

**Before the
Federal Communications Commission
Washington, DC 20554**

In the matter of)
Inquiry Regarding Carrier Current Systems) ET Docket 03-104
Including Broadband over Power Line Systems)

**REPLY COMMENTS OF
MITSUBISHI ELECTRIC POWER PRODUCTS, INC.,
MITSUBISHI ELECTRIC EUROPE B.V. AND
MITSUBISHI ELECTRIC CORPORATION**

Mitsubishi Electric Power Products, Inc., a US-based manufacturer of generation, transmission and distribution infrastructure, and on behalf of our parent company, Mitsubishi Electric Corporation, and Mitsubishi Electric Europe (collectively referred to herein as “Mitsubishi Electric”) submits the following reply comments in response to the Notice of Inquiry in the above referenced proceeding.

Mitsubishi Electric is a leading global manufacturer of generation, transmission, and distribution system technologies to utilities and a provider of information and communication systems to customers throughout the world. Mitsubishi Electric is currently drawing upon our experience in these industries to develop and integrate broadband over power line technologies for the European market.

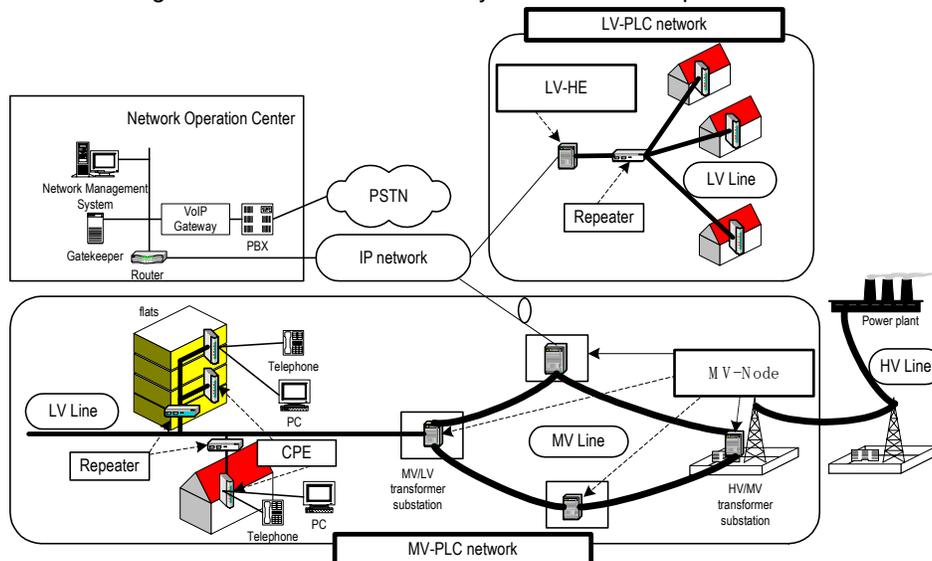
In Japan, Mitsubishi Electric is one of the leaders of industry efforts to promote the deregulation of BPL systems via the Japanese PLC Alliance (PLC-J). In the US, we are committed to developing BPL products that are viable for deployment under the average electricity distribution network topology.

Mitsubishi Electric strongly supports the actions of the Commission to accelerate BPL deployment in the US. As the Commission notes, BPL offers a competitive alternative to existing broadband technologies and the ability to enable high-speed Internet access and other communication services to rural and remote areas of the Nation.

In the reply phase of this proceeding, Mitsubishi Electric will focus its comments on our experience in bringing access BPL systems to international markets that may be helpful to the Commission as it further explores the technical issues associated with high-speed communications over power lines. Mitsubishi Electric has long history in power line communications, both in research/development and in actual field applications. It has carried out several field tests and studies with European customers, as well as providing network consultation and, installation processes. As a result of these activities, we have begun commercial deployment of BPL network business solutions in Europe.

The system Mitsubishi Electric proposed for the European Market is comprised of high speed (45 Mbps) BPL modems (Medium Voltage Node {MV-Node}, Low Voltage Repeater and Customer Premises Equipment {CPE}), the Network Management System tool and a range of connecting cables and accessories such as the Inductive Coupling Units (ICU) used to ease the installation while avoiding electric power outages. The strategy is to enable the customer to implement various business models, from high speed Internet and VoIP access service inside midtown, to connecting 'digital divide' areas via middle electric power lines.

Fig. 1 Mitsubishi Electric BPL System for the European Market



(Due to differences in the electricity distribution network topology between the U.S. and Europe, a new system would be proposed for the U.S.)

The system includes a thorough analysis of the customer's electricity distribution network. Our experience in research, product development, and substantiation of tests underscores the importance of fully understanding the characteristics of the power line in order to build an efficient BPL network with outstanding quality of service and viable costs. For this purpose, Mitsubishi Electric developed the "Broadband Powerline Characteristic Analyser" (BPCA), the only system of its kind in the world, that enables the efficient and accurate measurement of the customer distribution network.

Comments in relation to Access BPL Systems

- *Spectrum and bandwidth*

Mitsubishi Electric has been investigating the behavior of the BPL technology in the different portions of the spectrum for many years. Mitsubishi Electric acknowledges the frequency band identified in the United Power Line Council's comments, and would further definitively establish the frequency band for BPL technologies between 1.7 to 30 Mhz. (Any other portions of the spectrum above 30 Mhz are clearly less efficient primarily due to its high levels of attenuation.)

In contrast to United Power Line Council's comments that both Access and In-House "will likely share a portion of the same spectrum," Mitsubishi Electric recommends the establishment of separate bands for Access and In House use.

Mitsubishi Electric's BPL equipment for access works under 11 Mhz, as the usual characteristics of the electricity distribution network above 11 Mhz clearly shows higher levels of attenuation. High attenuation levels affect the communication of the high performance BPL system.

The frequencies between 11 Mhz and 30 Mhz should be allocated for in-house systems in an effort to avoid interference between the BPL system for access and in-house digital signals. Following this concept means that there will be no need for additional equipment such as converters or adapters. By prohibiting sharing of the same spectrum, potential additional sources of interference will be

eliminated, leading to improved performance and better acceptance in the marketplace.

While there are some technologies that might operate under higher frequencies, Mitsubishi Electric's experience has shown that to be able to operate in high frequency bands, it is necessary to inject more power into the lines in order to be able to communicate. The injection of higher levels of power often leads to higher level of emissions.

Speed:

Mitsubishi Electric's current BPL commercial products for Access in use in European commercial deployments offers a performance of 45 Mbps in the physical layer, achieving an average 18 Mbps in the upstream and 27 Mbps in the downstream.

Operating in normal conditions with the 45 Mbps modem, typical speeds of 15 – 45 Mbps can be sustained. This bandwidth is shared between the users connected per repeater. If there are 15 users sharing the bandwidth, each user can get between true broadband at 1 – 3 Mbps in a concurrent connection situation.

The next generation of BPL products currently under development will offer a bandwidth of 200 Mbps. This is the generation that Mitsubishi Electric intends to offer to the U.S. market. The first prototypes should be available in the 4th quarter of 2003.

- *Modulation techniques & security:*

The usual modulation techniques used are: Single Carrier, Multi Carrier, OFDM and SS. Mitsubishi Electric adopted the OFDM (Orthogonal Frequency Division Multiplex) for its BPL system modulation, as it can be easily adapted to the characteristics of the power line such as attenuation, group delay, multi pass fading, etc.

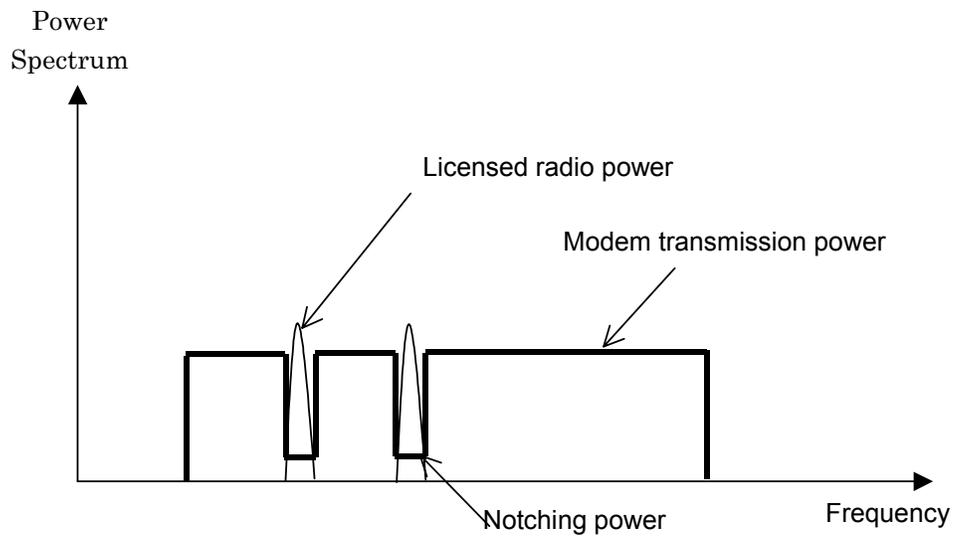
Mitsubishi Electric's BPL system supports 802.1Q VLAN technology to ensure the security of the data. This feature makes it possible to group the BPL users and manage the communication between each group.

- *Interference studies:*

Internationally, and as cited by the Information Technology Industry Council, there are several entities that are studying the radiated emissions of BPL technologies and the possibility of interference with existing radio systems. The CISPR is considering a permissible value of the conducted and radiated emissions level. As for other groups, there is the CENELEC, ETSI, PUA, and PLC Forum who are working towards the standardization of the BPL technology in Europe.

In Japan, there is an experiment scheduled to start at the end of 2003 in order to determine which permissible values can virtually avoid interference with existing radio systems.

During the deregulation discussion in Japan, Mitsubishi Electric experimented the technique called "power mask" in its magnetic chamber. This technique enables the creation of "notches" on the BPL OFDM carrier spectrum. These notches can be sustained at a certain frequency by avoiding the interference with licensed radio services operating in the same frequency band. In the experiment, the result was clear. This technology can be very useful to avoid the potential interference.



Conclusion

Mitsubishi Electric strongly supports and commends the initiative of the Commission to investigate and promote the development of BPL technologies. As many other interested parties in this proceeding cite, BPL technologies offer enormous potential to further improve upon the efficiency and competitiveness of Internet and broadband telecommunications worldwide. We look forward to working with the Commission in realizing the promise of BPL technologies.

Respectfully Submitted,

Roger Barna

Chairman & CEO

Mitsubishi Electric Power Products, Inc.

530 Keystone Drive

Warrendale, Pennsylvania 15086

724.778.5110