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I.S. EN 62488-1:2013

Power line communication systems for power utility applications -- Part 1: Planning of analogue and digital power line carrier systems operating over EHV/HV/MV electricity grids (IEC 62488-1:2012 (EQV))

## I.S. EN 62488-1:2013

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English version

**Power line communication systems for power utility applications -  
Part 1: Planning of analogue and digital power line carrier systems  
operating over EHV/HV/MV electricity grids  
(IEC 62488-1:2012)**

Systèmes de communication sur lignes  
d'énergie pour les applications des  
compagnies d'électricité -  
Partie 1: Conception des systèmes à  
courants porteurs de lignes d'énergie  
analogiques et numériques fonctionnant  
sur des réseaux d'électricité EHT/HT/MT  
(CEI 62488-1:2012)

Systeme zur Kommunikation über  
Hochspannungsleitungen für  
Anwendungen der elektrischen  
Energieversorgung -  
Teil 1: Planung von Systemen zur  
analogen und digitalen  
Nachrichtenübertragung über  
Hochspannungsleitungen  
(IEC 62488-1:2012)

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## Foreword

The text of document 57/1279/FDIS, future edition 1 of IEC 62488-1, prepared by IEC/TC 57 "Power systems management and associated information exchange" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62488-1:2013.

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- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-01-03

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

CISPR 22:2008	NOTE Harmonised as EN 55022:2010 (modified).
IEC 60038:2009	NOTE Harmonised as EN 60038:2011 (modified).
IEC 60044-1:1996	NOTE Harmonised as EN 60044-1:1999 (modified).
IEC 60255-5:2000	NOTE Harmonised as EN 60255-5:2001 (not modified).
IEC 60255-22-1:2007	NOTE Harmonised as EN 60255-22-1:2008 (not modified).
IEC 60255-151:2009	NOTE Harmonised as EN 60255-151:2009 (not modified).
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IEC 60721-3-1:1987 + A1:1991	NOTE Harmonised as EN 60721-3-1:1993 (not modified).
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IEC 60721-3-4:1995	NOTE Harmonised as EN 60721-3-4:1995 (not modified).
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IEC 61000-4-2	NOTE Harmonised as EN 61000-4-2.
IEC 61000-4-3	NOTE Harmonised as EN 61000-4-3.
IEC 61000-4-4	NOTE Harmonised as EN 61000-4-4.
IEC 61000-4-5	NOTE Harmonised as EN 61000-4-5.

## CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
1 Scope.....	11
2 Terms, definitions and abbreviations .....	11
2.1 Terms and definitions .....	11
2.2 Abbreviations .....	19
3 Power line communication systems .....	21
3.1 Introduction to PLC .....	21
3.2 PLC usage .....	21
3.3 PLC telecommunication system.....	22
3.4 Analogue and digital PLC systems (APLC & DPLC).....	23
3.4.1 APLC systems.....	23
3.4.2 DPLC systems.....	24
3.5 PLC modulation schemes .....	27
3.5.1 General .....	27
3.5.2 AM-SSB (Refer to Table 1).....	27
3.5.3 QAM (Refer to Table 1) .....	27
3.5.4 OFDM (Refer to Table 1).....	28
3.5.5 Other modulation schemes .....	28
3.5.6 Echo cancellation .....	30
4 Frequency bands for PLC systems .....	31
4.1 Introduction to the characteristics of PLC systems for EHV, HV and MV networks.....	31
4.2 Frequency bands for power line systems.....	33
4.3 Channel plans .....	35
4.3.1 General .....	35
4.3.2 EHV/HV/MV narrowband PLC channel plan .....	35
4.3.3 MV/LV narrowband DLC channel plan.....	35
4.4 High frequency spectral characteristics .....	36
4.5 Regulation and emission limits for PLC .....	36
4.5.1 Extra high voltage, high voltage for narrowband systems.....	36
4.5.2 Medium voltage and low voltage narrowband systems.....	37
4.5.3 Medium voltage and low voltage broadband systems.....	37
4.6 Selection of the frequency bands for HV PLC systems .....	37
4.6.1 General .....	37
4.6.2 Maximum power of PLC signal.....	37
4.6.3 Channelling .....	38
4.6.4 Frequency allocation .....	38
4.6.5 Paralleling .....	39
5 Media for DPLC and APLC systems.....	39
5.1 General.....	39
5.2 The electricity grid.....	39
5.3 Extra and high voltage electricity power lines .....	40
5.4 Medium voltage electricity power lines.....	40
5.5 Electricity power lines as transmission media .....	41
5.5.1 Coupling system .....	41
5.5.2 Coupling configuration for overhead cables EHV/HV/MV .....	48

5.5.3	Connecting cable .....	50
5.6	Transmission parameters of electricity power line channel .....	51
5.6.1	General .....	51
5.6.2	Characteristic impedance of power line .....	51
5.6.3	Overall link attenuation .....	54
5.6.4	Channel frequency and impulsive response .....	62
5.6.5	Noise and interference .....	64
6	Planning DPLC and APLC links and networks .....	71
6.1	General .....	71
6.2	APLC link budget .....	72
6.3	DPLC link budget .....	76
6.4	Frequency plan .....	81
6.4.1	General .....	81
6.4.2	Links over the same HV line between two substations .....	81
6.4.3	Global frequency planning .....	82
6.4.4	Other considerations .....	82
6.5	Network planning .....	83
6.5.1	General .....	83
6.5.2	Redundancy .....	83
6.5.3	Integration with other transmission technologies .....	83
6.6	Introduction to Internet numbering .....	84
6.6.1	Internet protocol numbering .....	84
6.6.2	IP addresses .....	84
6.6.3	Private IP addresses .....	86
6.6.4	Subnetting .....	86
6.7	Security .....	89
6.8	Management system .....	89
7	Performance of PLC systems .....	89
7.1	System performance .....	89
7.2	APLC link layer performance .....	90
7.3	DPLC link layer performance .....	92
7.4	Bit error ratio (BER) .....	93
7.5	Transmission capacity .....	93
7.6	Slip .....	94
7.7	Phase jitter .....	94
7.8	Sync loss and recovery time .....	95
7.9	Link latency .....	95
7.10	IETF-RFC2544 Ethernet performance parameters .....	95
7.11	Bit error testing setup .....	96
7.12	Serial synchronous interface .....	96
7.13	Ethernet interface .....	96
7.14	Overall quality link performance .....	97
8	Applications carried over PLC systems .....	99
8.1	General .....	99
8.2	Telephony .....	99
8.3	Speech quality .....	100
8.3.1	General .....	100
8.3.2	Measuring intelligibility (clarity) .....	101
8.4	Analogue telephony .....	101

8.5	Digital telephony .....	101
8.6	VoIP applications .....	102
8.7	Data transmission.....	102
8.8	Internetworking.....	102
8.9	Telecontrol .....	102
8.9.1	IEC 60870-5-101 SCADA-RTU communication .....	102
8.9.2	IEC 60870-5-104 SCADA-RTU communication .....	102
8.9.3	Teleprotection .....	102
8.9.4	Teleprotection signal .....	103
Annex A (informative)	Environmental conditions .....	104
Annex B (informative)	Electromagnetic compatibility (EMC) .....	105
Annex C (informative)	HF modulated power signal .....	107
Annex D (informative)	Bandwidth efficiency .....	115
Annex E (informative)	Noise measurements.....	119
	Bibliography.....	121
Figure 1	– Smart grid vision .....	21
Figure 2	– Smart grid players.....	22
Figure 3	– Complex PLC telecommunication system .....	22
Figure 4	– PLC telecommunication link .....	23
Figure 5	– Typical structure of an APLC terminal equipment .....	24
Figure 6	– Typical structure of a DPLC terminal equipment .....	25
Figure 7	– APLC/DPLC terminal equipment structure .....	26
Figure 8	– APLC/DPLC link carrying telecontrol, teleprotection and telephony services .....	26
Figure 9	– Signal space for a 16-QAM constellation .....	27
Figure 10	– Echo cancellation method for a DPLC link .....	31
Figure 11	– APLC narrowband channel plan .....	35
Figure 12	– DLC narrowband channel plans Europe vs. North America .....	36
Figure 13	– Minimum frequency gap .....	38
Figure 14	– PLC communication system .....	39
Figure 15	– Capacitive coupling system .....	41
Figure 16	– PLC link exploiting inductive coupling system.....	42
Figure 17	– Principle of inductive coupling system .....	42
Figure 18	– EHV/HV typical coupling capacitor (CVT) .....	43
Figure 19	– EHV/HV typical capacitive coupling system (single phase to earth) .....	43
Figure 20	– MV capacitive coupling system.....	44
Figure 21	– MV coupling inductor.....	44
Figure 22	– Line trap electrical scheme.....	45
Figure 23	– HV line trap.....	45
Figure 24	– Line trap impedance versus frequency .....	45
Figure 25	– Blocking impedance characteristic of a narrowband line trap.....	46
Figure 26	– Blocking impedance characteristic of a double band line trap .....	46
Figure 27	– Blocking impedance characteristic of a broadband line trap.....	46
Figure 28	– LMU components and electric scheme .....	47

Figure 29 – LMU characteristics with a coupling capacitor of 4 000 pF.....	47
Figure 30 – Phase-to-earth coupling .....	48
Figure 31 – Phase-to-phase coupling.....	49
Figure 32 – GMR of conductor bundles .....	53
Figure 33 – Terminating network for a three-phase line.....	53
Figure 34 – Optimum coupling arrangements and modal conversion loss $a_c$ .....	57
Figure 35 – Optimum phase to earth and phase to phase coupling arrangements .....	58
Figure 36 – Junctions of overhead lines with power cables .....	60
Figure 37 – EHV $H(f)$ and $h(t)$ typical channel response .....	63
Figure 38 – MV $H(f)$ and $h(t)$ typical channel response.....	63
Figure 39 – Attenuation versus frequency of a real HV power line channel.....	64
Figure 40 – Background noise .....	65
Figure 41 – Background noise over frequency .....	66
Figure 42 – Variations of the background noise spectrum over time.....	67
Figure 43 – Isolated pulse.....	67
Figure 44 – Transient pulse .....	68
Figure 45 – Periodic pulses.....	68
Figure 46 – Burst pulses .....	69
Figure 47 – APLC equipment architecture .....	72
Figure 48 – Example for a signal arrangement in two baseband channels.....	73
Figure 49 – DPLC equipment architecture.....	76
Figure 50 – Example for a DPLC channel arrangement.....	78
Figure 51 – Typical DPLC bandwidth efficiency for a BER of $10^{-6}$ .....	79
Figure 52 – HV line voltage ranges .....	80
Figure 53 – Example for DPLC system with automatic data rate adaptation .....	81
Figure 54 – Example of subnetting.....	87
Figure 55 – ISO/OSI reference model .....	90
Figure 56 – Limits for overall loss of the circuit relative to that at 1 020 Hz (ITU-T M.1020) .....	92
Figure 57 – Limits for group delay relative to the minimum measured group delay in the 500 Hz – 2 800 Hz band (ITU-T M.1020).....	92
Figure 58 – Some theoretical BER curves .....	93
Figure 59 – DPLC “C/SNR” characteristic in comparison to the Shannon limit efficiency for BER = 1E-4 and 1E-6 and Shannon limit.....	94
Figure 60 – Ethernet standard structure of frame format .....	97
Figure 61 – Example of unavailability determination (ITU-T G.826).....	98
Figure 62 – Example of the unavailable state of a bidirectional path (ITU-T G.826).....	98
Figure 63 – Quality performance estimation based on ITU-T G.821 and G.826 .....	99
Figure 64 – Relationship between clarity, delay, and echo with regards to speech quality.....	100
Figure C.1 – Power concepts .....	107
Figure C.2 – Single tone .....	109
Figure C.3 – Two tones.....	110
Figure C.4 – Example of noise equivalent bands for different services .....	111



Figure C.5 – Noise equivalent band for different services.....	112
Figure D.1 – 8-PAM signal constellation.....	115
Figure D.2 – SNR gap of DPLC efficiency to Shannon limit .....	117
Figure D.3 – DPLC efficiency for BER = $10^{-4}$ and $10^{-6}$ and Shannon limit .....	118
Table 1 – Characteristics of DPLC modulation schemes .....	29
Table 2 – QAM and OFDM DPLC modulation scheme characteristics .....	29
Table 3 – Early power communications techniques and frequencies .....	33
Table 4 – Parameters of power communications systems .....	34
Table 5 – Frequency bands in power line communication systems .....	34
Table 6 – HF spectrum allocated for PLC systems .....	35
Table 7 – HF spectrum allocation for narrowband PLC.....	36
Table 8 – Range of characteristic impedances for PLC circuits on EHV/HV overhead lines.....	54
Table 9 – Additional loss $a_{add}$ [dB] for various line configurations and optimum coupling arrangements.....	59
Table 10 – Typical power of corona noise power levels, referring to a 4 kHz bandwidth for various EHV/HV system voltages .....	66
Table 11 – Typical average impulse-type noise levels, measured at the HF-cable side of the coupling across 150 $\Omega$ in a bandwidth of 4 kHz .....	70
Table 12 – Signal parameters .....	74
Table 13 – Link budget .....	74
Table 14 – Signal and allowed noise levels at the receiver input .....	75
Table 15 – Typical corona noise levels for AC overhead lines .....	75
Table 16 – Possible solutions for the example of Figure 50.....	78
Table 17 – IP address definitions .....	85
Table 18 – Quality mask objectives (sample) .....	99
Table B.1 – Permitted conducted emissions on the mains port of class A equipment .....	105
Table B.2 – Permitted conducted emissions on the mains port of class B equipment .....	106

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**POWER LINE COMMUNICATION SYSTEMS  
FOR POWER UTILITY APPLICATIONS –**
**Part 1: Planning of analogue and digital power line carrier  
systems operating over EHV/HV/MV electricity grids**

## FOREWORD

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This International Standard has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This first edition of IEC 62488-1 cancels and replaces the relevant parts of IEC 60663 and IEC 60495, which will be withdrawn at a later date.

The text of this standard is based on the following documents:

FDIS	Report on voting
57/1279/FDIS	57/1298/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
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- replaced by a revised edition, or
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## 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 control of electrical networks and transmission and reception of data are through a combination of analogue and digital communication systems controlling devices and systems distributed throughout the electrical network.

The emergence of digital communication systems for controlling the devices of the electrical distribution network enables faster data transmission. The ability to represent the various electrical parameters as an analogue signal and or digital signal ensures the quality and quantitative aspects of seamless communication to be maintained throughout the electrical power network.

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

The development of digital techniques for communications in the electrical distribution networks is now very widespread along with other applications in electronics. This is especially relevant for the electrical distribution network where many of the devices have built into them analogue to digital converters, together with digital signal processing enabling them to perform many functions and offer fast seamless communication. The conversion of the analogue signal into a binary signal requires the binary digits to be formed into a code for the transmission of the information. These codes take different forms to represent the information to be transmitted. However, the main advantage for this is that digital signals compared with analogue signals provide for virtually error free transmission and the minimum errors that do arise may be detected and corrected by using suitable data encoding techniques. Further, digital transmission circuits generally are compatible with the digital devices in the communications circuit. The most commonly used multiplex systems are frequency division multiplex (FDM) and time division multiplex (TDM).

The development of the technical report "Planning of power line carrier systems" was first produced by the International Electrotechnical Commission through publication IEC 60663 in 1980 entitled Planning of (single sideband) power line carrier systems. In 1993, the International Electrotechnical Commission produced IEC 60495 "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 transmission and reception techniques improved the quality of transmission and reception 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, IEC 62488-3, IEC 62488-4, covering respectively analogue, digital power line carrier and broadband power line terminals.

The first part of this series is IEC 62488-1. Following this standard, parts IEC 62488-2, IEC 62488-3, IEC 62488-4 will follow. During the development of the above mentioned standards, the existing standards IEC 60663 and IEC 60495 will be maintained in use. They will be subsequently phased out at a date to be agreed by the International Electrotechnical Commission in conjunction with IEC technical committee 57.

These international standards apply to power line carrier (PLC) terminals used to transmit information over power networks including extra high, high and medium voltage (EHV/HV/MV) power lines. Both analogue and digital modulation systems will be included.

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 EHV/HV/MV electricity grids;
- Part 2: Analogue power line terminals or APLC;
- Part 3: Digital power line carrier terminals or DPLC;
- Part 4: Broadband power line systems or BPL.

## **POWER LINE COMMUNICATION SYSTEMS FOR POWER UTILITY APPLICATIONS –**

### **Part 1: Planning of analogue and digital power line carrier systems operating over EHV/HV/MV electricity grids**

#### **1 Scope**

This part of IEC 62488 applies to the planning of analogue and digital power line carrier systems operating over EHV/HV/MV electricity grids. The object of this standard is to establish the planning of the services and performance parameters for the operational requirements to transmit and receive data efficiently over Power Networks.

The transmission media used by the different electricity supply industries will include analogue and digital systems together with more common communication services including national telecommunications authorities, radio links and fibre optic networks and satellite networks. With the developments in communication infrastructures over the last two decades and the ability of devices connected in the electricity communications network to internally and externally communicate, there is a variety of architectures to use in the electricity distribution network to provide efficient seamless communications.

These series of standards for the planning of power line carrier systems will also be an integral part of the development of the overall architecture, standard IEC 61850 developed within IEC TC57 which provides the fundamental architecture for the formation of the smart grid.

#### **2 Terms, definitions and abbreviations**

##### **2.1 Terms and definitions**

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

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

##### **2.1.1 amplitude modulation**

###### **AM**

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

##### **2.1.2 analogue interface**

interface dedicated to the processing of voiceband analogue signals

##### **2.1.3 anomaly**

small discrepancy between the actually received and the desired data

Note 1 to entry: The occurrence of a single anomaly does not cause interruptions of the applications using the transmitted data.

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