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Technical Report

PowerLine Telecommunications (PLT);
Study on signal processing
improving the coexistence of VDSL2 and PLT

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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Powerline Telecommunications (PLT).

Introduction

The current solution for the IPTV market is based on ADSL link from the TELCO office to the customer premises, an ADSL gateway at the customer premise to decode the signal, and a home network to distribute the signal within the house. The next generation of broadband access, currently being deployed by European TELCOs, is based on VDSL2 technology. On the other hand, powerline technology is becoming the preferred solution for home networking when applications, such as IPTV, requiring high throughput and QoS are provided. However, both technologies, VDSL2 and PLT, use the same frequency band (2 MHz to 30 MHz), and several studies ([i.6] and [i.7]) predict the interference of PLT modems over VDSL2 systems. To confirm these predictions the ETSI PLT group conducted a Plugtest where the level of interference between both technologies was measured, and set up a Specialist Task Force with the following assignments:

1) to analyze the severity of the interference; and

2) to propose solutions to mitigate it.

The present document presents the result of the STF.

1 Scope

The present document presents the result of the work of the STF and suggests the methods and practices to reduce or mitigate the crosstalk between electricity and telephone cables. The present document also includes the results of a small measurement campaign in real housed aimed at confirming the results of the Plugtest and validating the mitigation methods.

The work was organised in three phases assigned to different STF members:

- Phase 1: Modelling the coupling channel between VDSL2 and PLT (clause 4).
- Phase 2: Simulations of signal processing algorithms for coexistence (clause 5).
- Phase 3: Implementation of the algorithms in PLT devices (clause 6); field measurements (clause 7) and laboratory validation (clause 8).

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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2.1 Normative references

The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] "Analysis of Multiconductor Transmission Lines", C.R. Paul. John Wiley & Sons, 1994.

[i.2] "Coupling of External Electromagnetic Fields to transmission Lines", A.A Smith John. Wiley & Sons, 1977.

[i.3] "Principes and applications of EM field coupling to transmission lines", F.M. Tesch. Proc. Int'l Symp. Electromagn. Compat. (EMC'95), Zurich, Switzerland, pp.21-31 (Supplement), 1995.

[i.4] "Compatibilité Electromagnétique 1 - des concepts de base aux applications", P. Degauque, A. Zeddam. Hermes Science. Get et Lavoisier, Paris 2007.

[i.5] "Coupling to Shielded Cables", E.F. Vance. John Wiley & Sons, 1977.

[i.6] "Analyse du rayonnement et des couplages électromagnétiques provoqués par des signaux hautes fréquences interférant avec des câbles d'énergie basse tension", R.Razafferson. Thèse de doctorat, Université des sciences et Technologies de Lille, 31 October 2002.

[i.7] "PowerLine effects over VDL2 performances", A.Bergaglio, U.Eula, M.Giunta, A.Gnazzo. IEEE international Symposium on Power Line, ISPLC 2008.