

To all radioamateurs

RTA and DARC e.V. present this document as a contribution to inform the amateur radio community on the issue of PLC and as discussion material to be used in public relations efforts. Latest developments are taken into account.

The paper is a common effort of DF7VX, DJ6AN, DJ1ZB, Mrs Volmer, DL2CH, DJ8CY, DF5DP, DF4JI, DL9MH and DF9IC and of the member societies of the RTA.

Translated by ON4WF.

PLC – not recommended

1. PLC – How it works

PLC (PLT) is the acronym for Power Line (Tele) Communication. Intended is to implement telephony and high rate Internet datatransmission on the existing 230 V (50 Hz) power grid in the users home, as well as Data, Audio and Video transmission from outlet to outlet inside a building or dwelling place (domotics). The datatransmission occurs broadband on radio frequencies up to 30 MHz. Not intended for the transmission of radiowaves on frequencies up to 30 MHz, the mains act as radiating antennas. PLC operators are (or will be) subject to radiation limits. Legal reference is the not yet enforced NB 30 frequency management norm. Most PLC systems will not be up to these constraints and consequently exceed the limits.

It has to be noted, that several existing appliances such as babyphones, garagedoor openers and heating controls are also mains channelled PLC applications. Using very low frequencies instead of high frequencies, these applications are free from undermentioned shortcomings and appropriate for domestic use.

2. PLC disturbs short wave radio services

PLC short wave frequencies have since long been allocated to various radio services such as broadcasting, air and maritime communications, fixed and mobile radio services, military, security services, radioastronomy, etc. not to forget the amateur radio service. Even with radiation limited to the NB30 norm, short wave reception is considerably disturbed because the receiving antennas cannot be set up far enough from the mains. Medium waves broadcasting and other frequencies can also be disturbed. These disturbances can endanger the very existence of some radio services, such as short wave broadcasting and the worldwide amateur radio service.

3. Short wave radio disturbs PLC

Widely distributed power lines, acting as antennas, not only produce strong disturbing radiation but also collect all kinds of high frequency signals, resulting in high noise levels on the mains. Regulations provide no legal protection of PLC against disturbances. High noise levels can considerably lower the datarate and even disrupt transmission, preventing the service provider to furnish the guaranteed datarate. PLC's immunity from disturbances is determined by the degree of protection built in the system itself. High immunity calls for a corresponding degree of protection measures, detrimental to the effective transmission capacity (datarate).

4. PLC can disturb other electronic devices

Since PLC signals, travelling on the power mains (230V - 50 Hz), directly access all mains fed devices, it is likely that a multitude of electronic devices will suffer interference, in particular entertainment and medical equipment in hospitals and consulting rooms. Most such devices have no special protection against PLC signals and are exposed to disturbance. In critical

locations, such as intensive care services, human lives can be endangered. For safety's sake, each device will then need appropriate and expensive protection measures.

5. PLC is unsure

A paper on PLC, published by the society for science and technology of the Dresden Technical University, concludes that PLC efficiency suffers from the mains "impedance instability" resulting from totally uncontrollable consumer on- and off-switching.

6. Right now, PLC is an outdated system

Electronic devices and modulation systems used for PLC draw on the latest technical developments in order to assure proper data transmission on since long heavily polluted power wires. Compared to alternative techniques, the PLC data transmission system, with a data rate limited to some 2 MB/second, does not even match ADSL (data transmission on telephone wires at 8 MB/second) commonly presented to the general public. Amateur radio operators consider cable TV data transmission a valuable alternative. ADSL also, provided that nearby amateur radio frequencies are protected by adequate filtering. These amateur radio reserves do not in any case extend to future alternative solutions such as fibreglass cable, microwave systems for small cells or the oncoming UMTS mobile system.

7. PLC is exposed to eavesdropping and malicious jamming

Like all radio signals, PLC can be intercepted and copied by anybody in the home or building. Therefore providers will take steps to secure PLC transmissions. Protection efficiency will depend upon securing measures, which ordinary end users cannot control. Users have no means to evaluate risks and cannot decide when to protect themselves. Since no connection is needed, eavesdropping is easy. Considering the expected numbers of users, illegal copying will rise to unheard of heights, and the foreseeable lack of data security is extremely high. Since radio transmissions are exposed to interference, a user terminal can easily be disturbed by a nearby jammer, even with low power.

8. PLC interference breaks the freedom of information

PLC can totally disrupt short wave broadcast reception cherished by our foreign fellow-citizens, as well as medium wave broadcasting and other radio services, such as the international Amateur Radio service. This is an infringement of Article 10 of the European Convention on Human Rights (fundamental right to active and passive freedom of information) since access to not otherwise accessible information is denied. On the other hand, practically all information and services offered by PLC are accessible through other and at least equally valuable or better techniques.

9. PLC raises completely new legal issues

Problems related to the delivery of data by power companies to end users at the limit of the property or at the power outlet in house (as well as the technical and legal liability for the PLC connection and for the content of the PLC exchange), refusal of citizens to accept the presence of PLC data on their property, endangered freedom of information and lack of data safety as well as questions about the applicable legislation on electromagnetic compatibility (EMC) in case of interference, raise legal issues and endanger good neighbourhood.

10. PLC is not economically justified

Compared to other data transmission systems, PLC is a waste of economical resources. In the United Kingdom, the promoters of PLC withdraw soon after some initial enthusiasm. Taking into account the cost and the return ratio of PLC, it is foreseeable that market mechanisms, once coverage becomes widespread, will confirm likely negative results. The limited range of PLC

restricts the implementation to densely populated areas, where a multitude of users have to share a limited bandwidth.

11. PLC's efficiency does not meet the growing need of quick data transmission

In distributed workplaces, professional computers nowadays show data transmission rates of 100 Mbit/s. Industry prepares a norm based on 10 Gbit/s. Professionals agree that data transmission to PC terminals follows the law of Moore, stating a two-fold increase of processing speed every 15 to 18 months. Personal computers of individual users will benefit from this technical development. Evidently, the projected PLC data rates of some 2 Mbit/s from provider to user will be outdated, once widely spread. Shareholders of PLC promoting undertakings should be aware of this when making decisions on the stock exchange.

12. Opposition

Opponents expressed their concern in a public hearing on frequency management presented by the German regulatory authority, more precisely about the norm NB 30. Significant is the negative position taken up by representatives of safety services, military, broadcasting, internationally renowned manufacturers of short wave equipment and audio and HF measuring instruments, other radio services and short wave users such as radio astronomy.

13. Their experimental service threatened to death, the radio amateurs strongly oppose PLC

Using very sensitive receivers for their experimental service, radio amateurs are especially concerned. In an official hearing of the German ministry of trade, they firmly expressed their opposition to PLC. Amateur radio operators have observed pilot projects, measured and made available the interfering signals. The DARC has participated as observer to tests performed by the spectrum surveillance service.

Radio amateurs have taken part in press conferences of future PLC providers and their questions have given rise to considerable uncertainty. Radio amateurs, primarily concerned, have produced press releases against PLC, participated to TV programmes, given interviews to local newspapers and alerted the European and the German members of Parliament. The DARC has exposed the issue to EUROCOM (European Union workgroup of the International Amateur Radio Union) as well as to the IARU conference and to the radio amateur community throughout Europe and worldwide.

Common action of European amateur radio societies has been developed. Outside of Europe, progress was noted in New Zealand and in Australia where radio amateurs showed considerable awareness and concern about these critical developments.

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