BS EN 50700:2014

BSI Standards Publication

Information technology — Premises distribution access network (PDAN) cabling to support deployment of optical broadband networks

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National foreword

This British Standard is the UK implementation of EN 50700:2014.

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.

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

ISBN 978 0 580 80045 0

ICS 35.110

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 28 February 2014.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50700

January 2014

ICS 35.110

English version

Information technology - Premises distribution access network (PDAN) cabling to support deployment of optical broadband networks

Technologie de l'information - Câblage du réseau de distribution dans les locaux (PDAN) pour prendre en charge le déploiement de réseaux optiques à large bande

Informationstechnik - Standortverkabelung als Teil des optischen Zugangsnetzes von optischen Breitbandnetzen

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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CENELEC

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 50700:2014 E

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Foreword

This document (EN 50700:2014) 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)	2014-11-25
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2016-11-25

This document has been developed to enable the application of system-independent pre-cabling of multi-subscriber premises to enable the delivery of broadband telecommunication services.

Introduction

Fibre to the home (FTTH) is the subject of standardisation in the form of:

- Technical Reports such as CLC/TR 50510 which cover general concepts and system planning;
- component standards that support its implementation;
- installation standards such as the EN 50174 series.

FTTH is a general term applied to the provision of broadband optical networks to residential premises. Some premises accommodate multiple subscribers and these may be residential or commercial enterprises such as offices, data centres, industrial, retail or a mix of these subscriber types. These multi-subscriber premises may consist of one or more buildings.

The cabling specified in this standard:

- constitutes the part of the broadband access network within multi-subscriber premises termed the premises distribution access network (PDAN); the access network serving single subscriber premises is not normatively addressed in this standard;
- is intended to be pre-installed, in readiness for subsequent connection of the multi-subscriber premises, to an access provider's infrastructure to an access demarcation point (ADP) - enabling broadband content to be delivered by the service provider(s).

Within premises, the importance of the information technology cabling infrastructure is similar to that of other fundamental building utilities such as heating, lighting and mains power. As with other utilities, interruptions to service can have a serious impact. Poor quality of service due to lack of design foresight, use of inappropriate components, incorrect installation, poor administration or inadequate support can disrupt service delivery.

This standard:

- allows access providers to be aware of the minimum implementation delivered to them when they reach such multi-subscriber premises;
- maximises the opportunity for network evolution by either the access provider or the service providers using that access infrastructure.

This standard specifies the cabling between the access demarcation point (ADP) and the subscriber interface (SI).The transmission performance of the premises cabling between the last operator connection point (LOC) and the ADP is not addressed although the requirements for its accommodation are provided by external reference to the EN 50174 series. The location of the LOC may be either outside the premises boundary (see the schematic in Figure 1) or inside the premises, internal or external to a building (see the schematic in Figure 2).

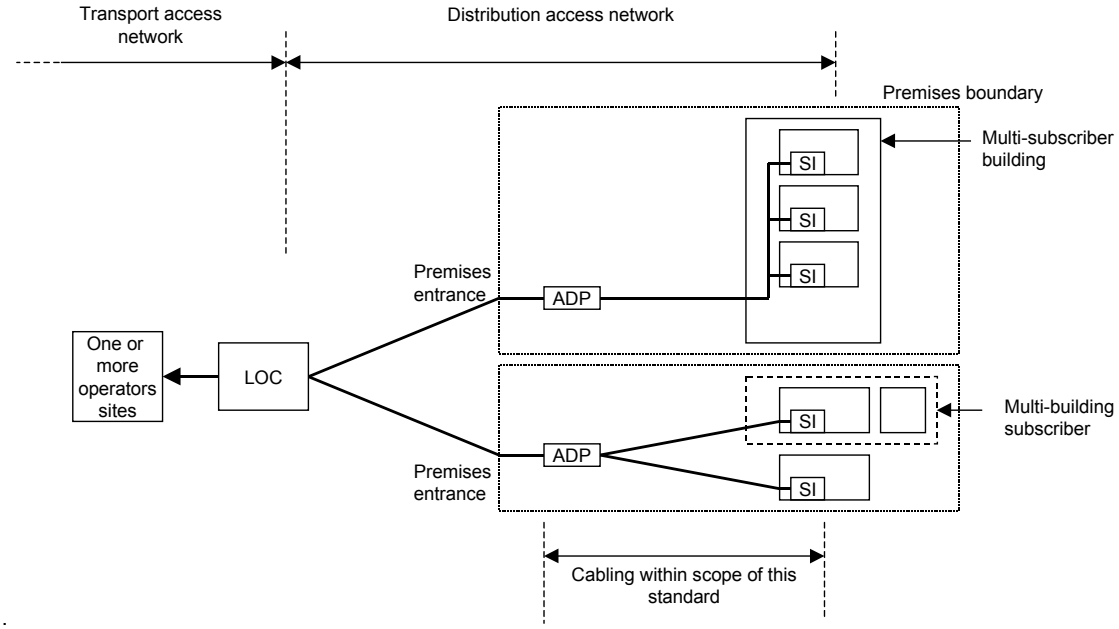

Figure 1 — Multi-subscriber PDAN cabling (LOC external to the premises)

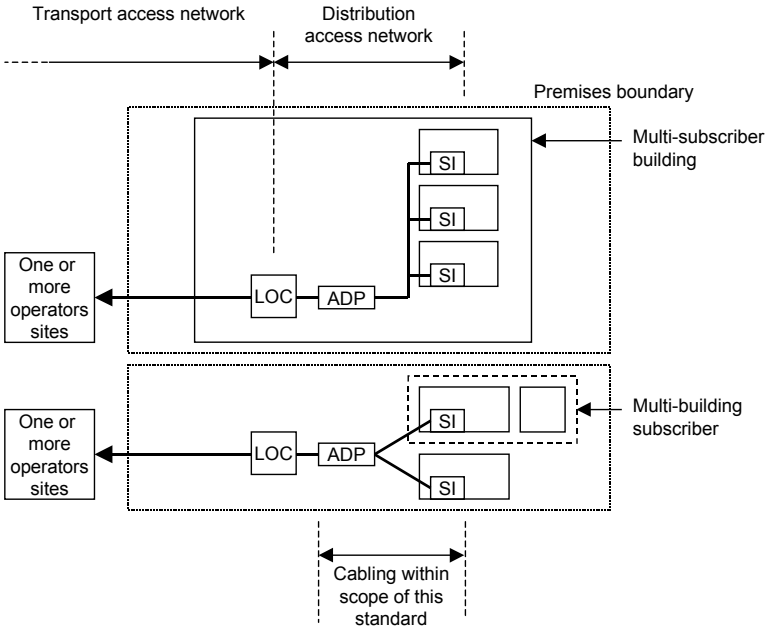

Figure 2 — Example of multi-subscriber PDAN cabling (LOC internal to the premises)

Where the subscribers' premises are homes, the design of generic cabling beyond the SI is specified in EN 50173-4. CLC/TR 50173-99-2 and CLC/TR 50173-99-3 provide additional information in relation to cabling design within homes. For other types of subscribers, the design of generic cabling beyond the SI is specified in other standards in the EN 50173 series.

This European Standard provides:

a) access providers with an application independent optical fibre cabling subsystem;

b) an open market for cabling components;

c) building professionals (for example, architects) with guidance for the accommodation of cabling and interfaces before specific requirements are known; i.e. in the initial planning either for construction or refurbishment.

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

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

- standards for the quality assurance and installation of information technology cabling (EN 50174 series) and testing of installed cabling (EN 50346 and, by external reference, EN 61280-4-2 and ISO/IEC 14763-3);

- applications developed by ETSI and Study Groups of ITU-T.

Figure 3 and Table 1 show the schematic and contextual relationships between the standards produced by TC 215 for information technology cabling, namely:

1) the EN 50173 series where this standard interfaces to the subscriber;

2) installation (EN 50174 series);

3) testing of installed cabling (EN 50346).

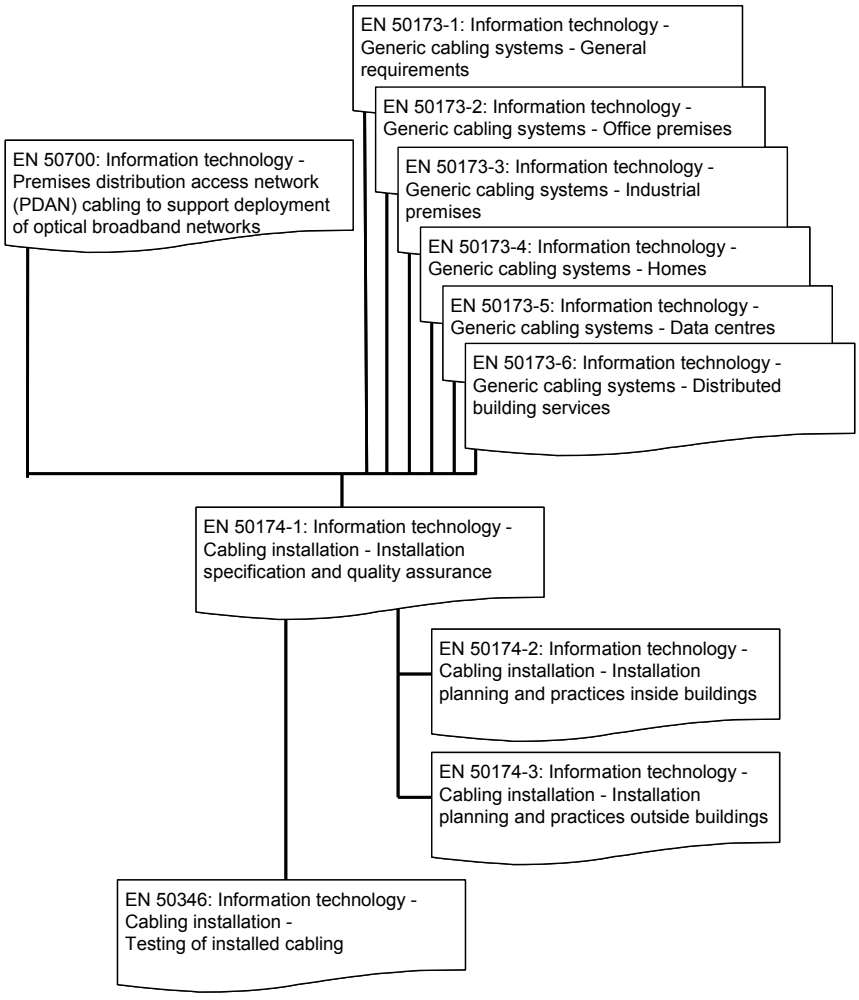

Figure 3 — Schematic relationship between EN 50700 and other relevant TC 215 standards

Table 1 — Contextual relationship between EN 50700 and other relevant TC 215 standards

<table>
<tr><th>PDAN cabling design phase</th><th>Specification phase</th><th>Installation phase</th><th>Operation phase</th></tr>
<tr>
<td rowspan="3">EN 50700
5: Structure of PDAN cabling within multi-subscriber premises
6: PDAN cabling performance
7: Implementation options
8: Cable requirements
9: Connecting hardware requirements</td>
<td>EN 50174-1
4 Requirements for specifying installations of information technology cabling
5: Requirements for installers of information technology cabling</td>
<td rowspan="3"></td>
<td rowspan="3">EN 50174-1
4: Requirements for specifying installations of information technology cabling</td>
</tr>
<tr>
<td>Planning phase</td>
</tr>
<tr>
<td>EN 50174-2
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
8: Office (commercial) premises
9: Industrial premises
10: Homes
11: Data centres
12: Multi-tenant pathways and spaces
and
EN 50174-3
4. Requirements for planning installations of information technology cabling
5. Requirements for the installation of information technology cabling
6. Segregation
7. Additional installation practices for specific sites and services</td>
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5. Requirements for the installation of information technology cabling
6. Segregation
7. Additional installation practices for specific sites and services
and
EN 50346
4: General requirements
6: Test parameters for optical fibre cabling</td>
</tr>
</table>

1 Scope

This European Standard specifies the optical fibre optical fibre access network cabling within multi-subscriber premises termed the premises distribution access network (PDAN). The premises may comprise single or multiple buildings.

The cabling specified is intended to be pre-installed, in readiness for subsequent connection of the multi-subscriber premises to an access providers infrastructure to support deployment of optical broadband networks.

This European Standard does not specify either the access network cabling external to the premises or the cabling within the subscriber space for onward distribution of services beyond the customer premises equipment.

This European Standard specifies:

a) the structure and configuration of the optical fibre cabling;

b) cabling performance requirements;

c) implementation options.

Safety practices in relation to optical power hazard are specified in EN 60825-2. Optical powers higher than the hazard levels specified in EN 60825-2 are not considered in this standard.

Safety (electrical safety, 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.

2 Normative references

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

EN 50173-1:2011, *Information technology — Generic cabling systems — Part 1: General requirements*

EN 50174-1, *Information technology — Cabling installation — Part 1: Installation specification and quality assurance*

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 50411-3-2:2011, *Fibre organisers and closures to be used in optical fibre communication systems — Product specifications — Part 3-2: Singlemode mechanical fibre splice*

EN 50411-6-1, *Fibre organisers and closures to be used in optical fibre communication systems — Product specifications — Part 6-1: Unprotected microduct for category S and A*

EN 60793-2-50:2013, *Optical fibres — Part 2-50: Product specifications — Sectional specification for class B single-mode fibres (IEC 60793-2-50:2012)*

EN 60794-5-10[1)], *Optical fibre cables — Part 5-10: Family specification for outdoor microduct optical fibre cables, microducts and protected microducts for installation by blowing (IEC 60794-5-10[1)])*

EN 60794-5-20[1)], *Optical fibre cables — Part 5-20: Family specification for outdoor microduct fibre units, microducts and protected microducts for installation by blowing (IEC 60794-5-20[1)])*

EN 61280-4-2[2)], *Fibre optic communication subsystem basic test procedures — Part 4-2: Fibre optic cable plant — Single-mode fibre optic cable plant attenuation (IEC 61280-4-2)*

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)*

EN 61755-1:2006, *Fibre optic connector optical interfaces — Part 1: Optical interfaces for single mode non-dispersion shifted fibres — General and guidance (IEC 61755-1:2005)*

EN 61755-2-2:2006, *Fibre optic connector optical interfaces — Part 2-2: Optical interface standard single mode angled physically contacting fibres (IEC 61755-2-2:2006)*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

3.1.1
access demarcation point
location from which premises distribution access network cabling is routed to subscribers

3.1.2
access network
functional elements (equipment and infrastructure) that enable communication between the core network and a customer network

[SOURCE: EN 50174-3:2013, 3.1.1]

3.1.3
access provider
operator or another entity providing the means to enable external telecommunications service provision to a subscriber

3.1.4
building entrance facility
facility that provides all necessary mechanical and electrical services for the entry of telecommunication cables into a building and which may allow for transition from external to internal cable

[SOURCE: EN 50173-1:2011, 3.1.17]

3.1.5
cabling
system of telecommunications cables, cords and connecting hardware that supports the operation of information technology equipment

[SOURCE: EN 50173-1:2011, 3.1.22]

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1) To be published.

2) Edition 2 in development at this time.

3.1.6
core network
functional elements (equipment and infrastructure) that enable communication between operator sites and/or network data centres

[SOURCE: EN 50174-3:2013, 3.1.6]

3.1.7
customer network
functional elements (equipment and infrastructure) that enable communication between the subscriber interface and one or more attached terminal equipment

[SOURCE: ETSI TS 105 174-1:2009, 3.1, modified]

3.1.8
customer premises equipment
equipment, not owned by subscribers, that is located on the customer's premises

3.1.9
distribution access network
sub-part of the access network comprising the functional elements that enable communication between the last operator connection point and the subscriber interface

[SOURCE: ETSI TS 105 174-1:2009, modified]

3.1.10
equipment interface
point at which application-specific equipment can be connected to the premises distribution access network cabling

3.1.11
external network test interface
point in or near the customer premises accessible to the network operator for testing purposes

[SOURCE: ETSI TS 105 174-1:2009, 3.1, modified]

3.1.12
last operator connection point
interface to the transport access networks of one or more operators from which cabling is routed to the access demarcation point (ADP) of the premises distribution access network cabling

3.1.13
multi-building subscriber
subscriber accommodated in more than one building within the premises

3.1.14
multi-subscriber premises
premises which are designed to accommodate more than one subscriber

3.1.15
operator access point
optional functional element of the premises distribution access network which allows a service provider to install an external network test interface between the subscriber interface and the access demarcation point

3.1.16
operator site
premises accommodating network telecommunications equipment providing direct connection to the core and access networks and which may also accommodate information technology equipment

[SOURCE: ETSI TR 105 174-2-1:2009, 3.1]

3.1.17
premises distribution access network
sub-part of the access network within multi-subscriber premises comprising the functional elements that enable communication between the access demarcation point and the subscriber interface

3.1.18
primary distributor
distributor in which the cable(s) from the access demarcation point is distributed onward to the secondary distributor(s), if present, or the subscriber interface

3.1.19
secondary distributor
distributor in which the cable(s) from the primary distributor, or another secondary distributor, is (are) distributed onward to other secondary distributor(s), if present, or the subscriber interface

3.1.20
service provider
operator of any service that furnishes telecommunications content (transmissions) delivered over access provider facilities

Note 1 to entry: The access provider and the service provider can be a single entity.

3.1.21
single-subscriber premises
premises which are designed to accommodate a single subscriber

3.1.22
subscriber
identifiable entity within the premises that may require a future direct connection to the access network

3.1.23
subscriber entrance facility
facility that provides all necessary mechanical and electrical services for the entry of cables into a subscribers space

3.1.24
subscriber interface
point where the customer premises equipment is connected to the premises distribution access network cabling

3.1.25
subscriber space
space within the premises allocated to a subscriber

3.1.26
test interface
point at which test equipment can be connected to the premises distribution access network cabling

3.1.27
transport access network
sub-part of the access network comprising the functional elements that enable communication between the core network and the last operator connection point

[SOURCE: ETSI TS 105 174-1:2009, 3.1, modified]

3.2 Abbreviations

For the purposes of this document, the following abbreviations apply.

ADP	Access Demarcation Point
BEF	Building Entrance Facility
CPE	Customer Premises Equipment
EI	Equipment Interface
ENTI	External Network Test Interface
FTTH	Fibre To The Home
LOC	Last Operator Connection point
OAP	Operator Access Point
PD	Primary Distributor
PDAN	Premises Distribution Access Network
SD	Secondary Distributor
SEF	Subscribers Entrance Facility
SI	Subscriber Interface
TI	Test Interface
WDM	Wave Length Division Multiplexing

4 Conformance

For a cabling system to conform to this European Standard:

a) the structure and configuration shall conform to the requirements of Clause 5;
b) the optical fibres and cables shall conform to the requirements of Clause 8;
c) the interfaces to the cabling at the subscriber interface (SI) shall conform to the requirements of 9.2 with respect to mating interfaces and performance;
d) connecting hardware at other places shall conform to Clause 9;
e) the performance of the cabling shall conform to the requirements of Clause 6;
f) local regulations including safety shall be met.

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.

Test methods to ensure conformance with cabling requirements of Clause 6 are specified in EN 61280-4-2.

5 Structure of PDAN cabling within multi-subscriber premises

5.1 General

This clause identifies the functional elements of the PDAN cabling, describes how they are connected together to form subsystems and identifies the interfaces at which application-specific components are connected.

5.2 Functional elements

This standard specifies the following functional elements and interfaces:

a) access demarcation point (ADP);
b) primary distributor (PD);
c) secondary distributor (SD);
d) operator access point (OAP);
e) subscriber interface (SI);
f) outdoor cable;
g) indoor cable.

The OAP is an optional functional element within the PDAN cabling and is used to enable a service provider to install an external network test interface (ENTI) typically adjacent to the SI. The OAP potentially degrades the transmission performance of the PDAN and should only be installed where there is evidence to suggest that at least one potential service provider may require such an ENTI design (see 5.8.5).

Groups of these functional elements are connected together to form cabling subsystems (see 5.3).

5.3 General structure and hierarchy

PDAN cabling systems contain up to two cabling subsystems: external cabling and internal cabling.

The composition of the cabling subsystems is described in 5.4.1 and 5.4.2.

Where the last operator connection point (LOC) is external to the premises, the cabling subsystems are connected together to create a cabling system with a structure as shown in Figure 4.

Where the LOC is located within the premises but external to a building, the cabling subsystems are connected together to create a cabling system with a structure as shown in Figure 5.

Where the LOC is located within the premises and internal to a multi-subscriber building, the cabling subsystems are connected together to create a cabling system with a structure as shown in Figure 6.

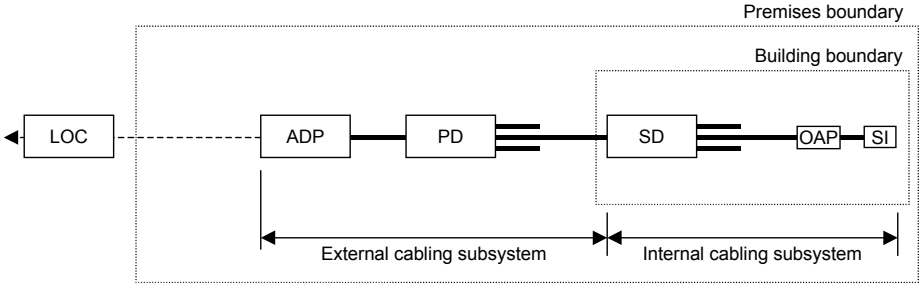

Figure 4 — PDAN cabling distribution schematic with future LOC external to premises

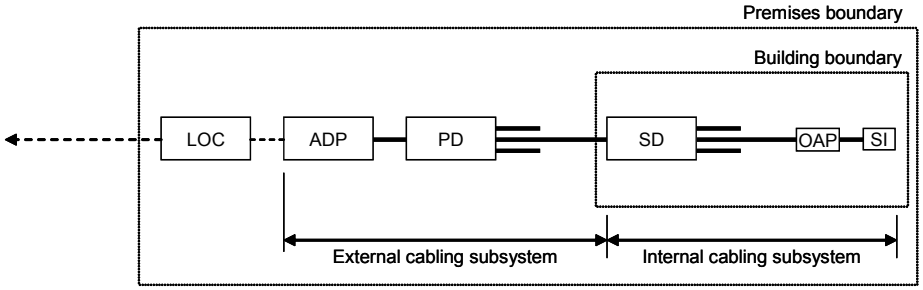

Figure 5 — PDAN cabling distribution schematic with ADP (and future LOC) internal to premises

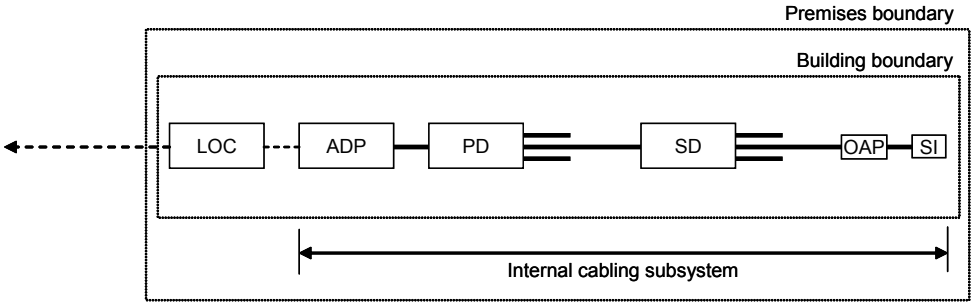

Figure 6 — PDAN cabling distribution schematic with ADP (and future LOC) internal to multi-subscriber building

The ADP may be co-located with the PD. SDs are implemented as required. There is no restriction on the number of SDs between the PD and the SI provided that the performance requirements of 6.3 are met. See 5.8.2 for the minimum number of functional elements.

Where the ADP is co-located with a building entrance facility (BEF), there is no external cabling subsystem. Where an SI is co-located with a building entrance facility (BEF), there is no internal cabling subsystem.

Distributors shall not contain any system specific components such as passive splitters or WDM components and there is a direct connection for each optical fibre between an SI and the ADP in all the configurations (Figure 4, Figure 5 and Figure 6).

5.4 Cabling subsystems

5.4.1 External cabling subsystem

The external cabling subsystem extends from the ADP (in Figure 4 and Figure 5) to the distributor associated with a BEF. When present, the subsystem includes:

a) the cables (outdoor cables) outside the building and extending into the building, through the BEF to the distributor associated with the BEF;

b) any cabling components in the distributors outside the building.

The cabling subsystems may comprise:

c) optical fibre cables which are spliced or terminated with connectors at the distributors to allow:

   1) the re-distribution of the number of optical fibres within the cables (e.g. one cable containing 24 optical fibres divided into 6 cables containing 4 optical fibres);
   2) a change of cable construction;

d) microduct fibre units or optical fibre cables that are installed within microducts that are connected at the distributors to allow:

   1) the re-distribution of the number of microducts in the distribution system (e.g. 2 microducts are split from a bundle of 8 microducts);
   2) a change of microduct construction.

Where the premises comprise a single multi-subscriber building, the BEF may be at the premises boundary.

5.4.2 Internal cabling subsystem

The internal cabling subsystem extends from the distributor associated with a BEF (in Figure 4 and Figure 5) or the ADP associated with a BEF (in Figure 6) to the SI. The subsystem includes:

a) the cables inside the building (indoor cables) between the distributors (in Figure 4 and Figure 5) or the ADP (in Figure 6) associated with a BEF and the SI;

b) any cabling components in SDs inside the building;

c) the mechanical termination of the cables at the SI.

The cabling subsystems comprise optical fibre cables which are spliced or terminated with connectors at the distributors to allow:

1) the re-distribution of the number of optical fibres within the cables (e.g. one cable containing 24 optical fibres divided into 6 cables containing 4 optical fibres);
2) a change of cable construction.

Where the premises comprises a single multi-subscriber building, the BEF may be at the premises boundary. In such cases, the PD replaces the SD associated with the BEF for this subclause.

Where the premises contain multiple single subscriber buildings the SEF in each building replaces the BEF for this subclause.

5.5 Design objectives

The cabling specified provides the service provider with an optical transmission performance capable of supporting the broadest set of existing and emerging applications within the environmental conditions defined in 6.2 and therefore provides the longest operational life. This will minimize disruption and the high cost of re-cabling.

The design of pathways and spaces shall consider the risks to services to subscribers associated with unauthorised access (e.g. eavesdropping or denial of-service).

The installation of additional pathways to enable the installation of additional pathway systems and/or cables should be considered (see EN 50174-2 and EN 50174-3 for planning information).

5.6 Accommodation of functional elements

5.6.1 Closures providing protection to optical fibre cables and cable elements

Closures are used to provide protection to optical fibres cables and cable elements at the following functional elements:

a) ADP,

b) PD,

c) SD,

d) OAP,

e) SI.

At all locations other than the SI, the closures used shall ensure that the minimum bend radius applied to the optical fibre cables or cable elements shall be 30 mm.

At the SI, the closure used shall ensure that the minimum bend radius applied to the optical fibre cables or cable elements shall be 20 mm.

Lower minimum bend radii may be applied provided that a risk assessment has been undertaken with regard to the total length of optical fibre subjected to such bends between the ADP and the SI.

5.6.2 Example configuration of multi-subscriber premises

Figure 7 shows an example of how the functional elements are accommodated within multi-subscriber premises.

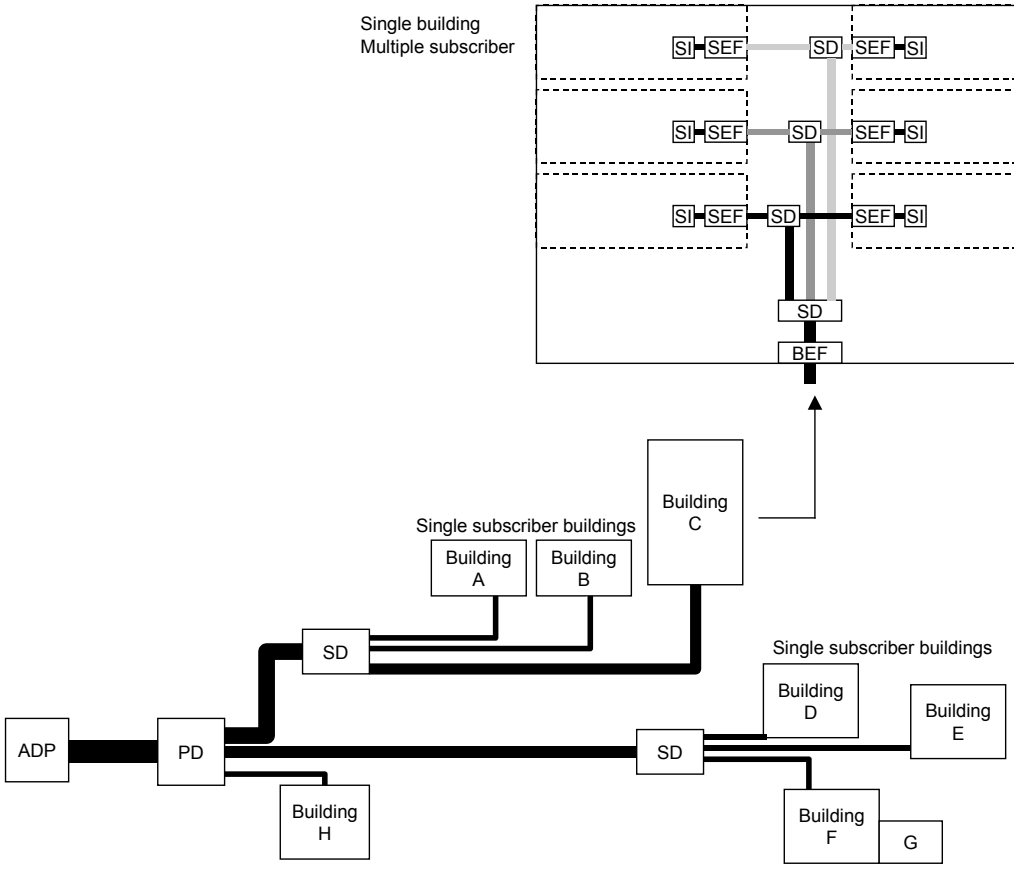

Figure 7 — Example of accommodation of functional elements

5.7 Interfaces

5.7.1 Equipment interfaces and test interfaces

Equipment interfaces (EI) and test interfaces (TI) to the PDAN cabling are shown in Figure 8.

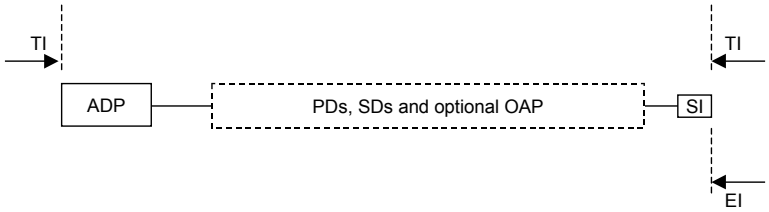

Figure 8 — Test and equipment interfaces

An equipment interface exists at the SI.

Test interfaces to the PDAN cabling exist at the ends of the complete cabling subsystem i.e. at the SI and at the optical fibre end-face prior to connection to the access network at the ADP. If it is required to measure the transmission performance of the PDAN cabling using techniques in accordance with EN 61280-4-2 (see 6.3), it may be necessary to terminate the optical fibre at the ADP with appropriate connecting hardware.

There is no test interface for the PDAN cabling at the OAP. The OAP enables a service provider to install an ENTI within the PDAN cabling which may then be used to perform a testing function on the complete access network as configured by the service provider.

5.7.2 Cabling

PDAN cabling is, if required, an application-independent cabling system that may be tested between the specific test interfaces as detailed in Clause 6.

Once connected to an operator's access network at the ADP, the PDAN cabling is part of the complete access network transmission path and extends from the operator site via the LOC to the customer premises equipment (CPE). The transmission performance of the PDAN cabling within the complete access network is not specified in this standard and depends on the configuration of the access network and any connections of that access network at the OAP.

Figure 8 indicates that the interface at the SI is a defined optical fibre connector interface. The interface at the ADP may be either an unterminated optical fibre or, if testing in accordance with EN 61280-4-2 is required, an optical fibre terminated with appropriate connecting hardware.

5.8 Dimensioning and configuring

5.8.1 Premises dimensions

In order to meet the performance requirements of 6.3 (Table 2), the maximum length of cabling from the ADP to the SI shall not exceed 500 m.

Any premises requiring longer cabling lengths will increase the attenuation of the PDAN cabling. Such configurations should not be pre-cabled without agreement with the access provider and may involve premises-specific implementations.

5.8.2 Distributors

The number and type of subsystems that are included in the PDAN cabling implementation depends upon the geography and size of the premises (e.g. campus or building) and upon the strategy of the premises owner.

A minimum implementation would include one PD, one SD per building, and one SI per subscriber.

If the premises is small enough and contain only a single building, the SD of that building may function as the PD (without the need for an external cabling subsystem). In contrast, larger premises/buildings may be served by a series of SDs.

Distributors should be located such that the resulting cable lengths are consistent with the cabling performance requirements of Clause 6, taking account of any connecting hardware installed within the distributors.

5.8.3 Subscriber Interface (SI)

A subscriber interface shall comprise at least two optical fibres for each intended access provider that are to be simultaneously supported in each subscriber space. These optical fibres shall be terminated in accordance with 9.2.

As indicated in Figure 9, the SI may be directly connected to the CPE or connected via a cord (see Clause 10). The implementation of an ENTI at the OAP is discussed in 5.8.5.

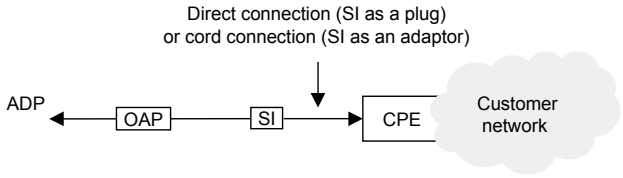

Figure 9 — SI connection to the customer network

The SI shall be located taking into account the provision of an electrical supply adequate to power any associated CPE.

5.8.4 Operator Access Point (OAP)

The OAP is an optional connection within the PDAN cabling and is used to enable a service provider to install an ENTI. The OAP is typically configured as a demountable connection (using connecting hardware in accordance with 9.3) and potentially increases the attenuation of the PDAN. The decision whether, and where, to implement an OAP shall be taken early in the design phase and should be based on advice obtained from potential access and/or service providers.

An OAP should only be installed where there is evidence to suggest that at least one potential service provider may require such an ENTI design (see 5.8.5).

5.8.5 External Network Test Interface (ENTI)

Figure 10 shows examples of the arrangements of the SI, OAP and ENTI in or adjacent to the subscriber space.

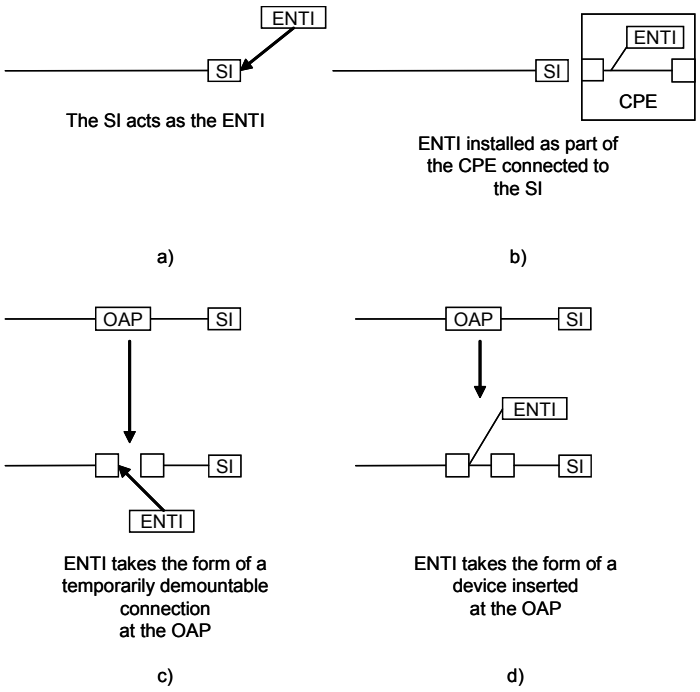

Figure 10 — Examples of arrangements of SI, OAP and ENTI

The location and type of ENTI is defined by the service provider. It may be:

a) at the SI in accordance with ETSI TS 102 873 (as in Figure 10a)) or associated with the CPE connected to the SI (as in Figure 10b));

b) at the OAP (as in Figure 10c)) or associated with application-specific equipment such as that described in FprEN 61753-041-2 introduced at the OAP (as in Figure 10d)).

The implementation of an ENTI is specific to the service provider. Any devices such as those in Figure 10d) may be application-specific. In general, any measurements made at any ENTI cannot be directly compared with the results of those applied to the PDAN cabling.

5.8.6 Entrance facilities

5.8.6.1 Building Entry Facility (BEF)

A BEF is required where PDAN cabling enters a building. It comprises an entrance point to the building and provides access to the pathway leading to a distributor (which enables a change from outdoor to indoor cable) inside the building. Local regulations may require special facilities where the external cables are terminated.

Where the ADP lies within a building (see Figure 6) the detailed requirements for the BEF are the responsibility of the access provider and are outside the scope of this standard.

5.8.6.2 Subscriber Entry Facility (SEF)

A SEF is required where PDAN cabling enters a subscriber space. It comprises an entrance point to the space and provides access to the pathway leading to an SI.

6 PDAN cabling performance

6.1 General

This clause specifies the minimum transmission performance of the PDAN cabling relevant to the test interfaces shown in Figure 8 and specifies test methods, where appropriate, taking into account the configuration of the SI, the cable lengths and their interconnections. The cabling comprises only passive sections of cable and connections as shown in Figure 11. The complete access network transmission path is from the operator site to the SI. The PDAN cabling specified in this standard is part of this transmission path.

The transmission performance of the cabling shall be achieved when subject to the relevant environmental classifications (see 6.2). The transmission and environmental performance of the connections at the active equipment are the responsibility of the equipment supplier.

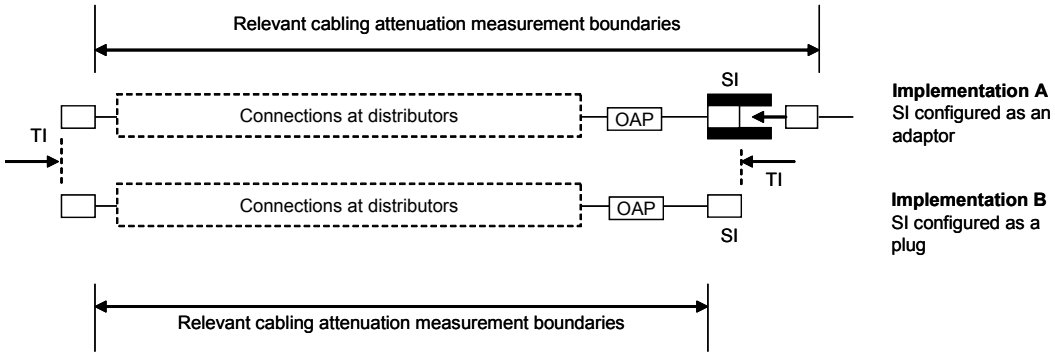

Figure 11 — Examples of SI configuration of passive PDAN cabling

6.2 Environmental performance

See EN 50173-1.

6.3 Transmission performance

6.3.1 Optical return loss

Optical return loss requirements are specified for the components of Clause 9.

When required, the return loss of the components installed shall be measured according to EN 61280-4-2 at 1 310 nm and 1 550 nm.

6.3.2 Attenuation

The attenuation of the PDAN cabling shall meet the limits given in Table 2.

Table 2 — PDAN cabling attenuation

	Maximum attenuation for PDAN cabling length ≤ 500m[a,b] dB
Wavelength	1 260 nm ≤ λ < 1 625 nm [c]
PDAN cabling (without OAP)	1,5
PDAN cabling (where OAP is provided)	2,0

[a] 500 m is considered adequate for the majority of installations. For lengths in excess of 500 m see 5.8.1.

[b] The attenuation of any subsequent connection to the access providers cabling at the ADP is not included. This may be influenced by the mode field diameter of the optical fibres at the ADP connection/splice. The PDAN designer should be able to provide the access provider with the nominal mode field diameter specification of the PDAN cabling (see 8.1). This may assist the estimation of any mismatch attenuation at the ADP (and at the SI).

[c] Cables are specified at 0,4 dB/km from 1310 nm up to 1625 nm. If used below this wavelength the specification is 0,45 dB/km. The requirements across the wavelength range take account of increased optical fibre attenuation below 1310 nm as specified in EN 60793-2-50.

When required, the attenuation of the PDAN cabling shall be measured according to EN 61280-4-2 at 1 310 nm and 1 550 nm using either optical time domain reflectometer or light source power meter techniques.

When light source/power meter testing to determine representative measurements of the attenuation between the boundaries shown in Figure 11 then:

a) Implementation A of Figure 11 shall be tested using the 2-cord reference method;

b) Implementation B of Figure 11 shall be tested using the 3-cord reference method.

The requirements of Table 2 which cannot be measured as specified in standards listed above shall be met by design.

7 Implementation options

The PDAN cabling shall meet the transmission performance requirements of Clause 6 using:

a) for the external cabling subsystem, the connecting hardware of Clause 9 with:

   1) outdoor cables specified in 8.2.1 and/or
   2) microduct fibre units or microduct optical fibre cables of 8.4 installed in microducts of 8.3;

b) for the internal cabling subsystem, the connecting hardware of Clause 9 with indoor cables specified in 8.2.2.

8 Cable requirements

8.1 General

This clause defines the minimum requirements for cables installed in the external and internal cabling subsystems specified in Clause 5 and used in the reference implementations of Clause 7.

The optical fibre shall be a less bend sensitive optical fibre in accordance with EN 60793-2-50:2013, Category B6_a. In order to maximise the opportunity of achieving the connecting hardware attenuation

requirements of 9.2 and 9.3, the optical fibres within the cables comprising the PDAN should be selected to have a common nominal mode field diameter specification.

8.2 Cable

8.2.1 Outdoor cable

See EN 50173-1:2011, 7.7.1.3.

8.2.2 Indoor cable

See EN 50173-1:2011, 7.7.1.3.

8.3 Microducts

See EN 60794-5-20 and EN 50411-6-1 for microduct suitable for the installation of microduct fibre units.

See EN 60794-5-10 and EN 50411-6-1 for microduct suitable for the installation of microduct optical fibre cables.

8.4 Microduct optical fibre

8.4.1 External microduct fibre units

See EN 60794-5-20 for the performance requirements of installed optical fibres in accordance with 8.1.

8.4.2 External microduct optical fibre cables

See EN 60794-5-10 for the performance requirements of installed optical fibres in accordance with 8.1.

9 Connecting hardware requirements

9.1 General requirements

Connecting hardware shall be installed at the SI. In addition, connecting hardware may be installed at distributors and at the ADP.

9.2 Connecting hardware at the SI

Unless national or local regulations determine an alternative implementation, at least one fibre shall be terminated with a plug in accordance with EN 61754-20:2012, Interface 20-5 (LC-APC). The adaptor interface shall be either in accordance with EN 61754-20:2012, Interface 20-2 or Interface 20-5 (LC-APC).

Where two optical fibres are required to be terminated the interface shall be in accordance with EN 61754-20:2012, Interface 20-5 (LC-APC). Where no adaptor interface is to be used, the plug should be accordance with EN 61754-20:2012, Interface 20-8 (LC-APC).

The components selected at the SI shall enable Grade B or Grade C attenuation performance in accordance with EN 61755-2-2:2006. The Grade selected depends upon the structure of the PDAN cabling (see Table 2).

NOTE 1 EN 61755-2-2 defines Grade B attenuation as 97% better than 0,25 dB and Grade C as 97% better than 0,5 dB.

The components selected at the SI shall enable Grade 1 return loss performance in accordance with EN 61755-1:2006.

NOTE 2 EN 61755-1 defines Grade 1 return loss as ≥ 60 dB for mated connectors and ≥ 55 dB for unmated APC connector.

The interfaces should be provided with mechanically retained fittings which protect the optical fibre end-face and adaptors until they are mated.

9.3 Connecting hardware at other places

9.3.1 Plugs and adaptors

Connections created by plugs and adaptors may be used elsewhere in the cabling subsystems provided that the transmission performance requirements of Clause 6 are met. It is recommended to use the same specification as at the SI in 9.2.

9.3.2 Mechanical and fusion splices

9.3.2.1 Mechanical splices

The components selected shall enable Grade B or C insertion loss performance in accordance to EN 50411-3-2:2011. The Grade selected depends upon the structure of the PDAN cabling (see Table 2).

NOTE 1 EN 50411-3-2 defines Grade B insertion loss as 97 % better than 0,25 dB and Grade C insertion loss as 97 % better than 0,5 dB.

NOTE 2 The insertion loss requirement for mechanical splices is less stringent than that of fusion splices (see 9.3.2.2).

The components selected shall enable Grade 1 return loss performance in accordance with EN 50411-3-2:2011.

NOTE 3 EN 50411-3-2 defines Grade 1 as ≥ 60 dB.

9.3.2.2 Fusion splices

The insertion loss of fusion splices shall not exceed 0,1 dB. See 8.1 for recommendations in relation to control of optical fibre nominal mode field diameter.

The return loss of fusion splices shall be 60 dB minimum.

10 Cords

Cords are outside the scope of this standard. However, it is recommended that:

a) wherever cords used they are made with the same optical fibre specification as described in 8.1;

b) the attenuation of the connection, especially at the SI assumes that the right grade of connecting hardware is used (see Clause 9); if for example a Grade B connection is needed to meet the attenuation of Table 2, only a cord with this connector grade is allowed to be used.

NOTE See EN 50377-7-4 for additional details on mixing different Grades.

11 Accommodation of the Subscriber Interface (SI) and the Customer Premises Equipment (CPE)

NOTE At the time of publication of this standard, requirements and recommendations for a closure to accommodate the SI and CPE are in development as prEN 50411-3-8.

11.1 Security for data integrity

For data integrity the housing shall be only operator accessible (with anti-tamper seal). Separate housings shall be provided for each SI.

The power supply shall be secured from accidental disruption either by:

a) a dedicated fused power supply (or a power supply with equivalent protection) shall be provided at each SI;

b) integrating a power outlet into each housing;

c) using other methods to prevent disconnection of the power supply.

Unterminated fibres shall be securely stored.

11.2 Placement of the housing

The housing, and therefore the SI, should be located in the SEF, and close to primary distribution space of the subscriber space in order to:

a) to provide optimal electrical and optical connections to the subscriber infrastructure;

b) to better distribute services within the subscriber space;

c) to facilitate the interconnection between external and subscriber networks (and cabling between the housing and the primary distribution space should be provided with mechanical protection).

Annex A
(informative)

Broadband infrastructure external to multi-subscriber premises

A.1 General

This annex gives an overview of areas not included in this standard to give a complete picture of optical broadband implementations including those to single subscriber premises which are outside the scope of this standard.

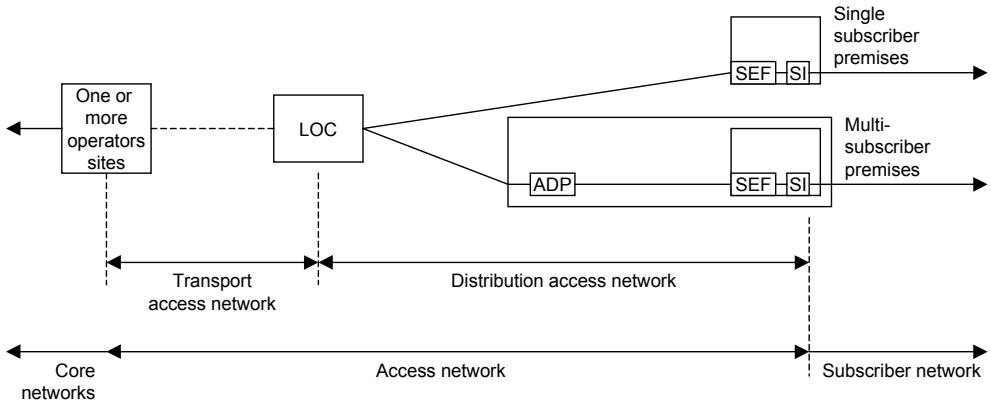

Figure A.1 — Broadband optical fibre cabling to subscriber premises

With reference to Figure A.1, the specification of the following elements of the access network cabling is not included in this standard:

a) the transport access network;

b) the distribution access network serving single subscriber premises;

c) the part of the distribution access network from the LOC to the ADP of multi-subscriber premises (this LOC may be located inside the premises).

A.2 Treatment of single-subscriber premises

Single-subscriber premises are outside the scope of this standard but can be treated similarly to multi-subscriber premises. Single subscriber premises are generally smaller than multi-subscriber premises. They will have a premises boundary, a BEF and an SEF but they may be co-located.

A.3 Treatment of multi-subscriber premises

In the case of multi-subscriber premises, the performance requirements of this standard assist in the determination of the transmission performance of other elements of the cabling infrastructure.

Annex B
(normative)

A-deviation

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

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

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

Clause	Deviation
5.8.3	In France, the following requirements are applicable, instead of the requirements of the clauses of this EN as per French ***Arrêté du 16 décembre 2011 relatif à l'application de l'article R.111-14 du code de la construction et de l'habitation.***
	NOTE 1 The regulation can be found at the following URL:
	http://www.legifrance.gouv.fr/jopdf/common/ jo_pdf.jsp?numJO=0&dateJO=20111220&numTexte=11&pageDebut=21460&pageFin=21461
	The purpose of the "Arrêté" is to define the organization of lines for electronic communications in new buildings
	As per Article 5, each dwelling or premise for professional purpose is connected with at least 1 fibre. This number is 4 for buildings with at least 12 dwellings or premises for professional purpose located in a city stated in Annex
	NOTE 2 The related Annex is a list of the 148 cities with high density of populations.

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EN 50173-5, *Information technology — Generic cabling systems — Part 5: Data centres*

EN 50173-6, *Information technology — Generic cabling systems — Part 6: Distributed building services*

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*

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*

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3) To be published.

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