Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of Inquiry Regarding Carrier Current Systems Including Broadband over Power Line Systems By W. Lee McVey, P.E. To: The Commission	)	**ET Docket No. 03-104**

REPLY TO COMMENTS OF AMPERION, INC.

1. The following are in response to the Comments of Mr. Phillip Hunt, Chief Executive Officer of Amperion, Inc. filed July 7, 2003.

A. Amperion's Solution Utilizes Superior Customer Interconnection Concept

2. Amperion, unlike other manufacturers commenting on this proceeding utilizes an IEEE 802.11(b) compliant microwave hub to deliver information to customers. Although not stated in their comments, it is assumed, by virtue of not involving any distribution transformer secondary or service drop conductor paths, that Amperion has placed the

hubs at centralized locations in order to supply 6 or more end users from one microwave hub.

3. "PowerWiFiTM uses only FCC-approved equipment that complies with industry standards and provides the best solution in safety, scalability, economics and is globally accepted." Amperion's equipment does not involve directly coupling a signal onto the low-voltage lines and therefore, there is no conducted path into a customer premises.[1]

4. Other approaches propose to use a passive bypass device to couple the BPL signal around the distribution transformer. Of considerable concern is the safe operation of such a device. Any device connected to a medium voltage system is subject to the requirements of the National Electric Safety Code (ANSI C-2), or equivalent state regulations in some jurisdictions, that have developed their own medium voltage safety orders. Such devices must have adequate insulation withstand capability to survive system transient over voltages without catastrophic failure. As such, devices must meet the Basic Insulation Level (BIL) rating for the distribution system voltage to which they are connected. For example, a 15kV medium voltage distribution system would require that transformers and other components have a 110kV BIL rating. That is to say, the design must be tested and pass satisfactorily in order to be considered to have sufficient and adequate insulation for safe application. All transformers, insulators, lightning arresters and other medium voltage power distribution equipment connected to energized parts must meet or exceed standardized BIL insulation ratings, or they are unlawfully installed. No commenters thus far have included statements as to bypass devices meeting

[1] Comments of Amperion, Inc. (July 7, 2003) ¶ 1. Page 2.

or exceeding BIL ratings for medium voltage distribution class systems. This appears to be a serious safety oversight that must be addressed to ensure public safety. If these devices are 'the weakest link' in the medium voltage distribution system, they may then be the first to fail in a transient over voltage event, and place customer premises at risk. Also of concern is the ability of noise, both generated on the medium voltage circuit and from customer equipment, to bypass the 'barrier' created by the distribution transformer. This is of special concern to in and near commercial deployments, since there are many significant noise sources which may be enhanced via the installation of such couplers and find their way into other customer premises causing harmful interference: electronic lighting ballasts, switching power supplies, uninterruptible power supplies, and variable speed motor drives.

5. For the above reasons, the Commission should find Amperion's use of IEEE 802.11(b) technology a superior means to interconnect as customer electrical systems would not be subject to the potential risks of directly connected bypass couplers; it will maintain barriers to customer-generated medium and high frequency noise; and it will offer the ability to use standard, proven, wireless devices over a relatively wide community area. And, with the coverage area enhancement possible at higher elevations atop wood poles in rural areas, could provide a very convenient, effective, and economical customer solution over an expanded area.

B. BPL Reliability and Propagation Concerns

6. Amperion explains that their BPL repeaters are unique and do not amplify, but act as modems: they demodulate and remodulate the signals and route the signals "down the

feeder."[2] No where does Amperion address what would happen if the utility were to change the routing by transferring part of a feeder to another source. Since Amperion indicates that packet routing information is included, how, then could packets routed down a specific distribution feeder get to their ultimate destination, if that destination has been switched to another feeder? Such switching occurs very often on utility systems. Sometimes seasonally, and sometimes as a result of electrical equipment failure. Many such transfers are unplanned and are made without prior notice, and would likely result in unplanned data failures and prolonged data service outages.

7. According to the national industry-utility association, the UPLC, BPL is a 'last mile' technology and fiber optic media will be needed to bring high speed resources to a BPL zone in order to maintain throughput speeds.[3] Amperion, although affiliated with UPLC, does not address what the maximum number of repeaters would be before service speed, to say nothing of cost, is compromised. Nor do they mention maximum propagation distances for each BPL repeater zone on overhead and on underground feeders.

8. And, what about the addition and removal of capacitor banks? Unless fiber optic cable is truly extended to the 'last mile' to exclude capacitors, then capacitors on rural and urban distribution feeders will be operated frequently on and off from time and voltage requirements and will either grossly attenuate BPL signals to unusable levels, or, result in excessive radiation from very high levels if capacitors should switch off.

9. Amperion recognizes that power outages will occur, and attempts to maintain data

[2] *Ibid*,¶2.,Pps 2 and 3.

[3] Comments of UPLC to NOI 03-104, Introduction, P. 1. (July 7, 2003)

flow in the event of an outage via a backup battery. SCADA systems are now widely used to remotely operate stored-energy-operator distribution field switches (via fiber optic cable, leased line, or radio modem), to quickly isolate and restore power. Most frequently, this means disconnection of the faulted section and rerouting from another distribution feeder. Ironically, this would mean restoration of power but, *disconnection* or *erroneous* BPL service, since the normal data path would be broken and switched to a different path.

C. Utility SCADA System Architecture

10. Amperion makes the claim that BPL will augment and enhance existing SCADA system ability to sense faults, imminent breakdown, or outages. Perhaps by monitoring current and voltage. In any case, for at least the last 10 years, thousands of small, packetized radio modem and digital repeaters have been used widely and very economically to perform such monitoring and control functions. Such systems have provided needed outage information and system status without excessive cost. Two manufacturers come to mind: Microwave Associates and Metrocom. Since BPL would require fiber optic cable 'to the last mile', it could only be based upon revenue from high speed data services, since economical SCADA solutions in both urban and rural areas have been available to utilities for a long time.

11. " (Pre-failure data) capabilities are not available with existing low-speed power line

carrier technologies." [4] I'm somewhat surprised, but not terribly, to hear Amperion

make such a bold comparison. Surely, Amperion is not trying to 'pull the wool' over

the Commission's eyes. Crude and archaic, present-day VLF PLC is in no way

capable of providing more than one data point or command per carrier channel. A

typical, present-day SCADA system, sans BPL, can monitor *thousands* of analog,

control or status/data points over one twisted pair, fiber, or microwave channel. Why

didn't Mr. Hunt state whether or not these desirable features were available via other

modern utility telecommunication media?

12. Speaking of VLF PLC, Amperion makes a noteworthy statement: " From an

operations perspective, BPL's high speed capacities will allow utilities to improve their

infrastructure security and better ensure public safety. This is increasingly important

due to classification by the government of specific public and private infrastructure

assets, such as electric utility assets, under MEVA (Mission Essential Voluntary Assets)

established by Presidential order as part of the Homeland Security policies framework

guidelines. MEVA assigns additional responsibilities to utilities in order to ensure

secure infrastructure power for federal facilities, including state, city, and local

[4] Comments of Amperion, Inc. (July 7, 2003) ¶ 6., P.9

government." [5] Amperion's statement clearly justifies the removal and replacement of

existing insecure VLF PLC. However, BPL's being a 'last mile' technology, would

preclude it from being used satisfactorily over a 30 to 50 mile transmission line path.

But, since most substations of any significance already have other media extended to

them for monitoring and control, PLC should be replaced with such other

telecommunications media for the very reasons Amperion cites above.

D. Conclusions

13. BPL is a 'last mile' concept. As such, existing electric utility fiber optic systems must be extended to the last mile to interconnect with BPL to achieve satisfactory throughput. Since technologies exist to provide both electrical conductor and fiber optic cores in one bundled, stranded cable, there is little reason why fiber core power cables could not be extended the entire length of distribution feeders directly to the customer. Or, at least to distribution transformers or other strategic points where a proven, high speed wireless technology, such as Amperion's IEEE 802.11(b) compliant PowerWiFi™ could be employed for the last 100 to 1000 feet or more to supply multiple customers with high speed two way Internet and perhaps even other services which are now unavailable outside urban areas. Also, with elevations of 30 to 45 feet above average terrain at pole-top, and wireless hub devices geographically centered, perhaps several rural customers could be served from one wireless hub overhead location. Power

[5] *Ibid* ¶6., P.10

system reconfiguration obstacles for fiber optic bundles could be resolved by simply bypassing fiber optic core tubes around electrical switches, allowing rearrangement of power flow without disrupting data service routing. Or, alternatively, installation of fiber core conductor as overhead common neutral would avoid switches altogether.

14. The above reply to comments is timely filed and submitted in accordance

with 47 CFR § 1.415. And, has been telefaxed to Mr. Hunt at (978) 659-0080 at

Amperion, Inc., Andover, MA, on July 30, 2003.

Respectfully Submitted,

/s/

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