

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

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

To: The Commission

**REPLY COMMENTS OF
SOUTHERN LINC,
SOUTHERN TELECOM, INC., AND
SOUTHERN COMPANY SERVICES, INC.**

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EXECUTIVE SUMMARY

The comments in this proceeding demonstrate the exciting potential for Access BPL to improve the quality and reliability of electric utility service to the public and to serve as a new facilities-based platform for broadband communications services.

Technical and market trials of this technology are underway, and more are expected, with the expectation that commercial service to the public could be provided in the 2004-2005 timeframe, if not sooner. The Commission is therefore urged to move promptly to remove regulatory uncertainty regarding this technology and to revise its rules as appropriate.

Despite the seemingly large numbers of negative comments, the vast majority of these comments have been filed by amateur radio licensees in response to the rigorous, and remunerative, lobbying campaign of ARRL, the National Association for Amateur Radio. Moreover, neither ARRL nor the individual commenters provide any technical support for their argument that Access BPL cannot operate in bands used by amateur radio licensees. Other comments, from cable television operators, local exchange carriers, and wireless Internet Service Providers, would seek to impose conditions on Access BPL intended to advantage their own broadband operations in order to deter, or prohibit, utilities from deploying this competitive technology platform.

Comments from the manufacturers and users of Access BPL equipment confirm that these systems can be operated in compliance with the limitations of Part 15, and that no complaints of harmful interference have been received. In fact, a number of

commenters request, and Southern concurs, that the Commission should initiate appropriate revisions to Part 15 to relax the emissions limitations for Access BPL systems in order to improve service and spectrum efficiency, and ensure that Access BPL can be made available on a cost-effective basis to as many potential users as possible.

Southern also joins a number of commenters who call for the convening of an industry technical committee to promptly develop standardized measurement procedures for verifying compliance with the Part 15 emissions limitations.

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Pursuant to Section 1.415 of the FCC's Rules, Southern Communications Services, Inc. d/b/a Southern LINC, Southern Telecom, Inc., and Southern Company Services, Inc. (collectively referred to herein as "Southern") hereby submit their Reply to the Comments filed on the FCC's *Notice of Inquiry* in the above-captioned matter.¹ As discussed more fully herein, the Comments indicate that there is strong support for BPL as a technology that can improve utility operations and provide competitive broadband access service, and that BPL systems can be operated without causing harmful interference to other spectrum users.

¹ In re Inquiry Regarding Carrier Current Systems, including Broadband over Power Line Systems, ET Docket No. 03-104, *Notice of Inquiry*, 18 FCC Rcd 8498 (2003) ("*NOI*"). By *Order*, DA 03-2590, released August 1, 2003, the time period for filing Reply Comments was extended to August 20, 2003.

I. COMMENTS EXPRESS STRONG SUPPORT FOR BPL

Commenters recognize that the timely deployment of BPL would serve multiple critical purposes. In particular, BPL would improve the reliability, quality, and efficiency of electrical distribution systems by permitting utilities to incorporate intelligent devices into their networks. BPL would also introduce broadband Internet access to underserved areas, while increasing competition in the market.

A. Utilities See A Need for BPL to Enhance Utility Service

The record demonstrates that BPL would permit utilities to have communications connectivity to virtually every customer and device connected to the power grid. This ubiquitous communications connectivity would enhance the reliability and quality, and reduce the cost, of electric service by enabling utilities to use high-speed applications throughout their service areas. While reliability, quality, and reduced cost are not mutually exclusive benefits, and appear in virtually every high-speed utility application, commenters have highlighted automated outage detection, monitoring and control devices, and load management as examples of these benefits.

BPL permits utilities to increase the reliability and quality of their electric service through automated outage detection. As Southern stated in its Comments, utilities could use the existing medium- and low-voltage electric distribution plant to create intelligent pathways for increased automation of electric operations. Commenters agree with Southern that the combination of BPL and intelligent devices would immediately alert utilities of areas experiencing an outage and identify the malfunctioning circuit or

equipment causing the problem.² These devices could also serve as a predictive failure mechanism, "detecting signal signatures that occur prior to breakdown of electric grid elements, such as faulty conductors, low voltage transformers, capacitors, fuse devices."³ This automation would result in more precise monitoring and control of the electric system and permit proactive replacement of these elements before they adversely affect the reliability and quality of electric service.

In addition, BPL would increase the quality of electric service by enhancing utility monitoring and control of their systems. While utilities currently employ supervisory control and data acquisition ("SCADA") systems to monitor and control the portion of their electric system up to the substation, commenters assert that BPL could extend the SCADA system from the substation to customers.⁴ As Southern stated in its Comments, an extension of monitoring and control would permit utilities to analyze variations in power quality and take immediate corrective measures to protect sensitive equipment used by high technology manufacturing operations and other industries. Utilities could also improve energy demand management and could reduce reliance on individual customer calls to target system outages.⁵

The reduction in costs is evident in the various load management applications that would become widely available after the deployment of BPL. While Southern's Comments focused on the dramatic reduction in time to restore service following power

² Cinergy at 4; Amperion at 9; PowerWAN at 5-6; Progress Energy at 9-10.

³ Amperion at 9; *see* Hawaiian at 2.

⁴ Cinergy at 3-4; Hawaiian at 2; PowerWAN at 6.

⁵ Hawaiian at 2; Amperion at 9; PowerWAN at 6.

outages, other commenters stress the efficiency of using automatic meter reading, direct load management, demand response programs, and other similar applications.⁶ For example, the implementation of automatic meter reading would lower costs by allowing utilities to avoid visits to customer premises.⁷ The absence of regular or specially requested physical inspections of electric meters would reduce vehicle, labor, and liability costs.⁸ These cost reductions would ultimately benefit utility ratepayers.

In addition to reliability, service quality, and cost reduction, commenters also assert that BPL would promote homeland security.⁹ While some commenters state that BPL would advance homeland security by providing a redundant data communications network,¹⁰ many commenters emphasize the vital role of BPL to the protection of critical infrastructure industries under the Mission Essential Voluntary Assets ("MEVA") guidelines.¹¹ The MEVA guidelines apply to "specific public and private infrastructure assets, such as electric utility assets . . . [and make] utilities . . . responsible to ensure secure infrastructure power for federal facilities, including military bases, and state, city, and local government."¹² The advanced telecommunications services associated with

⁶ PPL Telecom at 4-5; Cinergy at 4; UPLC at 6; Net2Phone at 4; Current Technologies at 2, 8.

⁷ Progress Energy at 9.

⁸ Progress Energy at 9.

⁹ UPLC at 6.

¹⁰ Cinergy at 3; Current Technologies at 8-9; ITI Comments at 2.

¹¹ PowerWAN at 6; Hawaiian at 2-3; Amperion at 9-10.

¹² Hawaiian at 2-3.

BPL would permit utilities to implement video and data applications to increase security of their equipment and improve public safety, thus satisfying the MEVA guidelines.¹³

B. BPL Could Permit Broadband Internet Access to Underserved Areas and Increase Competition

The commenters agree with the FCC and Southern that "[h]igh speed transmission capabilities could enable BPL technology to provide an alternative platform for broadband deployment, which would bring valuable new services to consumers, stimulate economic activity, improve national productivity and advance economic opportunity . . .

"¹⁴

As an initial matter, BPL will provide a new facilities-based platform for broadband competition without the high infrastructure costs normally associated with such deployment.¹⁵ Several commenters state that the deployment of BPL would expand broadband access services to rural and isolated areas that do not currently receive service from DSL or cable modem providers.¹⁶ While the rural and isolated areas are clearly underserved,¹⁷ this problem extends beyond rural and isolated areas to some of our nation's largest cities. For example, the District of Columbia stated that "due to 'technical limitations' inherent with DSL technology, DSL can not provide broadband

¹³ Hawaiian at 2-3.

¹⁴ FCC NOI at 4.

¹⁵ Net2Phone at 3; ITI Comments at 2; Power Line Communications Association at 2.

¹⁶ Cinergy at 3; ITI at 2; PSWN at 1, 4; Amperion at 10.

¹⁷ UPLC at 3; Current Technologies at 8; PPL Telecom at 3-4 ("out of a population of approximately 375,000 PPL Electric customers that have been evaluated for potential BPL service, PPL Telecom estimates that more than two-thirds of these customers do not now have access to equivalent two-way broadband access").

telecommunications service throughout all parts of the [city]."¹⁸ Thus, the record supports Southern's analysis and the FCC's statistical evidence, indicating that many consumers have either limited choices or no choice at all for broadband Internet access services and would welcome another facilities-based platform.

In addition to increasing the availability of broadband connections, commenters assert that the ubiquity of BPL would provide a viable retail and wholesale competitive alternative to cable, DSL, and satellite broadband access services.¹⁹ "The implementation of BPL would simply require additional equipment installed on the already existing infrastructure thereby reducing entry barriers associated with access to last mile facilities."²⁰ This additional competition could also encourage other providers to upgrade their networks, further enhancing the quality and availability of advanced telecommunications services and decreasing the price of the service.²¹

Commenters also concur that the deployment of BPL will stimulate economic activity, improve national productivity and advance economic opportunity. As discussed above, the deployment of BPL would increase economic competition in the broadband access market. Commenters further believe that BPL would "spur local economic

¹⁸ OPC at 2; *see also* PSWN at 1 (noting that the public may not have access to broadband services "because of geographic or other limitations").

¹⁹ District of Columbia at 3; Allegheny Energy Service Corporation at 1; Hawaiian at 3 (favoring an open access model through which it would lease access to other entities).

²⁰ Net2Phone at 3; *see also* Amperion at 11 (stating that BPL "provid[es] another facilities-based medium for last-mile customer connectivity"); Information Technology Industry Council at 2 ("this technology has the potential to become a last-mile solution throughout the United States").

²¹ District of Columbia at 3; Cinergy at 2; Net2Phone at 3-4; PSWN at 1, 3; Current Technologies at 9.

growth" by creating business opportunities for service providers, equipment manufacturers, retailers, and small businesses.²²

Although increased competition and economic growth is in the public interest, commenters identify other benefits that would result from BPL. For example, commenters note that "[c]onnecting rural and isolated areas can provide extended educational and learning services, access to medical information and monitoring, emergency services, as well as e-commerce to those underserved areas."²³

Southern disagrees with the position advanced by the Information Technology Industry Council (ITI) representing major providers of information technology products and services. Although claiming to support policies that will promote rapid development of affordable, high-speed Internet access, ITI recommends that the Commission limit BPL to "cases where other services do not or will not exist in the near future."²⁴ However, when one considers that ITI's membership includes AOL-Time Warner and other companies with a vested interest in limiting competition to existing broadband technology platforms, it is not surprising that ITI would seek to limit consumer access to BPL. The Commission should not, however, engage in the competitive "red-lining" that ITI recommends.

²² Allegheny Energy Service Corporation at 1; Cinergy at 3; Amperion at 10.

²³ ITI at 2; *see* Cinergy at 3; Current Technologies at 7.

²⁴ ITI at 3.

II. COMMENTS REVEAL THE GENERAL PARAMETERS WITHIN WHICH BPL IS EXPECTED TO OPERATE

A. Spectrum Anticipated to be Used for BPL

Commenters agree with Southern that the commercial deployment of BPL will occur primarily between 1.7 MHz and 50 MHz. While several equipment manufacturers focus on the spectrum between 1.7 MHz and 30 MHz, in accordance with the existing restrictions on conducted emissions,²⁵ many manufacturers also acknowledge that BPL systems could potentially operate up to 50 MHz.²⁶ PowerWAN believes that this wide range of spectrum would enable frequency reuse and allow for frequency avoidance in particular situations.²⁷

B. Spectrum Sharing Between Access BPL and In-House BPL

Commenters agree with Southern that the FCC does not have to designate specific spectrum for use by Access BPL or In-House BPL. Ameren asserts that the FCC does not need to designate particular frequencies because "Access and In-House BPL systems should be able to share spectrum, subject to modification by the utility deploying the system."²⁸ Other commenters also believe that the FCC should allow the industry to develop standards or design systems to avoid conflict between Access BPL and In-House

²⁵ xG at 3, 4; Main.net at 4; Amperion at 4; Electric Broadband at 4.

²⁶ xG at 3, 4; Progress Energy at 2; Main.net at 4; Amperion at 4.

²⁷ PowerWAN at 1.

²⁸ Ameren at 3-4.

BPL systems.²⁹ If the FCC were to designate discrete frequency bands for each type of BPL, it could unnecessarily foreclose innovative network designs.³⁰

C. Modulation and Data Rates

The modulation technique does not affect the ability of a BPL system to comply with the FCC's Part 15 emission limits. The record in this proceeding indicates that vendors generally use typical broadband modulations, either Direct Sequence Spread Spectrum ("DSSS") or Orthogonal Frequency Division Multiplexing ("OFDM"), for Access BPL.³¹ While equipment manufacturers appear to use OFDM more frequently than DSSS,³² commenters implore the FCC not to dictate a modulation technique, but to allow the industry to develop a variety of technological approaches.³³

Commenters also corroborate Southern's assertion that existing data transmission rates for Access BPL compare favorably to DSL and cable modem technologies.³⁴ While Southern anticipated that future data transmission rates could approach speeds twice as

²⁹ Current Technologies at 3, 17-18; UPLC at 5; Phonex at 2 ("It is recommended that the FCC not define BPL frequencies but allow this technology to properly and innovatively grow without undue constraints").

³⁰ Current Technologies at 18.

³¹ Current Technologies at 5 n.3; UPLC at 5 n.12; Main.net at 4.

³² *Compare* Main.net at 4 (DSSS and OFDM) *and* Ameren at 12 (DSSS) *with* PowerWAN at 2 (OFDM); Amperion at 4 (OFDM); Enikia at 2 (OFDM); *and* Current Technologies at 5 n.3 (OFDM).

³³ Electric Broadband at 4; UPLC at 5 ("the modulation technique employed by different BPL systems is a negligible factor in regards to emission measurements"); *see also* Phonex at 3 (asking the FCC to "allow the market place to determine the development of In-House BPL").

³⁴ Cinergy at 2 (stating that broadband access has reached speeds more than four times the speed of DSL during field tests); Ameren at 5 (speeds are competitive with cable modem and DSL).

fast as the current generation of cable modems, utilities and equipment manufacturers suggest that rates of up to 100 Mbps are feasible for next generation equipment.³⁵ The quality and characteristics of the power lines determines the actual speed of the data transmission,³⁶ but the record indicates that even the lowest range of speeds reached in the field tests are adequate for broadband Internet access service and internal utility operations.³⁷

In addition to the accelerated data transmission rates associated with Access BPL, commenters confirm that Access BPL generally provides users with symmetrical bandwidth.³⁸ In other words, unlike DSL and cable modem subscribers, BPL users may upload and download data at the same rate. Commenters predict that this combination of high data rates and symmetrical bandwidth will enable BPL users to take full advantage of the newest applications on the Internet, such as IP telephony, multi-player interactive video games, and other voice, data, and video services.³⁹

D. Timeframe for Deployment

The record also reveals that BPL is not quite ready for deployment to the general public. While some equipment manufacturers may have developed and placed

³⁵ Main.net at 3 (100 Mbps potentially); PowerWAN at 2 (approximately 100 Mbps potentially); Enikia at 1 (50-100 Mbps or more potentially); Progress Energy at 3 (54 Mbps potentially).

³⁶ Progress Energy at 3; Ameren at 4-5.

³⁷ Progress Energy at 3; Main.net at 3; Electric Broadband at 5.

³⁸ Ameren at 4-5; PowerWAN at 2; Main.net at 4 (either symmetric or asymmetric); Progress Energy at 4 (same).

³⁹ Net2Phone at 3; UPLC at 6; PPL Telecom at 4.

communications devices on the market,⁴⁰ utilities are still in the process of conducting field and market trials of Access BPL.⁴¹

These field and market trials consist of multiple phases of technical and marketplace tests. For example, PPL Electric began characterization testing and construction for a technical trial in late 2001, provided BPL to a limited group of participants in February 2002, conducted an expanded technical trial later in 2002, started testing in another market, expanded the tests in those two markets, but has not commenced the market-trial phase of the testing process.⁴² The multi-phase testing process suggests that deployment of a commercial service by utilities will occur in the 2004-2005 timeframe.⁴³ It is therefore critical that the FCC move promptly to remove any regulatory uncertainty for BPL.

III. BPL COMPLIES WITH PART 15 EMISSION LIMITS

A. Vendors and Users of BPL Equipment Report No Interference Problems with BPL

One of the most significant issues in this inquiry is the compatibility of BPL with other radio services. As noted by a number of commenters, Access BPL systems are

⁴⁰ Current Technologies at 4; Amperion at 5; Electric Broadband at 5.

⁴¹ *E.g.*, UPLC at 2 (noting that nine trials are currently underway with utilities); PPL Telecom at 2 (conducting a trial with Main.net); Hawaiian Electric Company, Inc. at 1 (conducting a trial with Intellon Corporation); Cinergy at 1-2 (conducting a trial with Current Technologies); Progress Energy at 1-2, 4 (conducting a trial with Amperion).

⁴² PPL Telecom at 2-3; Progress Energy at 4-5 (stating that it has held field trials for several months, is currently collecting test data and field experiences for an internal report on the technical feasibility of BPL, and may extend testing to trial markets for several months to determine whether BPL is commercially viable); Main.net at 2-3 (listing status of ongoing evaluation and field trials).

⁴³ PowerWAN at 2 (expecting to deploy Access BPL equipment in 2004).

designed to comply with the the limitations in Part 15 of the Commission's Rules on unintentional radiators. Most importantly, companies that are developing Access BPL hardware and utilities that have deployed BPL systems have reported no cases of harmful interference involving BPL. In its Comments, Southern indicated that it was not aware of any reported cases of harmful interference from use of this technology.⁴⁴ Ameren reports that it has not had a single report of interference in connection with its BPL trial, which runs past approximately 300 homes.⁴⁵ Hawaiian Electric reports that it received no interference complaints during its first three-month deployment of BPL, and that a testing consultant retained by its first BPL vendor discovered no apparent interference issues.⁴⁶ Similarly, Progress Energy, Inc. states that there have been no reported instances of interference during its extensive field trials.⁴⁷

Like the utilities, the manufacturers of BPL equipment have not uncovered any harmful interference from BPL to other radio services. Amperion states that it has several major deployments of its equipment operating in the field, and has had no complaints or instances of interference at any of these sites.⁴⁸ PowerWAN states that its field tests have not resulted in any complaints from either the "customer" or from the customer's

⁴⁴ Southern at 19.

⁴⁵ Ameren at 9.

⁴⁶ Hawaiian Electric Company, Inc. at 4. See also PPL Telecom at 7 (testing and operation of low-speed automated meter reading system with 600,000 customers and broadband BPL system indicates no interference).

⁴⁷ Progress Energy, Inc. at 6

⁴⁸ Amperion at 2

neighbors.⁴⁹ Thus, information from entities most likely to have reports of interference confirms that BPL can, in fact, operate without causing harmful interference to licensed radio services.

B. Opposition to BPL is Largely Based on Unsupported Allegations, Hyperbole and Anticompetitive Motives

Despite the seemingly large number of negative comments filed in this proceeding, the vast majority of these comments raise only unsupported allegations of potential interference from BPL, or raise other issues that have, as their basis, a motive to delay or derail BPL so that it is unable to provide any meaningful competition to the commenters' provision of broadband Internet access services.

1. Amateur Radio

The volume of comments filed by amateur radio licensees is largely reflective of a concerted effort by ARRL to inflate concern over BPL interference without demonstrated instances of interference or sound technical reasons to believe interference will occur.⁵⁰ The majority of these comments lack evidence of harmful interference from BPL and they fail to provide much of a technical basis for their perception that BPL will undermine amateur radio operations.

⁴⁹ PowerWAN, Inc. at 3. See also Electric Broadband at 3 (in its work with leading vendors and utilities who are using BPL technology, no interference issues have arisen under the existing rules for carrier current systems).

⁵⁰ ARRL has reported that its solitation of donations to fight BPL has provided it with a significant source of additional operating revenues, collecting nearly \$193,000 since it started its campaign against BPL. *See, e.g.*, "Amateur Community Responds to Potential BPL Threat," The ARRL Letter, Vol. 22 No. 30, August 1, 2003, available at <http://www.arrl.org/arrlletter/03/0801/> (last viewed August 8, 2003).

Even the comments filed by ARRL, the National Association for Amateur Radio, provide little to support its conclusion that BPL cannot operate in bands also used by amateur radio licensees. ARRL has failed to demonstrate that the limitations in Part 15 would be insufficient for BPL.

One of ARRL's major contentions is that noise from electric power lines is a source of interference to the extremely sensitive receivers used by some amateur radio enthusiasts, and that ARRL has intervened in a number of interference cases over the years to urge cooperation between the utility and the amateur radio licensee. ARRL concedes that most cases are being addressed by the Amateur licensee and the utility without ARRL or FCC intervention, or by the amateur licensee simply accepting whatever interference is being caused.⁵¹ ARRL's own evidence therefore indicates that the largest percentage of interference cases are being resolved. In any event, ARRL is making what could be perceived as a sweeping assessment of the "character qualifications" of all utilities to operate BPL systems just because the power systems operated by some utilities have caused RF interference to amateur radio operations. FCC records would probably show that a substantial number of amateur radio licensees (or individuals operating amateur transmitting equipment without licensing) have caused interference or violated FCC regulations over the years, yet it could not be seriously suggested that no further amateur radio operations should be permitted because of these problems.⁵²

⁵¹ ARRL at 3.

⁵² ARRL has recently advised the Commission that there have been "many thousands of instances of complaints against Amateur Radio operators and in some cases, civil and

Moreover, ARRL has not addressed the legal or factual nexus between environmental noise that can be generated through any of a number of mechanisms on an electric power system and interference from properly functioning BPL systems. As pointed out by Current Technologies, "[w]e are starting with a noisy radio-frequency environment, and the Commission must take that into account in assessing the impact of BPL. No BPL regulation can 're-quiet' the environment back to the pristine state that some commeters prefer."⁵³ While Southern and most utilities try to respond to complaints of RF interference that may be caused by the operation of the electric system itself, it must be acknowledged that there are any of a number of components (including such seemingly passive components such as rusty bolts) that can be implicated when interference is detected around normally operating electric power lines.

By contrast, a BPL system is under the active control of the system user with a finite number of signal generation and insertion points. As pointed out by Amperion, a utility installing a BPL system will have additional incentive to identify power system components that might be generating excessive noise in order to improve the RF environment for the BPL system itself.⁵⁴ Moreover, the RF components in a BPL system will be tested in advance for compliance with Part 15. Thus, ARRL's allegations

criminal actions being filed" due to amateur interference to consumer electronic equipment. *See* "Comments of ARRL, The National Association for Amateur Radio," in ET Docket No. 03-65, filed July 21, 2003, at 20. In that proceeding, ARRL urges tighter rules on immunity from interference for consumer devices, while rejecting the application of receiver standards on the Amateur Radio Service which ARRL characterizes as "fundamentally an experimental service." *Id.*, at 2.

⁵³ Current Technologies, Inc. at 12.

⁵⁴ Amperion Corporation at 9.

regarding noise from electric power lines has no relevance to the deployment of BPL systems under Part 15.

In a similar apples-to-oranges comparison, ARRL questions why utilities would be willing to operate BPL systems in radio bands in which amateur operators transmit with power levels up to 10,000 watts EIRP, when utilities opposed ARRL's request for an amateur allocation in the low frequency (LF) range where amateurs operate with less than one watt EIRP.⁵⁵ As described in the Comments of the IEEE Power System Relaying Committee, utilities operate narrowband Power Line Carrier (PLC) systems in the 10-490 kHz range to protect the electric transmission system.⁵⁶ Unlike BPL, PLC cannot tolerate latency since the control signals sent via PLC must be delivered within 4 milliseconds. The communications portion of a transmission protection system must operate within these parameters to allow sufficient time for automatic circuit protection equipment to identify the location of a fault and to take immediate measures to isolate the fault and thereby limit any electric outage to the immediately surrounding area. Any interference that would interrupt these PLC control signals (for example, during a fault condition) could result in circuit breakers opening in other portions of the interconnected power grid, leaving larger areas without power, or causing severe damage to the electric grid. By contrast, BPL is intended as a *broadband* network for packet communications where a lost data packet can be retransmitted with little disruption. As noted by the Commission

⁵⁵ ARRL at 5-6 and 18-19, citing the FCC's *Report and Order* in ET Docket No. 02-98, FCC 03-105, released May 14, 2003.

⁵⁶ IEEE Power System Relaying Committee at 5-6.

in the quotation included in ARRL's comments, amateur radio interference to a PLC-equipped powerline could "jeopardize the reliability of electrical service to the public."⁵⁷

ARRL states that it has concluded that "it is not possible to determine the interference potential of BPL with a computer model."⁵⁸ Undaunted, ARRL has submitted computer modeling studies purporting to simulate power lines as radiating antennas. While Southern could challenge a number of the assumptions underlying ARRL's analyses, it is sufficient to note that there is a high degree of variability among powerlines and the ways signals on power lines will tend to cancel each other out based on the number of signals on the line, directional changes in the power line, devices on the line, etc. Southern's research to date would suggest that a BPL signal injection point can appear like a point-source radiator, with the powerline having characteristics somewhere between a waveguide and an antenna.⁵⁹ Southern therefore disagrees with ARRL's depiction of a powerline as an efficient antenna for a single, discrete frequency.

Finally, ARRL argues that the Part 15 radiated emission limits presume the deployment of point-source radiators with a localized interference potential, and that these rules were not intended to deal with multiple transmitter or radiating distribution systems operating over large geographic areas.⁶⁰ This supposed intent behind Part 15 is also irrelevant. Part 15 has provided clear guidance for the introduction of a multitude of

⁵⁷ *Report and Order* in ET Docket No. 02-98, FCC 03-105, released May 14, 2003, at para. 18, cited in Comments of ARRL at 6.

⁵⁸ ARRL at 15.

⁵⁹ See, e.g., Current Technologies at 14 (BPL emissions come almost entirely from a short segment of line immediately adjacent to where the BPL device is attached).

⁶⁰ ARRL at 12.

communications devices that are in widespread use in many frequency bands. Despite the millions of cordless telephones, baby monitors, wireless intercoms, wireless microphones, and other low-cost consumer items that have been sold, there has been no evidence that licensed services in the same frequency bands have been rendered useless. With respect to BPL, it is also extremely unlikely that the number of active, simultaneous transmissions in a given cell will approach anywhere near the level ARRL fears. As described by Current Technologies, even though an Access BPL system will have one medium-voltage device at each transformer, only one of those on a distribution leg can transmit at a time. Similarly, In-Home BPL devices conforming to the HomePlug standard are designed to allow only one such device served by a given transformer to transmit at a time.⁶¹ Thus, aggregation of BPL signals is unlikely to occur.

2. Shortwave Broadcasters

The North American Shortwave Association (NASWA) objects to BPL because of concerns that it could interfere with reception in the United States of shortwave broadcasts originating in other countries. No one knows how many shortwave listeners there are in the United States, but Southern appreciates that some U.S. residents enjoy receiving broadcasts originating in foreign countries.

Shortwave signals that arrive here are weak to begin with, since they may originate many thousands of miles away. By the very nature of high-frequency radio propagation, the signals are influenced by seasonal variations, sunspots and even the time of day. In addition, the signals are subject to interference from the shortwave stations

⁶¹ Current Technologies at 14-15.

themselves, several of which may operate on the same or adjacent frequencies. In short, unlike domestic broadcasting, where stations operate on discrete, protected frequencies, shortwave reception can be very much a hit-or-miss proposition.

Given the vagaries of shortwave reception, it is not realistic to seek to “protect” such reception beyond the normal protection afforded to all radio services by operation of Part 15 of the Commission’s rules. Banning BPL altogether, as requested by shortwave broadcasters and listeners, is no more practical than banning sunspots or seasons. Southern is confident that BPL would have little noticeable impact on shortwave listeners. Although Southern disagrees that BPL and shortwave listening are mutually exclusive, on balance, the wider availability of broadband Internet access to a growing user community must be given precedence over any extreme measures that would be needed to preserve the interests of a dwindling constituency.⁶²

3. Radio Astronomy

Southern understands the importance of Radio Astronomy Service (RAS) allocations and has considered the potential impact on RAS as it has evaluated several BPL technologies. First, it should be pointed out that three of the seven frequency bands allocated for RAS would not be impacted since, as noted above, Access BPL systems are

⁶² The British Broadcasting Corporation (BBC) announced in 2001 that it will no longer attempt to serve U.S. listeners. According to news reports on the BBC's decision, BBC officials said that the Internet and digital satellite radio are making shortwave broadcasting obsolete in developed markets like the U.S. "Digital Age Pulls Plug on BBC Shortwave," *USA Today*, June 22, 2001, available at <http://www.usatoday.com/tech/news/2001-06-22-bbc-shortwave.htm> (last visited July 30, 2003). The BBC estimated at that time that there were only about 1.25 million shortwave listeners in North America, with the numbers diminishing. In any event, it should be noted that a large number of international broadcast stations simulcast on the Internet, thus providing an additional means for residents of the U.S. to receive such programming

expected to operate only on frequencies below 50 MHz.⁶³ Southern acknowledges the provisions of Part 15, as cited by the National Academy of Sciences (NAS), which prohibit intentional radiators in each of the RAS bands that would be used for BPL, but this provision would not apply to BPL since it is an unintentional radiator under Part 15. The NAS also points out that Part 15 restricts these bands to only spurious emissions falling below the radiated emissions limits of Section 15.209.⁶⁴ Southern is sensitive to the importance of evaluating spurious emissions and harmonics. In its field work, Southern has found that when in-band radiated emissions comply with the limits of Part 15, any spurs or harmonics are indistinguishable, and unmeasurable, in the system noise floor. When measured in a "quiet" environment away from a powerline, the levels of spurs and harmonics would indicate that they are actually significantly below the system noise floor.

The NAS also suggests that unwanted radiation from BPL could be minimized by keeping the BPL system "perfectly balanced," with equal currents flowing in each of the two conductors and with close spacing between the balanced conductors.⁶⁵ Southern understands and has observed that using a balanced injection does reduce emissions. However, the degree of balance that is achievable is dependent on the immutable laws of physics on the flow of electric current, and it is impossible to have a system that is "perfectly balanced." Even without perfect balance, there can be a measureable reduction in emissions along the line, leaving the injection points as the most significant source of

⁶³ The Radio Astronomy bands are identified in the Comments of the National Academy of Sciences' Committee on Radio Frequencies at 2-3.

⁶⁴ National Academy of Sciences' Committee on Radio Frequencies at 3-4.

⁶⁵ *Id.* at 4.

emissions. Southern is continuing to study the benefits of balanced coupling and is working to find practical ways of using this to optimal advantage.

4. Local Exchange Carriers

Verizon, Qwest, and Sprint express concern that BPL operations could interfere with voice and data services (i.e., VDSL and ADSL2+)⁶⁶ on twisted pair telephone cables located on the same utility poles as the BPL system. It should be noted, however, DSL modems are also classified as Part 15 devices and are not entitled to any greater protection from interference than BPL equipment. Thus, Southern anticipates that the developers and operators of both DSL and BPL equipment will need to cooperate in order to minimize the potential for interference should DSL operations begin to extend into higher frequency bands than currently used.

Qwest argues for adoption of "accounting controls" for BPL operators in order to preclude cross-subsidization with electric service revenues.⁶⁷ Even as Qwest, Verizon and Sprint attempt to impose additional burdens on BPL, they argue for reduced regulation of their own broadband offerings because of the competition that BPL could introduce. While this is not an appropriate proceeding in which to discuss the non-technical regulatory issues associated with BPL or other broadband services, Southern would simply note that the comments of these local exchange carriers seem to be motivated

⁶⁶ Southern understands that VDSL (Very High Bit Rate Digital Subscriber Line) is expected to operate in various band segments between 1.7 and 12 MHz band that would also be used by BPL. ADSL2+ is a recently adopted standard that would use the same spectrum as BPL in the 1.7-2.2 MHz band.

⁶⁷ Qwest at 4-5.

more by *competitive* interference from BPL than any demonstrated potential for *radiofrequency* interference to their own services.

5. Cable Television Operators

The purpose of the NOI is to address technical issues related to BPL and to determine whether any changes are needed to Part 15 to better accommodate this technology. However, a few cable television commenters have attempted to expand the review of BPL technology to request specific regulatory changes in order to advantage their own broadband operations and to deter or prevent utilities from providing competitive broadband services using BPL.⁶⁸ Specifically, these commenters have raised issues related to the FCC's jurisdiction to regulate pole attachments under Section 224 of the Communications Act of 1934, as amended. Although Commissioner Copps noted in his separate statement accompanying the NOI that there are several non-technical issues related to BPL, he also acknowledged that that these issues should be considered, if at all, outside of the present NOI. Undeterred, the cable television commenters have proceeded to raise their anticompetitive arguments in the context of the present NOI. Southern therefore feels compelled to respond in order to remove any doubt that these issues are inappropriate for consideration in this proceeding, and are, in any event, irrelevant.

While Southern Company takes issue with allegations made by the Joint Cable Operators regarding utility compliance with the Commission's rules and policies on pole attachments, a number of such allegations are already the subject of pending complaints to the Commission. However, they are not related to the technical issues surrounding

⁶⁸ See, e.g., Joint Cable Operators and Knology, Inc.

BPL and are inappropriate subjects for this proceeding. Existing FCC rules and regulations are more than adequate to address concerns related to current and ongoing attachments by the cable television commenters, and the Commission's pole attachment complaint procedures provide cable operators with a streamlined procedure for having such disputes resolved.⁶⁹ Furthermore, current FCC rules and state commission scrutiny of affiliate transactions will prevent affiliate transaction abuse in the event BPL technology is deployed. Also, current FCC rules and policies on access and cost allocations already prohibit utilities from discriminating in favor of their own telecommunications affiliates or subsidiaries.⁷⁰ Thus, further regulatory oversight is not needed to address the allegations raised by the Joint Cable Operators.

6. Wireless Broadband Licensees

The Wireless Communications Association, Inc. (WCA) representing wireless broadband system operators, expresses concern that Access BPL systems (which it believes may operate up to 80 MHz) could cause interference up to the tenth harmonic of the BPL operating frequency, and thus pose a threat to licensed radio services in the 700, and 800 MHz bands and unlicensed services in the 900 MHz band. WCA further posits that if Access BPL operates as high as 200 MHz, it could interfere with both licensed and unlicensed operations in the 2.1-2.5 GHz band.

⁶⁹ Although Knology claims that, since 1996, the average time for a pole attachment complaint has been 22 months, Knology also acknowledges that this does not include complaints that are resolved through settlement. In addition, the transfer of pole attachment complaint cases to the Enforcement Bureau has resulted in improvements in the speed with which such matters are handled and has encouraged settlement of disputes.

⁷⁰ 47 U.S.C. §224(f) and (g); 47 C.F.R. §1.1403(a)

WCA's concerns are unfounded and again, appear to be motivated by the potential for competition from BPL. First, WCA provides no technical support for its interference concerns other than the basic notion that emissions up to the tenth harmonic should be measured under Part 15. Second, a number of the radio services for which WCA raises concerns are, themselves, unlicensed and operating on an equal basis under Part 15 of the FCC's Rules. Third, the record in this proceeding indicates that the primary operating frequencies for BPL will be below 50 MHz, meaning the tenth harmonic will not exceed 500 MHz. Finally, frequencies above 80 MHz roll-off quickly because the BPL system components used to generate and carry the BPL signals to the power line have a characteristic impedance that is designed to produce this fast roll-off. Moreover, the natural impedance of the power line itself tends to quickly suppress frequencies above 80 MHz. Thus, any harmonic emissions that might be found above 700 MHz would be so far below the noise floor as to be unmeasurable.

IV. HIGHER EMISSIONS LIMITS FOR BPL ARE WARRANTED

Southern agrees with the commenters who have suggested that the emission limits for Access BPL should be relaxed because the risk of interference is negligible, technological advances have rendered the existing rules obsolete, and the resultant improvements in competition, service offerings, and spectrum efficiency are in the public interest. Southern encourages the Commission to give careful consideration to these proposals and to initiate appropriate revisions to Part 15 to permit higher signal levels, particularly in the 30-50 MHz band.

Commenters generally agree that the FCC should raise emission limits when the threat of interference would be minimal or nonexistent. Based on its experience with BPL systems, Electric Broadband asserts that increased emission limits would not result in any harmful interference.⁷¹ Reducing the need for BPL signal repeaters (which tend to appear as point source radiators) could actually reduce the area over which BPL emissions can be detected. Current Technologies further discounts the likelihood of interference from Access BPL systems "[b]ecause Access BPL devices are either mounted high on a pole or enclosed within a metal curb-side housing," so they "can safely be allowed somewhat higher emissions levels than a device inside a residence."⁷²

While some commenters have argued that the FCC should impose "stringent radiation standards" on Access BPL because the medium-voltage power lines run through residential areas and ultimately deliver service to residential customers,⁷³ those commenters neglect to point out that these medium-voltage lines never enter the home or otherwise pose an interference threat to consumer electronic equipment.⁷⁴ Medium - voltage power lines, which would be used by Access BPL, are always installed at a safe distance from customer residences.⁷⁵ As Electric Broadband observes, the proximity to

⁷¹ Electric Broadband at i, 8.

⁷² Current Technologies at 16-17; *see* Electric Broadband at 8 ("Clearly, in the underground or conduit configuration, the utility [Access BPL] facility is contained within its own "environment" that is physically separated from other nearby "environments.").

⁷³ ARRL at 13; North American Shortwave Association at 5.

⁷⁴ PowerWAN at 3-4; *see* Amperion at 6; Progress at 6 (stating that Access BPL is in open spaces and underground).

⁷⁵ Main.net at 5 ("the typical operation of an Access Medium Voltage BPL would normally never place the unit closer than 30 feet from a residential broadcast receiver);

residences of the medium-voltage power lines used for Access BPL is strictly regulated by the National Electrical Safety Code.⁷⁶ UPLC adds that "all BPL Access equipment would be professionally installed, away from the customer premises and consumer devices."⁷⁷ In addition to the sheer distance from other consumer electronic devices, "at frequencies above 30 MHz, the transformer very effectively blocks signals from reaching the customer premise[s]."⁷⁸ Thus, the absence of any interference potential should enable the FCC to increase the emission limits for Access BPL with no harmful repercussions, particularly above 30 MHz.

Commenters also assert that a relaxation of the emission limits is necessary because the existing rules no longer reflect the state of technology in Part 15 devices. The FCC has acknowledged that "[e]arly standards adopted to control interference are frequently significantly different from what is needed at the present time due to improvements in equipment, such as receiver sensitivity"⁷⁹ For example, the different emissions limits for frequencies above and below 30 MHz appear to have been carried forward from when the FCC first adopted limitations for digital computing devices nearly 25 years ago. When the Commission adopted its general rewrite of Part 15 in 1989, it noted that the general limits on radiated emissions in the 30-960 MHz band were the

Amperion at 6 (stating that the emission limits should vary depending on the distance from the residence).

⁷⁶ Electric Broadband at 8.

⁷⁷ UPLC at 12 (emphasis added).

⁷⁸ UPLC at 11-12.

⁷⁹ In re Revision of Part 15 of the Rules Regarding the Operation of Radio Frequency Devices without an Individual License, GEN Docket No. 87-389, *First Report and Order*, 4 FCC Rcd 3493, 3494 (1989).

same as those that previously had been applied to Class B computing devices.⁸⁰ The cut-off at 30 MHz appears to have been adopted due to the Commission's conclusion, in 1979, that conducted emissions limits alone would be effective to protect communications up to 30 MHz from digital computing devices.⁸¹

Electric Broadband affirms that "[t]echnological improvements made since these limits were adopted have improved the ability of receivers to distinguish between desired and undesired signals."⁸² Other commenters agree that the FCC should foster continuity in the rules governing emission limits for Access BPL systems by eliminating the distinction between frequencies below and above 30 MHz.⁸³ Thus, a relaxation of the Part 15 rules on emission limits is consistent with FCC precedent and would not jeopardize other users of the 1.705 MHz to 50 MHz bands because of the recent technological advances.

A relaxation in the emission limits for Access BPL would also serve the public interest by increasing competition, improving service, and enhancing efficient use of spectrum. "[A]n upward adjustment of [e]mission rules . . . will facilitate lowering the cost of Access BPL by lessening the need for repeaters to provide broadband in urban

⁸⁰ In re Revision of Part 15 of the Rules Regarding the Operation of Radio Frequency Devices without an Individual License, GEN Docket No. 87-389, *First Report and Order*, 4 FCC Rcd at 3497 (1989).

⁸¹ In re Amendment of Part 15 to Redefine and Clarify the Rules Governing Restricted Radiation Devices and Low Power Communication Devices, Docket No. 20780, *First Report and Order - Technical Standards for Computing Equipment*, 79 FCC 2d 28, 50 (1979).

⁸² Electric Broadband at 8.

⁸³ *E.g.*, Ambient at 5.

and[,] especially, rural areas."⁸⁴ These higher emission limits would be particularly economical in rural areas where distribution lines tend to be longer and the costs of deploying broadband must be spread over a smaller universe of potential customers. The reduced cost of deployment, in turn, would eliminate the barrier to entry posed by strict emissions limits, permitting BPL providers to bring the benefits of broadband to underserved areas and increase competition in other areas.⁸⁵

Higher emissions limits would also improve the services provided over BPL systems. Increased power will enable "significantly greater data rates," maximizing the performance of the system and resulting in a greater variety of service offerings.⁸⁶ If BPL is to be a viable, competitive service, it must be capable of overcoming the noise that is inherent in the power lines and be flexible enough to adapt to the length of the power line and distance between transformers. Higher emissions limits will permit BPL providers to solve these problems and provide the services demanded by consumers.⁸⁷

V. MEASUREMENT PROCEDURES SHOULD BE STANDARDIZED

A. An Industry Technical Committee Should Develop Measurement Procedures

In its Comments, Southern encouraged the Commission to adopt standardized measurement procedures for BPL that would permit testing at a number of representative

⁸⁴ PowerWAN at 3.

⁸⁵ Electric Broadband at 9; *see* Current Technologies at 16.

⁸⁶ Ambient at 5; Electric Broadband at 9; PowerWAN at 3.

⁸⁷ PowerWAN also notes that a relaxation of the emission limits would promote efficient use of the spectrum by allowing frequency reuse and better planning between Access BPL and In-House BPL systems PowerWAN at 3.

configurations.⁸⁸ Southern further recommended that emissions testing of Access BPL be based on average peak measurements as opposed to quasi-peak measurements.

A number of commenters have recommended adoption of standardized measurement procedures.⁸⁹ Current Technologies and Amperion both recommend a collaborative effort between the BPL industry and the Commission to develop standardized measurement procedures.⁹⁰ Southern agrees that such a collaborative effort would best ensure that the measurement procedures are suitable for a variety of BPL systems and architectures and that the combined experience of the BPL industry experts and the Commission staff can be leveraged to promptly develop practical and repeatable emissions tests.⁹¹ Southern would urge, however, that such a working group be tasked with developing a procedure within a relatively short timeframe in order to provide regulatory certainty on this fundamental precondition to BPL deployment.

⁸⁸ Southern at 22.

⁸⁹ Amperion at 7-8; Current Technologies at 18-19; Main.net at 8-10.

⁹⁰ Amperion at 7-8 and Current Technologies at 18-19.

⁹¹ The National Telecommunications and Information Administration (NTIA) has reported that it is planning to conduct testing to determine the "least constraining BPL emission limits," and that it is developing a measurement plan with its Institute for Telecommunication Sciences. *See* letter from Frederick R. Wentland, Associate Administrator, Office of Spectrum Management, to Edmond J. Thomas, Chief, Office of Engineering and Technology, dated July 1, 2003. Southern recommends that the Commission accept NTIA's invitation to work cooperatively on this matter, but urges both agencies to open this testing process to industry representatives as well, particularly in view of the unique operating environments associated with medium voltage electric power lines and the experience that the electric industry already has with Access BPL.

B. Access BPL Systems Should Be Subject to Only Radiated Emissions Testing

Commenters overwhelmingly agree with Southern that radiated emission limits alone are sufficient to control harmful interference from BPL systems.⁹² Conducted emission limits should not be used because "possible interference potential from BPL systems is primarily radiated, and not conducted."⁹³ Because conducted emissions have "no direct bearing on interference,"⁹⁴ the FCC should impose only radiated emission limits on BPL systems.

In addition, commenters assert that no evidence supports the application of conducted emission limits to BPL systems. While many commenters question the ability of a conducted emissions test to predict accurately the occurrence of radiated interference,⁹⁵ several other commenters note the lack of any empirical evidence demonstrating a correlation between conducted emissions and interference to licensees.⁹⁶ "Before seeking to replace radiated emissions test with a conducted emissions proxy, the Commission should ensure that such a proxy is based on sound science to avoid an arbitrary standard that will not enhance the public interest."⁹⁷

Commenters also believe that imposing new emission limits would chill the development of BPL systems. The application of the conducted emission limits could

⁹² Southern at 23.

⁹³ Enikia at 3; *see* Ameren at 14; Phonex at 3; Intellon at 8.

⁹⁴ Current Technologies at 16; HomePlug at 7-8.

⁹⁵ HomePlug at 8; Intellon at 9-10; Ameren at 14.

⁹⁶ Ameren at 14; Phonex at 3; UPLC at 14.

⁹⁷ HomePlug at 9.

also cause delays, additional costs, and unnecessary restrictions on BPL with no discernable increase in interference protection.⁹⁸

Main.net recommends different measurement methods for low voltage [In-House] and medium voltage [Access] BPL systems.⁹⁹ Under this proposal, the FCC would apply conducted emissions limits to In-House BPL but would use radiated emission limits for Access BPL.¹⁰⁰ Although Southern takes no position on whether conducted emissions limits would be preferable to radiated emissions testing for In-House BPL, Southern recommends that there be only one type of emissions limit for either In-House or Access BPL, and that only radiated emission limits be applied to Access BPL systems.

VI. CONCLUSION

The comments filed in this proceeding demonstrate that Access BPL could provide many important public benefits, including more reliable and cost-effective operation of our nation's electric utility infrastructure and the provision of competitive broadband Internet access services. Parties opposing BPL on fears of interference from Access BPL have made these claims without demonstrating such interference. Similarly, cable television operators, local exchange carriers, and wireless Internet Service Providers, have opposed BPL with anticompetitive recommendations for BPL regulation intended only to stifle the deployment of this competitive service platform.

The record demonstrates that Access BPL systems comply with the limitations in Part 15 and that this technology can co-exist with other services in the same bands. In

⁹⁸ Ameren at 14; UPLC at 14.

⁹⁹ Main.net at 8.

¹⁰⁰ Main.net at 8.

fact, higher emissions limits for Access BPL are warranted to reduce the number of injection points or repeaters needed to provide service, particularly in rural areas. Southern also supports the development of standardized measurement procedures for emissions testing through a collaborative industry technical committee.

WHEREFORE, THE PREMISES CONSIDERED, Southern respectfully requests the FCC to take action in this docket consistent with the views expressed herein.

Respectfully submitted,

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Dated: August 20, 2003

CERTIFICATE OF SERVICE

I, Christine Bisio, do hereby certify that on this 20th day of August, 2003, I caused a copy of the foregoing “Reply Comments of Southern LINC, Southern Telecom, Inc., and Southern Company Services, Inc.” to be mailed via first-class mail to each of the following:

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