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PowerLine Telecommunications (PLT);
Powerline HDMI® analysis for very short range link
HD and UHD applications

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Contents

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Foreword

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

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Introduction

This Technical Report investigates how to transmit over the powerline medium HD and UHD contents that typically are exchanged through the HDMI® cable between transmitter video sources like Blu-ray™ players or set-top boxes and receiver video sinks like video displays. The report also presents earlier findings. The scope of the Technical Report is providing the technical elements needed to establish a PHDMI specification. The report is structured as follows: in clause 4, the requirements in terms of target bit rate to be fulfilled by a PHDMI technology are presented for different HD and UHD formats together with a set of PLT links used for testing purposes. It has to be underlined that the initial target for phase 1 was only HD. It was however estimated that the market is rapidly moving towards UHD and it was hence decided to enlarge the scope to also cover UHD. In clause 5, some target use cases are described: these scenarios highlight the potential fields of application of a PHDMI technology. Clause 6 presents the schemes that have been scrutinized as potential PHDMI technologies. Two of them are tandem schemes, i.e. systems that separate the channel encoding part from the source encoding part, they are based upon the serial concatenation of a compression encoder (based upon JPEG 2000 or Dirac) specifications and a OFDM power line modem operating in the 2 MHz to 100 MHz band that is able to provide SISO-based or MIMO-based communication. Besides tandem scheme, a joint scheme relying on the SoftCast paradigm has been also considered: it accommodates joint source and channel encoding. These communication schemes have been tested on HD and UHD videos both on flat channel with AWGN and on realistic PLT links (both SISO, MIMO 2×2 and MIMO 2×3): results are reported in terms of video quality metrics in clause 7 and clause 8. In particular, it is worth noticing that a realistic long video sequence was furnished by France Télévision for this analysis. Clause 9 shows how to optimize the source encoder parameters for the tandem schemes: an interesting point that it is also evaluated in this clause is the resiliency to errors at the PLT level, i.e. the investigation to see if it is possible to tolerate some errors at the PLT level without requiring retransmission of wrong packets. Clause 10 presents a scheme of a rate controller: it is the PHDMI component that manages the compression encoder rate as a function of eventual changes of the PLT rate during the video transmission. Transmit and receive buffer requirements are also put in evidence. Conclusion and final recommendations are reported in clause 11 of the present document.

NOTE: Blu-ray™ is an example of a suitable product available commercially. This information is given for the convenience of users of the present document and does not constitute an endorsement by ETSI of this product.

1 Scope

The present document addresses Short Range Powerline modems for Very High Bit Rate links for both HDMI® 1.x and HDMI® 2.0 interfaces.

2 References

2.1 Normative 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.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

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

Not applicable.

2.2 Informative 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.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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] "High-Definition Multimedia Interface Specification Version 1.4b", October 2011.

[i.2] Consumer Electronic Association®: "A DTV profile for uncompressed high speed digital interfaces", CEA-861-D, July 2006.

[i.3] ETSI TR 101 562-3: "PowerLine Telecommunications (PLT); MIMO PLT; Part 3: setup and statistical results of MIMO PLT channel and noise measurements".

[i.4] L. Yonge, J. Abad, K. Afkhamie, et al.: "An overview of the HomePlug AV2 technology", Journal of Electrical and Computer Engineering, volume 2013, Article ID 892628, 20 pages, 2013. Doi:10.1155/2013/892628.

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