

PowerLine Telecommunications (PLT) Technical requirements for In-House PLC modems



Reference

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Keywords

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ETSI

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Foreword

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

The present document outlines the PLT In-house modem requirements.

Introduction

The present document gives a list of requirements that shall be specified in an ETSI PLT modems standard.

As this understanding develops during the writing of the actual standards, the present document is likely to require change. Therefore, it should be treated as a living document rather than a definitive text.

The requirements shall be for PLT Modems to be specified by ETSI PLT. These requirements should be used as guidelines for the In Home PLT Modem specification.

1 Scope

The present document includes Technical requirements of In Home PLT modems, PHY and MAC. For instance, data rate(s), BER, repeating functionality, latency, jitter, encryption, synchronization, etc. requirements will be defined.

Modems build for In home LAN applications within private networks shall support this requirements. The present document does not specify Consumer Premises Equipment of access use.

2 References

For the purposes of this Technical Report (TR) the following references apply:

- [1] ETSI TR 102 269: "PowerLine Telecommunications (PLT); Hidden Node review and statistical analysis".
- [2] ETSI TR 102 049: "PowerLine Telecommunications (PLT); Quality of Service (QoS) requirements for in-house systems".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

streaming data: continuously stream data

EXAMPLE: A MPEG2 Transport stream.

NOTE: Applications like video surveillance or video downloads shall not be implemented as streaming data.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

f	frequency
t	time

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

BER	Bit Error Rate
FEC	Forward Error Correction
IP	Internet Protocol
MAC	Medium Access Control
Mbps	Mega bits per second
PC	Personal Computer
PDA	Personal Digital Assistance
PHY	PHYSical
PLT	PowerLine Transmission
PSD	Power Spectral Density
QoS	Quality of Service
TCP	Transmission Control Protocol
UDP	User Data Protocol
WWW	World Wide Web

4 Application requirements

4.1 Outlook on applications

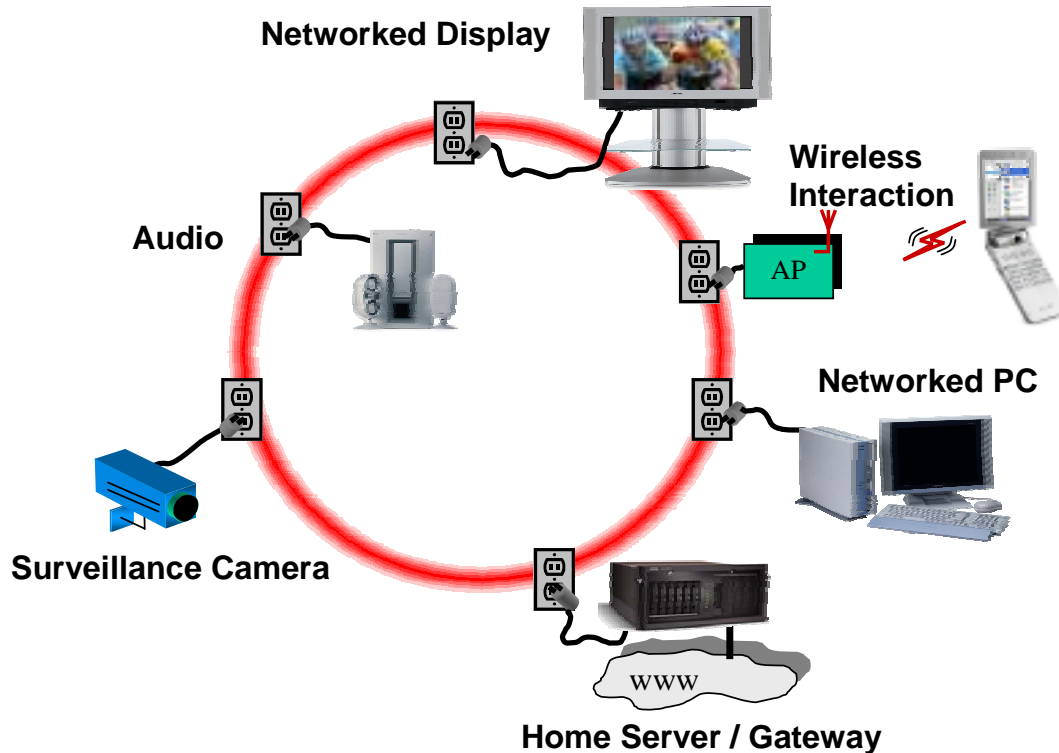


Figure 1: PLT application scenarios

To enable real broadband throughput for "room to room" connectivity, an in-home backbone that connects individual devices or clusters in the house without any installation effort is desirable. PLT fulfils these requirements: Modern modulation techniques enable the power network to transport high data rate services. Figure 1 shows applications that will be possible with a PLT in-home backbone.

All consumer electronic devices that are connected to the mains are equipped with a PLT modem. Wireless devices like PDAs communicate via an access point to the PLT network. Storage devices and the Internet gateway may be located in the house. Video services coming from door or baby watch cameras are available on all displays. Speakers no longer need dedicated audio cables.

4.2 Supported bit rates

Bit rates required here shall be reached in typical private homes, in a living unit.

- Minimum 20 Mbps average data rate as Data Payload on application layer (UDP/TCP):

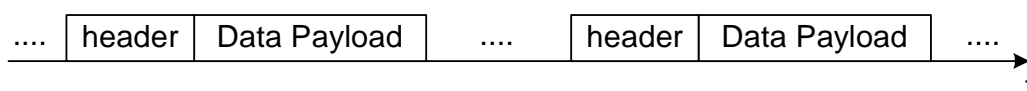


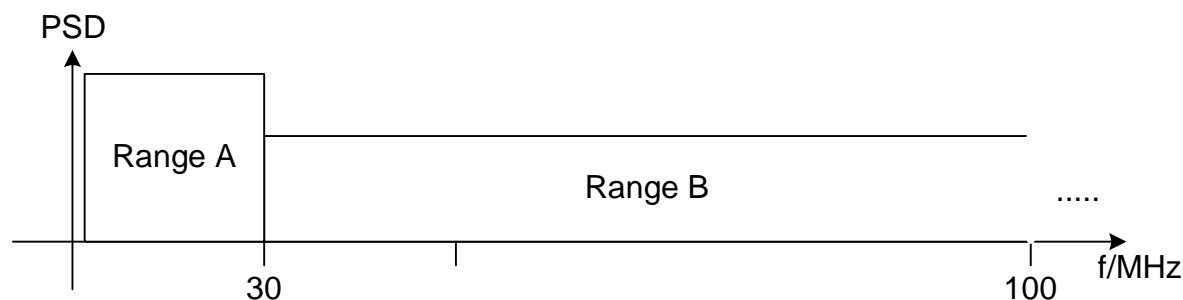
Figure 2: Phy bitstream

- System shall provide the desired bit rate for 98 % of all connections (statistic based on TR 102 269 [1]).
- Additional repeaters are acceptable in multi (more then 2) level houses.

- Data rate shall be scalable to higher values:
 - A minimum of 70 Mbps (on application layer combined up- and downstream) if physical resources allow this (supported for 50 % of all possible connections, same statistics than above).

5 Physical (PHY) layer requirements

5.1 Frequency usage



Frequency range A: 1,605 MHz to 30 MHz recommended.
 Frequency range B: > 30 MHz optional.

Figure 3: Frequency usage

5.2 Notching of frequencies

Dynamic Notching as intended to be specified by the ETSI PLT PSD Mask work item, being the objective to prevent harmful interference to radio services.

5.3 Power Spectral Density (PSD)

This depends on ongoing regulatory discussion.

5.4 Dynamic allocation of resources (time, frequency, power) according to throughput demands

Any communication demands an amount of space within the cube of time, frequency and power. Only the desired volume of the whole cube of resource shall be allocated. A negative example would be, if the full frequency span were used all the time with maximum PSD just to indicate, that the modem is in operation, without transporting any data.

6 Medium Access Control (MAC) layer requirements

6.1 Common features of 802

- Frame delimiting and recognition.
- Addressing of destination stations (both as individual stations and as groups of stations).
- Conveyance of source-station addressing information.

- Protection against errors, generally by means of generating and checking frame check sequences.
- Control of access to the physical transmission medium.

6.2 Quality of Service (QoS)

- Support QoS according to TR 102 049 [2] (Jitter and Latency): BER shall be specified application dependant (look in table of TR 102 049 [2]).
- Synchronicity or the Bus Clock (for e.g. Dolby Home Theatre, Stereo applications) shall provide a accuracy of signals (Jitter) < 20µs.
- Guaranteed bit rate for video and audio streaming data with BER better than 10E-10 after FEC.
- Automatic retransmission of erroneous packets for asynchronous traffic.
- Support for broadcast traffic.
- Recovery time after stream interruption: < 500ms.

6.3 Privacy and encryption

- Data encryption on MAC layer to avoid data interception by neighbour.

7 Interfacing requirements

Internal interface to application:

- Support for IP protocols.
- Bridging: IEEE802.1 and IEEE802.2.

8 Environmental requirements

8.1 Power consumption

- Node shut-down function.
- Node wake-up function.

9 System requirements

System shall include concepts that allow backward compatibility to future (next generation) In Home ETSI Powerline Standards. Upgrading of the system to higher data rates shall be possible. Network shall be scalable to future (higher) data rates backward compatible. Therefore a data rate negotiation is needed.

System shall be interoperable with access PLT Modems defined by ETSI based on a fair sharing of the medium resources in time, frequency and power.

The system shall implement the coexistence mechanism to be specified by the ETSI PLT "Coexistence" work items.

History

Document history		
V1.1.1	June 2005	Publication