

This is in response to NOI Docket 03-104 regarding Power Line Communications (PLC) and Broadband over Power Line (BPL).

My qualifications in this area include over 24 years of experience as an Electrical Engineer, with current hands-on design experience in the areas of RF and Microwave Communications, Telecommunications (both "copper" and fiber optic), and IEEE 802.11b based wireless devices.

I have reviewed the proposed technology and also some technical papers that were presented by my colleagues (some of whom are professionals in the area of Electromagnetic Compatibility - EMC). It is my opinion that PLC and BPL technology in its current form, will pose a serious and unacceptable risk of harmful interference to users of the radio spectrum. Further, I believe that power lines are not an appropriate medium for the transmission of high speed data, especially in residential areas.

I submit the following:

- While it is true that power lines can be made to carry high speed data, these power transmission lines are normally unshielded and use widely spaced conductors (relative to the wavelength of the proposed data signals). This is conducive to radiation of the signal from the power transmission lines.

- Unlike existing "part 15" devices, the radiation from a PLC system will propagate through entire neighborhoods or even entire cities, causing harmful interference to all receivers tuned within the frequency range of the PLC signal. There will be no way to relocate the receiver away from the interference source (as part 15 guidelines to consumers now advise). Harmful interference will be propagated by wires located in many directions relative to the receiver.

- Even at existing "part 15" levels, PLC can cause harmful interference to nearby radio receivers. Part 15 was originally intended to provide protection from individual electronic devices, not from long power lines carrying the signals over significant distances. The methods of measurement in part 15 need to be reviewed, as they do not adequately address emissions from physically large radiators.

- Current "part 15" guidelines allow relatively high emissions due to the original expectation that the interference would be intermittent in nature and that the user could mitigate the interference by simply relocating the device or turning it off. In the case of PLC, such mitigation is not possible.

- Power transmission lines behave very differently than Telecommunication transmission lines where "twisted pair" or coaxial conductors are the norm. Power lines are not designed to provide longitudinal balance. In non-coaxial telecom transmission lines, balance is used to reduce radiation, noise pickup, and crosstalk. Another consideration is the wide conductor spacing of power transmission lines. This is a contributor to the problem of signal radiation from the line. Injection of a PLC signal (into a

power line) using either the single ended or "dipole" technique will likely provide yet higher levels of radiated interference.

- The interference will certainly be bilateral. PLC will not only radiate harmful interference, but due to the implementation, it will also be highly susceptible to nearby RF fields.

- It is my understanding that the government of Japan has declined to approve PLC because of the threat of severe and harmful interference. Japan is a world leader in the area of personal and consumer oriented electronic technology. Studies undertaken in other countries have verified that harmful interference will occur.

- In an impromptu experiment, I simulated the level of interference expected from a typical PLC system (see references 1 and 2) while listening to a Sony model 2010 receiver tuned to the 31 meter international shortwave broadcast band. The received interfering signal was stronger than any broadcaster in this band. It was impossible to listen to any program on any frequency though this interference. The situation was worse in the HF Amateur Radio bands where signal levels are significantly lower than those used by international broadcasters.

In conclusion, I urge the FCC to proceed conservatively when considering any rule changes which address PLC or BPL technology. Existing Part 15 rules must be reviewed and updated in terms of their relevance to emissions from physically long conductors. In addition, appropriate test methods must be adopted that adequately test radiated interference from these long transmission lines. Emission limits must be set so that there will be no adverse impact or harmful interference Radio, TV, or Data communications services. In it's current form, I do not believe that the technology is capable of this.

References:

1) "Calculated Impact of PLC on Stations Operating in the Amateur Radio Service"

Author - Ed Hare

Presented to the Institute of Electrical and Electronic Engineers (IEEE)

C63 EMC Standards Committee Meeting, November 15, 2002

2) "On Radio Frequency Interference Assessments of Access PLC Systems"

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