



IEC 62488-1

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INTERNATIONAL STANDARD

**Power line communication systems for power utility applications –
Part 1: Planning of analogue and digital power line carrier systems operating
over HV electricity grids**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**Power line communication systems for power utility applications -
Part 1: Planning of analogue and digital power line carrier
systems operating over HV electricity grids**

FOREWORD

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IEC 62488-1 has been prepared by IEC technical committee 57: Power systems management and associated information exchange. It is an International Standard.

This second edition cancels and replaces the first edition published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Complete revision of this edition with respect to the previous edition with the main focus on planning of analogue and digital power line carrier systems operating over HV power networks;
- b) A general structure of a bidirectional point-to-multipoint APLC, DPLC or ADPLC link has been introduced;
- c) Introduction of a new approach for global frequency planning.

The text of this International Standard is based on the following documents:

Draft	Report on voting
57/2773/FDIS	57/2794/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts of IEC 62488 series, under the general title *Power line communication systems for power utility applications*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

The complexity and extensive size of present-day electricity generation, transmission and distribution systems are such that it is possible to control them only by means of an associated and often equally large and complex telecommunication system having a high order of reliability.

The simultaneous use of the power distribution network for both energy transmission and data communication is unique and reduces the costs of installing two services over one transmission path. This communication technology is called generically power line carrier (PLC) communications.

Therefore, by using either analogue power line carrier communication (APLC) or digital power line carrier communication (DPLC) or a combination of both types of system (ADPLC), seamless efficient communication can be maintained throughout the power network.

The development of digital techniques for communications in the HV electrical power networks is now very widespread along with other applications in electronics. This is especially relevant for the electrical distribution network where many of the PLC devices use analogue to digital converters together with digital signal processing techniques enabling higher flexibility and HW efficiency.

The development of the technical report "*Planning of power line carrier systems*" was first produced by the International Electrotechnical Commission through publication IEC 60663 [1]¹ in 1980 entitled *Planning of (single sideband) power line carrier systems*. In 1993, the International Electrotechnical Commission produced IEC 60495 [2], "*Single sideband power-line carrier terminals*". In the intervening years, electronic systems and the associated communications systems for electronic devices evolved and developed considerably. The introduction of digital communication techniques improved the quality of transmission and reception PLC signals within electronic devices, enabling them to provide more detailed quality analysis and control of the data being communicated throughout the electricity distribution network, from control centre to service provider.

Both of these standards, IEC 60663 and IEC 60495, are being updated and replaced by the following: IEC 60663 is replaced by IEC 62488-1 and IEC 60495 is replaced by IEC 62488-2 [3] and IEC 62488-3 [4] covering respectively analogue, digital and hybrid analogue-digital power line carrier terminals.

These documents apply to power line carrier (PLC) terminals used to transmit information over HV power networks. Both analogue and digital modulation systems will be considered.

The IEC 62488 series consists of the following parts under the general title: *Power line communication systems for power utility applications*:

- Part 1: *Planning of analogue and digital power line carrier systems operating over HV power networks*;
- Part 2: *Analogue power line carrier terminals or APLC*;
- Part 3: *Digital power line carrier (DPLC) terminals and hybrid ADPLC terminals*.

¹ Numbers in square brackets refer to the Bibliography.

1 Scope

This part of IEC 62488 applies to the planning of analogue (APLC), digital (DPLC) and hybrid analogue-digital (ADPLC) power line carrier communication systems operating over HV electric power networks. The object of this document is to establish the planning of the services and performance parameters for the operational requirements to transmit and receive data efficiently and reliably.

Such analogue and digital power line carrier systems are used by the different electricity supply industries and integrated into their communication infrastructure using common communication technologies such as radio links, fibre optic and satellite networks.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

NOTE Other terms used in this document and not defined in this clause have the meaning attributed to them according to the International Electrotechnical Vocabulary (IEV).

3.1.1

amplitude modulation

AM

modulation technique in which information is transmitted through amplitude variation of a carrier wave

3.1.2

analogue interface

interface dedicated to the processing of voiceband analogue signals

3.1.3

attenuation

power reduction along a transmission line for the mode or modes under consideration, quantitatively expressed either by the ratio or the logarithm of the ratio of an input power at the initial point to the corresponding output power at the final point

3.1.4

availability

time or fraction of time a system is operational over a given time interval

3.1.5

background noise

noise present over all real high voltage power-line channels, due mainly to corona and partial discharges and electromagnetic interference with other PLC equipments operated over the same electricity grid and other interferences due to radio stations working in the same radio frequency spectrum