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Technical Specification

Powerline Telecommunications (PLT); Reference Network Architecture Model; PLT Phase 1



Reference

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Foreword

This Technical Specification (TS) has been produced by ETSI Powerline Telecommunications (PLT).

The present document specifies the network architecture model for PLC (powerline communication) systems. The document defines and specifies all PLC external interfaces. PLC internal interfaces are defined within the document but (if the interfaces are new standards) specified in other documents to which references are given.

Introduction

Powerline networks may be used for other services than just energy service. The Powerline can also act as a carrier for telecommunication services. The powerline network needs to interwork with a number of service related networks. The present document presents a number of different interfaces at the user side and the network side and shows how the PLT access network interconnects them, both for user and signalling data.

1 Scope

The scope of the present document specifies the 2 areas of PLT interworking:

- a) interworking between PLT (PowerLine Telecommunication) networks and telecommunication networks for telecommunication services;
- b) embedding of PLT into energy networks.

2 References

Void.

3 Definitions and abbreviations

3.1 Definitions

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

Downstream direction: direction from the network towards the subscriber

IP Network Termination: device that allows high-speed access to the Internet via a PLT access network. An IP Network Termination will typically have two interfaces, one to the Powerline network and the other to the Internet CPE equipment

Communication Networks: generic term for each possible telecommunication, information technology or other network. When using this generic term, there is no distinction made between access network, backbone, IT access or other network components

Service Node: (G.902): network element that provides access to various switched and/or permanent telecommunication services. In case of switched services the SN is providing access call and connection control signalling, and access connection and resource handling

Service Node Interface: interface between an Access Network and a Service Node (G.902: interface which provides customer access to a service node)

Upstream direction: direction from the subscriber towards the network

User Network Interface: interface at which the user equipment is connected to the network. For ISDN the interface is valid on reference points T and S/T (I.112: the interface between the terminal equipment and a network termination at which interface the access protocols apply)

3.2 Abbreviations

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

EDN	Energy Distribution Network
HV	High Voltage (50 – 400 kV, Levels TBD)
IP	Internet Protocol
IP	Interface Powerlines (see clause 4)
LV	Low Voltage (400 V)
MV	Medium Voltage (1 – 50 kV, Levels TBD)
PLT	PowerLine Telecommunication
SN	Service Node
UNI	User Network Interface

4 Generic logical building block - PLT-x

The telecommunication part is formed out of the generic building block from figure 1.

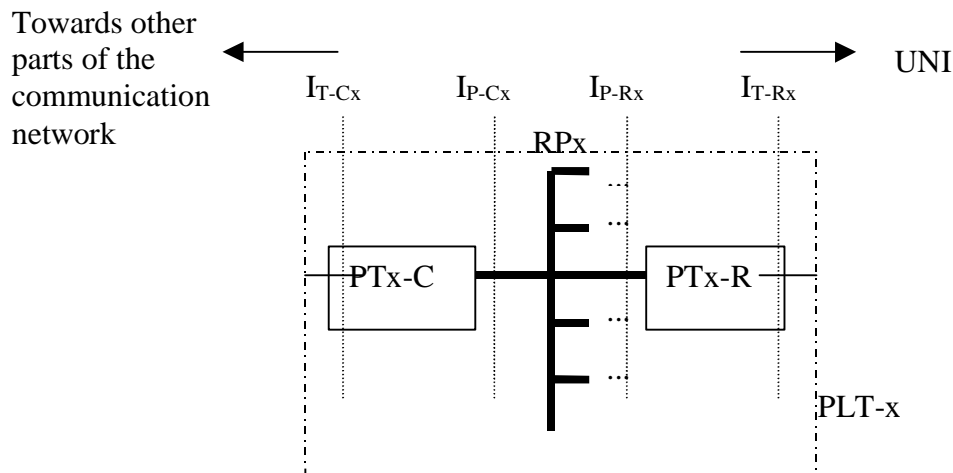


Figure 1: Generic Building Block PLT-x

x Fill-in for **H**: High Voltage, **M**: Medium Voltage, **L**: Low Voltage Outdoor, **P**: Premises denotes the respective voltage level at which the building block is placed. Although **L** and **P** denote identical voltage levels they provide the necessary distinction between the outdoor low voltage EDN operated by a utility company and the low voltage customer premises network.

y Fill in for C (= Central) or R (= Remote)

I_{T-Cx} Interface **T**elecommunication **C**entral. Connection point to either a core backbone network or to the **I_{T-Rx}** of another PLT-x in a repeated or layered PLT infrastructure

I_{T-Rx} Interface **T**elecommunication **R**emote. Connection point to either customer equipment or to the **I_{T-Cx}** of another PLT-x in a repeated or layered PLT infrastructure

PTx-C **P**owerline **T**ransmission unit **C**entral. Central modem unit. Modulates interface information from **I_{T-Cx}** in downstream direction into a RF signal on the **IP_{-Cx}** interface. Demodulates an upstream RF signal from the **IP_{-Cx}** into the **I_{T-Cx}**

PTx-R **P**owerline **T**ransmission unit **R**emote. Remote modem unit. Modulates interface information from **I_{T-Rx}** in upstream direction into a RF signal on the **IP_{-Rx}** interface. Demodulates a downstream RF signal from the **IP_{-Rx}** into the **I_{T-Rx}**

IP_{-Cx} Interface **P**owerline **C**entral. Connection point of PTx-C to the EDN

IP_{-Rx} Interface **P**owerline **R**emote. Connection point of PT_{x-R} to the EDN

There may multiple IP_{-Rx} per RP_x . This is typical for IP_{-RL} and IP_{-RP}

RP_x **R**eference **P**oint. Reference to the respective section of the EDN

$PLT-x$ **P**owerline **T**elecommunications building block

5 Logical Interconnection of PLT Building Blocks ($PLT-x$)

Figure 2 gives a summarizing example of a logical PLT architecture based upon building blocks $PLT-x$.

Gateway (GW) to other parts of the communication network: I_{T-CH} , I_{T-CM} , I_{T-CL} , I_{T-CP}

User Network Interfaces (UNI): I_{T-RM} , I_{T-RL} , I_{T-RP}

TE Terminal Equipment

Figure 2 contains every possible logical interconnection between other parts of the communication network and $PLT-x$ as well as between $PLT-x$ and TE. A real PLT network may exhibit only a small subset of the given connections or an extension of this structure. Principle physical interfaces are shown in the figure as well.

The UNI interfaces might have different functions for different applications. UNI interfaces could be for example interfaces to PCs (that means for telecommunication terminal equipment), to value added service terminals (e.g. for reading the power meter), or others. Please refer to detail interface specifications (to be specified) for the complete option list per interface.

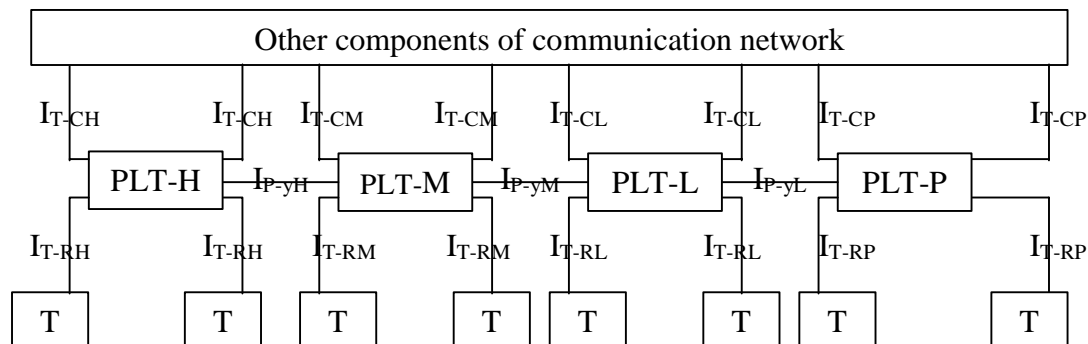


Figure 2: PLT architecture based on upon building blocks $PLT-x$

6 Physical embedding into energy networks (IP_{-yx} Interfaces)

Figure 3 shows the physical interfaces.

An EDN is built from a number of basic elements, namely cables and aerial wires for the transport of electrical energy, substations with cable connections, transformers, switches and safety equipment as well as the premises entrance point (PEP) with fuses and meter before the premises cabling. Figure 4 gives a schematic of an EDN substation. Switches and safety equipment are not shown. Figure 4 draws the PEP with premises cabling.

There may be different medium voltage levels. They may be different and more complex inhouse structures.

The figure shows a star configuration for simplicity. Ring configurations are also possible on each power level.

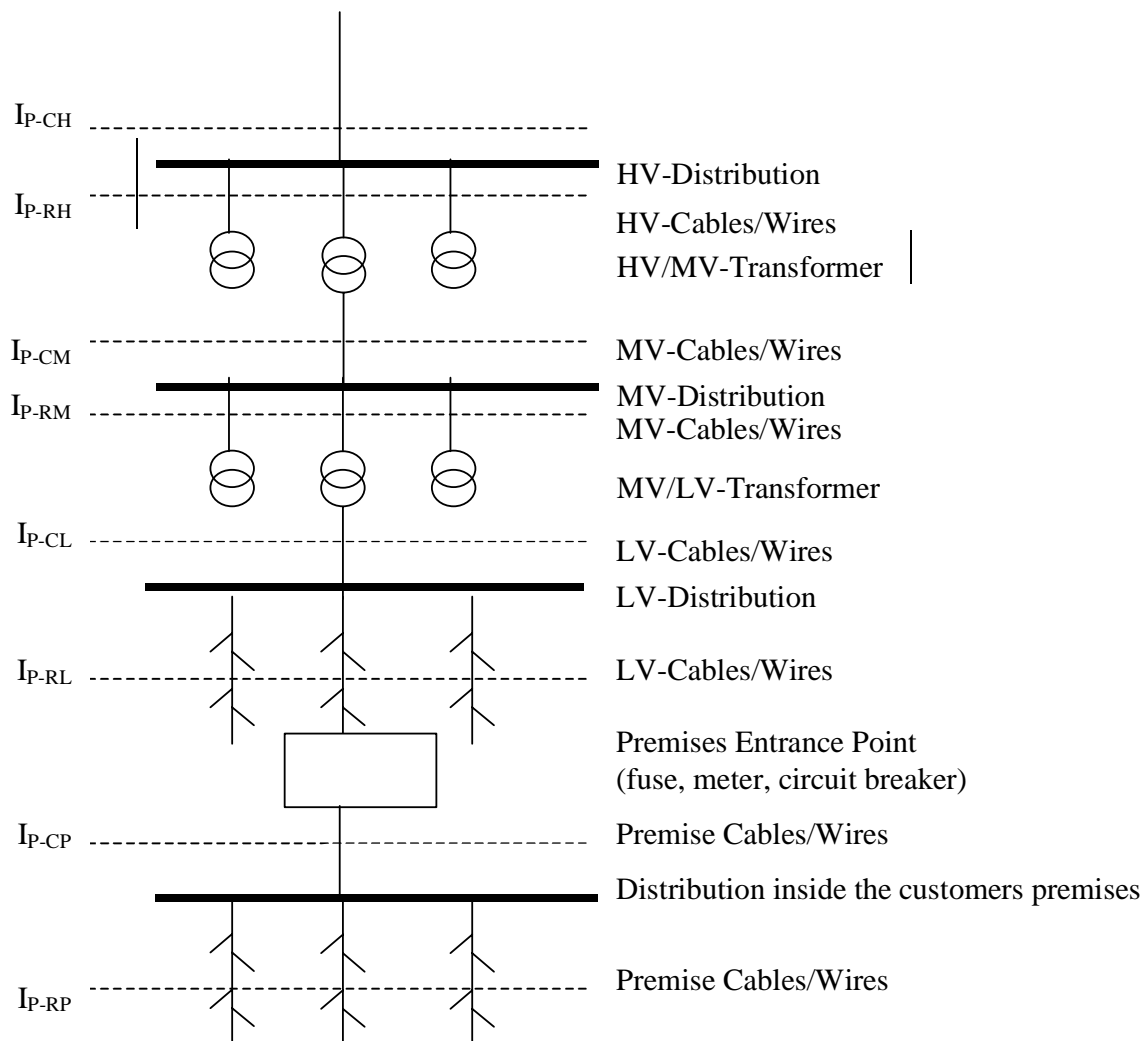


Figure 3: Physical Interfaces

History

Document history		
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