

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Cable networks for television signals, sound signals and interactive services –
Part 1-1: RF cabling for two way home networks**

**Réseaux de distribution par câbles pour signaux de télévision, signaux de
radiodiffusion sonore et services interactifs –
Partie 1-1: Câblage RF pour réseaux domestiques bidirectionnels**



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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	9
2 Normative references	9
3 Terms, definitions, symbols and abbreviations.....	11
3.1 Terms and definitions.....	11
3.2 Symbols.....	19
3.3 Abbreviations.....	20
4 Methods of measurement for the home network.....	21
5 Performance requirements of the home network	22
5.1 General.....	22
5.2 Impedance.....	23
5.3 Performance requirements at the terminal input	23
5.3.1 General	23
5.3.2 Signal level.....	23
5.3.3 Other parameters	24
5.4 Performance requirements at system outlets.....	24
5.4.1 Minimum and maximum carrier levels	24
5.4.2 Mutual isolation between system outlets	24
5.4.3 Isolation between individual outlets in one household	24
5.4.4 Isolation between forward and return path	24
5.4.5 Long-term frequency stability of distributed carrier signals at any system outlet.....	24
5.5 Performance requirements at the HNI	24
5.5.1 Minimum and maximum carrier levels at HNI1	24
5.5.2 Minimum and maximum carrier levels at HNI2 and HNI3	24
5.6 Carrier level differences in the home network from HNI to system outlet	24
5.7 Frequency response within a television channel in the home network	25
5.7.1 General	25
5.7.2 Amplitude response	25
5.7.3 Group delay.....	25
5.8 Random noise produced in the home network	26
5.9 Interference produced into downstream channels within a home network.....	26
5.9.1 General	26
5.9.2 Multiple frequency intermodulation interference	26
5.9.3 Intermodulation noise	27
5.9.4 Crossmodulation.....	27
6 Home network design and examples.....	27
6.1 General.....	27
6.2 Basic design considerations.....	27
6.2.1 General	27
6.2.2 System outlet (SO) or terminal input (TI) specifications.....	27
6.2.3 Home network interface (HNI) specifications.....	27
6.2.4 Requirements for the home network	28
6.3 Implementation considerations.....	28

6.4	Home networks with coaxial and balanced cables	29
6.4.1	General	29
6.4.2	Network examples	29
6.4.3	Calculation examples	30
6.4.4	General considerations	40
6.4.5	Home network design in a MATV system	41
6.4.6	Return path examples	41
6.5	Different home network types (HNI3 case C) (glass or plastic fibre optic network)	41
6.6	Different home network type (HNI3 case D)	42
6.6.1	General	42
6.6.2	Wireless links inside the home network	42
6.6.3	Applications of IEEE 802.11 (WLAN)	43
6.6.4	Available bands in the 2 GHz to 6 GHz frequency range	44
6.6.5	Main characteristics of a WLAN signal	44
6.6.6	Main characteristics of coaxial cables	45
6.6.7	Characteristics of WLAN signals at system outlet	45
6.6.8	Characteristics of signals at the TV system outlet	46
6.6.9	Example of duplexers and power splitters near the HNI	46
6.6.10	Example of system outlet for coaxial TV connector and WLAN antenna	46
6.6.11	Examples of WLAN connection into home networks	47
Annex A (informative)	Wireless links versus cable links	52
A.1	General	52
A.2	Wireless links	52
A.3	Cable links	53
Annex B (informative)	Isolation between radiating element and system outlet	55
Annex C (informative)	MIMO techniques of IEEE 802.11n	57
C.1	General	57
C.2	MIMO techniques	57
Bibliography		59
Figure 1	– Examples of RF home network types	8
Figure 2	– Examples of location of HNI for various home network types	15
Figure 3	– Examples of home network implementation using coaxial or balanced cables	30
Figure 4	– Signal levels at HNI1 (flat splitter response)	32
Figure 5	– Signal levels at HNI1 (+6 dB compensating splitter slope)	33
Figure 6	– Signal levels at HNI2 (L_1) (flat splitter/amplifier response)	34
Figure 7	– Signal levels at HNI2 (+6 dB compensating splitter/amplifier slope)	34
Figure 8	– Signal levels at HNI3 (flat splitter/amplifier response)	38
Figure 9	– Signal levels at HNI3 (+6 dB compensating splitter/amplifier slope)	38
Figure 10	– Example of a home network using optical fibres	41
Figure 11	– Example of a home network using cable connection and cable/wireless connection	43
Figure 12	– Example of a coupler (tandem coupler) to insert WLAN signals into the home distribution network	46
Figure 13	– Example of system outlet for coaxial TV connector and WLAN antenna	46

Figure 14 – Assumed properties of the filters in the system outlet.....	47
Figure 15 – Reference points for the examples of calculation of link loss or link budget	47
Figure B.1 – Required isolation and attenuation of a cut-off waveguide, with cut-off frequency of 2 275 MHz and a length (L) of 25 cm or 15 cm.....	55
Figure C.1 – Principle of MIMO techniques according to IEEE 802.11n.....	57
Table 1 – Methods of measurement of IEC 60728-1:2014 applicable to the home network.....	22
Table 2 – Amplitude response variation in the home network	25
Table 3 – Group delay variation in the home network.....	26
Table 4 – Example of home network implementation with coaxial cabling (passive) from HNI1 to system outlet	35
Table 5 – Example of home network implementation with coaxial cabling (active) from HNI2 to system outlet	35
Table 6 – Example of home network implementation with balanced pair cables (active) from HNI3 to coaxial terminal input (case A)	39
Table 7 – Example of home network implementation with balanced pair cables (active) from HNI3 to coaxial system outlet (case B).....	39
Table 8 – Maximum EIRP according to CEPT ERC 70-03	44
Table 9 – Available throughput of the WLAN signal.....	45
Table 10 – Minimum signal level at system outlet (WLAN antenna).....	45
Table 11 – Loss from the system outlet to WLAN base station	48
Table 12 – Direct connection between two system outlets (TV outlets).....	49
Table 13 – Link budget between a WLAN equipment and the WLAN base station	49
Table 14 – Wireless connection between two WLAN equipment	50
Table 15 – Connection from a SO to a WLAN equipment	51
Table A.1 – Maximum distance for a wireless link (WLAN) in free space or inside a home	53
Table A.2 – Maximum length of the cable.....	54
Table C.1 – MCSs that are mandatory in IEEE 802.11n	58

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CABLE NETWORKS FOR TELEVISION SIGNALS,
SOUND SIGNALS AND INTERACTIVE SERVICES –****Part 1-1: RF cabling for two way home networks**

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International Standard IEC 60728-1-1 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 second edition cancels and replaces the first edition published in 2010, and constitutes a technical revision.

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

- update of performance requirements in Clause 5 to include those for DVB-T2 signals.

This International Standard is to be used in conjunction with IEC 60728-1:2014.

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

FDIS	Report on voting
100/2249/FDIS	100/2285/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 the IEC 60728 series, under the general title *Cable networks for television signals, sound signals and interactive services*, 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

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INTRODUCTION

Standards and deliverables of IEC 60728 series deal with cable networks including equipment and associated methods of measurement for headend reception, processing and distribution of television and sound signals and for processing, interfacing and transmitting all kinds of data signals for interactive services using all applicable transmission media. These signals are typically transmitted in networks by frequency-multiplexing techniques.

This includes for instance

- regional and local broadband cable networks,
- extended satellite and terrestrial television distribution systems,
- individual satellite and terrestrial television receiving systems,

and all kinds of equipment, systems and installations used in such cable networks, distribution and receiving systems.

The extent of this standardization work is from the antennas and/or special signal source inputs to the headend or other interface points to the network up to the terminal input of the customer premises equipment.

The standardization work will consider coexistence with users of the RF spectrum in wired and wireless transmission systems.

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

The reception of television signals inside a building requires an outdoor antenna and a distribution network to convey the signal to the TV receivers.

This part of the IEC 60728 deals with the requirements and implementation guidelines for a home network that can be realised with different techniques. The following types of home networks (HN) are possible:

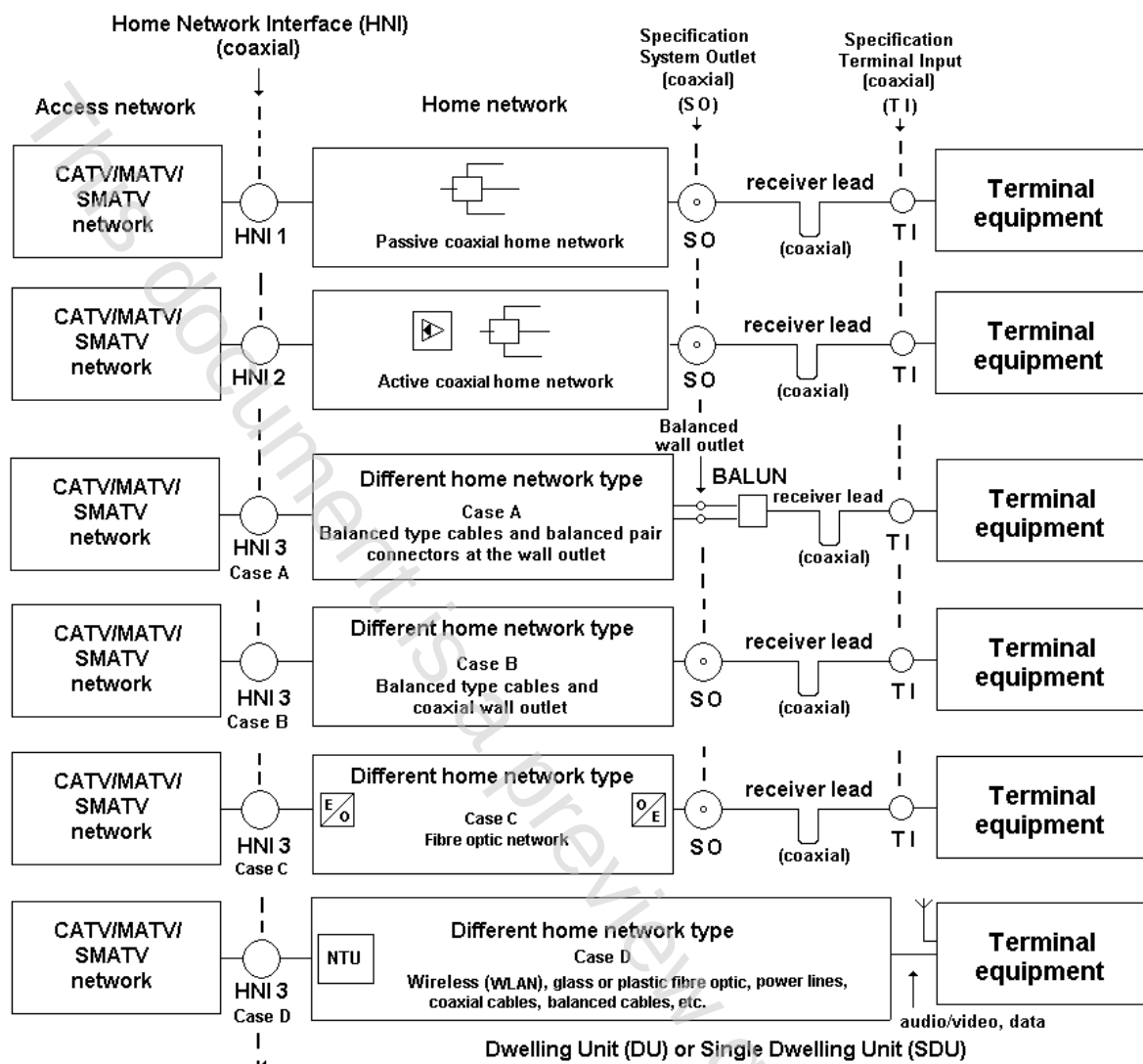
- passive coaxial home network;
- active coaxial home network;
- different home network types.

Figure 1 shows typical situations that are possible when considering RF home networks.

The RF home network can be realised using coaxial cables, balanced cables, optical cables or radio links.

Clause 5 defines the performance limits measured at system outlet or terminal input for an unimpaired (ideal) test signal applied at the HNI. Under normal operating conditions for any analogue channel and meeting these limits, the cumulative effect of the impairment of any single parameter at the HNI and that, due to the home network, will produce picture and sound signals not worse than grade four on the five-grade impairment scale contained in ITU-R BT.500. These requirements are given in IEC 60728-1-2. For digitally modulated signals the quality requirement is a QEF (Quasi Error Free) reception.

This standard describes the physical layer connection for home networks. Description of protocols required for Layer 2 and higher layers is out of the scope of this standard. Logical connections between devices within the home network are therefore not always guaranteed.



IEC 2523/09

Figure 1 – Examples of RF home network types

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

Part 1-1: RF cabling for two way home networks

1 Scope

This part of IEC 60728 provides the requirements and describes the implementation guidelines of RF cabling for two-way home networks. This standard is applicable to any home network that distributes signals provided by CATV/MATV/SMATV cable networks (including individual receiving systems) having a coaxial cable output. This standard also applies to home networks where some part of the distribution network uses wireless links, for example instead of the receiver cord.

This part of IEC 60728 is therefore applicable to RF cabling for two-way home networks with wired cords or wireless links inside a room and primarily intended for television and sound signals operating between about 5 MHz and 3 000 MHz. The frequency range is extended to 6 000 MHz for distribution techniques that replace wired cords with a wireless two-way communication inside a room (or a small number of adjacent rooms) that uses the 5 GHz to 6 GHz band.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-705, *International Electrotechnical Vocabulary – Chapter 705: Radio wave propagation*

IEC 60050-712, *International Electrotechnical Vocabulary – Chapter 712: Antennas*

IEC 60050-725, *International Electrotechnical Vocabulary – Chapter 725: Space radiocommunications*

IEC 60728-1:2014, *Cable networks for television signals, sound signals and interactive services – Part 1: System performance of forward paths*

IEC 60728-1-2, *Cable networks for television signals, sound signals and interactive services – Part 1-2: Performance requirements for signals delivered at system outlet in operation*

IEC 60728-3:2010, *Cable networks for television signals, sound signals and interactive services – Part 3: Active wideband equipment for coaxial cable networks*

IEC 60728-10, *Cable networks for television signals, sound signals and interactive services – Part 10: System performance of return paths*

IEC 60966 (all parts), *Radio frequency and coaxial cable assemblies*

IEC 60966-2 (all parts), *Radio frequency and coaxial cable assemblies – Part 2: Detail specification for cable assemblies for radio and TV receivers*

IEC 60966-2-4, *Radio frequency and coaxial cable assemblies – Part 2-4: Detail specification for cable assemblies for radio and TV receivers – Frequency range 0 MHz to 3 000 MHz, IEC 61169-2 connectors*

IEC 60966-2-5, *Radio frequency and coaxial cable assemblies – Part 2-5: Detail specification for cable assemblies for radio and TV receivers – Frequency range 0 MHz to 1 000 MHz, IEC 61169-2 connectors*

IEC 60966-2-6, *Radio frequency and coaxial cable assemblies – Part 2-6: Detail specification for cable assemblies for radio and TV receivers – Frequency range 0 MHz to 3 000 MHz, IEC 61169-24 connectors*

IEEE 802.11, *IEEE Standards for Information technology – Telecommunications and Information Exchange between Systems – Local and Metropolitan Area Network – Specific Requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications*¹

IEEE 802.11a, *IEEE Standard for Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications – Amendment 1: High-speed Physical Layer in the 5 GHz band*

IEEE 802.11b, *Supplement to 802.11-1999, Wireless LAN MAC and PHY specifications: Higher speed Physical Layer (PHY) extension in the 2.4 GHz band*

IEEE 802.11e, *IEEE Standard for Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: Amendment 8: Medium Access Control (MAC) Quality of Service Enhancements*

IEEE 802.11g, *IEEE Standard for Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications – Amendment 4: Further Higher-Speed Physical Layer Extension in the 2.4 GHz Band*

IEEE 802.11h, *IEEE Standard for Information technology – Telecommunications and Information Exchange Between Systems – LAN/MAN Specific Requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications: Spectrum and Transmit Power Management Extensions in the 5GHz band in Europe*

IEEE 802.11n, *IEEE Standard for Information Technology – Telecommunications and information exchange between systems-Local and metropolitan area networks-Specific requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: Amendment 4: Enhancements for Higher Throughput*

IEEE 802.16, *IEEE Standard for Local and metropolitan area networks – Part 16: Air Interface for Fixed Broadband Wireless Access Systems (WiMax)*

ITU-R Recommendation BT.500, *Methodology for the subjective assessment of the quality of television pictures*

¹ Parts of IEEE 802.11 are reproduced in ISO/IEC 8802-11:2005, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specification*

ITU-T Recommendation J.61, *Transmission performance of television circuits designed for use in international connections*

ITU-T Recommendation J.63, *Insertion of test signals in the field-blanking interval of monochrome and colour television signals*

EN 50117-2-4, *Coaxial cables – Part 2-4: Sectional specification for cables used in cabled distribution networks – Indoor drop cables for systems operating at 5 MHz to 3 000 MHz*

ETSI EN 300 421, *Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for 11/12 GHz satellite services*

ETSI EN 300 429, *Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for cable systems*

ETSI EN 300 473, *Digital Video Broadcasting (DVB); Satellite Master Antenna Television (SMATV) distribution systems*

ETSI EN 300 744, *Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for digital terrestrial television*

ETSI EN 302 307, *Digital Video Broadcasting (DVB) – Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications (DVB-S2)*

ETSI EN 302 755, *Digital Video Broadcasting (DVB) – Frame structure, channel coding and modulation for a second generation digital terrestrial television broadcasting system (DVB-T2)*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-705, IEC 60050-712 and IEC 60050-725, apply.

NOTE The most important definitions are repeated below.

3.1.1

active home network

home network that uses active equipment (for example, amplifiers) in addition to passive equipment like splitters, taps, system outlets, cables and connectors up to the coaxial RF interface (input and/or output) of the terminal equipment for distributing and combining RF signals

3.1.2

antenna

part of a radio transmitting or receiving system which is designed to provide the required coupling between a transmitter or receiver and the medium in which the radio wave propagates

Note 1 to entry: In practice, the terminals of the antenna or the points to be considered as the interface between the antenna and the transmitter or receiver should be specified.

Note 2 to entry: If the transmitter or receiver is connected to its antenna by a feeder line, the antenna may be considered to be a transducer between the guided radio waves of the feeder line and the radiated waves in space.

[SOURCE: IEC 60050-712:1992, 712-01-01, modified – The term feeder line instead of feed line has been used in note 2.]