor, which I understand uses 5 Ghz signals on powerlines sounds very promising as well. I challenge the existing and future BPL providers to look forward, and to find solutions that do not interfere with licensed services. The HF radio spectrum is a very precious gift with unique abilities to support long-distance radio communications. Please don't destroy it, as there is nothing that can replace it and there is no new radio spectrum is being created.

Respectively submitted,

Kevin L. Anderson
1565 Alta Place
Dubuque, Iowa 52001-5849

Shortwave listener and
ARS licensed as K9IUA

[3] See for instance the Telebria RuralMesh system in the United Kingdom, http://www.telebria.com, or LocustWorld MeshBox systems, http://www.locustworld.com/. These relay-based systems are apparently being tested in such places as Santa Rosa, California (known as RoofTop) and Menlo Park, California (known as SkyPilot). MeshNetworks, a firm in Maitland, Florida, is developing a ambitious system that will include support for all ranges of mobile devices in addition to the home users.