

**Department of Energy and Climate Change (DECC)  
and the Gas and Electricity Markets Authority  
(GEMA)**

***Smart Metering implementation programme.***

Reference Number: 10D/732 Open Date: 2010-07-27

**Memorandum**

**from the**

**Electromagnetic Compatibility Industry Association  
(EMCIA)**

27 October 2010

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## 1 Executive Summary

EMCIA strongly recommends that the licence and code given to the DCC should prohibit the use of Broadband PLT\*. Furthermore, for other technologies it should set out specific and application-relevant requirements both for immunity to electromagnetic interference and for the emission of such interference.

The very high levels of EMI emitted by PLT have serious consequences for radio communications in the “Short-Wave” and “Very High Frequency” bands including potentially severe safety consequences. It can also interfere with the delivery of broadband Internet by xDSL technologies using telephone cables, slowing their data rate.

### \* PLT = Power Line Telecommunication

PLT also goes by other names, including PowerLine Communications (PLC) and Broadband over PowerLine (BPL)

## 2 The EMCIA — a brief introduction

The full name of the EMCIA is the Electromagnetic Compatibility Industry Association.

The EMCIA was formed in March 2002 for the benefit of companies involved in the supply, design, test or manufacture of EMC\* products, or the provision of EMC Services. The EMCIA is a UKTI Accredited Trade Organisation.

**\*EMC** is short for Electromagnetic Compatibility – the ability of equipment or a system to function satisfactorily in its electromagnetic environment, when used as intended:

- without causing intolerable electromagnetic interference (EMI) into its environment, and,
- without suffering unacceptable degradation of performance due to EMI present in its operating environment.

The achievement of EMC is vital for everything that employs electrotechnology, and is necessary for:

- (a) All manufacturers who incorporate electronic devices within their products.  
Including: agricultural; consumer; commercial; communications; industrial; education; science; military; transport (road, rail, air, space, marine, etc.); national infrastructures (electricity and gas generation and distribution; telecommunications and internet; radio and TV broadcasting; water supply and sewage treatment, etc.); medical; security; building automation; etc.  
Based on figures from ORGALIME, the total value of these manufactured goods in the UK is in excess of £30 billion per year.
- (b) Owners/operators of systems/installations that employ electronic equipment  
Including all buildings and vehicles: agricultural; scientific; residential; commercial; industrial; healthcare; national infrastructure; communications; military (land, sea, air, space); educational; governmental; etc.
- (c) All service organisations that employ electronic equipment.
- (d) Employers who provide work equipment incorporating electronic devices  
Including: agricultural; retail; commercial; entertainment; industrial; government; military; communications; scientific research; transport; healthcare; education; transport; etc.

The EMCIA Secretariat is Nutwood UK Limited, Eddystone Court, De Lank Lane, St Breward, Bodmin, Cornwall. PL30 4NQ, telephone: 01208 851 530, fax: 01208 850 871. [www.emcia.org](http://www.emcia.org)

### **3 Comments on Question 10 posed in the Prospectus**

**Question 10: Do you have any comments on the proposal to establish DCC as a procurement and contract management entity that will procure communications and data services competitively?**

This question refers to para. 3.27, which deals with the Governance of the central data and communications entity ("DataCommsCo" or "DCC") and reads;-

*"DCC will be responsible for procuring services and technologies to satisfy the obligations placed on it by its licence and the Code. The licence and Code will not specify the technology or technologies to be used for WAN communications but rather will set out the functional, including security, requirements of the end-to-end communications system. Instead, technology choices will rest with DCC. We intend to seek further information in the next stage of work to help us understand in detail service providers data and communications capabilities and the cost implications of different requirements scenarios."*

**EMCIA comment as follows;**

Whilst it is proper that the licence and code assigned to the DCC should not be overly restrictive, it must be recognized that the communication system for Smart Metering will be unique both in its connection to and deployment within almost every building in the UK and also in its impact upon the lives of every citizen. As such, extraordinary steps will need to be taken to ensure;-

- The immunity of the communications system to external electromagnetic influences that might disrupt its supply security or billing functions.
- The spurious emissions from the communications equipment that might disrupt the myriad electronic devices and wireless systems with which it is necessarily in close proximity.

Extraordinary steps will be required because the industry-standard design and quality practices used by candidate technologies for communication are generally applied where the consequences of failure are less serious. Failures of the sort dealt with by EMCIA members on a daily basis usually come as a surprise to the system's designers, and are often found only after large-scale deployment. Such failures tend to be sporadic and apparently idiopathic and require expensive skilled technical investigation on user's premises.

Whilst it might be hoped that conformance to EMC Standards would be sufficient to avoid such risks, we note that

- Many Standards are written around applications where some disruption can be accepted, and endeavour to allow the marketing of minimum-cost products capable of operating adequately when there is a significant separation between culprit and victim. Very few EMC Standards exist that are appropriate for High-Integrity Systems such as Smart Metering.

- It is now acceptable under the EC EMC Directive to market products that do not conform to *any* recognised EMC Standards. It has been clearly and repeatedly stated by the European Commission that the use of harmonized standards is voluntary.

Accordingly we believe that the licence and code given to the DCC should set out application-specific requirements both for immunity to electromagnetic interference, and for the limitation of emission of such interference.

There is one candidate technology that requires particular caution in this respect. Power Line Telecommunications (PLT) exists in two forms;

- Low frequency, as used for tele-control within the electricity supply network for many years and standardised according to EN50065. This technology has a good track record in the above respects.
- Broadband PLT (otherwise PLC or BPL) that by virtue of its choice of frequency bands produces significant interference to local and international broadcasting and point-to-point radio services. Some of the problems with Broadband PLT are set out in the Appendix and references.

## 4 Recommendation

EMCIA strongly recommends that the licence and code given to the DCC should prohibit the use of Broadband PLT. Furthermore, for other technologies it should set out application-specific requirements both for immunity to electromagnetic interference and for the emission of such interference.

## 5 Appendix: High-Frequency (Broadband) PLT

The mains power distribution network, both to and within homes, is not suitably constructed to carry the high frequencies used by high-speed data signals.

Furthermore the mains network already carries high-frequency interference caused by the operation of electrical and electronic products.

For these reasons there is a difficult trade-off between reliable data rate and interference emission. For PLT to communicate with a high data rate over useful distances it must inject such high levels of signals into the mains network that copious levels of electromagnetic interference (EMI) are emitted from the mains wiring.

The emitted levels of EMI are far above those permitted by test standards generally applied to everyday products.

In fact, a single PLT device in a home creates as much interference as would over 1,000 barely-EMC Directive-compliant products all plugged into the same mains circuit.

This EMI has a deleterious effect on users of radio communications [2], [3], and could have severe safety consequences (e.g. for short-wave radiocommunications with aircraft, or in the case of a national disaster).

The EMI from PLT also affects the delivery of broadband signals via telephone wires, for example the new VDSL2 standard, as shown by [4], and so will add costs to, and delay the implementation timescales of, the UK Government's "Digital Britain" project.

The vast number of individual communication links that will be involved in Smart Metering will precipitate a "Cumulative Interference problem" [5], [6] that is projected for PLT systems but is at present barely observable with today's market penetration.

## 6 References

- [1] *RF Emissions of Powerline Ethernet adaptors*, Tim Williams, EMC Journal, Issue 82, May 2009, pp 15-18, [www.theemcjournal.com](http://www.theemcjournal.com)
- [2] *Why broadband PLT is bad for EMC*, Tim Williams, EMC Journal January 2009, Issue 80, pp 25-34, [www.theemcjournal.com](http://www.theemcjournal.com)
- [3] *BTVision; the radio interference iceberg*, Richard Marshall, EMC Journal July 2009, Issue 83, pp 22-24, [www.theemcjournal.com](http://www.theemcjournal.com)
- [4] *VDSL2 and in-door PLT Coexistence*, ETSI, LAN09AF033 Ed.02, July 16, 2009. ETSI is the European Telecommunications Standardisation Institute, and it makes this report available as: PLT52\_TD12\_VDSL2-PLT\_Plugtest\_Report, ETSI, 2009.pdf
- [5] *Environmental Effects of the widespread deployment of high speed Power Line Communication*, Richard Marshall, EMC Journal March 2010, Issue 87, pp 33-41, [www.theemcjournal.com](http://www.theemcjournal.com)
- [6] *Impact of powerline telecommunications systems on radio communications systems operating in the LF, MF, HF, and VHF bands below 80MHz*, draft report ITU-R SM.[PLT] Document 1/67-E, 23<sup>rd</sup> September 2009-12-20

## 7 Further information

EMCIA can provide access to a wide range of recognised UK experts in all of the areas mentioned above, including those who are not members of the EMCIA.