BRITISH STANDARD

BS EN 50173-4:2007 +A2:2012
Incorporating corrigendum May 2011

Information technology — Generic cabling systems —

Part 4: Homes

ICS 33.040.50

BSI British Standards

National foreword

This British Standard is the UK implementation of EN 50173-4:2007+A2:2012, incorporating corrigendum May 2011. It supersedes BS EN 50173-4:2007+A1:2010, which will be withdrawn on 12 November 2015.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CENELEC text carry the number of the CENELEC amendment. For example, text altered by CENELEC amendment A1 is indicated by [A1⟩ ⟨A1].

The UK participation in its preparation was entrusted to Technical Committee TCT/7, Telecommunications — Installation requirements.

A list of organizations represented on this committee can be obtained on request to its secretary.

In addition to the requirements listed in subclause 1.2, conformance to BS EN 50173-4:2007 also requires the application of BS 6701.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 August 2007

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30 April 2011	Implementation of CENELEC amendment A1:2010
30 September 2011	Implementation of CENELEC corrigendum May 2011: modification of Figures 13 and 14
30 April 2013	Implementation of CENELEC amendment A2:2012

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50173-4:2007+A2

November 2012

ICS 33.040.50

Incorporating corrigendum May 2011

English version

Information technology - Generic cabling systems - Part 4: Homes

Technologies de l'information - Systèmes de câblage générique - Partie 4: Locaux d'habitation

Informationstechnik - Anwendungsneutrale Kommunikationskabelanlagen - Teil 4: Wohnungen

CENELEC

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

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 50173-4:2007 E

Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 215, *Electrotechnical aspects of telecommunication equipment*, in cooperation with the Technical Committee CENELEC TC 209, *Cable networks for television signals, sound signals and interactive services*.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50173-4 on 2007-04-11.

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) 2008-05-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2010-05-01

The European Standards EN 50173:1995 and EN 50173-1:2002 have been developed to enable the application-independent cabling to support ICT applications in office premises. Their basic principles, however, are applicable to other types of applications and in other types of premises.

TC 215 has decided to establish relevant European Standards which address the specific requirements of these premises. In order to point out the commonalities of these cabling design standards, these EN are published as individual parts of the series EN 50173, thus also acknowledging that standards users recognize the designation “EN 50173” as a synonym for generic cabling design.

At the time of publication of this European Standard, series EN 50173 comprises the following standards:

EN 50173-1	Information technology – Generic cabling systems – Part 1: General requirements
EN 50173-2	Information technology – Generic cabling systems – Part 2: Office premises
EN 50173-3	Information technology – Generic cabling systems – Part 3: Industrial premises
EN 50173-4	Information technology – Generic cabling systems – Part 4: Homes
EN 50173-5	Information technology – Generic cabling systems – Part 5: Data centres
A2 EN 50173-6	Information technology – Generic cabling systems – Part 6: Distributed building services A2

This standard, EN 50173-4, is based upon but is not identical to ISO/IEC 15018:2004, Information technology - Generic cabling for homes.

Foreword to amendment A1

This amendment was prepared by the Technical Committee CENELEC TC 215, Electrotechnical aspects of telecommunication equipment.

The text of the draft was submitted to the formal vote and was approved by CENELEC as amendment A1 to EN 50173-4:2007 on 2010-12-01.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2011-12-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2013-12-01

This standard introduces several changes in order to align the standard with the changes resulting from the introduction of new Channel classes and component Categories in EN 50173-1:2011. Furthermore, it introduces several technical changes to requirements for BCT cabling in Clauses 6 and 7.

For the convenience of the reader of this standard, the pertinent tables are reproduced in total, with grey shading of new table cells. Where modifications to text apply to single expressions or a few words only, this is indicated by underlining.

Foreword to amendment A2

This document (EN 50173-4:2007/A2:2012) has been prepared by CLC/TC 215 "Electrotechnical aspects of telecommunication equipment".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2013-11-12
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2015-11-12

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document introduces optical fibre cabling support within homes. In addition, several editorial improvements have been introduced.

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Introduction

This European Standard specifies generic cabling in homes, installed to support one or more of the following groups of applications and based upon balanced, coaxial and optical fibre cabling as appropriate:

- Information and Communications Technologies (ICT);
- Broadcast and Communications Technologies (BCT);
- Commands, Controls and Communications in Buildings (CCCB).

Other cabling media, used for the above applications, are not covered in this standard.

Backbone cabling connecting individual homes within single premises is built according to the relevant standard (EN 50173-1, EN 50083 series and EN 60728 series).

Generic cabling realised according to this standard:

i) allows deployment of a wide range of applications without changes to the fixed cabling infrastructure;

ii) provides a platform to support moves, adds and changes of connectivity.

This European Standard, EN 50173-4, has been prepared to reflect the demands of generic cabling within homes and provides for each group of applications (ICT, BCT and CCCB):

a) users with an application-independent generic cabling system;

b) users with a flexible cabling scheme such that changes are both easy and economical;

c) building professionals (for example, architects) with guidance for the design and dimensioning of home cabling according to the end-user needs or requirements (expressed or assumed);

d) industry and applications standardisation bodies (e.g. ITU-T, ISO/IEC JTC 1/SC 6, ISO/IEC JTC 1/SC 25/WG1, IEC/TC 100, CLC/TC 205, CLC/TC 209, ETSI) with a cabling system that supports current products and provides a basis for future product development in application standardization;

e) users, designers, and manufacturers of application-specific cabling systems with advice on interfacing to this generic cabling;

f) suppliers of cabling components and installers of cabling with relevant requirements;

g) service providers with a distribution system for their services.

This European Standard specifies multi-vendor cabling, and is related to:

- the associated standard covering general requirements for generic cabling within premises (EN 50173-1);

- standards for cabling components developed by Technical Committees of CENELEC and/or IEC;

- standards for the quality assurance and installation of information technology cabling (series EN 50174) and testing of installed cabling (EN 50346);

- applications developed by the technical bodies of IEC (including the subcommittees of ISO/IEC JTC 1), CENELEC and study groups of ITU-T.

A number of ICT, BCT and CCCB applications have been analysed to determine the requirements for a generic cabling (see EN 50173-1:2011, Annex F) and to specify the minimum performance of channels given in Clause 6. These requirements, together with the logical and physical models described in Clauses 4 and 5, have been used to develop the transmission requirements for cabling components and to stipulate their arrangement into generic cabling systems.

Figure 1 and Table 1 show the schematic and contextual relationships between the standards produced by TC 215 for information technology cabling, namely

1) this and other parts of the EN 50173 series;

2) application dependent cabling design (e.g. EN 50098 series);

3) installation (EN 50174 series);

4) testing of installed cabling (EN 50346);

5) equipotential bonding requirements (EN 50310).

Figure 2 indicates the multi-layer approach specified in this standard in order to deliver ICT, BCT and CCCB applications within homes.

[A1] In addition, a number of Technical Reports have been developed to support or extend the application of these standards, including

- CLC/TR 50173-99-1, *Cabling guidelines in support of 10 GBASE-T*,
- CLC/TR 50173-99-2, *Information technology – Implementation of BCT applications using cabling in accordance with EN 50173-4.*[A1]

[A2] - CLC/TR 50173-99-3, *Information technology – Generic cabling systems - Part 99-3: Home cabling infrastructures up to 50 m in length to support simultaneous and non simultaneous provision of applications* [A2]

[A2]

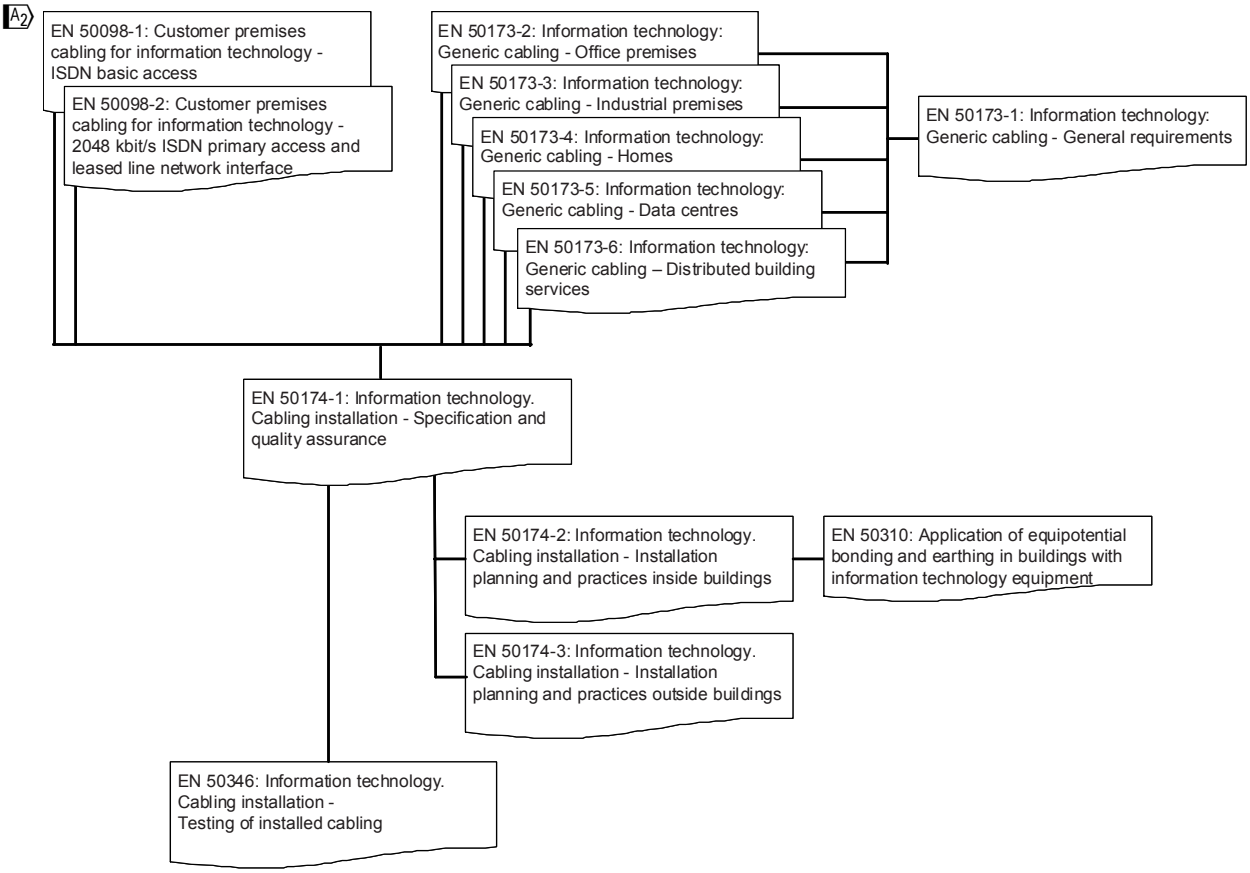
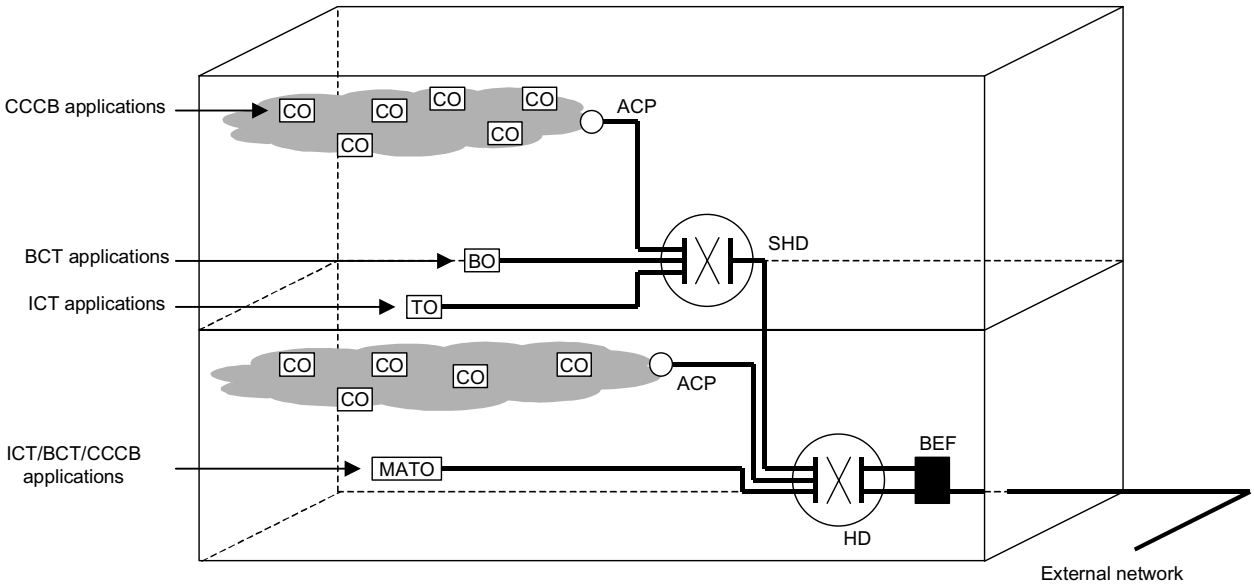


Figure 1 - Schematic relationship between the EN 50173 series and other relevant standards [A2]

Table 1 – Contextual relationship between EN 50173 series and other standards relevant for information technology cabling systems

Building design phase	Generic cabling design phase	Specification phase	Installation phase	Operation phase
EN 50310	**EN 50173 series except EN 50173-4**	**EN 50174-1**		**EN 50174-1**
6. Bonding networks	4: Structure 5: Channel performance 7: Cable requirements 8: Connecting hardware requirements 9: Requirements for cords and jumpers A: Link performance limits	4: Requirements for specifying installations of information technology cabling 5: Requirements for installers of information technology cabling		4: Requirements for specifying installations of information technology cabling
		Planning phase		
	and EN 50173-4	**EN 50174-2**	**EN 50174-2**	
	4 and 5: Structure 6: Channel performance 8: Cable requirements 9: Connecting hardware requirements 10: Requirements for cords and jumpers A: Link performance limits	4: Requirements for planning installations of information technology cabling 6: Segregation of metallic information technology cabling and power supply cabling 7: Electricity distribution systems and lightning protection	5: Requirements for the installation of information technology cabling 6: Segregation of metallic information technology cabling and power supply cabling 8: Office (commercial) premises 9: Industrial premises 10: Homes 11: Data centres	
		and EN 50174-3	**and EN 50174-3**	
		and (for equipotential bonding) EN 50310	**and (for equipotential bonding) EN 50310**	
			and EN 50346 4: General requirements 5: Test parameters for balanced cabling 6: Test parameters for optical fibre cabling	



A1 **Figure 2 – Schematic of generic cabling within a home** A1

1 Scope and conformance

1.1 Scope

[A2] This European Standard specifies generic cabling in homes, installed to support one or more of the following groups of applications and based upon balanced, coaxial and optical fibre cabling as appropriate: [/A2]

1) Information and Communications Technologies (ICT);
2) Broadcast and Communications Technologies (BCT);
3) Commands, Controls and Communications in Buildings (CCCB).

A home may contain one or more buildings or may be within a building that contains more than one home.

This European Standard is based upon and references the requirements of EN 50173-1. In addition to the requirements of EN 50173-1, this European Standard specifies the following aspects of generic home cabling:

a) structure and topology;
b) minimum configuration;
c) performance requirements for permanent links and channels[1)];
d) density and location of connection points;
e) interfaces to application-specific equipment and external networks;
f) coexistence with other building services.

Safety (electrical safety and protection, optical power, fire, etc.) and electromagnetic compatibility (EMC) requirements are outside the scope of this European Standard and are covered by other standards and regulations. However, information given in this European Standard may be of assistance in meeting these standards and regulations.

NOTE 1 National regulations and local codes may preclude carrying certain services on the cabling specified in this standard.

NOTE 2 Test requirements in this standard are for system designers.

NOTE 3 The installation tests should be decided between supplier and customer or according to the relevant installation guide.

NOTE 4 Audio/video applications are traditionally supported by application-specific cabling implemented with cabling systems based on EN 50083 (see Annex D). Such cabling systems may co-exist with generic cabling specified by this European Standard.

1.2 Conformance

For a cabling system to conform to this European Standard:

a) the cabling shall support ICT applications;
b) the structure and configuration of cabling in support of ICT and BCT applications shall conform to the requirements of Clause 4;
c) the structure and configuration of cabling in support of CCCB applications shall conform to the requirements of Clause 5;
d) the interfaces to the cabling at the Multi-Application Telecommunications Outlet (MATO), Telecommunications Outlet (TO) and the Broadcast Outlet (BO) shall conform to the requirements of Clause 9 with respect to mating interfaces and performance;
[A1] e) connecting hardware at other places in the cabling structure shall meet the requirements specified in Clause 9; [/A1]

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1) This term, as defined in EN 50173-1, refers to the passive cabling between the interfaces described in Clauses 4 and 5. Differing definitions of the term “channel” as given in other standards are not applicable in this European Standard.

f) the performance of channels shall conform to the requirements of Clause 6. This shall be achieved by one of the following:

- a channel design and implementation ensuring that the prescribed channel performance Class of Clause 6 is met;

〉A1〈 - attachment of appropriate components to a link design meeting the prescribed performance Class of Annex A. Channel performance shall be 〉A2〈ensured〈A2〉 where a channel is created by adding more than one one cord to either end of a link meeting the requirements of Annex A; 〈A1〉

- using the reference implementations of Clause 7 and compatible cabling components conforming to the requirements of Clauses 8, 9 and 10 based upon a statistical approach of performance modelling.

g) local regulations concerning safety shall be met.

〉A1〈 In addition the requirements of the EN 50174 series of standards shall be met.

The test parameters to be measured and the sampling levels to be applied for a particular installation shall be defined in the installation specification and quality plans for that installation prepared in accordance with EN 50174-1.

The treatment of measured results that fail to meet the requirements of this clause, or lie within the relevant measurement accuracy, shall be clearly documented within a quality plan as described in EN 50174-1. 〈A1〉

Test methods to verify conformance with the channel and link requirements of Clause 6 and Annex A respectively are specified in EN 50346. 〉A1〈 *Text deleted* 〈A1〉

〉A1〈 *Text deleted* 〈A1〉

2 Normative references

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

〉A1〈 EN 50173-1:2011, *Information technology – Generic cabling systems – Part 1: General requirements* 〈A1〉

〉A1〈 EN 50174-1, *Information technology – Cabling installation – Part 1: Installation specification and quality assurance* 〈A1〉

EN 50174-2*, Information technology – Cabling installation – Part 2: Installation planning and practices inside buildings*

EN 50174-3*, Information technology – Cabling installation – Part 3: Installation planning and practices outside buildings*

EN 60603-7-7, *Connectors for electronic equipment – Part 7-7: Detail specification for 8-way, shielded, free and fixed connectors, for data transmission with frequencies up to 600 MHz (IEC 60603-7-7:2006)*

〉A1〈 EN 60728-1:2008, *Cable networks for television signals, sound signals and interactive services – Part 1: System performance of forward paths* (IEC 60728-1:2007) 〈A1〉

〉A1〈 CLC/TR 50173-99-2, *Information technology – Implementation of BCT applications using cabling in accordance with EN 50173-4* 〈A1〉

EN 61076-3-104, *Connectors for electronic equipment – Product requirements - Part 3-104: Detail specification for 8-way, shielded free and fixed connectors, for data transmissions with frequencies up to 1 000 MHz (IEC 61076-3-104:2006)*

EN 61076-3-106:2006, *Connectors for electronic equipment - Product requirements - Part 3-106: Rectangular connectors - Detail specification for protective housings for use with 8-way shielded and unshielded connectors for industrial environments incorporating the IEC 60603-7 series interface (IEC 61076-3-106:2006)*

EN 61169-2, *Radio-frequency connectors – Part 2: Sectional specification – Radio frequency coaxial connectors of type 9,52 (IEC 61169-2:2001)*

EN 61169-24, *Radio-frequency connectors – Part 24: Sectional specification – Radio frequency coaxial connectors with screw coupling, typically for use in 75 ohm cable distribution systems (type F) (IEC 61169-24:2001)*

EN 61754-20:2012, *Fibre optic interconnecting devices and passive components – Fibre optic connector interfaces – Part 20: Type LC connector family (IEC 61754-20:2012)*

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this European Standard, the following definitions apply in addition to those of EN 50173-1.

3.1.1
application outlet
a point at which equipment is connected to the generic cabling in support of ICT and/or BCT application

3.1.2
area connection point (ACP)
a point at which CCCB coverage area cabling is connected to area feeder cabling

3.1.3
area feeder cable
CCCB cable connecting the home distributor (or secondary home distributor, if present) to the area connection point

3.1.4
broadcast outlet (BO)
fixed connecting device where the BCT home cable terminates

NOTE The broadcast outlet provides an interface to the terminal equipment cabling for BCT applications

3.1.5
connector sharing
the ability of a connector to simultaneously accept multiple plugs in one socket such as 4 one-pair plugs in one 4 pair socket while maintaining the required performance; this may also be achieved by means of an external adapter

3.1.6
coverage area
area served by an area connection point

3.1.7
home
a physical structure used as a dwelling place, such as a house or an apartment

NOTE This may be an individual building, part of a larger building or more than one building.

3.1.8
home distributor (HD)
the distributor within a home where cables terminate

3.1.9
multi-application Telecommunications outlet (MATO)
grouping of telecommunications outlets and broadcast outlets, which may include one or several interfaces

NOTE A MATO may also include control outlets

3.1.10
pathway
facility dedicated to the placement of cable or area reserved for the placement of cable

3.1.11
remote power feeding
the supply of power different from mains power to application-specific equipment via cabling specified by this standard

3.1.12
secondary home distributor (SHD)
an optional distributor used to provide additional infrastructure flexibility and / or allocate transmission equipment between the home distributor and coverage areas (e. g. for homes with multiple floors)

3.1.13
telecommunications outlet (TO)
fixed connecting device where the ICT home cable terminates

NOTE The telecommunications outlet provides an interface to the terminal equipment cabling for ICT applications

3.1.14
terminal equipment
equipment (e.g. telephone handset) that provides user access to an application at an application outlet

3.1.15
terminal equipment cabling
cord and other devices connecting the telecommunications outlet or broadcast outlet to the terminal equipment

3.1.16
transmission equipment
active and passive equipment used to distribute applications from distributors to other distributors and to outlets

3.2 Abbreviations

For the purposes of this European Standard the following abbreviations apply in addition to those of EN 50173-1.

ACP	Area Connection Point
BEF	Building Entrance Facility
BO	Broadcast Outlet
CATV	Community Antenna Television
CCTV	Closed Circuit TV
CO	Control Outlet
ENI	External Network Interface
ffs	for further study
HBES	Home and Building Electronic System
HD	Home Distributor
MATO	Multi-application Telecommunications outlet

PS Power source

SHD Secondary Home Distributor

TE Terminal equipment

TO Telecommunications Outlet

TV Television

4 Structure of the generic cabling system to support ICT and/or BCT applications in homes

4.1 General

This Clause identifies the functional elements of generic cabling to support ICT and/or BCT applications, describes how they are connected together to form subsystems and identifies the interfaces at which application-specific components are connected to the generic cabling infrastructure. Channels, created by connecting application-specific cabling components to the generic cabling, are used to support ICT and/or BCT applications. Applications listed in EN 50173-1:2011, Annex F, are supported by connecting active equipment at the external network interfaces, application outlets and the distributors.

NOTE The channels specified in Clause 6 do not support the simultaneous transmission of multiple applications, of the same or different application Classes, within a cable or at an interface to the generic cabling. The sharing of components by applications (to, for example, maximise the capacity of cable management systems) may require additional performance requirements and/or supplier instructions to be applied. These requirements are outside the scope of this standard.

4.2 Functional elements

The functional elements of generic cabling are as follows:

a) home distributor (HD);

b) home cable;

c) secondary home distributor (SHD);

d) secondary home cable;

e) application outlet (MATO, TO or BO).

NOTE The SHD and secondary home cable are optional functional elements.

The type and number of functional elements used depends upon the type of premises and the application group(s) served. It is possible to combine multiple functional elements into a single element.

4.3 General structure and hierarchy for ICT and BCT cabling

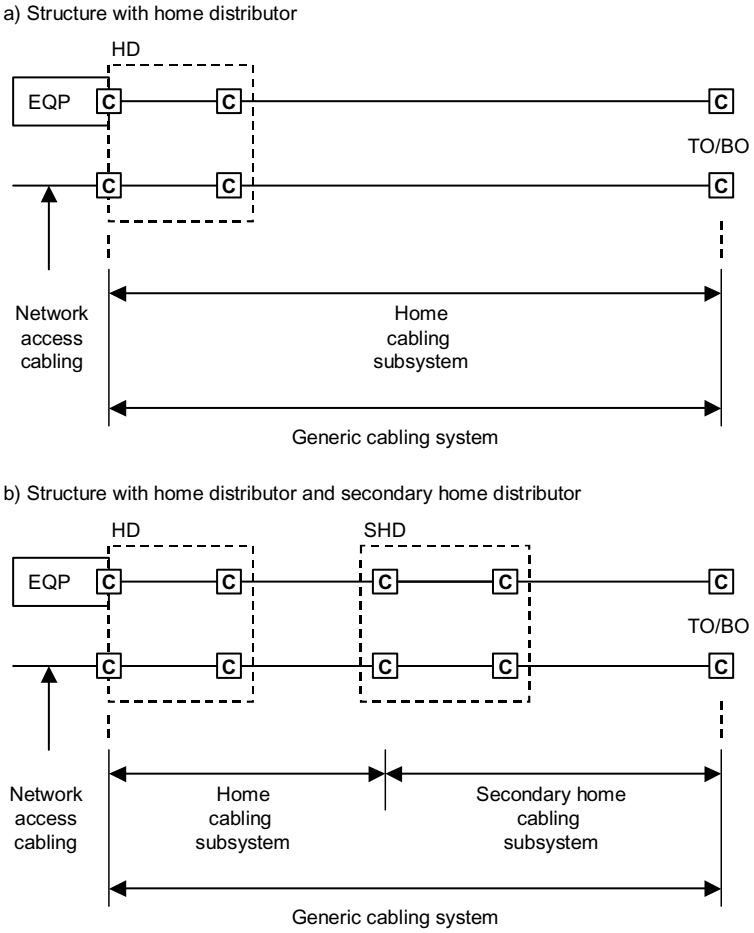
Generic cabling systems to support ICT and/or BCT applications contain a maximum of two types of cabling subsystems: the home cabling subsystem and the secondary home cabling subsystem as shown in Figure 3.

The composition of the subsystems is described in 4.4.1 and 4.4.2. The functional elements of the cabling subsystems are connected to form a hierarchical structure as in Figure 4. Conformance to this standard does not require the presence of the secondary home cabling subsystem.

The distributors and the application outlets provide the means for configuring the cabling to support topologies in addition to those implemented by the installed cables.

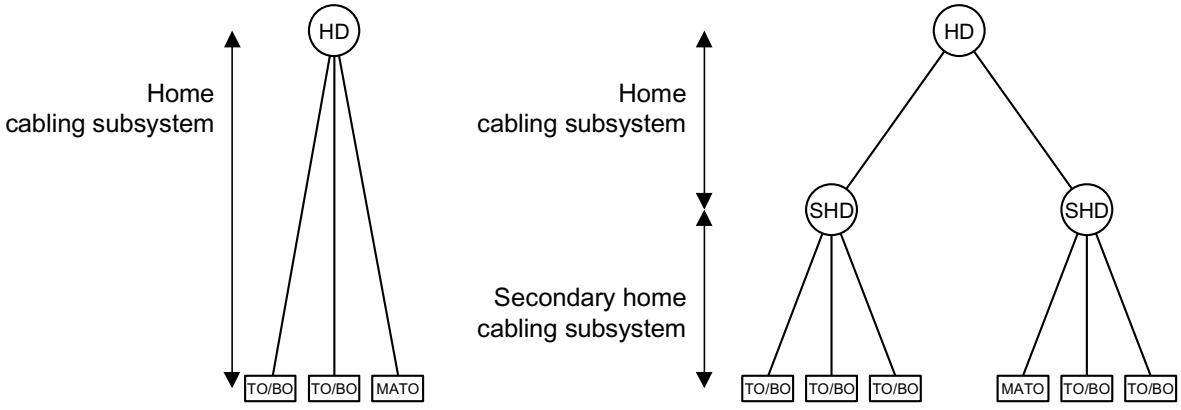
Connection to application-specific equipment at the distributors generally adopts an interconnect approach (see EN 50173-1). Cabling designs that adopt a direct connection to the equipment at the distributors may be implemented in order to achieve the desired transmission performance but serve to restrict the flexibility of the infrastructure and are non-conformant with the requirements of this clause. Passive connections between cabling subsystems adopt either a cross-connect approach, by way of either patch cords or jumpers, or an interconnect approach.

Passive connections between the home cabling subsystem and the network access cabling at the HD are generally achieved using a cross-connect approach.



NOTE The dotted elements represent the boundaries of functional elements and not the enclosure that contains the functional elements.

Figure 3 - Structure of the generic cabling system in homes



a) Structure with home distributor

b) Structure with home distributor and secondary home distributor

Figure 4 - Hierarchical structure of a generic cabling system in support of ICT and BCT applications

4.4 Cabling subsystems for ICT and BCT applications

4.4.1 Home cabling subsystem

The home cabling subsystem extends from the HD to the application outlet.

When an SHD is used, the home cabling subsystem extends from the HD to the secondary home cabling subsystem. The subsystem includes:

a) the home cables;
b) the mechanical termination of the home cables at the SHD or application outlet as appropriate;
c) the mechanical termination of the home cables together with associated patch cords and/or jumpers at the HD;
d) the MATO, TO or BO (where a SHD is not used).

Although equipment cords are used to connect the transmission equipment to the home cabling subsystem, they are not considered part of the home cabling subsystem because they are application-specific.

The home cabling subsystem does not include the interface to the network access cabling at the HD.

4.4.2 Secondary home cabling subsystem

The secondary home cabling subsystem extends from a SHD to the application outlet.

The subsystem includes:

a) the secondary home cables;
b) the mechanical termination of the secondary home cables at the MATO, TO or BO;
c) the mechanical termination of the secondary home cables together with associated patch cords and/or jumpers at the SHD;
d) the MATO, TO or BO.

Although equipment cords are used to connect the transmission equipment to the secondary home cabling subsystem, they are not considered part of the secondary home cabling subsystem because they are application-specific.

4.5 Accommodation of functional elements

4.5.1 Home Distributor

Each home shall be served by a single HD.

The HD shall be located in a designated area with adequate access, space and environmental conditions to house the cabling and the transmission equipment and to enable management of the cabling connections. The transmission equipment may be active, passive or both. Outlets for mains power shall be located close to the HD.

See EN 50174 series for additional requirements.

4.5.2 Secondary Home Distributor

Where used, SHDs shall be located in a designated area with adequate access, space and environmental conditions to house the cabling, the transmission equipment and to enable management of the cabling connections. SHDs shall be provided with access to the mains power required for the application-specific equipment.

Other requirements for the accommodation of SHDs should be based upon the general recommendations of EN 50174-1 for other distributors.

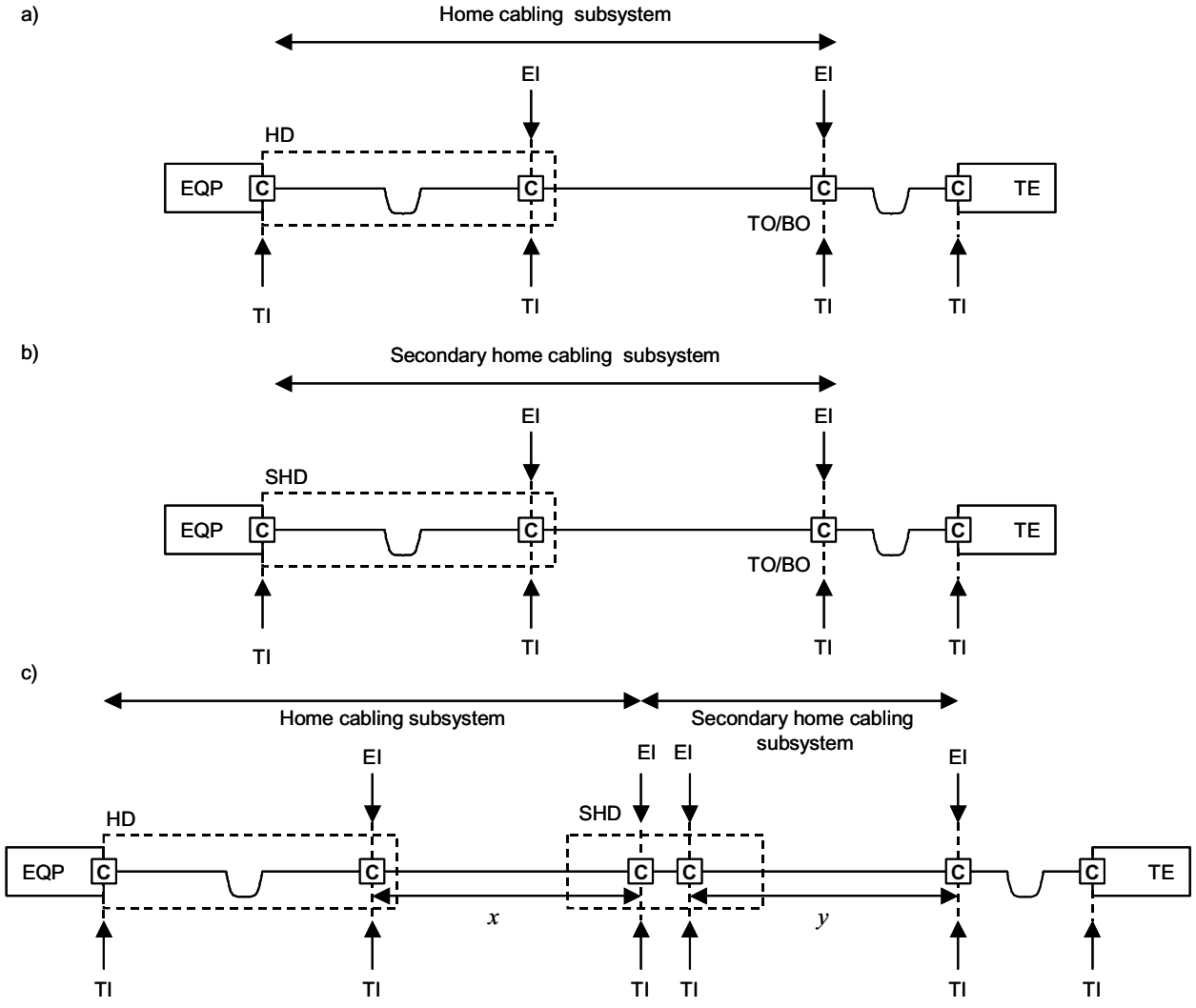
4.6 Interfaces

4.6.1 Equipment interfaces and test interfaces

Equipment interfaces to generic cabling are located at distributors and application outlets. Test interfaces to cabling are located at the ends of each subsystem.

Figure 5 shows the potential equipment interfaces and potential test interfaces within the generic cabling system.

Transmission and terminal equipment are generally connected to the equipment interface using an equipment cord.



NOTE 1 The dotted elements represent the boundaries of functional elements and not the enclosure that contains the functional elements.

NOTE 2 For BCT-C applications (see Clause 6) the test interface is defined according to EN 61169-1.

NOTE 3 The channels created in Figure 5c) are not supported by the reference implementations of Clause 7 unless lengths x and y exceed 15 m.

Figure 5 - Equipment and test interfaces in support of ICT and BCT applications

4.6.2 Channels and permanent links

4.6.2.1 Channel

For cabling to support ICT and/or BCT applications, the channel consists of the home cabling subsystem(s) together with the equipment cord(s) as shown in Figure 6. See C.2 for the creation of BCT-C channels using BCT-B cabling.

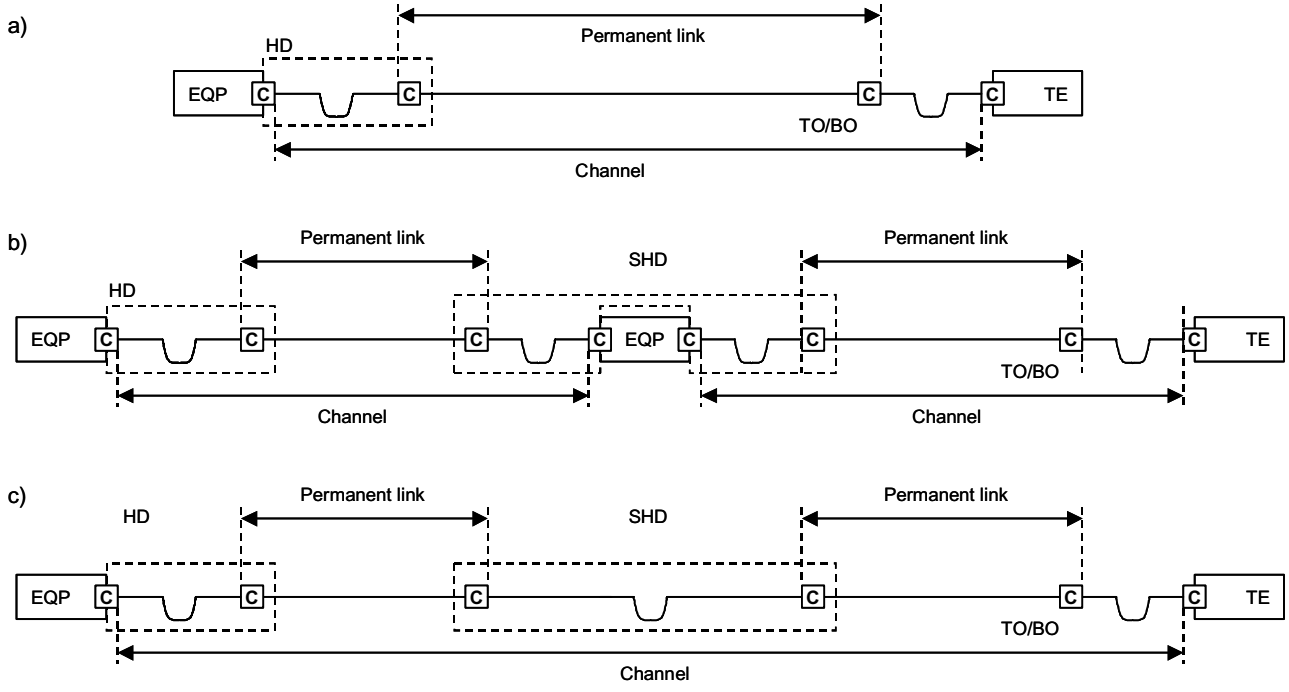
It is important that the cabling channel is designed to meet the required class of performance for the applications that are to be run. For the purposes of testing, the channel excludes the connections at the application-specific equipment.

The transmission performance of channels is detailed in Clause 6.

The creation of a channel between two application outlets via a passive cross-connection at a distributor is allowed provided that the relevant channel performance of Clause 6 is met.

The maximum channel lengths for each application group are dependent upon the performance of the cable and connecting hardware used (see Table 2 and Table 5 for maximum channel lengths using the reference implementations of Clause 7).

Where the performance requirements of an application allow, longer channels may be formed by the passive connection of cabling subsystems together with equipment cords where appropriate.



NOTE The channels of Figure 6c) are not supported by the reference implementations of Clause 7 unless both permanent link lengths exceed 15 m.

Figure 6 - Channels and permanent links within the home

4.6.2.2 Permanent link

If there is no SHD, the permanent link consists of the home cable and the termination of that cable at the application outlet and the HD as shown in Figure 6.

If there is an SHD, there are two permanent links. The first permanent link consists of the home cable and the termination of that cable at the SHD and the HD; the second permanent link consists of the secondary home cable and the termination of that cable at the application outlet and the SHD. These permanent links are also shown in Figure 6. See Annex C for the creation of BCT-C channels using BCT-B cabling.

For the purposes of testing, the permanent link includes the connections at the ends of the installed cabling.

The transmission performance of permanent links is detailed in Annex A.

4.7 Dimensioning and configuring

4.7.1 Distributors

Each home shall be served by a single HD. The physical volume of the HD depends upon the complexity of the infrastructure being served.

The design of distributors should ensure that the lengths of patch cords, jumpers and equipment cords are minimised. The design lengths of the cords should be maintained during operation.

Distributors shall be located such that the resulting cable lengths are consistent with the channel performance requirements of Clause 6. For the reference implementations described in Clause 7, the maximum channel lengths in Table 2 shall be observed subject to the following restrictions:

a) not all applications are supported over the maximum lengths shown in Table 2 using a single cable type and the support of specific applications over installed channels may require a mix of cabling media and types;
b) national, regional, and local regulations or service provider instructions may restrict the maximum channel length between the application outlet and the external network interface.

〈A2〉 **Table 2 – Maximum channel lengths for reference implementations of ICT, BCT and optical channels**

Cabling type			
ICT	**BCT-B**	**BCT-C**	**Optical**
100 m	50 m	100 m	100 m
NOTE 1 See 6.3.2.3 and Annex B for performance and length considerations for BCT channels. NOTE 2 Some BCT applications may not be supported over the maximum lengths (see EN 50173-1:2011, Annex F). NOTE 3 Some implementations of optical channels are not supported over the maximum lengths (see 6.3.3 for performance and length considerations).			

〈A2〉

NOTE Reference implementations are not intended to restrict the use of shorter lengths.

4.7.2 Network access cabling

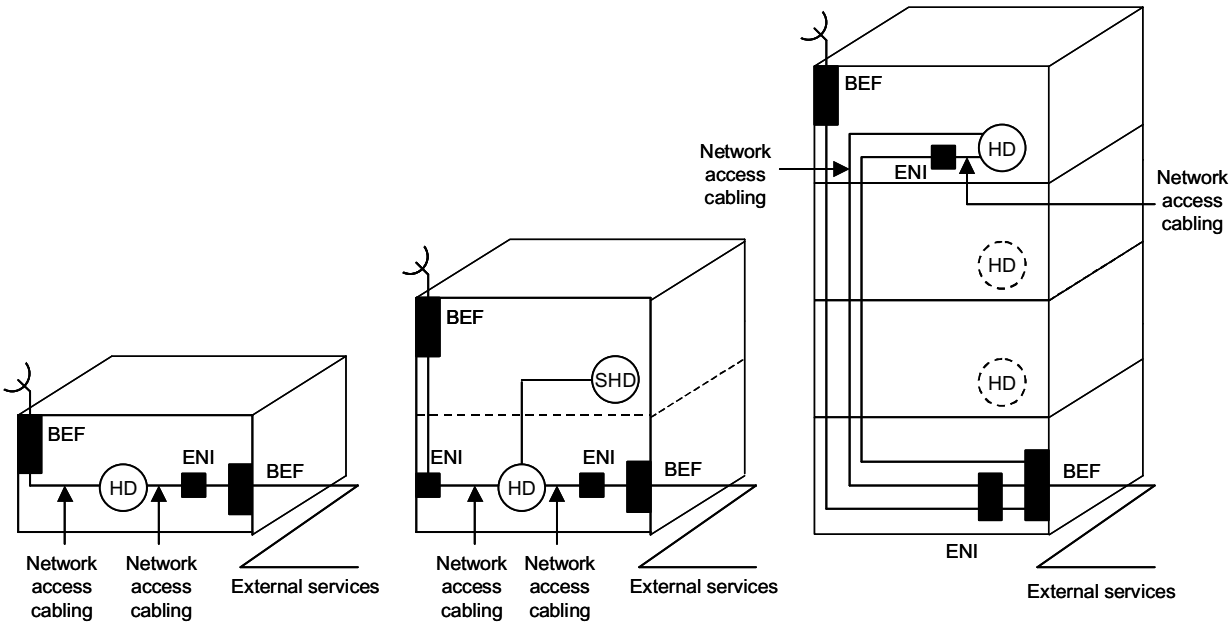
Network access cabling is presented at the HD as shown in Figure 7.

In premises containing a single home the network access cabling provides the connection between the external network interfaces (ENI, public or private) and the HD.

In premises containing multiple homes the network access cabling may, subject to national or local regulation, also provide the connection between:

a) the individual homes in the same premises;
b) the premises external network interfaces (public or private) and the HD in each home.

When used to provide a direct connection between the generic cabling system and an external network interface in the home, the performance of the network access cabling should be considered as part of the initial design and implementation of customer applications.



a) Single home without Secondary Home Distributor(s)

b) Single home with Secondary Home Distributor(s)

c) Premises containing multiple homes

NOTE Some network access cabling uses bus structure

Figure 7 - Examples of interconnection of home and network access cabling

A1 When used to provide a connection between the generic cabling system and an external network interface in the same premises (but not within the home served by the home distributor), the network access cabling shall be in accordance with EN 50173-1 (backbone cabling) for ICT applications and shall take into account CLC/TR 50173-99-2 for BCT applications in accordance with EN 60728-1. A1

The only interfaces to network access cabling within a home shall be those serving that home.

4.7.3 External network interface

Connections to external networks for the provision of external telecommunications services are made at external network interfaces. The location of external network interfaces, if present, and the facilities required may be specified by national, regional and local regulations. The service provider(s), responsible of the installation of the ENI(s), shall be contacted to locate the external network interface(s).

A1 The equivalent to the ENI for BCT applications in accordance with EN 60728-1 is described in CLC/TR 50173-99-2. A1

4.7.4 Equipment cords

The performance contribution of the equipment cords, used to connect application-specific equipment to the cabling at distributors and at application outlets, shall be taken into account in the design of the channel. Assumptions have been made concerning the length and the transmission performance of these cords; the assumptions are identified when relevant. Clause 7 provides guidance on cord length for reference implementations of cabling in accordance with this Clause.

4.7.5 Application outlets

4.7.5.1 [A2] General [A2]

The number and distribution of application outlets depends upon the size and function of the rooms and areas served. It should also be noted that the channels specified in Clause 6 do not support the simultaneous transmission of multiple applications, of the same or different application Classes, at an application outlet.

Rooms should be provided with one TO and one BO for each 3,75 m of room perimeter. The application outlets should be evenly distributed around the room perimeter.

It is possible for the areas served by the cabling to extend beyond the external walls of a building or to serve a separate building within the home.

The cabling for the application outlets shall be

a) for ICT channels as specified in Clause 6: a minimum of one cable containing four balanced pairs capable of supporting ICT channels in accordance with 6.3.2. For channels exploiting the maximum length specified in Table 2, the cable transmission performance shall be either, for ICT, in accordance with 8.2.2 or, for BCT, in accordance with 8.2.3;

and

b) for BCT channels as specified in Clause 6, either:
   i) a minimum of one cable containing at least one pair capable of supporting BCT channels in accordance with 6.3.3. For channels exploiting the maximum length specified in Table 2 the cable transmission performance shall be in accordance with 8.2.3;

   or

   ii) a minimum of one coaxial BCT cable capable of supporting BCT channels in accordance with 6.3.3. For channels exploiting the maximum length specified in Table 2 the cable transmission performance shall be in accordance with 8.3.

[A1] Where a BCT channel is provided by a balanced cable containing more than one pair, the transmission performance of the cable shall enable channels to be created using the pairs which

1) shall meet the requirements of 6.3.2,
2) should meet EN 50173-1:2011, Class F or Class F_A. [A1]

All cable elements within areas served shall be terminated at application outlets. A cable element shall not be terminated at more than one application outlet. This does not exclude Radio/TV-outlets, see C.1.1.

NOTE Cabling configurations beyond the application outlet that provide such connections (e.g. physical bus) are application-specific and lie outside the scope of this standard.

Where the pairs are provided to an application outlet by more than one cable, care shall be exercised to ensure that the channel requirements of Clause 6 are met.

[A2] Additional balanced cables (for ICT and/or BCT applications), coaxial cables (for BCT applications) or optical fibre cables should be provided as defined by

- the number and mix of applications (e.g. satellite feed, multi-cable feed of CATV, in-house generated video);

  NOTE Some applications, such as direct satellite feeds, use frequencies above 1 000 MHz that are only supported by the higher bandwidth BCT-C channels.

- the number of application outlets to be served.

For metallic cabling supporting both ICT and BCT channels, the application outlet is termed the MATO. A MATO may also be used to support CCCB applications where appropriate, see EN 50173-1:2011, Annex F.

For balanced cabling supporting ICT channels only, the application outlet is termed the TO and uses connecting hardware specified in 9.2. A TO may also be used to support BCT and CCCB applications where appropriate, see EN 50173-1:2011, Annex F.

For balanced or coaxial cabling supporting BCT channels only, the application outlet is termed the BO and uses connecting hardware specified in 9.3. A BO using balanced BCT-B cabling may also be used to support ICT and CCCB applications where appropriate, see EN 50173-1:2011, Annex F. [A2]

For optical channels supporting either ICT or BCT channels, the application outlet is termed an optical TO/BO and terminates a minimum of one cable containing two optical fibres in accordance with 6.3.3.2 using connecting hardware as specified in 9.5.

Figure 8 shows the interconnection of home cabling in a single home comprising two buildings.

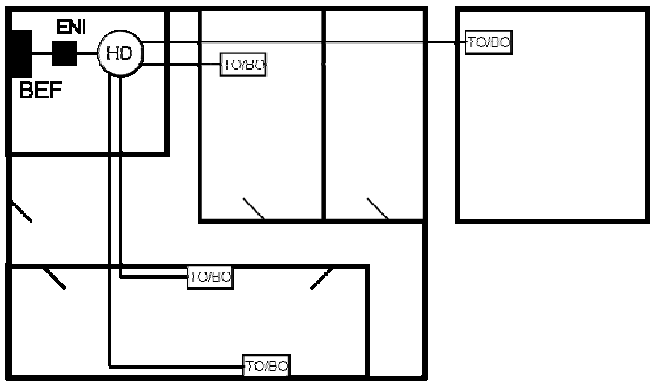


Figure 8 – Interconnection of home cabling

4.7.5.2 Multi-application Telecommunications Outlet (MATO)

The MATO supports both ICT and BCT applications and shall present a minimum of four balanced pairs.

For ICT applications at least two balanced pairs shall be terminated per MATO taking into account the recommendations of 4.7.5.3.

NOTE Two pairs will not support some applications (see EN 50173-1:2011, Annex F, for details).

For BCT applications at least either one balanced pair or one coaxial cable per MATO shall be terminated.

4.7.5.3 Telecommunications Outlet (TO)

The TO shall be located in readily accessible locations in the room, depending on the design of the building and subject to the requirements of national and local regulations.

Each TO should be terminated in accordance with 9.2.2.1 and EN 50173-1:2011, Figure 8, using four pairs. Two pairs per TO may be used as an alternative to four pairs, however this may require pair reassignment and will not support some applications. Care should be taken that the initial pair assignment, and all subsequent changes, are recorded (see EN 50174-1 for details of administration requirements). Pair reassignment by means of inserts is allowed.

4.7.5.4 Broadcast Outlet (BO)

The BO shall be located in readily accessible locations in the room, depending on the design of the building and subject to the requirements of national and local regulations.

Each BO using balanced BCT cable should be terminated in accordance with 9.3.2.1 and 9.3.3. Fewer than four pairs per BO may be terminated, however this may require pair management. Care should be taken that the initial pair assignment, and all subsequent changes, are recorded (see EN 50174-1 for details of administration requirements). Pair reassignment by means of inserts is allowed.

Each BO using coaxial BCT cable shall be terminated in accordance with 9.3.2.2 and 9.3.3.

Where balanced cable is used and the BO is intended to also support ICT applications, the number of pairs to be terminated shall take into account the recommendations of 4.7.5.3.

4.7.5.5 Optical TO/BO

The optical TO/BO shall be located in readily accessible locations in the room, depending on the design of the building and subject to the requirements of national and local regulations.

Each optical TO/BO shall be terminated in accordance with 9.5.

5 Cabling structure to support CCCB applications in homes

5.1 General

This Clause identifies functional elements of the generic cabling system to support CCCB applications. Where the functional elements differ from those of Clause 4, this Clause describes how the functional elements are connected together to form subsystems and identifies the interfaces at which application-specific components are connected to the generic cabling system infrastructure.

5.2 Functional elements

In order to support CCCB applications the following set of functional elements are specified:

a) home distributor (HD) (see Clause 4);

b) home cable (see Clause 4);

c) secondary home distributor (SHD) (see Clause 4);

d) area feeder cable;

e) area connection point (ACP);

f) coverage area cable;

g) CO.

The type and number of functional elements used depends upon the type of premises. It is possible to combine multiple functional elements into a single element.

The functional elements used within a given implementation of a generic cabling system are connected together to form cabling subsystems (see 4.3). The connection of equipment at the COs and distributors supports applications.

The CO may be connecting hardware or may be a termination on the application-specific equipment.

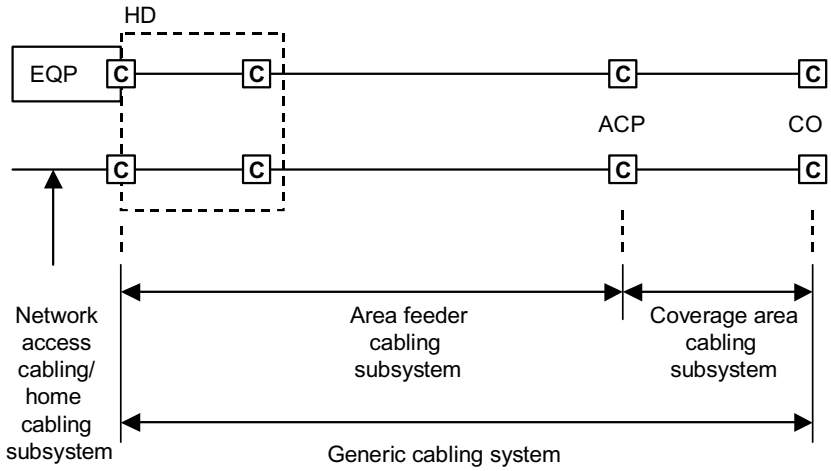
5.3 Cabling structure for CCCB applications

Generic cabling systems to support CCCB applications contain a maximum of three types of cabling subsystems: the home cabling subsystem (where a SHD is used) as specified in Clause 4, the area feeder cabling subsystem and the coverage area cabling subsystem as shown in Figure 9.

The composition of the area feeder cabling and coverage area cabling subsystems is described in 5.4.1 and 5.4.2 respectively. The functional elements of the cabling subsystems are connected to form a hierarchical structure as in Figure 10. Conformance to this standard does not require the presence of the secondary home cabling subsystem.

The distributors and the COs provide the means for configuring the cabling to support topologies in addition to those implemented by the installed cables.

Connections between the cabling subsystems at the ACPs adopts an interconnect approach (see EN 50173-1).



NOTE The dotted elements represent the boundaries of functional elements and not the enclosure that contains the functional elements.

Figure 9 - Structure of the generic cabling system in support of CCCB applications

For CCCB applications, the area feeder cabling shall have a star topology from the distributor to the ACP.

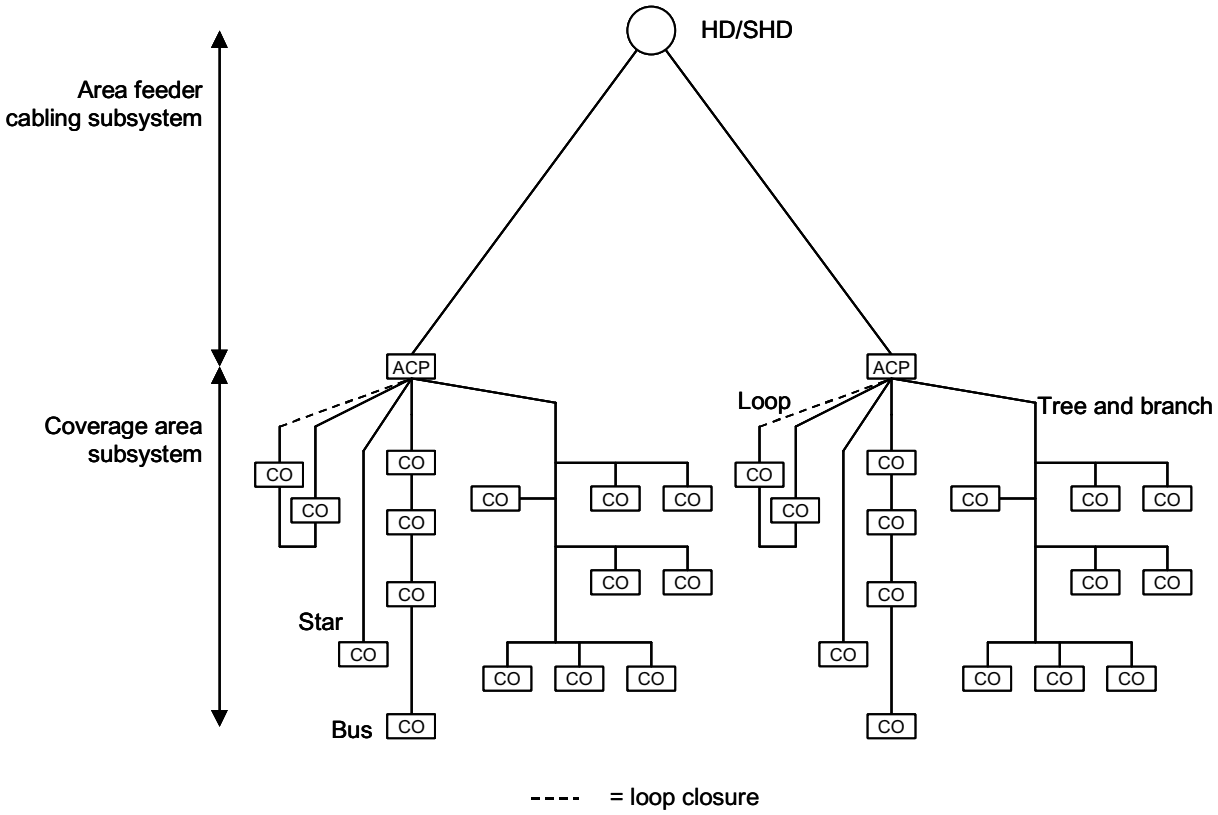


Figure 10 - Hierarchical structure of a generic cabling system in support of CCCB applications

5.4 Cabling subsystems for CCCB applications

5.4.1 Area feeder cabling subsystem

The area feeder cabling subsystem extends from the HD (or SHD as appropriate) to the ACP. The subsystem includes:

a) the area feeder cables;

b) the mechanical termination of the area feeder cables at the ACP;

c) the mechanical termination of the area feeder cables together with associated patch cords and/or jumpers at the HD or SHD;

d) the ACP.

Although equipment cords are included in a channel they are not part of the cabling subsystem because they are application-specific.

5.4.2 Coverage area cabling subsystem

The coverage area cabling subsystem extends from the ACP to the COs. The subsystem includes:

a) the coverage area cables;

b) the mechanical termination of the coverage area cables at the ACP;

c) the mechanical termination of the coverage area cables at the COs;

d) the mechanical termination of the coverage area cables to each other at other places within the subsystem;

e) the COs.

Although equipment cords are included in a channel they are not part of the cabling subsystem because they are application-specific.

The coverage area cabling may be installed in any of the topologies shown in Figure 10. Where permitted by the application, loops shall be closed by a connection only at easily accessible points (e.g. the ACP or at distributors).

5.5 Accommodation of functional elements

See 4.5.

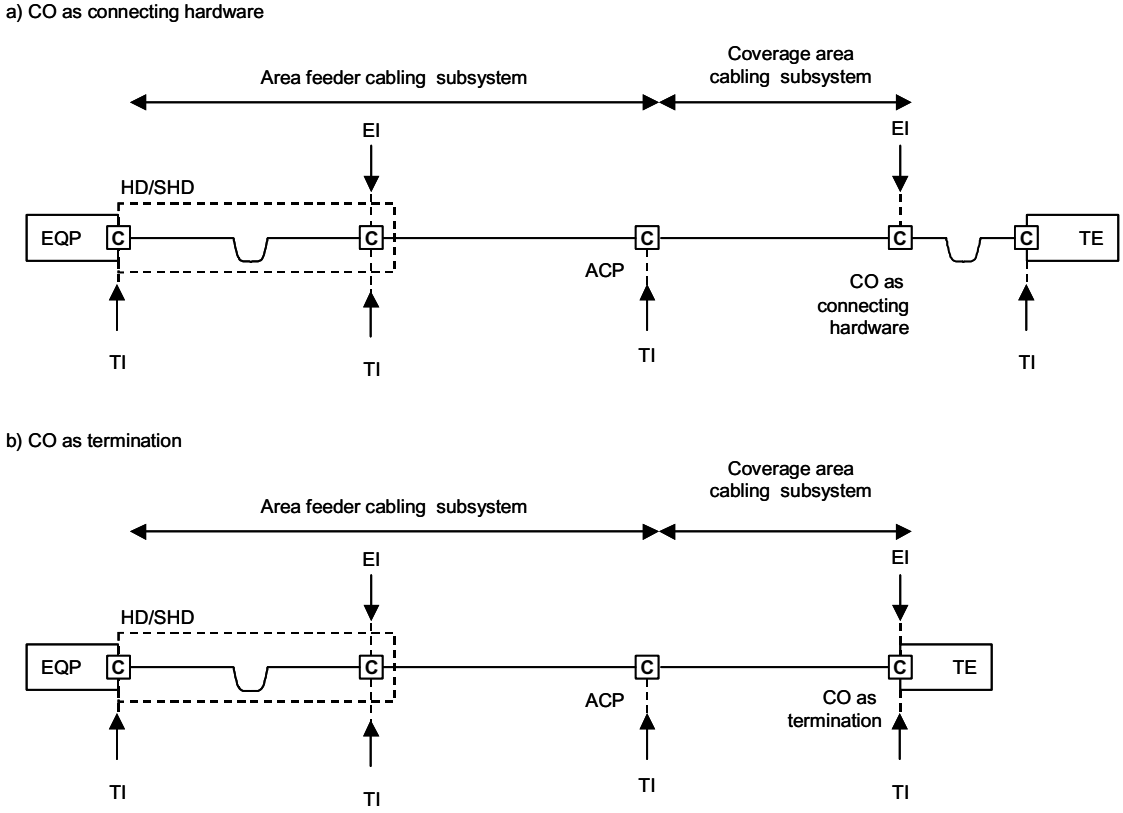
5.6 Interfaces

5.6.1 Equipment interfaces and test interfaces

Equipment interfaces to generic cabling are located at distributors and the COs. Test interfaces to cabling are located at the ends of each subsystem.

Figure 11 shows the potential equipment interfaces and potential test interfaces within the generic cabling system.

Transmission equipment at the distributor is generally connected to the equipment interface using an equipment cord. At the CO the equipment interface may be connecting hardware or may be a termination on the application-specific equipment.



NOTE The dotted elements represent the boundaries of functional elements and not the enclosure that contains the functional elements.

Figure 11 - Equipment and test interfaces in support of CCCB applications

5.6.2 Channels and permanent links

5.6.2.1 Channel

For cabling to support CCCB applications, the channel consists of the area feeder cabling subsystem and/or coverage area cabling with the equipment cord(s) as shown in Figure 12.

It is important that the cabling channel is designed to meet the required class of performance for the applications that are to be run. For the purposes of testing, the channel excludes the connections at the application-specific equipment.

The transmission performance of channels is detailed in Clause 6.

The creation of a channel between two COs in different coverage areas via a passive cross-connection at the distributors is allowed provided that the relevant channel performance of Clause 6 is met.

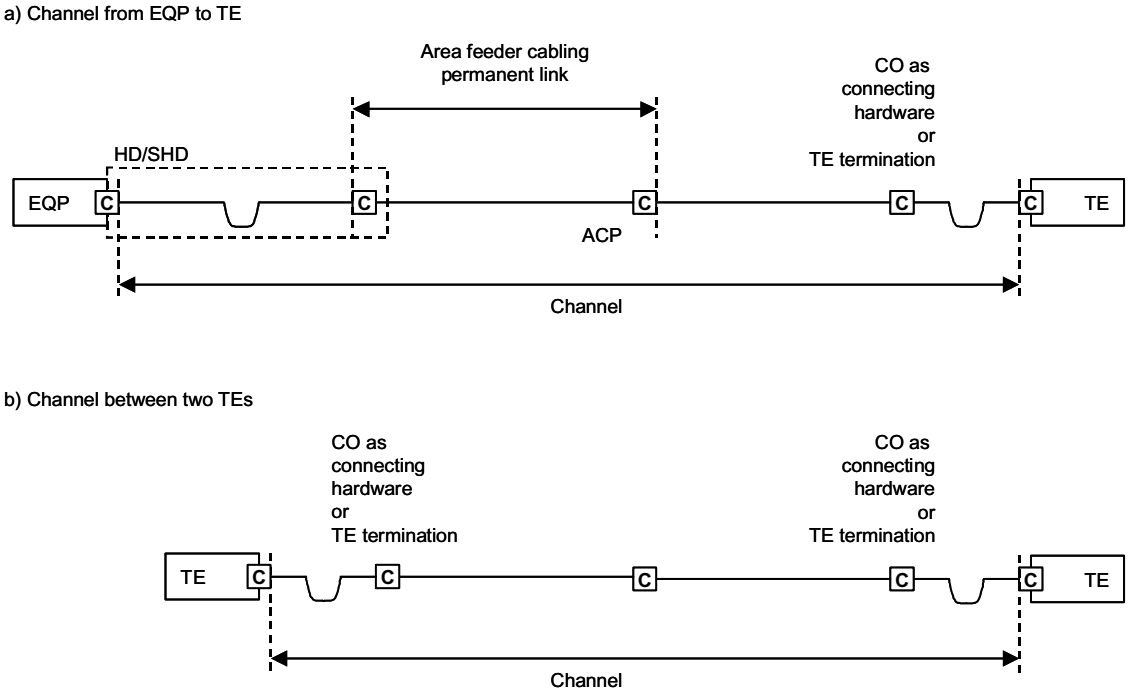
Maximum channel lengths are dependent upon the performance of the cable and connecting hardware used. See 5.7.1 for the maximum cabling lengths using the reference implementations of Clause 7. Where the performance requirements of an application allow, longer channels may be formed by the passive connection of cabling subsystems together with equipment cords where appropriate.

5.6.2.2 Area feeder permanent link

The area feeder permanent link consists of the area feeder cable and the termination of that cable at the ACP and the HD or SHD, respectively, as shown in Figure 12.

For the purposes of testing the permanent link includes the connections at the ends of the installed cabling.

The transmission performance of permanent links is detailed in Annex A.



NOTE The dotted elements represent the boundaries of functional elements and not the enclosure that contains the functional elements.

Figure 12 - Channels and permanent links for CCCB cabling

5.7 Dimensioning and configuring

5.7.1 Distributors

See 4.7.1.

Distributors shall be located such that the resulting cable lengths are consistent with the channel performance requirements of Clause 6.

For the reference implementations described in Clause 7, the maximum length of the area feeder cabling permanent link shall not exceed 90 m and the total length of coverage cabling shall not exceed 50 m.

5.7.2 Network access cabling

See 4.7.2.

5.7.3 External network interface

See 4.7.3.

5.7.4 Equipment cords

See 4.7.4.

5.7.5 Area connection points (ACPs)

For CCCB applications the coverage area corresponds to a room or a maximum area of 25 m^2. Each coverage area should be provided with a minimum of one ACP.

CCCB cabling is intended to carry signal and, in many cases, power to the COs. The ACP may provide pair reassignment to allow the conductors within the area feeder cabling to be used in parallel.

Relevant application standards and manufacturers' instructions shall be consulted with reference to safety aspects of power feeding. Care shall be taken when using multi-unit or bundled cables due to the possible rise of temperature within the cabling components that may degrade channel performance.

The area feeder cables shall be 4-pair balanced cables capable of creating channels of Class D minimum provided that appropriate connecting hardware and cords are used at the distributor and the ACP.

5.7.6 Control outlets (COs)

A CO should be located at, or near, all potential locations of CCCB terminal equipment to facilitate direct termination of CCCB terminal equipment.

It should be noted that in certain cases the terminal equipment connected within a coverage area may be located on the external surface of the building or in a separate building within the premises.

5.7.7 Sharing of cable and connecting hardware

〈A1〉 The channels specified in Clause 6 do not support the simultaneous transmission of multiple applications, of the same or different application Classes, within a cable or at an interface to the generic cabling. The sharing of components by applications (to, for example, maximise the capacity of cable management systems) may require additional performance requirements, which are outside the scope of this standard, and/or shall be incorporated in accordance with the supplier's specifications and instructions. 〈A1〉

Where the coverage area cabling is not directly terminated to the CCCB terminal equipment, the CO uses connecting hardware specified in 9.4.

A TO or a BO (see Clause 4) may be used to support CCCB applications where appropriate.

A minimum of 1-pair shall be terminated at each CO. The same pair may be terminated at multiple COs within a coverage area.

5.7.8 Cable pathways

Where CCCB, ICT and/or BCT cables are to be installed in the same pathways as mains power cables the requirements of EN 50174-2 shall be observed.

NOTE Based on local regulations or practical considerations, it may be necessary or advisable to have two parallel pathways (one for mains, one for information; or one for mains and CCCB, one for ICT and BCT) even though this standard specifies one.

6 Channel performance in homes

6.1 General

This Clause specifies the minimum channel performance of generic cabling in homes. The channel performance is specified as a combination of environmental performance and transmission performance.

The environmental performance of the cabling is specified in terms of Classes in 6.2.

A2 The transmission performance of balanced, coaxial and optical fibre cabling channels is specified in terms of Classes in 6.3. A2

The channel comprises only passive sections of cable, connections, terminal equipment cords, equipment cords, patch cords and jumpers.

The environmental classification of homes is generally $M_1I_1C_1E_1$ as specified in EN 50173-1.

The transmission and environmental performance of the connections at the active equipment are the responsibility of the equipment supplier in support of the applications including those listed in EN 50173-1:2011, Annex F.

Application support depends on channel transmission performance only, which in turn depends on cable length, number of connections and performance of the components within the environments to which the channel is subjected.

6.2 Environmental performance

See EN 50173-1.

6.3 Transmission performance

6.3.1 General

The channel transmission performance specifications are separated into Classes that allow for the transmission of three groups of applications: ICT, BCT and CCCB.

The minimum channel performances specified in this Clause are independent of the length of the channels and are determined by application requirements.

The channel performance requirements described in this Clause shall be used for the design and may be used for verification of any implementation of this European standard, using the test methods defined, or referred to, by this Clause. In addition, these requirements can be used for application development and trouble shooting.

The channel specifications in this Clause allow for the transmission of defined Classes of applications over distances other than those of Clause 7, and/or using media and components with different transmission performance than those of Clauses 8, 9 and 10.

Consideration should be given to measuring performance at worst case temperatures, or calculating worst case performance based on measurements made at other temperatures.

Link performance requirements are specified in Annex A.

A2 6.3.2 Balanced and coaxial cabling channels

6.3.2.1 General A2

Specification of channel performance is based on the minimum performance of the most demanding application of an application group for each transmission characteristic. In general a channel specified for an

application group with higher requirements supports applications with lower requirements. Less demanding applications of a higher group may also use channels aimed at a lower group as shown in Table 3.

If passive components other than cable and connecting hardware (e.g. devices as described in Annex C) are included in the channel, then:

a) if the channel transmission performance remains in accordance with the relevant Class then the channel is conformant with this standard;

b) if the channel transmission performance fails to meet the requirements of the relevant Class then the channel is deemed to be application-specific;

c) if the channel transmission performance falls but is in accordance with a lower Class then the channel is conformant with this standard at the lower Class.

[A2] NOTE [A2] The channel performance specified in this Clause is the best performance an application may expect from the worst channel that meets this standard if the design is intended to use any channel that conforms to this standard.

[A2] *Note deleted* [A2]

Table 3 - Different channels and their potential use

Channel	Upper frequency of specification MHz	ICT Applications supported	BCT Applications supported	CCCB Applications supported
Balanced CCCB channel	$f = 0{,}1$	ICT applications supported by CCCB channels	BCT applications supported by CCCB channels	all CCCB applications
Balanced ICT channel	$f = 100$	all ICT applications supported by Class D channels as specified in EN 50173-1 [a] up to 100 MHz	BCT applications supported by Class D channel performance as specified in EN 50173-1 [a]	CCCB applications supported by the ICT channel performance [b]
Balanced BCT channel	$f = 1\ 000$	ICT applications supported by the BCT channel performance	all BCT applications supported by balanced cabling	CCCB applications supported by the BCT channel performance [b]
Coaxial BCT channel	$f = 1\ 000$	all ICT applications supported by coaxial cabling that require up to 1 GHz	all BCT applications supported by coaxial cabling that require up to 1 GHz	N/A
	$f = 3\ 000$	all ICT applications supported by coaxial cabling that require up to 3,0 GHz	all BCT applications supported by coaxial cabling that require up to 3,0 GHz	N/A

[a] When Class E or F channels are installed to meet the minimum requirements for ICT channels, ICT and BCT applications accommodated by the performance of the respective channels are supported.

[b] The power carrying capacity may limit the applications or the number of COs supported.

[A2] While cabling channels for ICT and CCCB within the home presently are provided via balanced cables only, channels for BCT may be provided via balanced cable or coaxial cable. The CCCB channel specified in this Clause assumes power feeding and information transfer on the same pair(s). The CCCB channel is specified with a current carrying capacity of 0,7 A. This requirement may be met with one pair of a CCCB cable or the use, in combination, of the pairs of an ICT cable. All channels specified in this Clause assume bi-directional transmission.[A2]

The majority of BCT channels use one balanced pair or one coaxial cable. ICT applications use one, two, three or four pairs. The requirements for pair-to-pair characteristics are specified in this standard also to cover the case where a channel contains multiple transmission paths (pairs). The power feeding, where applicable, is covered in the specification of the channel. The channel for power feeding may start at other points than that for information transfer.

The minimum performance specified in this Clause shall be met by appropriate design of the channels, selection of adequate material and their proper installation.

6.3.2.2 ICT channel performance

Home and, where relevant, secondary home cabling

a) shall be designed to provide a channel performance as required from Classes D or higher as specified in EN 50173-1:2011, taking into consideration the requirements for application support over the lifetime of the cabling,

b) should be designed to provide a channel performance in excess of Class D as specified in EN 50173-1:2011.

In the case of cable sharing, additional requirements shall be taken into account for balanced cabling. The additional crosstalk requirements are specified in 8.2.2.

6.3.2.3 BCT channel performance

Home and, where relevant, secondary home cabling shall be designed using either balanced or coaxial cabling components.

Homes of different sizes may be subject to different signal levels delivered to the HD. This signal level may depend upon the distance to an antenna or an ENI of a cable TV system. To support this variation in home sizes economically, three BCT channels with different insertion loss levels are specified for both balanced and coaxial cabling in EN 50173-1. Further information is provided in CLC/TR 50173-99-2.

With reference to Table 4:

a) BCT-H channels shall be designed as BCT-B-H balanced cabling channels in accordance with EN 50173-1:2011, 5.2.2, or BCT-C-H coaxial cabling channels in accordance with EN 50173-1:2011, 5.2.3;

b) BCT-M channels shall be designed as BCT-B-M balanced cabling channels in accordance with EN 50173-1:2011, 5.2.2, or BCT-C-M coaxial cabling channels in accordance with EN 50173-1:2011, 5.2.3;

c) BCT-L channels shall be designed as BCT-B-L balanced cabling channels in accordance with EN 50173-1:2011, 5.2.2, or BCT-C-L coaxial cabling channels in accordance with EN 50173-1:2011, 5.2.3.

BCT-H, BCT-M and BCT-L channels support the same applications but with reducing level of system engineering being required (see EN 50173-1:2011, Annex F).

In cases where a home contains BCT channels of different performance levels, the level of performance should be identified for each channel installed. Channels that have a higher insertion loss than the maximum insertion loss specified for BCT-M should be marked as BCT-H, channels that have a higher insertion loss than the maximum insertion loss specified for BCT-L but a lower than the maximum insertion loss for BCT-M should be marked as BCT-M, and channels below the maximum insertion loss for BCT-L should be marked as BCT-L.

Table 4 – BCT channel levels

Name	BCT-H	BCT-M	BCT-L
Using coaxial cabling			
Insertion loss value at 1 000 MHz	21,9 dB	16,1 dB	7,7 dB
Max. reference lengths with coaxial cable assuming total cordage of 4 m	100 m	73 m	34 m
Using balanced cabling			
Insertion loss value at 1 000 MHz	33,2 dB	17,6 dB	9,5 dB
Max. reference length with balanced cable assuming total cordage of 4 m	50 m	25 m	11,8 m
NOTE The signal impairment requirements of EN 60728-1 at the terminal equipment are unlikely to be supported by BCT-B-H or BCT-C-H channels (see EN 50173-1:2011, Annex F).			

6.3.2.4 CCCB channel performance

Area feeder and coverage area cabling shall be designed using balanced cabling components.

Area feeder cabling shall be designed using balanced cabling components to provide channel performance as required from Classes D or higher as specified in EN 50173-1:2011.

Verification of this requirement would require termination with connecting hardware specified for the TO.

Specifications for HBES, like EN 50090 series, support the connection of a number of addressable devices to a shared channel. Such devices are often powered via the same conductors that are also used for information transfer. Therefore the performance of CCCB channels that may be installed prior to the selection of a specific application is determined by:

- the maximum number of devices supported on a single channel by the majority of HBES specifications;
- the maximum feeding distance of the most power-demanding devices;
- the minimum transmission characteristics of the most bandwidth-demanding device.

Based on these considerations cabling channels for information transfer and for power feeding may start at different locations even when they share the same pair.

Channels for information transfer created using coverage area cabling and, where relevant, area feeder cabling shall be designed to provide a minimum of Class CCCB performance as specified in EN 50173-1:2011, 5.2.

The nature of the CCCB cabling within the coverage area (shown as a cloud in Figure 14 and Figure 15 and in more detail in Figure 10) requires that transmission performance is specified in two ways.

The first specifies the individual transmission paths between any two connection points for application specific equipment. The second specifies the characteristics of all the cabling within the coverage area together with its area feeder cabling. The electrical characteristics of the latter are specified and may be measured as detailed in EN 50173-1:2011, 5.2.2.16.

Connection points where CCCB applications may be connected shall provide a minimum of one channel for information transfer and for power feeding consisting of and sharing one balanced pair.

The CCCB channel model specified in Clause 5 supports the implementation of CCCB and/or of ICT Class D channels with utilisation of appropriate coverage area cabling.

6.3.3 Optical fibre cabling channels

Cabling shall be designed using the cabled optical fibre Categories referenced in Clause 8 to provide channel performance of:

a) Class OF-25 - using cabled plastic fibre of Category OP1;

NOTE 1 The supported emerging application HS-BASE-P described in ETSI TS 105 175-1-1 is specified to deliver 1 Gbit/s over this channel Class.

b) Class OF-100 - using cabled optical fibre of at least Category OM3;

c) Class OF-300 – using cabled optical fibre Category OS1 or OS2.

NOTE 2 The length of the channel is limited to 100 m as specified in Table 2.

These channels are specified in EN 50173-1:2011 for the following parameters:

d) channel attenuation;

e) propagation delay.

7 Reference implementations in homes

7.1 General

This Clause describes implementations of a generic cabling infrastructure that utilises components that meet the minimum requirements specified in Clauses 8, 9 and 10. These reference implementations meet the requirements of Clauses 4 and 5 and, when installed in accordance with the EN 50174 series of standards, meet the channel transmission performance requirements of 6.3 when subjected to the relevant environmental classifications of 6.2.

To ensure the integrity of the environmental performance of the cabling components, compatibility between cabling components shall be assured by design and in accordance with EN 50174-1.

〈A2〉7.2 Balanced and coaxial cabling channels

7.2.1 General implementations 〈A2〉

In the reference implementation of this Clause, the components used in each cabling channel shall meet the following requirements:

a) a specific balanced copper cabling channel shall use components all of the same nominal impedance;

b) coaxial cabling channels shall use components that meet the requirements as specified in 8.3 and 9.3.1.2.

The reference implementations will meet the channel performance specified in Clause 6 over the maximum distances specified in Table 2 with components meeting the performance requirements at 20 °C. When the channels are intended to operate at a higher temperature, they shall meet the minimum performance at that temperature, either by shortening the channel taking into account the effect of temperature on the performance of cables as shown in Table 5, or by using cables that provide the performance needed at the higher temperature.

The generic cabling provides the transmission paths from the HD to TOs, BOs, and COs. With cables and connecting hardware meeting the minimum performance specified in Clauses 8 and 9 respectively, it is possible to create channels of lengths up to 100 m for all ICT and coaxial BCT channels. For balanced BCT channels using these components it is also possible to create channels of lengths of up to 50 m. For CCCB the combined length of the area feeder permanent link and the total cable length installed in the coverage area shall not exceed 140 m.

〈A1〉 Table 5 – Channel length equations

			Implementation equations			
Model	**Figure**	**Max. length** m	**ICT components**	**BCT balanced components**	**BCT coaxial components**	**CCCB components**
CCCB area feeder cabling	14, 15	90	90	90	N/A	N/A
CCCB coverage area cabling	14, 15	50	50	50	N/A	50
ICT (≤ 2 connections)	13a	100	$H = 109 - F \times X$	$H = 135 - F \times X$	N/A	N/A
ICT (4 connections)	13b	100	$H = 105 - F \times X$	$H = 133 - F \times X$	N/A	N/A
BCT-B-L (2 connections)	13a	50	N/A	$H = 51{,}4 - F \times X$	N/A	N/A
BCT-B-M (2 connections)	13a	25	N/A	$H = 26{,}4 - F \times X$	N/A	N/A
BCT-B-H (2 connections)	13a	11,8	N/A	$H = 13{,}2 - F \times X$	N/A	N/A
BCT-C-L (2 connections)	13a	100	N/A	N/A	$H = 101 - 1{,}25 \times F$	N/A
BCT-C-M (2 connections)	13a	73	N/A	N/A	$H = 74 - 1{,}25 \times F$	N/A
BCT-C-H (2 connections)	13a	34	N/A	N/A	$H = 35 - 1{,}25 \times F$	N/A

H maximum length of the fixed cable (m)

F combined length of patch cords, jumpers and equipment cords (m)

X ratio of flexible cable attenuation (dB/m) to fixed cable attenuation (dB/m);
for ICT cable (balanced), 1,5 is used as default value;
for BCT cable (balanced), 1,35 is used as default value

For operating temperatures above 20 °C, H should be reduced by 0,2 % per °C for screened balanced and coaxial cables and 0,4 % per °C (20 °C to 40 °C) and 0,6 % per °C (> 40 °C to 60 °C) for unscreened balanced cables.

These are default values and should be used where the actual characteristic of the cable is not known.

If the cable is specified to meet the insertion loss requirements of Clause 8 at a "base" temperature above 20 °C then the calculation shall only apply to planned temperatures above the "base" temperature.

〈A1〉

Three BCT channel levels have been specified (see Table 4) in order to avoid unnecessary amplification and attenuation of BCT applications at the distributors and BOs respectively.

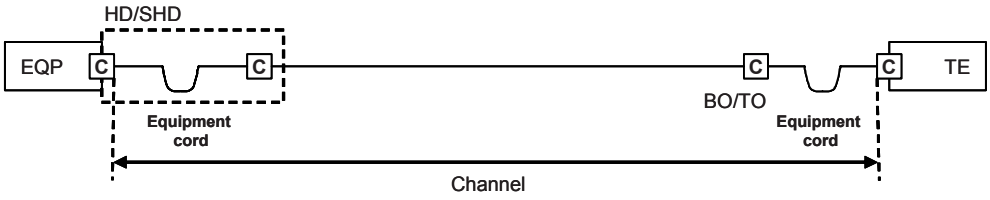
Table 5 gives an overview of the maximum length achievable for the different channels when the components used just meet the minimum performance specified in Clauses 8, 9 and 10.

7.2.2 ICT and BCT channels

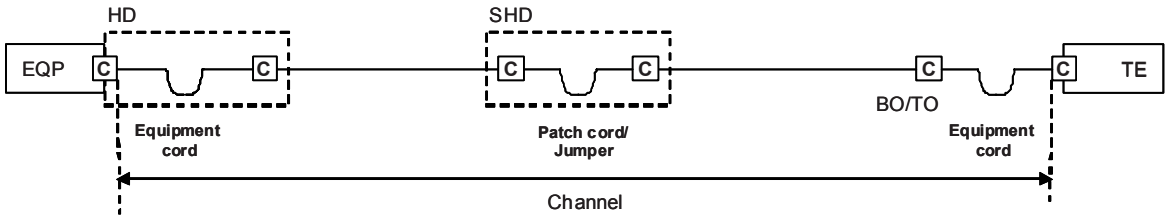
Figure 13a) shows the models used to correlate home cabling dimensions specified in this Clause with the ICT and BCT channel specifications in Clause 6.

Figure 13b) shows the channel configurations from the distributors to the TOs and BOs. The channels shown contain a maximum of four connections.

NOTE Channel and permanent link performance requirements are based on assumptions regarding the minimum length and insertion loss of cords.



a) Model with two connections



b) Model with four connections

Figure 13 – Reference implementations for ICT and BCT channels (HD/SHD - TO/BO)

Cabling designs that adopt a direct connection to the equipment at the distributors may be implemented in order to achieve the desired transmission performance but serve to restrict the flexibility of the infrastructure and are non-conformant with the requirements of Clause 4.

7.2.3 CCCB channels

There is considerable design freedom for CCCB channels. Figure 14 and Figure 15 show some of the most common designs.

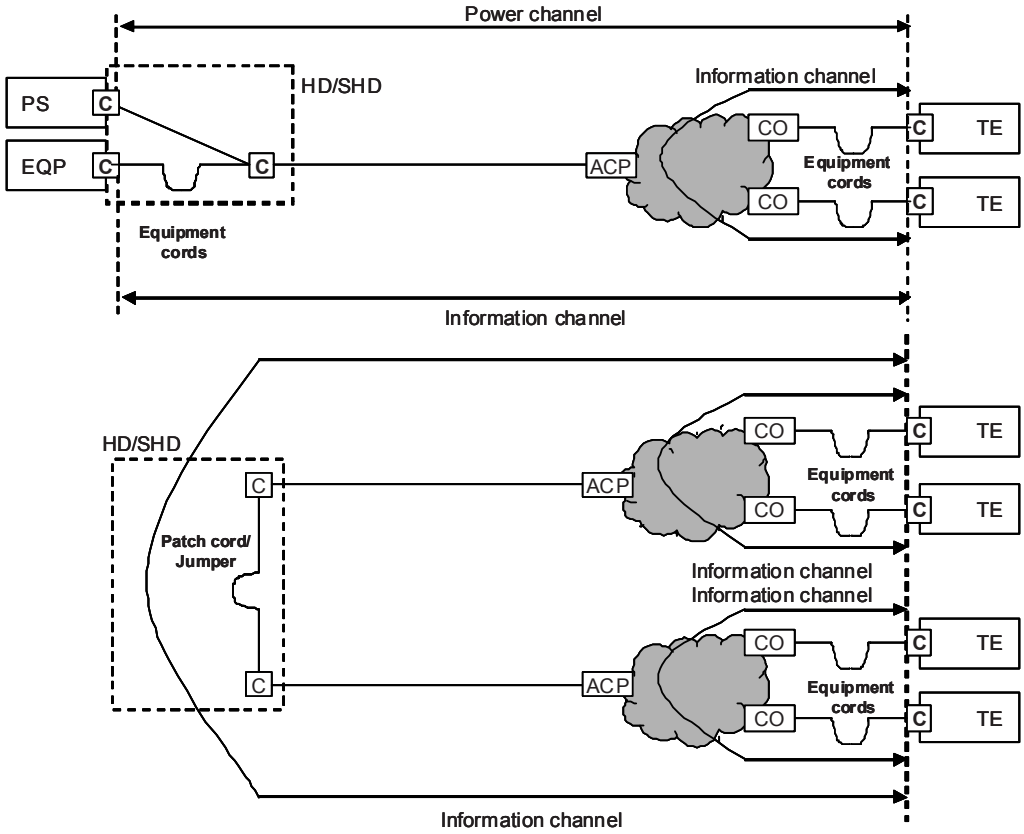


Figure 14 – Reference implementations for CCCB channels with HD or SHD

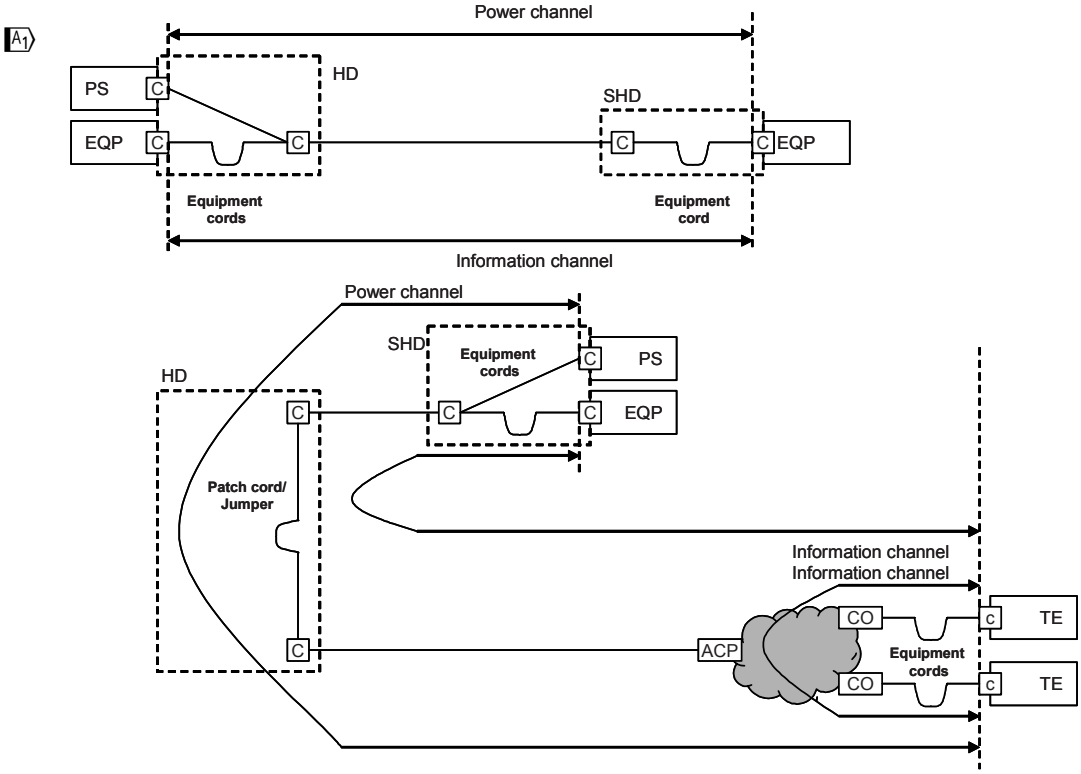


Figure 15 – Reference implementations for CCCB channels with HD and SHD

7.3 Optical fibre cabling

7.3.1 General

Optical fibre channels shall be comprised of components that comply with Clauses 8, 9 and 10. The optical fibres are defined in terms of physical construction (core/cladding diameter) and their transmission performance Category within a cable.

Within the reference implementations of this clause, the optical fibres used in each cabling channel shall have the same physical construction specification and the cabled optical fibres shall be of the same category. When more than one physical construction or cabled optical fibre category is used in a cabling subsystem the cabling shall be marked to allow each cabling type to be clearly identified.

7.3.2 Component choice

The selection of optical fibre components shall be determined by the channel lengths required and the applications to be supported. Refer to EN 50173-1:2011, Annex F, for guidance.

7.3.3 Maximum channel lengths

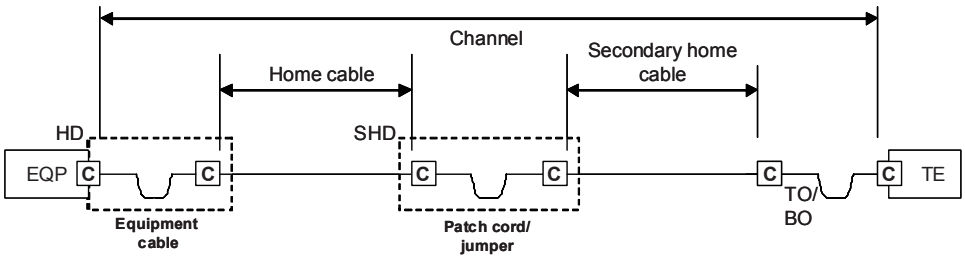
The models of Figure 13 are applicable to home or secondary home optical fibre cabling. It should be noted that the connection systems used to terminate fixed optical cabling may contain mated connections and splices (permanent or re-useable) and that cross-connects may comprise re-useable splices.

The delivery of optical fibre to the optical TO/BO would not generally require transmission equipment at the SHD. This allows the creation of a combined home/secondary home cabling as shown in Figure 16. The two diagrams show a spliced channel and a direct channel (which does not require the use of a SHD).

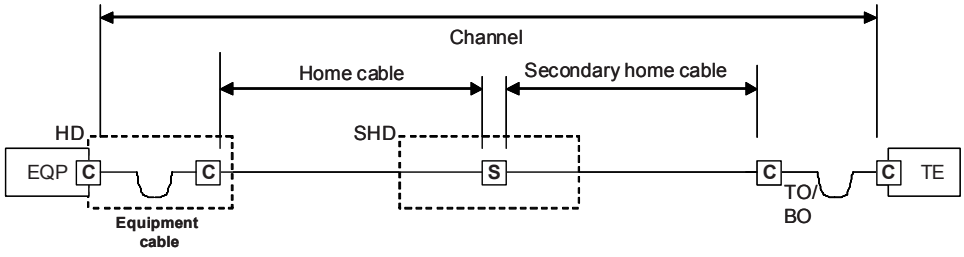
In order to accommodate differing quantities of mated connections and splices of the cables used within a channel of a given Class (see 6.3.3), the total channel length shall be determined by reference to:

a) EN 50173-1 for reference implementations using all-silica optical fibres;

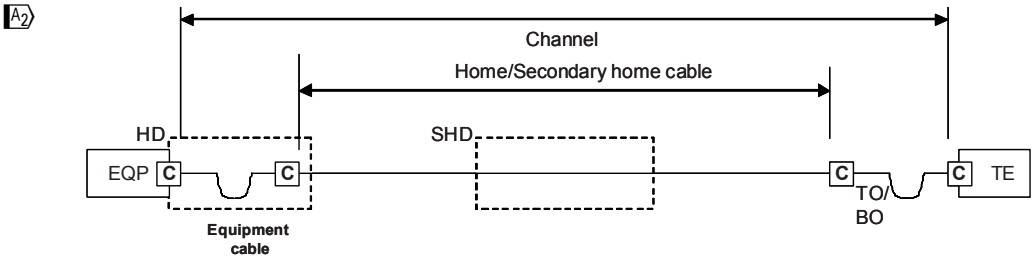
b) Table 6 for reference implementations using plastic optical fibres.



a) "Patched" combined channel



b) "Spliced" combined channel



c) "Direct" combined channel

Figure 16 – Home/secondary home cabling channels

Table 6 – Channel length equations for plastic optical fibre cabling

Cabled optical fibre Category	Class	Implementation equations			
		Wavelength			Maximum length m
		650 nm	850 nm	1 300 nm	
OP1	OF-25	$L = 41{,}6 - 8{,}3 \times x$	–	–	25
L length of the channel (m) x total number of mated connections in the channel					

Additional connections may be used if the optical power budget of the application allows (see EN 50173-1:2011, Annex F). The formulae of Table 6 may not support the implementation of all the channel configurations shown in Figure 16.

8 Cable requirements in homes

8.1 General

This Clause defines the minimum requirements for:

a) cables installed in the home and secondary home cabling subsystems specified in Clause 4 and used in the reference implementations of 7.2;

b) cables installed in the area feeder and coverage area cabling subsystems specified in Clause 5 and used in the reference implementations of 7.3;

c) cables to be assembled as cords as specified in Clause 10 and used in the reference implementations of Clause 7;

d) balanced cables or cable elements to be used as jumpers.

In addition it specifies those cable requirements that provide compatibility with connecting hardware of Clause 9, where required, as well as other cable requirements important for the implementation of generic cabling systems.

8.2 Balanced cables

8.2.1 General

[A1] The mechanical performance of balanced cables shall meet the requirements of EN 50173-1:2011, 7.3, and EN 50173-1:2011, 7.4, as appropriate, in order to ensure compatibility with connecting hardware specified in Clause 9. [A1]

8.2.2 ICT cables

The electrical performance of balanced cables used in reference implementations of home and secondary home cabling of 7.2 shall meet the Category 5, 6 or 7 requirements of EN 50173-1:2011, 7.3.

Cables connected to more than one TO shall meet the transmission requirements for the corresponding cable Category and type given in EN 50173-1:2011, 7.3. Additionally, the requirements of EN 50173-1:2011, 7.5, shall apply.

8.2.3 BCT-B cables

The electrical performance of balanced cables used in reference implementations of home and secondary home cabling of 7.2 shall meet the Category BCT-B requirements of EN 50173-1:2011, 7.3.

8.2.4 CCCB cables

The electrical performance of balanced cables used in reference implementations of coverage area cabling of 7.1 shall meet the Category CCCB requirements of EN 50173-1:2011, 7.4.

The electrical performance of balanced cables used in reference implementations of area feeder cabling of 7.1 shall meet the Category 5, 6 or 7 requirements of EN 50173-1:2011, 7.3.

8.3 Coaxial cables

The mechanical performance of coaxial cables shall meet the requirements of EN 50173-1:2011, 7.6, in order to ensure compatibility with connecting hardware specified in Clause 9.

The electrical performance of coaxial cables used in the reference implementations of home and secondary home cabling of 7.2 shall meet the Category BCT-C requirements of EN 50173-1:2011, 7.6.

[A2] 8.4 Optical fibre cables

8.4.1 Cabled all-silica optical fibres

Cabled multimode optical fibres shall meet the requirements of at least Category OM3 of EN 50173-1:2011, 7.7.1.1.

Cabled singlemode optical fibres shall meet the requirements of Category OS1 of EN 50173-1:2011, 7.7.1.2 or Category OS2 of EN 50173-1:2011, 7.7.1.3.

NOTE Category OS1 and OS2 cabled optical fibre supports both Category B1.3 and B6_a of EN 60793-2-50:2008 (see EN 50173-1). If the optical fibre management at the TO/BO requires a bend radius (installed) of less than 30 mm then the optical fibres should be of Category B6_a.

8.4.2 Cabled plastic optical fibres

Cabled plastic optical fibres shall meet the requirements of Category OP1 of EN 50173-1:2011, 7.7.2.[A2]

9 Connecting hardware requirements in homes

9.1 General requirements

Connecting hardware is installed:

a) in a home distributor (HD/SHD) providing the cross-connections between cabling subsystems and interconnections to application-specific equipment;

b) at the ACPs;

c) at the TOs, BOs, MATOs and COs.

Passive or active electronic circuitry such as media adapters, impedance matching transformers or baluns may be used within permanent links and channels provided that the corresponding permanent link or channel performance is met.

[A2] 9.2 ICT connecting hardware for balanced cabling [A2]

9.2.1 General requirements

[A1] See EN 50173-1:2011, 8.1. [A1]

[A1] 9.2.2 Electrical, mechanical and environmental performance [A1]

[A1] 9.2.2.1 Connecting hardware at the TO [A1]

[A1] See EN 50173-1:2011, 8.2 and 8.6. [A1]

Where required by the design or the environmental classification of the location, the protective housing shall meet the general requirements of this Clause and the mechanical and physical requirements of EN 61076-3-106:2006, Variant 04.

NOTE Some local codes or regulation may require a specific connector for a telephone outlet, especially for homes.

Pair rearrangement at the TO should not involve modification of the cable terminations. If pair rearrangement is used at the TO, the configuration of the outlet terminations shall be clearly identified.

NOTE When two physically similar cabling links are used in the same installation (for example, different performance Categories and cables with different nominal impedance) special precautions are required to ensure that they are properly identified.

[A1] 9.2.2.2 Connecting hardware at other locations

See EN 50173-1:2011, Clause D.3. Additionally, for reference implementations of Clause 6, see EN 50173-1:2011, 8.2 and 8.6.

Connecting hardware of Category 5, 6, 6_A, 7 and 7_A shall meet the requirements of EN 50173-1:2011, Annex D. Other connecting hardware shall at least meet the mechanical and environmental requirements are specified in EN 50173-1:2011, Clause D.3. [A1]

[A2] 9.3 BCT connecting hardware for balanced and coaxial cabling [A2]

9.3.1 General requirements

9.3.1.1 Connecting hardware for balanced cabling

[A1] See EN 50173-1:2011, 8.1. [A1]

9.3.1.2 Connecting hardware for coaxial cabling

See EN 50173-1:2011, 8.1 and 8.4.

[A1] 9.3.2 Electrical, mechanical and environmental performance [A1]

[A1] 9.3.2.1 Connecting hardware at the BO for balanced cabling

See EN 50173-1:2011, 8.2 and 8.7.

Connecting hardware of the type used at the BO shall be in accordance with EN 61076-3-104. Alternatively, where factors such as interoperability with EN 60603-7 series take precedence the interface specified in EN 60603-7-7 (for Category 7) or EN 60603-7-71 (for Category 7_A) may be used (see EN 50173-1:2011, 8.6). [A1]

[A1] 9.3.2.2 Connecting hardware at other locations for balanced cabling

See EN 50173-1:2011, Clause D.3. Additionally, for reference implementations of Clause 6, see EN 50173-1:2011, 8.2 and 8.7 (or 8.6, as appropriate). [A1]

[A1] 9.3.2.3 Connecting hardware for coaxial cabling

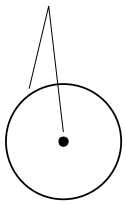
Connecting hardware of the type used at the BO shall be in accordance with one of the following:

a) EN 61169-2: Coaxial connector of Type 9,52;

b) EN 61169-24: Coaxial connector (Type F). [A1]

9.3.3 Pin grouping and pair assignments at the BO

Pin grouping and pair assignments for balanced cabling connecting hardware shall be as shown in EN 50173-1:2011, Figure 8 and Figure 9. [A2] Figure 17 [A2] shows the conductor assignment for mating interfaces of coaxial BOs.



[A2] Figure 17 [A2] - Conductor assignment of EN 61169-2 (Type 9,52) and EN 61169-24 (Type F)

9.4 CCCB connecting hardware

9.4.1 General requirements

See EN 50173-1:2011, 8.1 and 8.3.

9.4.2 Mechanical and environmental performance

9.4.2.1 Connecting hardware of the type used at the CO

Connecting hardware of the type used at the CO is not specified in this standard.

9.4.2.2 Other connecting hardware

See EN 50173-1:2011, Annex D

A2 9.5 Optical fibre connecting hardware

9.5.1 General requirements

See EN 50173-1:2011, 8.1.

9.5.2 Connecting hardware for all-silica optical fibres

9.5.2.1 Optical, mechanical and environmental performance

9.5.2.1.1 Connecting hardware at the optical TO/BO

See EN 50173-1:2011, 8.5.1.

The interface shall be in accordance with EN 61754-20:2012, Interface 20-5 (duplex LC). The termination of the home cabling shall be a plug in accordance with EN 61754-20:2012, Interface 20-1 (simplex LC) or Interface 20-4 (duplex LC).

9.5.2.1.2 Connecting hardware at other locations

See EN 50173-1:2011, 8.5.1.

9.5.3 Connecting hardware for plastic optical fibres

9.5.3.1 Optical, mechanical and environmental performance

9.5.3.1.1 Connecting hardware at the optical TO/BO

See EN 50173-1:2011, 8.5.2.

For cabled optical fibre cable of Category OP1, the interface shall be in accordance with EN 61754-20:2012, Interface 20-14 (duplex LC). The termination of the home cabling shall be a plug in accordance with EN 61754-20:2012, Interface 20-11 (simplex LC) or Interface 20-12 (duplex LC).

9.5.3.1.2 Connecting hardware at other locations

See EN 50173-1:2011, 8.5.2. A2

10 Requirements for cords and jumpers

See EN 50173-1.

Annex A
(normative)

Link performance limits

A.1 General

This annex contains performance requirement formulae for permanent links as shown in 4.6.2.2 and 5.6.2.2 and relates to EN 50173-1:2011, Annex A.

A.2 Balanced cabling

Consideration should be given to measuring performance at worst case temperatures, or calculating worst case performance based on measurements made at other temperatures.

In all configurations the test configuration reference plane of a link is within the test cord cable next to, and including, the test cord connection which mates to the termination point of the link under test.

Link performance shall meet the requirements of EN 50173-1:2011, A.1.

A.3 Coaxial cabling

Consideration should be given to measuring performance at worst case temperatures, or calculating worst case performance based on measurements made at other temperatures.

The requirements for permanent links for BCT-C are for further study. In the interim, conformance with channel requirements is normative. Link performance shall meet the requirements of EN 50173-1:2011, A.2.

A.4 Optical fibre cabling

Link performance shall meet the requirements of EN 50173-1:2011, A.3.1.

Annex B
(informative)

Applications and Associated Cabling

Cabling is an infrastructure for applications. The requirements of applications on the media used are, above all, related to the transmission frequencies and the topology (logical and physical implementation) used. Previously at least six kinds of cabling have been found in homes and commercial buildings that support groups of applications as listed in Table B.1. In addition, cabling specific to a single application may be used, for example, between a PC and a printer, and between a hi-fi amplifier and speakers.

NOTE Table B.1 does not record new technologies like EuroDOCSIS that while using the cabling designed for a specific application will support a number of other applications, e. g. ICT applications on top of BCT.

The generic cabling specified in this European standard replaces the multitude of topologies and cabling materials detailed in Table B.1 by simplified cabling structure using a restricted range of cabling components.

Table B.1 - Grouping of applications and cabling

Application field		As supported by legacy present cabling topology / cable type							As supported by application groups in this standard
No	**Name**	**Mains**	**Phone**	**CATV MATV SMATV**	**Intercom**	**Security**	**Control**	**Other**	
a)	Mains electricity supply	O/p							
b)	Lighting control	O/p					O/h, p, t		CCCB
c)	Building control	O/p					O/h, p, t		CCCB
d)	Appliance control	O/p					O/h, p, t		CCCB
e)	Demand management via circuit breakers	O/p							
f)	Burglar alarm					B/t			CCCB
g)	Fire alarm					B/t			CCCB
h)	Intercom				B/t		O/h, t		ICT
i)	Telephone		E/t						ICT
j)	ISDN		E/t						ICT
k)	Computing		B/d, S/t		B/d, S/t	B/d, S/t	B/d, S/t, d	O/d	ICT
l)	CCTV			B/c,S/c	B, S			B/c	BCT
m)	Radio and TV (via cable, terrestrial and satellite reception)			B, S/c				B/c	BCT

B: Bus, loop through
c: coaxial cable
d: data cable
E: extended star
h: home control system cable
O: open topology. For mains distribution based on local regulations, this may include loops.
p: power distribution cable
S: star
t: simple “telephone” cable

The range of cabling solutions listed in Table B.1 exist for a number of reasons including differences in:

a) requirements of the channel transmission characteristics;

b) the topology required or permitted by the applications;

c) the number of outlets supported by a specific transmission technology used for/by the application, e. g., point to point or bus;

d) traditions in installation profession.

NOTE In some cases national or local regulations may limit the degree of integration allowed in a specific implementation.

By reviewing the similarities of the topologies and the channel transmission requirements of the different applications, this European standard has mapped the applications into three application groups (ICT, BCT and CCCB) as shown in the right-hand column of Table B.1. This has allowed the specification of generic cabling (see Table B.2) that allows the delivery of a range of applications within and across the application groups.

ICT and CCCB cabling use balanced cabling. BCT may use coaxial and balanced cables. Therefore for pre-cabling both cable constructions are specified.

Table B.2 - Characteristics of ICT, BCT and CCCB Cabling

Characteristic	ICT Cabling	BCT Cabling	CCCB Cabling
Topology	(Hierarchical) star see 4.3	(Hierarchical) star see 4.3	Bus, tree, star , see Figure 10
Type of media	Balanced cables	Balanced cables, coaxial cables	Balanced cables
Typical frequency range	Up to 100 MHz (Class D), up to 250 MHz (Class E) or up to 600 MHz (Class F)	Up to 3,0 GHz [a]	Up to 100 kHz
Channel Classes according to EN 50173-1	Class D, E or F [b]	N/A	N/A
Power distributed on network	YES	Occasionally	Frequently
Device Mobility or frequent Relocation	YES	YES	NO for sensors, switches YES for specific appliances
Interface at device	Balanced connector: EN 60603-7 series [c]	Coaxial connectors: EN 61169-2 or EN 61169-24 (“F type”) Balanced connector: EN 61076-3-104 [d]	Fixed connection, CCCB connector(s)

NOTE Vicinity to mains depends on installation preferences and local regulation.

[a] On balanced cabling up to 1 GHz

[b] This definition is from EN 50173-1.

[A1] [c] In installations where other factors, such as interoperability with EN 60603-7 series take preference over the connector sharing offered with EN 61076-3-104, also the interface specified in EN 60603-7-7 (for Category 7) or EN 60603-7-71 (for Category 7_A) may be used. [A1]

Annex C
(informative)

Application-specific BCT outlets and baluns

C.1 TV outlets for coaxial cabling

C.1.1 Double outlet

This application outlet consists of two outlets connected to one coaxial cable, typically marked “TV” and “Radio”. The frequency range for terrestrial broadcast and CATV applications (including a return channel) is defined from 5 MHz up to 862 MHz. For SAT-IF applications the frequency range extends to 2 150 MHz. In most European countries the outlets are “IEC connectors” according to EN 61169-2. D.c. transmission is optional for remote feeding purposes.

C.1.2 Triple outlet

This application outlet comprises an outlet as described in C.1.1 together with a third outlet usually using an F-type connector according to EN 61169-24.

It is designed for either SAT-IF applications (frequency range 950 MHz to 2 150 MHz and DC remote feeding) or a cable modem for data transmission in the frequency range 5 MHz to 862 MHz.

These outlets do not change cable type neither impedance but are used as frequency dependent splitters.

C.2 Baluns for TV applications using 100 Ω balanced cabling channels

C.2.1 General

If the TV receiver has a 75 Ω coaxial input port, it is necessary to provide a balance to unbalance and an impedance transformation. The device providing the transformation is termed a balun.

C.2.2 Impedance matching balun (100 Ω/75 Ω)

These devices provide impedance matching over a typical frequency range of 47 MHz to 862 MHz. If return signalling is needed lower frequencies may be specified. DC transmission is optional for remote feeding purposes.

C.2.3 Impedance matching and frequency splitting balun

The device converts the impedance as described in C.2.1 and additionally splits the signal for Radio and TV as described in C.1.1.

Annex D
(informative)

Application-specific networks for audio/video applications

D.1 General

This standard describes a generic cabling system which has its technological origin in the Information and Communication Technologies (ICT) commonly used for cabling systems operated in office premises. The convergence of ICT and broadcast services to multimedia services observed today provided the need for the migration of this technology into private homes.

The Broadcast and Communications Technologies (BCT) applications within homes have traditionally been based on coaxial cables serving either antenna-fed or cable-fed systems (referred to as CATV, MATV, SMATV networks).

This Annex provides information as to the applicable standards for such application-specific networks, and indicates specific areas where the requirements of the standards also apply to the cabling designed in accordance with this standard.

D.2 Antenna-fed networks

ffs

D.3 Cable networks (CATV-, MATV- and SMATV-networks and individual receiving networks)

D.3.1 System performance of cable networks

A1 EN 60728-1 specifies signal parameter limits to ensure a minimum signal quality for the subscriber. EN 60728-1 applies these limits to both coaxial and balanced cabling media used to deliver the application. These values are applicable to cabling designed in accordance with this standard. A1

EN 50083-10 addresses the transparent return path of cable networks operated in the frequency range between 5 MHz and 65 MHz (or parts thereof). It defines the basic methods of measurement for signals typically used in the return path of cable networks in order to assess the performance of those signals and their performance limits. These values are applicable to cabling designed in accordance with this standard.

D.3.2 Safety requirements for cable networks

EN 60728-11:2005 applies to fixed sited systems and equipment and is intended to provide specifically for the safety of the system, personnel working on it, subscribers and subscriber equipment. It deals only with safety aspects and is not intended to define a standard for the protection of equipment used in the system.

D.3.3 EMC requirements for equipment and for cable networks

EN 50083-2 specifies methods of measurement and limit for maximum allowed radiation, minimum immunity and minimum screening effectiveness for the following equipment:

- Active wideband equipment for coaxial cable networks (see EN 50083-3);
- Passive wideband equipment for coaxial cable networks (see EN 50083-4);
- Headend equipment (see EN 50083-5);
- Optical equipment (see EN 60728-6).

To minimise the risk of interference to other radio services caused by possible radiation from a cable network and to limit the possible penetration of external signals which may interfere with the operation of a network, it is necessary not only to use equipment which satisfies the requirements of EN 50083-2 regarding limits of radiation and of immunity to external fields but also to ensure the integrity of all cable connections on each item of active or passive cable network equipment.

EN 50083-8 applies to the radiation characteristics and immunity to electromagnetic disturbance of complete cable networks for television signals, sound signals and interactive services and covers the frequency range 0,15 MHz to 3,0 GHz. It specifies EMC performance requirements and lays down the methods of measurement.

Annex E
(informative)

A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CENELEC national member.

This European Standard does not fall under any Directive of the EU.

In the relevant CENELEC countries these A-deviations are valid instead of the provisions of the European Standard until they have been removed.

Clause	Deviation
	Spain
9.5.2.1.1, 9.5.3.1.1	In Spain, the following requirements are applicable, instead of the requirements of the clauses of this EN as per ***Real Decreto 346/2011, de 11 de marzo, por el que se aprueba el Reglamento regulador de las infraestructuras comunes de telecomunicaciones para el acceso a los servicios de telecomunicación en el interior de las edificaciones.***

NOTE The regulation can be found at the following URL:
http://www.boe.es/boe/dias/2011/04/01/pdfs/BOE-A-2011-5834.pdf

This regulation concerning the telecommunication infrastructure in home buildings includes references to the SC/APC (the only one type mentioned) fibre optic connectors here:

On page 33838 (page 28 of the pdf file):

2.5.Connection elements
2.5.1.Interconnection point (network termination point)
2.5.1 c) F.O. cables interconnection point (main optical cabinet)
"..fibre termination with SC/APC style connectors is recommended,..."
....
On page 33841 (page 31 of the pdf file):

2.5.3.d.i.
"The user access point (PAU) shall have
i) The outlet with as many SC/APC termination connectors (and due adapters) as optic fibres..."

On page 33855 (page 45 of the pdf file):

5.2.4.
Connection elements for the f.o. cables network.
a) f.o. cables interconnection box

i)...
ii) ...The basic module for the building f.o. network termination shall allow the termination with up to 8, 16, 32 or 48 connectors in blocks where the fibres of the distribution network shall be terminated with the corresponding SC/APC connector....
.....
On page 33856 (page 46 of the pdf file):

c) f.o. outlet.

The outlet for f.o. cables shall be located in the network termination cabinet and it shall consist in a box containing or supporting the SC/APC connectors for the f.o. distribution network termination....
...
d) Connectors for f.o. cables

The connectors for f.o. cables shall be SC/APC style with the corresponding adapter, to be installed in the pre-assembled connection panels at the main optical interconnection cabinet, and at the PAU optical outlet where they shall have the corresponding adapters. ⟨A2⟩

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EN 50083-5, *Cable networks for television signals, sound signals and interactive services – Part 5: Headend equipment*

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[A1] *Text deleted* [A1]

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