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

In the Matter of	)	
Amendment of Parts 2 and 97 of the Commission's Rules to Create a Low Frequency Allocation for the Amateur Service	)	**ET Docket No.** 02-98 **RM -** 9404
By W. Lee McVey, P.E.	)	
To: Chief, Public Safety and Private Wireless Branch, Wireless Telecommunications Bureau	)	

REPLY TO COMMENTS

My reply comments are filed in response to Comments by the United Telecommunications Council, Pinnacle West Capital Corporation, and the IEEE Power System Relaying Committee

I. Existing Power Line Carrier (PLC) Schemes Alleged 'Mission Critical'

The United Telecommunications Council (UTC) states that "PLC is a mission critical system. One that is designed to trip relays within a second to prevent widespread outages that could occur." In reality, PLC is a communication conduit. One which is both insecure and incredibly

simplistic by virtue of its simple on/off or, in some instances, singular frequency shift to initiate a trip.

If PLC is the end-all to power system reliability, why then, are fiber optic and microwave paths used? The answer is simple: When reliability and security of the trasfer-trip or supervisory control communication path is deemed important, then these methods are used in highly secure and redundant fashion within their mode. As an example, fiber optic, self-healing ring buses or and multiple microwave channels are commonly employed to ensure that interruption of one path will not jeopardize the ability of a protective relay to initiate a trip of a distant circuit breaker.

Utilities that employ PLC communications logically in parallel with fiber and microwave communications for the same initiator seriously impair the operational security of their schemes and increase the likelihood of mis-operation/false tripping.

II. Amateurs Would be Free to Interfere with PLC and Utility Operations with Impunity

Amateur radio operators have no history of intended or intentional interference with other services. And, to strongly imply that Amateur operators would intentionally interfere with or intend to cause misoperation of utility systems is way out of line. Intentional interference is both contrary to existing Federal law and beyond the spirit of Amateur Radio operation.

III. PLC Systems are the First Line of Defense that Protect the Grid from Overloads

PLC is but a communication method. It, in and of itself, offers no protection from overloads or faults. Protection is the function of specific types of protective relays designed to operate under specific, abnormal conditions. And, as has been stated previously, much of the application of

PLC as a trip blocking 'conduit' is due to the fact that old and imprecise electromechanical protective relays could not be adjusted to properly differentiate between their primary and secondary zones of protection.

I would hesitate to think that massive reaction schemes to shed load and separate generation are PLC-dependent for proper operation. If they are, then one of the first agendas for our new Federal Homeland Security Department ought to be to require 'hardening' of our national and regional transmission and substation communication and control systems to prevent their potential compromise.

IV. Transfer Trip, Steady-State PLC Signals Vulnerable to Detection and Unauthorized Operation

PLC system transmitters employing FSK guard signals operate at power levels allowing their easy detection with receivers and perhaps even frequency counters in close proximity to substations and transmission lines. Further, their presence can easily be observed visually at substation line termination points. The large series inductors and associated coupling capacitors are quite obvious. To operate such a simplistic, insecure communication and control system certainly begs to question the UTC claim that it's a 'first line of defense that protects the grid'. The first lines of defense to protect the electric utility system grid are properly designed, applied and maintained protective relays and their associated circuit breakers.

V. Transmission Service to the Public Would be Interrupted During System Modification

Since PLC communication systems either initiate a distant breaker trip or block a distant breaker trip, redundant replacement equipment could be installed without interruption simply by bridging the initiating circuitry at terminal end points. Abandoned PLC wave trap inductors and coupling

capacitors would create no impediment to continued operation of transmission lines until system conditions permit removal of a given line from service without customer interruption.

Similarly, if wave traps and couplers needed retuning to approximately 5kHz above or below the new Amateur band, a very brief line outage, if at all would likely be required as much of the work would take place in low voltage circuitry beyond coupling capacitors. If utilities must retain transfer trip capability during retuning, temporary means could be employed such as temporary point to point radio or telephone pathways.

VI. PLC Receiver 4kHz Bandpass Excessive

Assuming that only the presence of a carrier or FSK operation via shift from guard-to-operate frequencies, there is no justification for a 4kHz PLC receiver bandwidth. Modern, multi-pole crystal filters and digital signal processors could be employed in PLC receivers and allow them to easily achieve a bandpass of less than 1kHz. And, with guard-to-operate carrier frequency shifts of only 200 to 500Hz necessary, the bandpass of PLC receivers could easily be halved to 2kHz or even quartered to 1kHz without suffering any degradation of performance. This would allow, effectively, two to four times the present number of PLC channels and would negate the loss of one-half of one existing channel for the new Amateur band. Also, narrowing PLC receiver bandpass would reduce the probability of adjacent channel interference near the proposed new Amateur band.

VII. Amateurs Would Use This Band for SSB Telephony, et. Al.

Clearly, the UTC does not understand the bandwidth needed for telephony. With a proposed allocation of only 2.1kHz, that is not enough to employ SSB telephony for just one station, let

alone several. Such a narrow bandwidth essentially limits Amateur operation to narrow band CW or digital modes.

VIII. Why would the Commission Jeopardize the Broad Public Interest of the Electric Utility Grid to Serve the Narrow Public Interest of the Amateur Community?

Perhaps the Commission does understand that PLC is more often than not a back up, second or third level communication method. Or, if not, then it should be. And, that protective devices that are indeed critical already have other communication paths deemed to offer security and reliability far superior to PLC.

Further, there is a collective national and international public interest in experimentation with narrowband LF radio communications by Amateur Radio operators. To name just a few: public safety; national security; research and development; and international good will.

But one example of innovative creation and achievement by Amateur Radio experimentation which today greatly benefits the public is the digital X.25 packetized communication protocol. This was developed by the Tucson (AZ) Amateur Packet Radio community and is the basis for today's high speed digital communication systems including the Internet.

IX. Conclusions and Recommendations

Perhaps a comment by the IEEE Power System Protective Relaying Committee chair should be taken to heart: "The Federal Government should take all actions necessary to retain (electric utility system) reliability." Retention, or better yet, improvement of power system reliability and security ought to be one of the first mandates from our new Homeland Security Department.

The use of PLC systems for anything but second or third level blocking schemes to prevent

unnecessary circuit breaker operation via old electromechanical protective relays should cease. Proper PLC operation through a fault on the PLC conductor should not be assumed. The signal attenuation resulting from a fault can vary significantly. Further, wave traps can and do become de-tuned from environmental effects and satisfactory signal levels cannot always be depended upon.

As stated in my previous Reply Comments, major Western United States utilities do not use vulnerable PLC for primary transfer trip applications. Instead, they use communication methods such as redundant, automatically self-healing secure fiber or microwave radio ring telecommunication configurations offering multiple, independent communication and control paths are used. These methods should replace PLC in transfer-trip applications to better protect our national and regional power systems from compromise.

The Commission should allocate the almost insignificant 2.1kHz band to the Amateur Radio Service for narrowband modes as proposed. Electric utilities that still insist on PLC for blocking schemes on frequencies within the new band should be requested to change their operating frequencies, narrowband their receiving equipment to provide additional operating channels, and retune their wavetraps a few kilohertz to frequencies outside of the new Amateur band.

Respectfully Submitted,

(electronically)

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