After the EMC Directive

Tim Williams
Elmac Services

Does the EC think that standards are a waste of time? It has always been legally permissible to comply with New Approach Directives without actually testing to their listed harmonised standards, the aim being that whatever other approach is used should meet the Essential Requirements of the Directive. But what we are seeing now in the case of Power Line Communications (PLC, occasionally Power Line Telecommunications, PLT) is a situation in which manufacturers of such products are complaining about their inability to meet these standards, twisting out of doing so by using rejected draft documents as if they were legitimate, and doing this apparently with the full support and encouragement of the European Commission.

In the past year, complaints about interference from PLC products, and particularly about in-house Ethernet-to-Powerline adaptors that are on all the time, have been fired at the European Commission and at enforcement authorities from all directions. The response, when it comes, has been to shrug off the complaints as if they are irrelevant. A widely-circulated letter to an MEP from the Vice-President of the EC [1] says

> *"Power line adapters" are covered by Directive 2004/108/EC on "electromagnetic compatibility" (EMC), which provides Member States (in the case of the UK OFCOM) with ample provisions to correct situations of interference. The relatively few problems that occurred can be handled within its context. PLC technology does not interfere into military services since they typically do not operate in areas where there is a risk of interference. Emergency services now use advanced digital radio technologies to communicate. Shortwave broadcast reception has further been substituted by internet radio."*

This article will look at some aspects of the response and draw some conclusions for European regulation – conclusions which may surprise some people.

The Discussion Document

The European Commission's EMC Working Party last met at the end of June 2009, and PLC was one of the topics on the agenda. The Commission had circulated a "Discussion Document On The PLC Standardisation State Of Affairs" [2] in May, for the EMCWP to consider. In it, it was suggested that as of October 2009, manufacturers of PLC products will not be able to use EN 55022:2006 or any other harmonised standard for demonstrating compliance. This was taken to be because of a new testing flowchart which appears in this edition and which, it was felt, forced a PLC manufacturer to apply a conducted emission test which the PLC industry claims it didn't have to do under the previous 1998 edition; and October 2009 is the date from which the 1998 edition is superseded, as published in the *Official Journal of the EU*. The document includes what sounds like a sob story for PLC:

> *Any market surveillance check of PLC products conducted after October 2009 with the EN 55022:2006 test methods will show test results substantially above the limits of Table 1 & 2. As a result, PLC manufacturers have the impression that, even if their technical file is convincing, they run a serious risk of a sales ban by market surveillance authorities.*

The Commission had clearly been briefed in this regard by PLC manufacturers, not for the first or only time. A written question to the Commission in April [3], over the signatures of a number of MEPs, started by saying

> *Recent amendments to European standard EN55022 throw into jeopardy the future of powerline communications (PLC) technologies by imposing artificially low electromagnetic emissions limits that will make it impossible to place PLC equipment on the EU market from October 2009.*

Consequently, the Discussion Document for the EMCWP proposed one of two "solutions", either:

> *- to postpone the date of withdrawal of EN 55022:1998 which is the only standard with which PLT/PLC are able to comply. The new date could be discussed with CENELEC and industry so as to give reasonable time before the mandate deliverables can be referenced in the OJEU. However, for PLC/PLT equipment, which would continue to use the 1998 version, this solution postpones the benefits of all the other non controversial improvements which have been integrated in the 2006 version.*

- to render inapplicable to PLT/PLC the branch "mains" in the 2006 version (Article 6.4.b "publish with restrictions"). Thus, PLC/PLT technologies would still benefit from the non controversial improvements in the 2006 version.

But it is *not true* to say that such technologies could comply with earlier versions of the standard, i.e. CISPR 22: 1998 or its EN equivalent. The later 2006 edition has, in the flowchart in Annex C, explicitly referred to the "mains type" as a potential type of telecommunications port which must be tested according to the established limits for mains terminals. This aspect of the flowchart has been maintained by CISPR/I in the face of pressure from the PLC industry for it to be modified; moreover, it has been maintained into the replacement for CISPR 22, the draft CISPR 32. This shows that CISPR/I regard it as imperative that the established limits should be applied *whatever the notional function of the mains connection*. The CISPR/I approach has a solid technical foundation, which is operative regardless of the type of equipment which is connected to the mains.

CISPR emissions standards exist to protect the radio spectrum. The radio spectrum is a valuable and irreplaceable natural resource, like air and water, but its true value is only really appreciated when it is no longer available. These emissions standards, their test methods and limits, are based on a rigorous, well documented approach* and many decades of experience in real-world prevention of radio interference.

The third edition of CISPR 22, published as EN 55022:1998, was drafted before the question was raised of whether a PLC mains connection should be treated as a telecommunications port. It has no Annex C flowchart (although, in their discussion document, the Commission don't seem to know this) and does not explicitly state that a telecommunications port could be a "mains" type. However, it applies, without qualification, limits for conducted disturbance at the mains terminals. Nothing in the standard would disapply this to a PLC modem. These are exactly the same limits as are referred to in the Commission's document as "too low to be complied with by today's PLC technologies". Therefore there is no difference as far as the mains terminals are concerned between EN 55022:1998 and EN 55022:2006. Any manufacturer whose equipment breaches the limits for mains terminal disturbance voltage in tables 1 or 2 of EN 55022:1998 and yet who has declared unqualified compliance to that standard, has done so incorrectly.

Consequently, there is no change in status when EN 55022:1998 is withdrawn in October 2009. So the "two solutions" proposed in the discussion document are illusory. The first would not change the situation that a PLT modem which cannot comply with the mains terminal disturbance limits, cannot comply with the EMC Directive through the harmonised standards route. The second clearly sets the Commission at odds with CISPR/I.

The implication of the Commission's two suggested solutions is that they regard the approach taken by CISPR/I as inconsistent with the purpose of the EMC Directive, and are looking for ways to circumvent it. This has serious consequences for the application of harmonised standards, which are largely based on CISPR requirements.

In the event, the outcome of the Working Party meeting was inconclusive; the point regarding the lack of difference between EN 55022:1998 and :2006 was made clear to the Commission, who nevertheless "reserved their position"**. It is obvious that the Commission had been incorrectly briefed by the PLC lobby (and had accepted that briefing), who for some reason think that they can "get away with" inadequate compliance to EN 55022:1998. What is that reason?

The advice to Notified Bodies

A previous article [4] has pointed out that the actual levels that one particular device puts on the mains supply are 30dB over the limit, over 75% of the conducted emissions frequency range. That device is said to use CISPR/I/89/CD, a withdrawn draft from 2003, in order to "tweak" CISPR 22 to allow compliance, and [4] discusses why this is not acceptable. But another source has suggested using a rejected CISPR document to allow a PLT device to claim compliance. This is ECANB (Group Of

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* Interested parties may care to look at CISPR 16-4-4, "Statistics of complaints and a model for the calculation of limits for the protection of radio services"; of relevance to this argument, it contains, in its new Annex A, values of the classical CISPR mains decoupling factor which were determined by measurements in real LV AC mains grids in the 1960s. It is deemed that these mains decoupling factors are still valid and representative.

** Update: on 21st August 09, the Commission postponed the date of cessation of EN 55022:1998 to 1st October 2011, against the advice of their Working Party.

Notified Bodies Under The EMC Directive) TGN17 Version 1.0: April 2008, "Technical Guidance Note TGN on Assessment of Powerline Telecommunications (PLT) Equipment" [5]. It says

> *CISPR/I/257CD "CISPR 22 Limits and method of measurement of broadband telecommunication equipment over power lines" replaces the older CISPR/I/89CD. Thus it may be the basis for assessment by Notified Bodies until an amended CISPR 22 comes into force.*
>
> *...*
>
> *Notified Bodies when being consulted to provide an opinion on PLT conformity assessment should base their opinion on the following:*
>
> *a) Measurement of PLT emission should be done according to CISPR I 257CD (depending on the outcome of the voting this clause may need to be revised).*
>
> *b) Additional mitigation measures can be recommended to be implemented as described in CISPR/I/258DC* [which refers to notching and power management].

CISPR/I/257/CD having been swiftly rejected, TGN17 has now (a year later) been revised. For over a year Notified Bodies, and by extension manufacturers wishing to perform their own assessment, had an official imprimatur – ECANB is recognised as a source of guidance by the EC – for using a failed method. But the revised TGN is hardly any different; it merely repeats most of the relevant parts of CISPR/I/257/CD in its own text, and adds a description of mitigation techniques which is derived from (but not the same as) CISPR/I/258/CD. This in itself introduces problems, partly because the TGN now clearly diverges from the present thinking in the CISPR working group, and partly because some of the techniques are either patented or not yet commercially available. The guidance in the new TGN now reads

> *Notified Bodies when being consulted to provide an opinion on PLT conformity assessment are strongly encouraged to base their opinion on the following:*
>
> *a) Measurement of PLT emissions have to be done according to what it is described in clause 2 of this TGN.*
>
> *b) Additional mitigation measures have to be implemented according to what it is described in clause 3 of this TGN*

Note the difference between "strongly encouraged" and "should". In neither case is the word "shall" used. Even so, the ECANB view is clearly at odds with the approach taken by CISPR.

The EMC assessment

At this point it would be as well to remind ourselves of the wording of the second edition EMC Directive 2004/108/EC. Annex II.1 says

> *The manufacturer shall perform an electromagnetic compatibility assessment of the apparatus, on the basis of the relevant phenomena, with a view to meeting the protection requirements set out in Annex I, point 1. The correct application of all the relevant harmonised standards whose references have been published in the Official Journal of the European Union* ***shall be equivalent to*** *the carrying out of the electromagnetic compatibility assessment.*

Point 3 says

> *In accordance with the provisions set out in Annex IV, the manufacturer shall draw up technical documentation providing evidence of the conformity of the apparatus with the essential requirements of this Directive.*

And Annex IV.1 says

> *The technical documentation must enable the conformity of the apparatus with the essential requirements to be assessed. It must cover the design and manufacture of the apparatus, in particular:*
>
> *— a general description of the apparatus;*
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> *— evidence of compliance with the harmonised standards, if any, applied in full or in part;*
>
> *— where the manufacturer* ***has not applied harmonised standards, or has applied them only in part****, a description and explanation of the steps taken to meet the essential requirements of the Directive, including a description of the electromagnetic compatibility assessment set out in Annex II, point 1, results of design calculations made, examinations carried out, test reports, etc.;*

— *a statement from the notified body, when the procedure referred to in Annex III has been followed.*

(My emphasis)

From these points, we can understand that while a manufacturer *could* apply harmonised standards in full, *he doesn't have to*. If he doesn't, then he has to document how he thinks he's met the essential requirements in such a way that the conformity can be assessed; but the Directive doesn't say who is to do the assessing, except that the documentation must be held "at the disposal of the competent authorities". Reference to CISPR/I/257/CD, and even to CISPR/I/89/CD, would almost certainly be accepted by anyone who is not familiar with the detailed technical arguments that have gone into their rejection.

Now, this has always been the case since 2004/108/EC was published; there is nothing new in it. But various correspondence with Trading Standards and Ofcom (the competent authority in the UK) as well as statements from the EC themselves have all indicated repeatedly that these authorities believe that PLT modems, which clearly don't meet the limits in the harmonised standards, nevertheless have been legally placed on the market. This, even though there is plenty of evidence that these units are not designed such that "the electromagnetic disturbance generated does not exceed the level above which radio and telecommunications equipment or other equipment cannot operate as intended" (the EMC Directive's first essential requirement). To quote a senior EC official, "Why make legal products illegal?" This leads us to reinforce a very significant conclusion (and I apologise for the triple negative):

Non-compliance with a harmonised standard's limits does not mean non-compliance with the EMC Directive.

This is dire news for CISPR and for the effort to protect the radio spectrum through the application of standards. It is clear that, as ITE, PLT modems should fall under CISPR 22; and that if their emissions are above the well-established limits for mains conducted disturbance, they cannot comply with CISPR 22; and therefore, there is no justification for them to be placed on the market, end of story. There are plenty of precedents to show that non-compliance with applicable standards mean effectively that a technology is outlawed. There is no reason for PLT modems to be treated as a special case, despite the lobbying by their supporters, nor should there be. They are used in the same electromagnetic environment as other products, all of which are subject to the same regulatory environment. But we now have clear evidence that the body responsible for the regulations agrees with the view, put forward in [3] quoted above, that the limits in the standards are "artificially low". The consequent conclusion must be that they are artificially low for all products.

If the standards can be discarded in such a cavalier fashion, why does anyone bother to work for their development, and why does anyone bother to observe their limits, or even test for them? And what price the EMC Directive itself? If anyone thought the Directive was about protecting the radio spectrum, think again. If spectrum protection collides with commercial protection, the spectrum loses.

References

[1] Letter to Caroline Lucas MEP (and others) from Günter Verheugen, Vice-President of the European Commission, 21st April 2009

[2] *Discussion Document On The PLC Standardisation State Of Affairs*, European Commission Enterprise And Industry Directorate-General, Brussels, 19 May 2009

[3] WRITTEN QUESTION by Alejo Vidal-Quadras (PPE-DE) , Fiona Hall (ALDE) , Satu Hassi (Verts/ALE) , Pilar del Castillo Vera (PPE-DE) and Erika Mann (PSE) to the Commission, 2nd April 2009; see http://tinyurl.com/mvc2th

[4] *RF Emissions of Powerline Ethernet adaptors*, Tim Williams, EMC Journal no 82 May 2009, pp 15-18, www.theemcjournal.com

[5] *Technical Guidance Note TGN on Assessment of Powerline Telecommunications (PLT) Equipment*, ECANB TGN17; Version 1.0, April 2008; Version 2.0, July 2009; available from http://circa.europa.eu/Public/irc/enterprise/emccbnb/library

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