

The following comments concerning the Broadband over Power Line (BPL) NOI are in reply to comments by Cinergy Corp. and PPL Telecom, LLC.

#### THE POTENTIAL PROBLEM

The idea of using existing power lines as another pathway to provide broadband access is laudable and at first glance seems like a good concept. In practice, the idea is problematic. The characteristics of the transmission lines and the enormous size of the power line grid carrying the signals result in massive antennas that can radiate radio frequency emissions over wide areas. Signals in the frequency range contemplated for use (2- to 80 MHz) do not require much power from a large antenna to be efficiently transmitted and travel long distances.

The electric lines carrying these signals do not just exist in our back yards and along roads and easements in our communities; they enter our homes and surround us in the walls of our dwellings and work places. Thus, devices that receive or are affected by radio frequency signals such as radios, televisions, pagers, and other appliances will never be more than a few feet removed from a large antenna system---the electric power line---capable of emitting radio frequencies. Unlike most Part 15 devices that operate intermittently (for example, the transmitter for a garage door opener), the broadband signals carried by power line will operate every hour of every day and may provide a continuous source of radio frequency interference.

Large antenna systems can not only emit radio frequency signals, they can receive them. The same devices noted above as well as various types of common radio frequency transmitters emit radio frequencies during their operation that can be received by the electric power system antennas. In many cases these devices will be directly connected to the electric system. Thus, broadband signals carried by the electric power grid have a strong possibility of being disrupted by devices operating legally under FCC authorization.

Additional hardware will be needed to make the BPL system work; one cannot just add a signal to the power line and be done with it. There is a need for repeaters and amplifiers to boost the signal along the lines, modulating and demodulating hardware to get the signal from the power line and send the signal to the power line at the customer and source ends, as well as other control hardware and software. Already, some of the proponents of BPL are requesting special consideration to lower the costs of these devices so that the system can be made economically feasible.

#### THE ACTUAL PROBLEM

While the problems listed above are potential, there have been several studies in Europe, Japan, and the U.S. by government agencies, university researchers, and

amateur radio societies to determine the actual reality of the problem. A number of studies are referenced at the American Radio Relay League (ARRL) web site (<http://www.arrl.org/tis/info/HTML/plc/>) and several have taken measurements of interference near test sites of demonstration BPL systems. Results of these studies have been remarkably consistent: BPL systems do cause significant radio frequency interference to high frequency communications. Levels of interference varied depending upon the system studied and other circumstances, but ranged from significantly hampering communications on frequencies of existing radio services to completely obliterating signal reception on these frequencies. Levels of interference demonstrated in these studies prompted the governments of Holland, Japan, and other countries to not approve implementation of BPL while the problems exist. The most graphic demonstration of the radio frequency interference is a video prepared by the ARRL (<http://www.arrl.org/news/stories/2003/08/08/2/?nc=1>). The video shows an engineer from this organization driving parallel to a BPL test line in the northeast U.S., while operating a high-frequency radio receiver in his automobile. Distance between the power line and the vehicle was typical of the distance between a power line and a residence or office. As clearly demonstrated on the video, it was impossible to receive any signal over the frequency ranges tested except for the radio frequency interference produced by the BPL system. The signal strength of the BPL radio frequency interference was much greater than the signal strengths of existing radio services that would normally be received by the short wave receiver.

In its comments, PPL Telecom has stated that the burden is on opponents of BPL to justify blocking a new entrant or technology that may provide more affordable telecommunication services to a broader base of customers. This burden has been met. The studies noted above show that BPL does and will cause significant radio frequency interference of such magnitude to completely destroy the communication capability of existing legally licensed radio services. This demonstration is sufficient justification to block application of the technology until there is proof that the interference problem can be eliminated.

Cinergy Corp. has stated that a justification for BPL is to enhance homeland security by creating redundancy. U.S. radio services operating within the frequency range of 2- to 80 MHz include television channels 2-6, short wave broadcasting (including Voice of America), long-range air navigation (such as marker beacons), military communication, civil security communication (including Department of Homeland Security and Drug Enforcement Administration), some public safety organizations (including California Highway Patrol), marine international distress frequency, Alaska emergency frequency, amateur radio, and many others. A communication technology that reduces or eliminates the communication capabilities of some or all of the high frequency radio services listed above does not create redundancy. Instead, it reduces or eliminates redundancy and places more dependence on the electric power grid system, a system that just last week

(August 14, 2003) shut down of its own accord creating the largest electric power shutdown in U.S. history affecting 50 million citizens. There is no need to reduce or eliminate other working technologies and increase communication reliance on a single technology (BPL) that operates over a system characterized as inadequate last week by the President of the United States.

Little information has been presented by the supporters of BPL to show that emissions from devices producing radio frequencies will not affect BPL communication. This should be clearly demonstrated before the FCC authorizes application of this technology.

The economics of the BPL initiative are not clear. In urban settings, BPL would compete with Digital Subscriber Line (DSL), cable, and satellite services. There is relatively little advantage of BPL over these services in urban areas since the infrastructure for telephone and cable lines already exists. In my local community the price of DSL and cable broadband access has dropped by more than 40% in the last six months, and now only costs about twice that of dialup internet access. It is probable that the price for these services will continue to drop due to competition and it seems unlikely that a new technology will be able to establish itself quickly enough to be able to compete effectively in urban areas given the tremendous advantage of more mature cable and DSL systems in technology (including eliminating interference), market share, and competitive experience. In urban areas it seems unlikely that the BPL technology will provide more affordable service or extend that service to a wider base than is already available.

In rural settings, BPL would hold an advantage where cable and telephone service did not exist or were not of high enough quality to support broadband. Yet, there are few places in the U.S. where this is true. The major reason DSL and cable broadband have not reached some rural areas is the lack of sufficient demand in terms of numbers of subscribers to justify the expenditure for repeaters, amplifiers, and other hardware necessary to supply the service. But, this is the same problem that will be experienced by BPL providers since they must provide hardware that essentially provides the same functions as for cable and DSL. It's not the lack of wires that is the problem, it is the lack of customers. Due to this problem, it seems unlikely that BPL will be able to justify extending service at low rates to a broad base of customers in rural areas.

It would be folly for the FCC to approve application of a new technology that would probably not be competitive in urban areas due to the competitive advantages of other broadband providers, would probably not be profitable in rural areas due to a lack of demand, and at the same time would significantly degrade or eliminate the communication ability of other established communication systems already

authorized by the FCC and currently serving the public safety and welfare.

#### PROPOSED ACTION

The current technology for BPL at test sites in Europe, Japan, and the U.S. has been shown by competent and credible experts and organizations to cause significant or complete radio frequency interference to existing FCC-authorized radio services. The service proposed by BPL supporters is already provided by at least three other types of providers with other technologies that are affordable and competitive and avoid the radio frequency interference problem of BPL operation. The proponents have not demonstrated that the proposed service will provide more affordable or wider-spread communication, but have demonstrated that the proposed service will diminish existing radio communication capability through radio frequency interference. Therefore, the FCC should deny requests for application of BPL technology at the present time.

Continued investigation concerning the potential BPL is justified, however. The major problem with BPL is that radio frequency emissions will occur through a very large antenna system (electric power lines) 24 hours of every day. The rules under which BPL supporters propose to operate these systems were originally contemplated for point source devices, without large antennas, that operated intermittently. Before the FCC can authorize application of BPL, it must determine a maximum level of radio frequency radiation from power lines occurring on a continuous basis that will not disrupt existing radio services. Then it must write special rules concerning the maximum emissions allowed for BPL, justifying these rules on the basis of the threat of interference to airwaves and existing radio services due to the continuous emissions of the lines and the size and extent of the electric power line antenna system. These rules should include clear requirements that any emissions from the power lines not only shall adhere to the FCC radio frequency emission standards but also shall not produce interference in any existing U.S. radio service or international radio service covered by a treaty to which the U.S. is a party.

When these limits are established and the BPL proponents have had time to apply necessary technology to bring their radio frequency emissions within the required levels, the FCC should authorize a series of public tests of the systems in several areas of the country. These should not only test the efficacy of the customers' experience but also test for radio frequency interference to existing radio services (from the power lines and all equipment required for the system), and freedom of the system from interference from operation of radio services already authorized by the FCC and currently operating. Only after new emission standards for BPL are

in place that assure no interference with existing radio services should the FCC allow application of the technology to commence.

#### SUMMARY

The FCC's job is to conserve and ensure the wise use of the valuable airwaves while allowing many types of communications to flourish. The current BPL proposal potentially expands the avenues for communication but on further examination provides only another means to compete against several mature and efficient technologies. Because it is coming along late in the game, it fails to provide a competitive advantage in urban settings and will suffer the same problems of customer demand experienced by other technologies in rural settings. However, implementation of the BPL technology will cause significant to complete interference of existing FCC-licensed radio services in high frequency bands that currently provide commercial, security, public safety, emergency, and amateur communications. The small advantage that the current BPL proposal provides is greatly outweighed by the disadvantage to important radio services it would compromise or eliminate by interference. The FCC should deny application of the technology at this time, but hold open the possibility that with technological advances it might be able to implemented at a future date if the problems of radio frequency interference can be overcome.

Respectfully submitted,

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