

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

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

**COMMENTS OF VERIZON<sup>1</sup>**

**Summary**

Broadband over Power Line (“BPL”) promises to be yet another facilities-based broadband platform – in addition to the several other existing facilities-based platforms – poised to challenge the cable companies that dominate the broadband mass market and eventually provide an alternative to the long distance carriers that dominate the business segment.

The emergence of BPL, along with the many other largely deregulated alternative broadband platforms ranging from cable to satellite to fixed wireless to WiFi and others, reinforces the urgent need for the Commission to classify all broadband services under Title I and to treat all broadband providers equally. Local wireline companies face a host of burdensome regulatory obligations when they provide broadband, while their competitors operate largely free from regulation. In order for broadband to provide the greatest benefits to American consumers and the economy, broadband services by all providers must fit within a coherent regulatory scheme that treats all competitors equally and harmonizes the rights and obligations of all broadband providers. This means a

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<sup>1</sup> The Verizon telephone companies are the local exchange carriers affiliated with Verizon Communications Inc. listed in Attachment A.

deregulatory national policy that frees all providers of broadband services to compete vigorously. And, although the Commission should encourage the deployment of BPL along with other broadband technologies and services, it must also ensure that this deployment does not interfere with existing and future telecommunications services. The best way for the Commission to do so is to encourage the development of industry standards for BPL to protect against interference with other communications technologies or devices, and, based on these standards, to modify its Part 15 rules to the extent necessary.

**I. The Prospect of BPL Underscores That The Commission Must Treat All Broadband Providers Equally.**

This country is still in the early stages of broadband deployment. So far, the broadband marketplace has developed competitively, with multiple facilities-based providers competing head-to-head. *See, e.g., Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Establish Rules and Policies for Local Multipoint*

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*Distribution Service and for Fixed Satellite Services*, 15 FCC Rcd 11857, ¶ 19 (2000)

(“The record before us, which shows a continuing increase in consumer broadband choices within and among the various delivery technologies — xDSL, cable modems, satellite, fixed wireless, and mobile wireless, suggests that no group of firms or technology will likely be able to dominate the provision of broadband services”).

Although competition exists in the broadband market, cable companies currently dominate the mass market for broadband and the interexchange carriers have the overwhelming advantage in the large business market.

The introduction of this new and different facilities-based platform – free of the regulatory burdens imposed on local wireline companies – underscores how imperative it

is that the Commission treat *all* broadband providers equally. Local wireline companies are subject to a host of crippling regulations that do not apply to their competitors. Cable, satellite, and the various wireless providers are free to offer broadband transmission on a non-common-carrier basis – or, indeed, not to offer transmission on a stand-alone basis at all – while telephone companies are obliged to operate as common carriers under Title II. The interexchange carriers that enjoy a giant market-share advantage in the larger business segment are treated as non-dominant in their provision of broadband and also avoid most of Title II’s more onerous regulations. Local telephone companies, on the other hand, are subject not only to the full range of Title II regulations but also to a host of additional requirements under the *Computer Inquiries* rules.

This regulatory scheme makes no sense in a market with so many competitive alternatives, and with still other competitive alternatives continuing to emerge. This proceeding makes clear that the Commission must craft a national policy that subjects the broadband services of *all* facilities-based providers, including BPL, to minimal regulation and treats all broadband providers the same. The Commission cannot continue to leave certain aspects of the market deregulated while maintaining the regulatory burdens that hamper others. The broadband Internet access and transmission provided by local telephone companies are functionally identical to the broadband Internet access services and transmission provided over cable modem, satellite, or wireless, and, presumably, that will be provided over BPL. The rules in place across all platforms must be the same, and any regulatory freedoms available to BPL must be available to all providers.

## **II. The Commission Should Encourage The Deployment of BPL Along With Other Broadband Technologies and Services, But Ensure That It Does Not Interfere With Existing and Future Telecommunications Services.**

The Commission must ensure that the rollout of BPL does not interfere with existing and future telecommunications services, including voice, DSL, and VDSL services. BPL clearly has the potential to create significant interference problems with telecommunications services. BPL systems can operate either inside a building (“In-House BPL”) or over utility poles and medium voltage electric power lines (“Access BPL”).<sup>2</sup> Both types of systems use existing electrical power lines as the transmission medium, injecting radio frequency energy on power distribution cables. The power cables used for BPL, however, were originally designed for transmitting electrical power and thus are unshielded and unbalanced. As a result, when these cables are used to transport the higher frequencies used for BPL – frequencies in the 9 kHz to 30 MHz range – they may “leak” or emit part of the high frequency energy in the form of electromagnetic radiation (or “radiated emissions”). In addition, the current flowing through the power distribution system may also cause “induction” into telecommunications outside plant cabling as well as customer premises cabling and equipment.

Through both radiated emissions and induction, BPL may adversely affect a variety of telecommunications services, for example:

**Voice and DSL Services:** BPL may potentially interfere with existing voice and DSL service. Telecommunications equipment contains “non-linear” electrical devices

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<sup>2</sup> *Inquiry Regarding Carrier Current Systems, including Broadband over Power Line Systems, Notice of Inquiry, ET Docket No. 03-104, FCC 03-100 (Apr. 28, 2003) (“NOP”) at 1-2.*

(devices with input and output voltages that are not related by a linear function). When bombarded by the high frequencies used by BPL, these devices may demodulate these signals – or extract the low frequency signals from the high frequency signals – and produce “noise” that can degrade voice and DSL services.

The magnitude of this interference will depend on a number of factors: the frequency spectrum of the interfering signal, the BPL signal strength, and the condition and arrangement of the power system grid, among others. It is clear, however, that the interference will be greater if the power cables are in close proximity to telecommunications cables or equipment. If a telecommunications cable or drop wire is located within a few yards of a power cable, the strength of the BPL emissions will be greater, interference will be more likely, and the magnitude of the interference will be greater than if the distance were a few hundred yards. Thus, if BPL is installed close to telecommunications equipment and facilities carrying voice or DSL signals – for example where telecommunications equipment is co-located on the same utility pole as BPL equipment or where telecommunications cables run in parallel with power line cables for some distance – there is a strong potential for interference with voice or DSL service.

**VDSL**: BPL may also potentially interfere with the next generation of DSL technology, VDSL or Very High Bit Rate Digital Subscriber Line service. VDSL – although not yet widely deployed in the United States – has been run in various trials in the United States and Europe and more than 2.5 million lines are deployed worldwide, mostly in Asia. VDSL can provide data rates of up to 52 Mbps downstream, which makes it capable of high-speed applications such as multiple television channels, HDTV, and interactive services.

Industry groups promoting BPL have already claimed use of a frequency spectrum that overlaps with the frequency bands set for VDSL by an American National Standards Institute (“ANSI”) accredited standards developer.<sup>3</sup> This overlap means that radiated emissions from HomePlug products have the potential to interfere with VDSL service, particularly where lines are located close to electric power lines used in connection with In-House BPL products.

### **III. The Commission Should Consider Changes to its Part 15 Rules Only After Industrywide Technical Standards Are Established for BPL.**

The *NOI* asks whether the Commission should revise its Part 15 rules to address the impact of BPL. Since interference generated by BPL systems may impact telecommunications as well as other critical services, the Commission must be sure that the inference aspects of BPL are fully understood before revising its Part 15 rules. The Commission will be in the best position to do so when industry standards have been established.

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Unlike telecommunications services and equipment, there are no industry standards or technical requirements for the operation of BPL. Before taking any regulatory action, the Commission should encourage the development of industry standards for BPL. This standards setting process must be open to all interested parties including power companies, telecommunications providers, cable TV operators, manufacturers of BPL systems, Ham radio operators, and other affected parties. It is also

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<sup>3</sup> The T1E1.4 Digital Subscriber Line working group of ANSI-accredited standards developer, Standards Committee T1 - Telecommunications, has produced a trial use standard (“T1.424”) which defines the physical layer modulation schemes and transceiver protocols for VDSL. That standard defines the upstream VDSL frequency bands as 25 - 138 kHz, 3.75 - 5.2 MHz, and 8.5 - 12 MHz, and the downstream VDSL frequency bands as 25 kHz to 1.1 MHz, 1.6 - 3.75 MHz, and 5.2 - 8.5 MHz. As the *NOI* notes, the HomePlug Powerline Alliance has developed In-House BPL equipment specifications that utilize the frequency spectrum between 4.5 to 21 MHz. *NOI* at 8.

critical that the standards setting process include the development of a measurement and assessment program to characterize the change in the electromagnetic environment caused by BPL and to assess the effect of those changes on telecommunications and cable TV systems. The assessment program should focus not only on the frequency spectrum to be used by BPL systems, but also on the harmonics of such systems and the effect of modulation in producing unwanted out-of-band energy. For example, an effective measurement and assessment program would include the formulation of a test plan, power and telecommunications plant characterization, real-world measurements, data analysis, and characterization of the susceptibility of various communications.

Some potential interference problems may in fact be resolved during the standards setting process. For example, the Institute of Electrical and Electronics Engineers, Inc. (“IEEE”) has developed two standards that address voiceband noise caused by power cables.<sup>4</sup> Also, in recent years the Home Phonenumber Networking Alliance (“HomePNA”) developed a technology for high-speed home networking that uses the existing phone wires in the home to allow several PCs to share a single Internet connection. Initial deployments of HomePNA were capable of generating radio interference and were also highly susceptible to nearby amateur radio transmissions. These problems were resolved by the development of the Version 2.0 HomePNA specifications, which excluded use of the amateur radio frequency spectrum. A similar approach could be adopted for BPL.

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<sup>4</sup> See IEEE 776-1992, *IEEE Recommended Practice for the Inductive Coordination of Electric Supply and Communication Lines*, Institute of Electrical and Electronics Engineers, Inc., New York, NY, 1993; IEEE 1137-1991, *IEEE Guide for the Implementation of Inductive Coordination Mitigation Techniques and Application*, Institute of Electrical and Electronics Engineers, Inc., New York, NY, 1992.

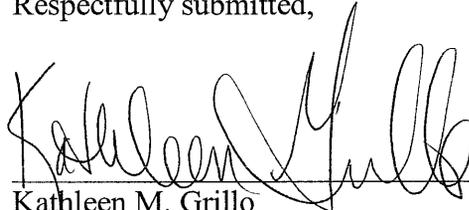
After the standards setting process is completed, the Commission may need to modify its Part 15 rules. As the *NOI* recognizes, the existing Part 15 rules may not be adequate to protect other services from interference from BPL. Part 15 may need to be revised to define the frequency spectrums that BPL must avoid to prevent interference or to limit emissions in certain frequency spectrums. Moreover, when BPL is widely deployed, the wire structures carrying the BPL signals are likely to form an “antenna array” and signals from multiple sources connected to the same antenna will combine to produce emissions. Thus, the Commission may need to institute system emission limits in addition to emission limits for individual devices.

Within the past two years, several companies have conducted field trials of BPL, including Main.net, Southern Telecom, Amperion, American Electric Company, Ambient, and Con Edison. The Commission should tap into the results from these trials and encourage future ones before revising its Part 15 rules. The impact of BPL will be best understood after more testing and field trials by BPL equipment vendors and power companies.

**CONCLUSION**

The Commission should encourage the deployment of BPL along with other broadband technologies and services, and should do so with minimal regulation, but must extend this regulatory freedom to all broadband providers. And, in encouraging BPL technology, the Commission must also ensure that BPL does not interfere with other telecommunications services.

Respectfully submitted,



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THE VERIZON TELEPHONE COMPANIES

The Verizon telephone companies are the local exchange carriers affiliated with Verizon Communications Inc. These are:

Contel of the South, Inc. d/b/a Verizon Mid-States  
GTE Midwest Incorporated d/b/a Verizon Midwest  
GTE Southwest Incorporated d/b/a Verizon Southwest  
The Micronesian Telecommunications Corporation  
Verizon California Inc.  
Verizon Delaware Inc.  
Verizon Florida Inc.  
Verizon Hawaii Inc.  
Verizon Maryland Inc.  
Verizon New England Inc.  
Verizon New Jersey Inc.  
Verizon New York Inc.  
Verizon North Inc.  
Verizon Northwest Inc.  
Verizon Pennsylvania Inc.  
Verizon South Inc.  
Verizon Virginia Inc.  
Verizon Washington, DC Inc.  
Verizon West Coast Inc.  
Verizon West Virginia Inc.