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Federal Communications Commission:

RE: FCC 03-104 on BPL (Broadband on Power Lines)

Commissioners:

There are two major aspects of this question, one of which has not been

addressed in any of the background provided by the Commission or other parties in the discussion;

1. High-frequency interference from the technical viewpoint, about which there remains much to be considered;

2. Constitutional and legal privacy issues, which does not seem to have been addressed by anyone to date.

I shall address them in that order in this comment.

Interference with other services has been addressed from energy-comparison standpoints ( Interference temperature) by several groups. But more practical, logistical issues need consideration. Composite Interference Temperature is not the only criterion of importance.

#### MODE INTERFERENCE

Composite Energy-content analysis does not address the issue of Mode Interference. It is well known that certain modes of modulation can coexist in a given band because their distributions in the spectrum deliver the energy into different parts of a limited spectrum, set primarily by the modulation mode used, and making them easily separable. AM and FM are a good example. They can "Live Between Each Others' Toes". Their compatibility may be seen in terms of Modulation Mode Interference Temperature (MMIT), a concept I here introduce.

The concept of interaction measurement is well known in statistics, the mathematics of employing randomization to balance-out irrelevant information which is seen as "Noise" masking out relevant information, and relying upon natural randomness in unknown noise to balance that out. MMIT is simply the RMS magnitude of interaction between two modes, easily measured.

If modulation modes do not interact in employed detection mechanisms, they are of low MMIT. To the extent that they do interact, they have a higher MMIT.

Randomization of unwanted signals to raise SINAD is the method of advantage in "Spread-Spectrum" and other digital modes. But proponents of a mode nowhere consider or measure its interactive impact upon other modes.

A hundred spread-spectrum stations transmitting in the same bandwidth still deliver the same energy into it as do a hundred AM broadcast stations of the same power in the same bandwidth. Only the spectral distribution is different. We now enter a long period of low Sunspot activity; interaction noise issues will be of growing importance.

The only advantage gained by spreading the spectrum is from more elegant detection schemes which digitally synchronize the detection of the signals to discern them from others by randomizing them. This is a crucial point.

Consider impact upon other digitized modes of transmission such as digital TV. Digitization only shifts part of the transmitted signal from one sub-spectrum into a few others to support digital synchrony. All energy in those sub-spectra is in fact NOISE to other digital demodulation. Since digital modes commonly share these sub-spectra, It can be expected that DTV , for example, will see that noise (to it, in needed spectrum, high MMIT) disproportionately. The tests in the literature have not addressed DTV or similar mode-interference at all; only relative energy contribution. Indeed, it wasn't there to test in most of the tests used to support BPL.

The many emerging digital modes may, indeed, meet a growing cacaphony and put a heavy load on regulatory bodies such as the Commission to control and suppress it. These modes have much relative spectrum use in common. Their advantages result from spreading their information over a wider spectrum, which allows noise-compensating detection schemes. Compensating the atmospheric noise and other-modulation-mode "Noise" lowers its impact on the desired information.

But digital modes which share "digitization spectra" do not avoid interference from each other even if they "Frequency-Hop" randomly. Their energy is still there, in the form of "Error variance"; (in the electronic jargon, "noise level"). However you slice it, the energy is noise to all other modes. You do not escape it, only cleverly evade it in the mode system. And the digital modes will interact highly.

But, here, we are considering very low-power signals. Does that change the issue?

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Not really. Part 15 is the bulwark against growing noise levels

from uncontrolled devices. A new criterion must be added to it, one controlling Mode Interaction effects, including interaction with other digital methods. MMIT is offered as a beginning, in a search of a best.

#### INTERFERENCE, THE HEART OF REALIABILITY

Watts do not change by changing the communication mechanisms to one of the same reliability or usage, which is the next sub-issue.

The history of RF interference has always been full of unreliability. The Commission's files of decisions about interference speak eloquently to that, even as recently as May 2, 2003. A manufacturer recalled millions of tiny PLC stations which nobody had before proven were interfering. Part 15 was the controlling factor.

And the Power companies' record of maintenance may be dismal; a customer often would have to prove the company caused a problem when a loose connection, rectifying connection, or intermittent change occurred, to say nothing of more major problems. Easy to understand why; it costs big money to maintain their networks and resolve their unshielded-emission characteristics. The situation will be exacerbated if DSL systems over power lines are not redesigned in many ways. I speak with understanding, as a member for twelve years of the Board of Directors of a Suburban Utility Commission.

One would think from the studies reported on this issue that that is a non-issue, because the power systems are transparent to the transmissions. That is a double-edged sword, both edges on the same side of the sword.

Yes, it allows the signal to pass into a domicile; but as any of you may have personally experienced, other things come in with them. And since all users on a line are transparent, it comes to everyone. The TV jerk and wobble on a rainstorm comes not all from the airborne signal, but to a great extent from the power lines. So. The second major topic.

#### CONSTITUTIONAL AND LEGAL PRIVACY

Electric power is a unidirectional issue. They sell it, you buy it. You need a distribution system to get it. Its reliability has been power-centered, not interference-centered. BPL will change that, and the costs of distribution.

But, as I state, the other things that come in on the wires may be undesirable.

I and others believe this is an issue of Constitutional proportions, both of property rights and privacy; the DPL is BI-DIRECTIONAL.

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We have already seen incursions upon our privacy by telephone companies (e.g., telemarketing) which require us to pay for the right to not submit to them. Shall we create another such monster? I hope not.

Utilities hold a special place in law because they deliver a needed product economically. But when the telephone utilities were deregulated, we found the truth (FALSITY?) of that concept. By contrast, telephone is a narrow-band, largely shielded access to our domiciles. I quote a writing from the Commission's Internet pages by a proponent of BPL:

"The trials proved that PTI's solutions could transmit broadband communications over the low and medium voltage power grid, transmit through distribution transformers, and pierce residential electric meters. During the trials, multiple single-family homes were connected by the PLC technology."

I again mention the wide-band nature of BPL and of its bidirectional nature, there stated as "transparent". This is a quite different issue from that of telephone, a known bidirectional and relatively avoidable device when compared to heat and light. It will make every domicile transparent to a bidirectional transmission conduit, whether the owner or renter wishes it or not. This is a step into my Castle I will not submit to. It is far worse than the telephone. I can disconnect that safely.

The U.S. Constitution guards our right to control the flow of information into and out of our homes. It must be maintained. AN ACT OF CONGRESS, PERHAPS A CONSTITUTIONAL AMENDMENT, IS REQUIRED BEFORE THE COMMISSION MAY INSTITUTE THIS PROPOSAL.

Consequently to these two major points, I propose that the Commission:

- 1: Not permit any high frequency use of domestic power lines without an empowering act of Congress acting to protect the public privacy;
2. Prohibit the use of such transmission of digital modes commercially over wide bandwidths, specifically including spread spectrum modes, outside of the limitations of present Part 15, by requiring limits upon and regulating their MMIT or by other means, with respect to other modes;
3. Leave unchanged or tighten the present Part 15 of the code to implement (2) above;
4. Limit research and application of the digital modes to its present allocations and limits with use of those spectra for experimentation by act of the FCC in its administrative functions, on experiment-by-experiment basis to conserve the spectrum;

Respectfully,  
G.R. Norberg