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**Kabelska omrežja za televizijske in zvokovne signale ter interaktivne storitve –  
7-1. del: Nadzorovanje stanja zunanjih inštalacij omrežij hibridnih optično-  
koaksialnih kablov – Specifikacija fizične (PHY) plasti (IEC 60728-7-1:2003)**

**(istoveten EN 60728-7-1:2005)**

Cable networks for television signals, sound signals and interactive services – Part  
7-1: Hybrid Fibre Coax Outside Plant Status Monitoring – Physical (PHY) Layer  
Specification (IEC 60728-7-1:2003)

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EUROPEAN STANDARD

**EN 60728-7-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2005

ICS 35.100.10; 33.160; 33.040

English version

**Cable networks for television signals,  
sound signals and interactive services  
Part 7-1: Hybrid Fibre Coax Outside Plant Status Monitoring –  
Physical (PHY) Layer Specification  
(IEC 60728-7-1:2003)**

Réseaux de distribution par câbles  
pour signaux de télévision, signaux  
de radiodiffusion sonore et services  
interactifs

Partie 7-1: Surveillance de l'état  
des installations extérieures des réseaux  
hybrides à fibre optique et câble coaxial –  
Spécification de la couche physique  
(CEI 60728-7-1:2003)

Kabelnetze für Fernsehsignale,  
Tonsignale und interaktive Dienste  
Teil 7-1: Zustandsüberwachung Hybrid-  
Faser-Koax-Netze (HFC) –  
Festlegung Bitübertragungsschicht (PHY)  
(IEC 60728-7-1:2003)

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**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## Foreword

The text of the International Standard IEC 60728-7-1:2003, prepared by technical area 5: Cable networks for television signals, sound signals and interactive services, of IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the formal vote and was approved by CENELEC as EN 60728-7-1 on 2004-12-01 without any modification.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2005-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-12-01

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## Endorsement notice

The text of the International Standard IEC 60728-7-1:2003 was approved by CENELEC as a European Standard without any modification.

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# INTERNATIONAL STANDARD

# IEC 60728-7-1

First edition  
2003-10

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## Cable networks for television signals, sound signals and interactive services –

### Part 7-1: Hybrid Fibre Coax Outside Plant Status Monitoring – Physical (PHY) Layer Specification (standards.iteh.ai)

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CABLE NETWORKS FOR TELEVISION SIGNALS,  
SOUND SIGNALS AND INTERACTIVE SERVICES –**

**Part 7-1: Hybrid Fibre Coax Outside Plant status monitoring –  
Physical (PHY) layer specification**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60728-7-1 has been prepared by technical area 5: Cable networks for television signals, sound signals and interactive services, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This standard was submitted to the national committees for voting under the Fast Track Procedure as the following documents:

CDV	Report on voting
100/576/CDV	100/683/RVC

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.

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

The following differences exist in some countries:

The Japanese *de facto* standard (NCTEA S-006) concerning requirements for the HFC outside plant management, which was published in 1995, has already been available in Japan. The purpose of this standard is to support the design and implementation of interoperable management systems for HFC cable networks used in Japan. (see Table 4)

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## INTRODUCTION

Standards of the IEC 60728 series deal with cable networks for television signals, sound signals and interactive services including equipment, systems and installations for

- head-end reception, processing and distribution of television and sound signals and their associated data signals, and
  - processing, interfacing and transmitting all kinds of signals for interactive services
- using all applicable transmission media.

All kinds of networks like

- CATV-networks,
- MATV-networks and SMATV-networks,
- individual receiving networks

and all kinds of equipment, systems and installations installed in such networks, are within this scope.

The extent of this standardization work is from the antennas, special signal source inputs to the head-end or other interface points to the network up to the system outlet or the terminal input, where no system outlet exists.

The standardization of any user terminals (i.e. tuners, receivers, decoders, multimedia terminals, etc.) as well as of any coaxial and optical cables and accessories therefore is excluded.

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## CABLE NETWORKS FOR TELEVISION SIGNALS, SOUND SIGNALS AND INTERACTIVE SERVICES –

### Part 7-1: Hybrid Fibre Coax Outside Plant status monitoring – Physical (PHY) layer specification

#### 1 Scope

This part of IEC 60728 specifies requirements for The Hybrid Fibre Coax (HFC) Outside Plant (OSP) Physical (PHY) Layer Specification and is part of the series of specifications developed by the Hybrid Management Sub-Layer (HMS) subcommittee under the SCTE. The purpose of the HMS specification is to support the design and implementation of interoperable management systems for evolving HFC cable networks. The HMS Physical (PHY) Layer Specification describes the physical layer portion of the protocol stack used for communication between HMS-compliant transponders interfacing to managed outside plant network elements (NE) and a centralized head-end element (HE).

This standard describes the PHY layer requirements that must be implemented by all *Type 2* and *Type 3* compliant OSP HMS transponders on the HFC plant and the controlling equipment in the head-end. Any exceptions to compliance with this standard will be specifically noted herein as necessary. Refer to Table 1 for a full definition of the type classifications.

Electromagnetic Compatibility (EMC) is not specified in this standard and is left to the vendor to ensure compliance with local EMC regulatory requirements. Other than operating temperature, physical parameters such as shock, vibration, humidity, etc., are also not specified and left to the vendor's discretion.

Transponder type classifications referenced within the HMS series of standards are defined in Table 1.

**Table 1 – Transponder type classifications**

Type	Description	Application
Type 0	Refers to legacy transponder equipment, which is incapable of supporting the HMS specifications	This transponder interfaces with legacy network equipment through proprietary means.  This transponder could be managed through the same management applications as the other types through proxies or other means at the head-end
Type 1	Refers to stand-alone transponder equipment (legacy or new) which can be upgraded to support the HMS specifications	This transponder interfaces with legacy network equipment through proprietary means.  Type 1 is a standards-compliant transponder (either manufactured to the standard or upgraded) that connects to legacy network equipment via a proprietary interface
Type 2	Refers to a stand-alone, HMS-compliant transponder	This transponder interfaces with network equipment designed to support the electrical and physical specifications defined in the HMS standards.  It can be factory or field-installed.  Its RF connection is independent of the monitored NE
Type 3	Refers to a stand-alone or embedded, HMS-compliant transponder	This transponder interfaces with network equipment designed to support the electrical specifications defined in the HMS standards.  It may or may not support the physical specifications defined in the HMS standards.  It can be factory-installed. It may or may not be field-installed.  Its RF connection is through the monitored NE

## 2 Normative references

None.

## 3 Terms, definitions and abbreviations

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

### 3.1

#### **forward spectrum**

the pass-band of frequencies in HFC cable systems with a lower edge of between 48 MHz and 87,5 MHz, depending on the particular geographical area, and an upper edge that is typically in the range of 300 MHz to 860 MHz depending on implementation

### 3.2

#### **full spectrum**

combined forward and return spectrums in HFC cable systems and excludes any guard band

### 3.3

#### **guard band**

unused frequency band between the upper edge of the usable return spectrum and the lower edge of the usable forward spectrum in HFC cable systems

### 3.4

#### **network element (NE)**

active element in the outside plant that is capable of receiving commands from a head-end element (HE) in the head-end and, as necessary, providing status information and alarms back to the HE

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### 3.5

#### **open system interconnection (OSI)**

framework of International Organization for Standardization (ISO) standards for communication between multi-vendor systems that organizes the communication process into seven different categories that are placed in a layered sequence based on the relationship to the user. Each layer uses the layer immediately below it and provides services to the layer above. Layers 7 through 4 deal with end-to-end communication between the message source and destination, and layers 3 through 1 deal with network functions

### 3.6

#### **physical (PHY) layer**

layer 1 in the Open System Interconnection (OSI) architecture; the layer that provides services to transmit bits or groups of bits over a transmission link between open systems and which entails electrical, mechanical and handshaking procedures

### 3.7

#### **return spectrum**

pass-band of frequencies in HFC cable systems with a lower edge of 5 MHz and an upper edge that is typically in the range of 42 MHz to 65 MHz depending on the particular geographical area

### 3.8

#### **transponder**

device in the outside plant that interfaces to outside plant NEs and relays status and alarm information to the HE. It can interface with an active NE via an arrangement of parallel analogue, parallel digital and serial ports