

Comments to FCC 03-104: Comments are on the behalf of Pulsar Technologies, Inc., Roger E. Ray, Co-President

Since there seems to be some different usage of terms, let us clarify the terminology usage, as we are familiar with it:

- Power-Line carrier (PLC) - 10 to 490 kHz signals that are superimposed on high voltage transmission lines (69kV to 765kV lines), for use with protective relaying systems for protection of HV and EHV transmission lines. This type of a system has also been called "Carrier Current" in the past.
- FCC Doc refers to Carrier Current Systems - localized use of RF energy on ac lines for school campuses, and home uses such as AM radio, control of appliances and control and monitoring of the distribution lines (below 69 kV and 30kHz).
- Broadband-Power-Line carrier (BPL) - used for access or in-house communications for Internet access (4.5 MHz to 21 MHz).

As a manufacturer of Power-Line Carrier equipment we have these comments:

Ø Concept of Using BPL for system protection:

1. The PLC signal is a point-to-point communications and provides direct communications where needed at the protection terminals
2. PLC systems have a very low absolute delay time on the order of 2 to 16 ms and the delay time is constant. Because of this the operation time of the protection system is predictable and fast.
3. The new BPL technology operates in the frequency range of 4.5 to 21 MHz. At these frequencies the losses on an HV or EHV power line (25 to 200 miles) would be too large to deal with without major reconstruction work on the power line. These frequencies could be made to communicate over a single phase of the power line if the conductors in the phase bundle were insulated from each other at the RF frequency. Also not all lines have bundled conductors. Therefore, the cost would be prohibitive.
4. Every HV and EHV substation has significant capacitances to ground due to the bus structures, power transformers, reactors and other equipment. This large capacitance to ground will tend to short the 4.5 to 21 MHz to ground. Thus the station would have to be somehow isolated and bypassed in order to make a BPL network possible on the HV and EHV portion of the power system.
5. Use of a packet switched network system as proposed for the BPL system is a system that does not have a deterministic absolute delay characteristic. This can present problems for most of the protection systems in service today. Considerable cost and redesign of the protection system is required to handle the indeterminate delay characteristics of a packet switched type of network
6. The use of BPL on the HV and EHV portion of the power system would, I think, create a much bigger issue in terms of interference problems to existing licensed services. Much more so than the present proposed usage for the "last mile" type of application on the distribution portion of the power system.

Ø Review of present PLC HV and EHV equipment and systems for protection and control in terms of present Part 15

I have been involved with the application of PLC technology to protection systems for the past 35 years. In that period of time this subject has been discussed twice that I am aware. The last time the subject was discussed was a few years back and that was when the UTC database was created.

The Utility industry has been using PLC for power system protection and control since the early 1930s, and there has been very little disruption to any licensed service in that period of time. The reason for this lack of interference is because both the power utility Engineers and the manufacturers of equipment are acutely aware of their obligation to licensed services. As a result the design of transmitters with very low harmonic output and the way the equipment is applied in the protection system mitigates the need for licensing and testing of the equipment. In other words, it has been a self-regulating industry. Where there have been cases of a disruption of a licensed service the utility involved has always been cooperative and changed frequency or take whatever other action was needed to solve the interference issue.