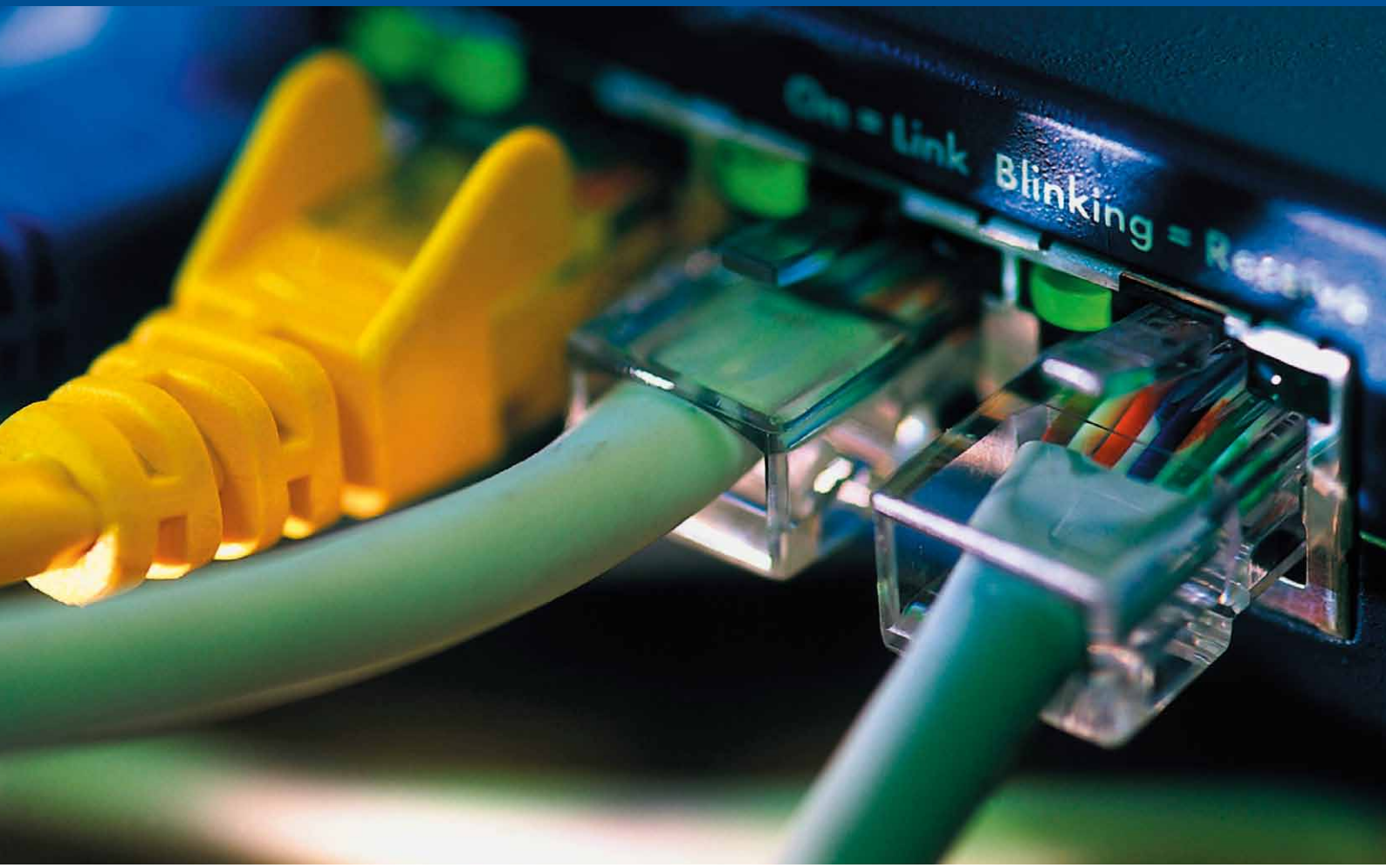
PAS 2016:2010

Next generation access for new build homes – Guide



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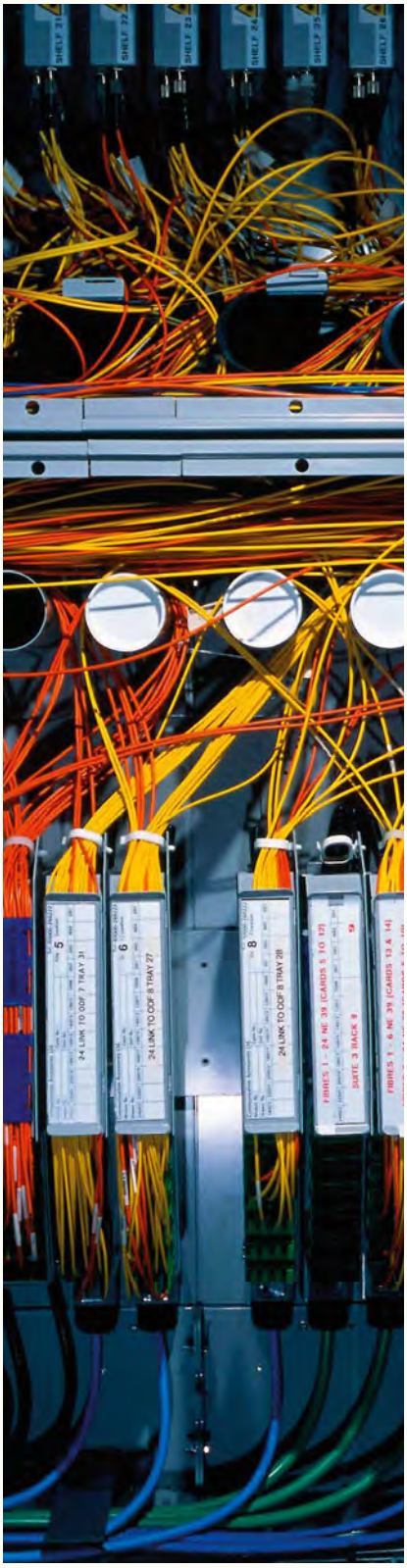
Contents

List of figures



Foreword

This Publicly Available Specification (PAS 2016:2010), was sponsored by the Department for Business, Innovation and Skills (BIS) and its development was facilitated by the British Standards Institution (BSI).

Acknowledgement is given to Mike Perry of BRE (the Building Research Establishment) as the Technical Author for this Publicly Available Specification.

BSI also wishes to acknowledge the following organizations that were involved in the development of this Publicly Available Specification:

- BT;
- Derby City Council;
- Digital Communications Knowledge Transfer Network (DC-KTN);
- HCA;
- Independent Fibre Networks Ltd & NICC;
- Land Securities;
- Miniflex;
- OpenHub;
- PRP;
- Willmott Dixon.

Wider comments from other interested parties were invited by BSI. The expert contributions made by the organizations and individuals consulted in the development of this Publicly Available Specification are gratefully acknowledged.

Use of this document

As a guide, this Publicly Available Specification takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this Publicly Available Specification is expected to be able to justify any course of action that deviates from its recommendations.

It has been assumed in the preparation of this Publicly Available Specification that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions in this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should". It does not contain requirements.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

The word "should" is used to express recommendations of this standard. The word "may" is used in the text to express permissibility, e.g. as an alternative to the primary recommendation of the clause. The word "can" is used to express possibility, e.g. a consequence of an action or an event.

Notes and commentaries are provided throughout the text of this standard. Notes give references and additional information that are important but do not form part of the recommendations.

Contractual and legal considerations

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.

Introduction

The UK is embarking on the process of installing a national digital infrastructure, to support the delivery of broadband digital services, particularly to the home setting via high-speed internet access, referred to in this Public Available Specification (PAS) as "broadband". The Coalition Agreement provides the Government's views, aspirations for superfast broadband and objectives on how this can be achieved. The Government aims to ensure the UK has the best superfast broadband network in Europe by 2015. This is tackled in more detail in the Government's National Broadband Strategy: Britain's Superfast Broadband Future, published in December 2010.

The initial residential use of the internet was driven by PC-based services such as web browsing and email. Subsequent use has increasingly included a wider range of applications, including video and others, which will involve machine to machine communication for applications such as meter reading, security, telecare, etc. This development has involved an increase in the number of devices to be connected in individual homes and this trend will continue.

A digital infrastructure has two parts to it, connection to the house and distribution within the house. This parallels with the delivery of electricity. Service delivery depends on "end-to-end connectivity", i.e. a connection from the broadband supplier right through to the device situated within the home, and therefore needs both parts of the distribution system.

A network in the home benefits the delivery of the digital services as well as providing convenience to the home owner. This also has the potential of providing the developer with an attractive marketing opportunity.

An easier challenge is to install digital infrastructure into all new build domestic dwellings. While cabled media is the preferred digital infrastructure, particularly for demanding high bandwidth video distribution, wireless connectivity is also likely to play a significant role. Wireless provides convenience and flexibility for the connection of mobile devices in particular, e.g. laptops.

1 Scope

This Publicly Available Specification (PAS) provides guidance and a practical framework to identify the recommendations for digital communications infrastructures to and within new build domestic dwellings, supporting effective installation in new build homes.

The PAS addresses:

1) single dwelling units, i.e. houses which are individual dwellings not sharing common parts (other than party walls) with other houses; and
2) multi-dwelling units, i.e. housing where multiple separate housing units for residential (i.e. non-commercial) inhabitants are contained within one building.

The PAS is not intended for:

a) other multiple occupancy buildings such as hostels, i.e. where residents having their own rooms share facilities;

   ***NOTE** For example common kitchens.*

b) community-wide wireless infrastructures; and

   ***NOTE** While these are important in the provision of digital infrastructure, they are not within the scope of this PAS.*

c) the external provision of digital infrastructure to locations where wired infrastructure is not practical.

   ***NOTE** This is for further study.*

The PAS is intended for house developers and builders, and all those concerned with supplying, installing, commissioning or operating digital infrastructure and related services in new build homes.

***NOTE** The intention is not to mandate a specific technology or supplier, but to identify a minimum standard of connectivity which can be fulfilled in a number of ways.*

2 Normative references

The following reference documents are required 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.

ANSI-TIA-568-C.0: *Generic telecommunications cabling for customer premises*

ANSI-TIA-568-C.2: *Balanced twisted-pair telecommunications cabling and components standards*

BS 6701, *Telecommunications equipment and telecommunications cabling – Specification for installation, operation and maintenance*

BS 7671, *Requirements for electrical installations – IEE Wiring Regulations – Seventeenth edition*

BS EN 50173-1, *Information technology – Generic cabling systems – Part 1: General requirements*

BS EN 50173-4, *Information Technology – Generic cabling – Part 4: Homes*

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

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

BS EN 50346, *Information technology – Testing of installed cabling*

BS EN 60603-7, *Connectors for electronic equipment – Part 7: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 100 MHz*

3 Terms and definitions

For the purpose of this PAS the following terms and definitions apply.

3.1 assistive living (telecare and telehealth)

digital services used to support independent lifestyle (telecare), or the remote delivery of healthcare services (telehealth)

NOTE *These services are often, but not exclusively, supplied to the elderly, or anyone with chronic long term conditions, e.g. diabetes II, dementia, chronic obstructive pulmonary disease (COPD), irrespective of age.*

3.2 active infrastructure

active equipment for receiving, transmitting or distributing digital data and information

3.3 balanced cables/connectors

metallic cables of twisted pair construction and associated connectors of a specified category of performance

3.4 bandwidth

measure of the capacity of a transmission system to deliver information

NOTE *In general the greater the bandwidth of the transmission system, the greater the data transmission rate it is able to deliver.*

3.5 broadband

high-speed, "always on" internet access

3.6 cabled aggregation aperture

collation point for all the internal network cables where they enter the customer premises equipment (CPE) space

3.7 cabled media

balanced and optical fibre cables and connectors used for the transmission of digital data and services

3.8 category of balanced cables/ connectors

hierarchical system of performance classification for balanced cables/connectors

NOTE *Higher category components have higher performance and bandwidth.*

3.9 customer premises equipment (CPE)

digital home equipment, normally active, used for the reception, transmission and distribution of digital data and services

NOTE *For example WiFi router.*

3.10 data transmission rate

measure of the information delivered over a network typically expressed in bits per second

NOTE *High-definition television (HDTV) requires a data transmission rate of c. 10 Mb/s.*

3.11 digital communications infrastructure

infrastructure required for digital communications allowing reception of data and information services delivered externally, and for the transmission of digital data and information within a domestic dwelling

3.12 fibre optic

transmission technology that allows for the transmission of digital data by light pulses using optical fibre cable and fibre optic connecting hardware

NOTE Optical fibre can be either glass or plastic.

3.13 home distributor (HD) panel

equipment for interconnecting data ports by means of short connecting cables or cords

NOTE For example, a switch (an active device), to be connected with the required output socket, normally using equipment cords.

3.14 internet service provider

commercial supplier of digital content and services

3.15 local area network (LAN)

main distribution point that connects to a main street cabinet and then to a jointing chamber, which provides the final link to the external wall of the dwelling

NOTE The internal network within the dwelling, together with equipment, such as routers (outside the scope of this PAS) also form part of the LAN.

3.16 network termination point (NTP)

final connection point and demarcation between the external and internal networks, and installed by the supplier

NOTE Beyond this point, the developer, builder or occupier has liability for the digital infrastructure.

3.17 optical fibre cables and fibre optic connectors

all-silica (glass) or plastic fibre optic cables and associated connectors

3.18 passive infrastructure

non-active parts of the digital infrastructure

NOTE This includes cables and outlet sockets and contain no active elements.

3.19 power line communications (PLC)

use of electrical power cables for the distribution of digital data and content

3.20 residential gateway

device combining in one unit a number of active pieces of equipment for the distribution of digital data and content, and an access network interface

3.21 service provider

telecommunications operator or other entity responsible for the connection of a household to the global internet

3.22 star topology

network where digital service outlets are connected to a common central point

NOTE For example in home networks the residential gateway or switch, by dedicated connections.

3.23 supplier

provider of digital infrastructure, services or both

3.24 router

primary active equipment interfacing external and internal networks of a dwelling, and connecting digital devices in the home to form an internal network

NOTE 1 There may be more than one switch needed in an internal network.

NOTE 2 It is often integrated into the residential gateway.

3.25 wireless deadspot

location in a building or the built environment where the reception of wireless signals is not possible because of signal blocking or other interference

3.26 wireless links

use of radio transmissions to carry digital data

4 Domestic dwelling digital infrastructure

4.1 General

The objective of a domestic dwelling digital infrastructure is to provide:

a) broadband connectivity to the internet; and

b) distribution network for the reception and transmission of digital signals and services throughout the dwelling. These services may or may not involve an access connection, i.e. there can be services which are solely confined to the dwelling.

__NOTE__ For example, home entertainment, energy services, telecare and telehealth services – referred to as assistive living services.

__NOTE 1__ The objective of the Coalition Government is to ensure the UK has the best superfast broadband network in Europe by 2015, through market deployment or through strategic intervention in areas the market will not reach. In doing so, the Coalition also aims to achieve, in virtually every home, access to a minimum of 2 Mb/s broadband connectivity. In new build homes, 2 Mb/s is a lower bound. Up to 24 Mb/s is already the standard in respect of asymmetric digital subscriber line (ADSL), very high speed digital subscriber line (VDSL) from the street cabinet will increase this. Hybrid Fibre Coax Networks already deliver up to 50 Mb/s. New build infrastructure can be designed to support rates far greater than these data rates, e.g. 100 Mb/s.

In densely populated urban areas this is unlikely to be a problem, while in remote rural areas without a cabled connection, achieving this bandwidth can be challenging.

Next generation distribution systems in new build homes should be able to support 2 Mb/s transmissions, but also have a much higher capability so they can handle the likely increases to Mb/s. This high data rate can only be reliably supported on a cabled infrastructure.

Within the dwelling, balanced cabling is the most practical medium with optical fibre cabling being considered as an optional addition for future installations.

For new build dwellings, a cabled medium should be used as the transmission medium of preference.

Most users are likely to use wireless distribution in addition to the fixed infrastructure with the latter primarily being used for the most demanding applications, e.g. video distribution, especially high definition and video on demand.

Wireless provides convenience, and offers the possibility of connecting to the internet from any place in the dwelling, provided there are no wireless deadspots. However, cabled medium is required to connect wireless routers to the Internet. Wireless connectivity is assumed in this PAS to provide a supplementary method of connectivity to broadband services, used in conjunction with cabled media.

In the context of new build domestic dwellings, providing free access to cable routes then power line communications are unlikely to be a major consideration. Although power line communications are an alternative option in the context of existing properties and refurbishment, this is beyond the scope of this PAS.

All dwellings are likely to have digital terrestrial or satellite TV connectivity, or both. These requirements should be included in the specification of the home network, providing digital interconnectivity between such TVs and associated, for example, programmable video recorders (PVRs), Digital video disc (DVD) and Blu-ray players, other digital devices within the home and the "residential gateway".

5 Boundary between internal and external infrastructure

5.1 General

This PAS describes the external and internal digital infrastructures separately. The division between the two is defined by the demarcation point, a legally defined point in the provision of telecommunications services at which responsibility for the infrastructure passes from the service provider to the householder. The demarcation point is defined differently in different countries. In the UK there will be active or passive (i.e. un-powered or powered) NTP which belongs to the telecommunications provider and which isolates the incoming connection from the customer's equipment (see Figure 1).

In UK new build homes, the following should be considered for the external infrastructure, including:

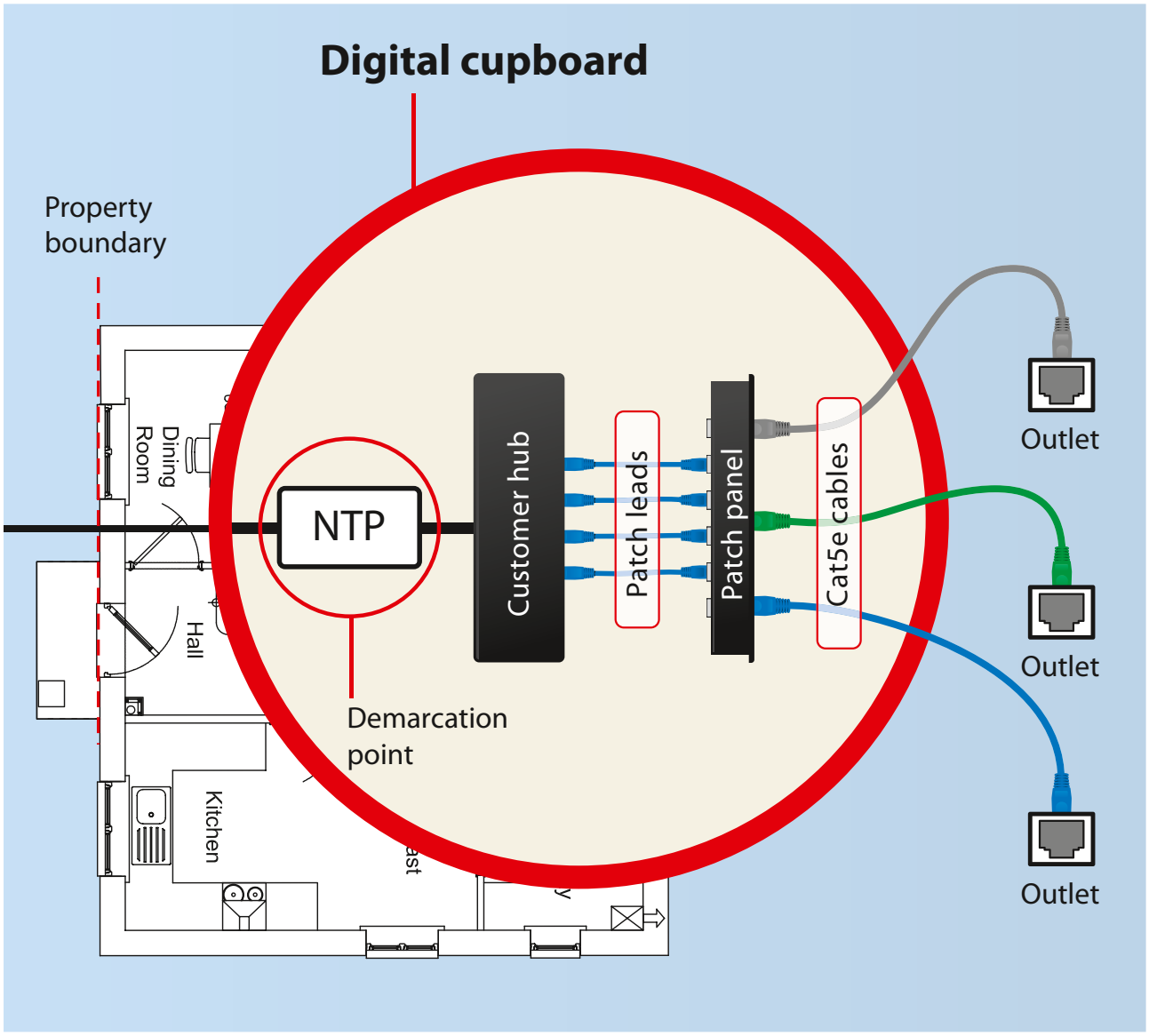
a) there is an individual connection (metallic or optical fibre) to an individual dwelling from the service provider's equipment external to the curtilage of the dwelling. In this case the demarcation point will be at or within the boundary of the curtilage of the dwelling;

b) there is a connection to the individual dwelling, but this is provided from the service provider's equipment installed in a location owned and/or managed by the organization responsible for common parts;

NOTE *For example a building or estate management company.*

c) the service provider delivers service to a demarcation point external to individual dwellings, and final distribution is managed by an organization responsible for common parts. An example of this would be an estate or municipality that wishes to provide its own local digital infrastructure. In such cases, a secondary demarcation point will exist for each attached dwelling.

Figure 1 – Domestic digital installations



5.2 Liability

This PAS is focused on the internal digital infrastructure contained within the bounding walls of the dwelling and gives guidance on the external connection from the jointing chamber. This is the most immediate external connection point, linking the dwelling infrastructure with the external networks; most often it is located in the street beyond the curtilege of the property.

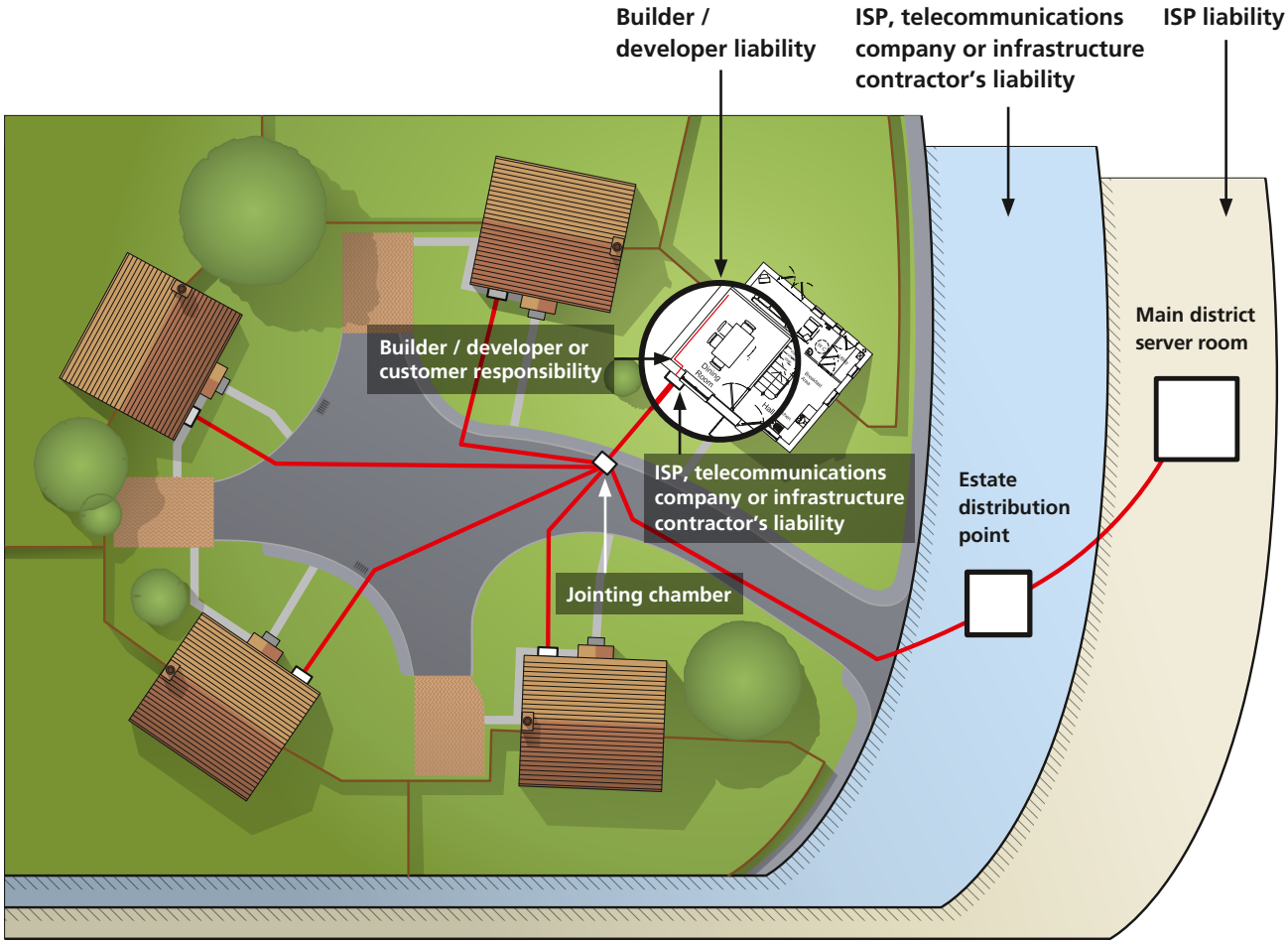
The reason for the distinction between external and internal digital infrastructure is that up to the NTP, liability rests with the infrastructure installer or ISP.

Beyond the external termination point, liability for the internal digital infrastructure lies with the builder/ developer or customer, unless installed by the service provider.

However ultimate liability for the internal network remains with the householder, even if he contracts that to another entity.

The generic zones of liability for a typical single dwelling unit are shown in Figure 2.

Figure 2 – Generic zones of liability



6 External infrastructure

6.1 Local Area Network (LAN) connections

The connection of a domestic dwelling to an external digital network is the end of point of the external Local Area Network (LAN), with the internal network also being an LAN, or home network. The demarcation point between external and internal networks is the NTP.

In the local area, the main distribution point for the external LAN should be an exchange or a server room. This connects to a main street cabinet (primary connection point), and then to a jointing chamber, which provides the final link to the external wall of the dwelling.

6.2 Connection to the external wall of the property

For all telecommunication services a NTP should be installed, internally or externally, to allow entry of the data infrastructure into the home.

***NOTE** See CLG guidance on data ducting for new homes which describes best practice in relation to external entry into new homes [1].*

The NTP is the demarcation point between the provider's external network and the developer/ customer-provided cabling. All internal cabling beyond the NTP should be the responsibility of the builder/ customer, and after handover, the customer.

7 Internal digital infrastructure

7.1 Overview

Internal digital infrastructure should consist of both cabled and wireless elements.

The design of generic information technology cabling in homes is specified in BS EN 50173-4. The specification of those installations and their quality assurance is specified in BS EN 50174-1. Particular requirements for installation planning and practices in homes are specified in BS EN 50174-2.

BS EN 50173-4 requires that cabling be implemented in a star configuration from a home distributor (HD) located in a "primary distribution space" which is separately specified in BS EN 50174-2. Exceptionally for large buildings, additional star points [secondary home distributors (SHDs)] may be used to serve areas of the building not easily served by the primary star point. Where possible the demarcation point should be co-located with the HD.

The installation of unscreened balanced cabling components of Category 5 should be installed in accordance with BS EN 50173-1 (equivalent to Category 5e of ANSI-TIA-568-C.2) which also meets the minimum implementation of BS EN 50173-4.

A star topology is a network where the data outlets are connected to a common central point, in home networks the residential gateway or switch, by dedicated connections. The main benefits of a star network is reliability – if one of the "point-to-point" segments is broken, only the devices on that link will be affected, and not affect other devices on other arms of the star.

7.2 External to internal connection – Houses and multi-dwelling units

The ducting should be laid from the footway jointing chamber (with the socket end presented to the joint box) and terminate with a pre-formed 90° bend at the outside of the house wall. The duct runs should be kept to a minimum depth of cover of 350 mm beneath the proposed finish level (450 mm under a soft surface).

20 mm electrical conduit should be supplied and installed through the cavity wall at a point vertically above the end of the service duct. A back box or single-gang flush steel box should be installed in preparation for the installer to fit and commission the connection to the active digital equipment, e.g. switch or other type of main socket.

All ducts should be provided with a draw rope after installation, unless local agreement is made to substitute the draw rope for lead-in cable; 1 m at the house and 3 m at the tail in the chamber should be left.

The service duct should be cut level, two bricks below the damp proof course; it should be sealed at both ends using a duct plug, to prevent ingress of debris.

7.3 Primary distribution space

7.3.1 Accommodation

In each dwelling the cabled CPE, the presentation of the home cabling and associated equipment should be accommodated in a primary distribution space, as specified in BS EN 50174-2, which is secure (lockable).

This space should be located in for example an under-stairs cupboard, or a similar location.

The primary distribution space should be provided with two-twin gang switched 13A sockets installed in accordance with BS 7671.

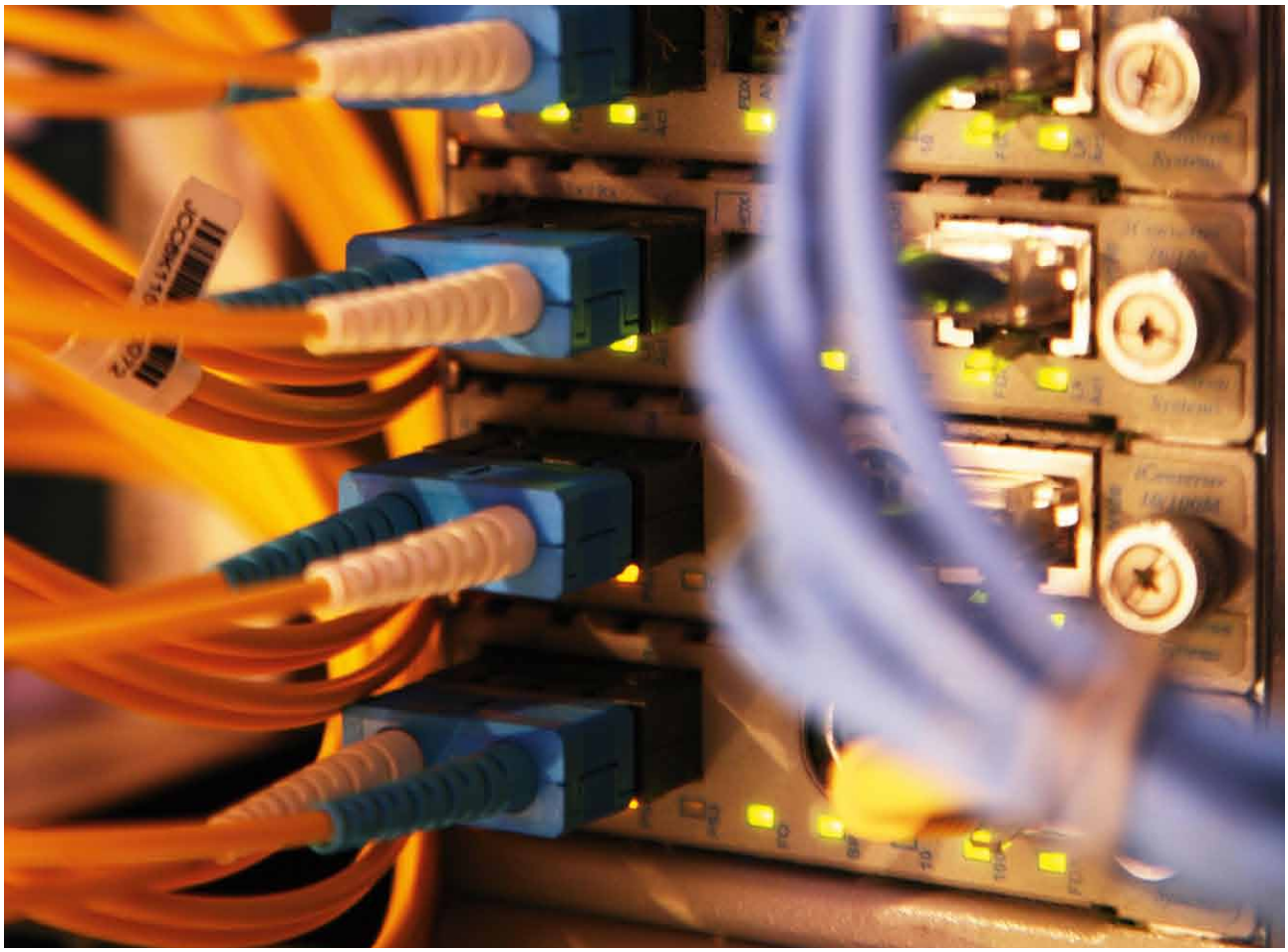
When designing the house installation, sufficient dimensions for the cable aggregation aperture should be designed-in – to the point where all cables and ducts enter the equipment space. An aperture diameter of 50 mm is adequate in most cases.

On exiting the primary distribution space:

a) BS EN 50174-2 requires that the pathway between the dwelling entrance and the primary distribution space shall have a cross-section equivalent to a minimum diameter of 38 mm (consistent with Size 40 conduits of BS EN 61386 series);

b) BS EN 50174-2 requires that the pathway between the primary distribution space and the outlets shall have a cross-section equivalent to a minimum diameter of 16 mm (consistent with Size 20 conduits of BS EN 61386 series).

The location should allow for ease of connection and maintenance access between the incoming service duct and the termination at the CPE. The location of the primary distribution space should be agreed early in the design of the dwellings.



The space should be located to avoid extremes of temperature and humidity. The standard ambient temperature range is 0 °C - 44 °C. Humidity should be kept within a range to avoid the risk of condensation.

The equipment may be mounted in a 19 in rack, or other suitable mounting system, including wall mounted sockets. Where used, the rack system can be floor mounted or wall mounted. There should be sufficient capacity to allow for expansion of the number of wall sockets throughout the house to provide two, twin outlets per room, excluding bathrooms and toilets.

***NOTE** This may not comply with the recommendations of BS EN 50173-4 for large rooms but may over-provide for smaller rooms and is judged to provide a good guide.*

All cabinets, frames or racks accommodated within the primary distribution space should be earthed in accordance with BS 6701. Any power supply cabling provided to these cabinets, frames or racks should be carried out in accordance with BS 7671.

7.3.2 Customer premises equipment (CPE)

The initial CPE should provide sufficient outlet ports to service:

a) two telephone points; and

b) four independent data service outlets on the switch or residential gateway.

7.3.3 Presentation of home cabling

The outlets terminating the home cabling should be mounted on a panel(s) to allow interconnection to CPE and, where appropriate, to other outlets on the panel(s).

7.4 Premises distribution cabling

7.4.1 General provision

In the case of all internal cabling, it is essential that the developer designs the cable routes and socket placements to achieve the maximum capability for the delivery of multiple services to all main rooms.

***NOTE** This way all the benefits offered by the network can be realized.*

Pathways should be provided throughout the home to provide each room two, twin outlets per room, excluding bathrooms and toilets. The required pathways should be carried out in accordance with **7.3.1.**

The developer should install cabling for data services using cables and connectors in accordance with **7.4.2.**

For "connected" (digitally wired) homes there should be, as a minimum, data outlets in the lounge, master bedroom and study locations, and also to each location where a co-axial socket is deployed for TV services.

In this way multiple services, such as high speed Internet, or broadband TV content can be delivered simultaneously. A star wire configuration should connect each room in the dwelling, using the ceiling rose as the primary connection point in each room. This provides an ease of access for dropping communications cables to any location in the room.

Data outlet sockets should be mounted in the range 700 – 900 mm [2]. This is for ease of access for people in wheelchairs, and on the ground floor, to help reduce damage in the event of floods.

7.4.2 Cables and connectors

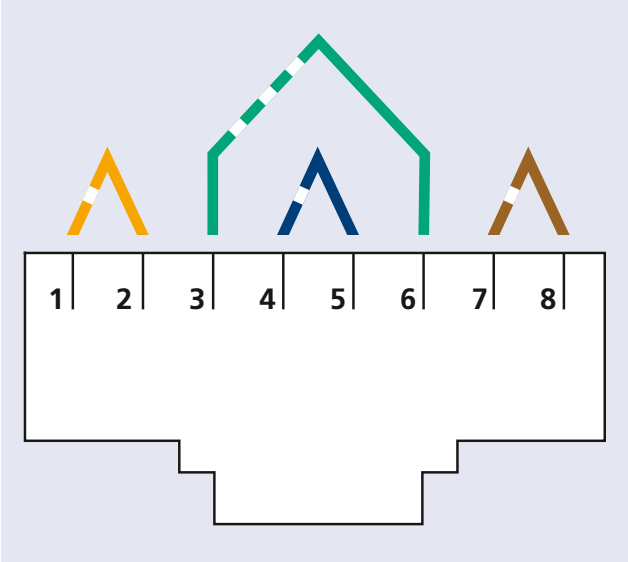
Balanced cables should be unscreened Category 5 in accordance with BS EN 50173-1 (which are equivalent to the unshielded Category 5e cables of ANSI-TIA-568-C.2).

The maximum length of the cables should be 90 m in accordance with the reference implementations of BS EN 50173-4 or ANSI-TIA-568-C.2 respectively.

The presentation of the home cabling at the HD and the wall sockets distributed through the home should be in accordance with BS EN 60603-7 (commonly but inaccurately referred to as RJ45). As specified for telecommunications outlets in BS EN 50173-4, these connectors should be of the same type (i.e. unscreened or screened) and category as the balanced cable. The termination of the cable at those outlets should be as shown in Figure 3.

***NOTE** Unscreened category 5 connectors are specified in BS EN 60603-7-2. Higher category of unscreened and screened connectors are specified in other parts of the BS EN 60603-7 standards series.*

Figure 3 – Pin grouping and pair assignments for BS EN 60603-7 series connecting hardware (front view of connector)



7.4.3 Data cable runs

Balanced cables should be kept at a minimum separation of 50 mm from mains power cables.

***NOTE** BS 7671 delegates the requirements for separation/segregation between power supply and telecommunications cabling to BS 6701 (for safety/protection) and to BS EN 50174-2 (for suppression of electrical interference). This PAS may comply with these requirements provided that the power supply cable (or bundle of cables) is not carrying in excess of 100 amps.*

The user of this PAS is recommended to comply with the wider requirements of BS 6701 and BS EN 50174-2 where this separation cannot be maintained.

7.4.4 Wireless connectivity

Wireless can also be deployed enabling mobility around the home. An end-user may choose to collocate an ISP's residential gateway either at the cabled CPE location (leading to further ISP fan out over the star wired data sockets) or at the end of any of the 4 × star wired data sockets.

***NOTE 1** For example the ISP's residential gateway may be deployed in a home office.*

***NOTE 2** Wireless networking may form part of the "final leg" of the home network, where it provides a reasonable alternative to physical cabling to data points.*

The location of wireless access points should be tested to ensure the effectiveness of their transmission and reception, and that they are not located in a wireless deadspot.

7.4.5 Blank data sockets and cable ducting

7.4.5.1 Blank data sockets

The minimum number of recommended cabled data sockets per house is four. At least one double back box and blanking plate should be located in each room in the house, excluding bathrooms, toilets and storage cupboards.

Each blank double data socket should be mounted close to double socket power outlets in accordance with BS 7671.

7.4.5.2 Cable ducting

Cable ducting provides an open infrastructure to accept current or future cabling solutions throughout the dwelling. This allows quick and easy expansion or upgrade during the life of the building with no impact or damage to the physical structure or decorative finishes.

Ducting should be laid from the central distribution point, the CPE space, to every power socket in the premise at the same time as providing the power cabling to each socket.

***NOTE 1** BS EN 50174-2 requires that the pathway between the primary distribution space and the outlets have a cross-section equivalent to a minimum diameter of 16 mm (consistent with Size 20 conduits of BS EN 61386 series).*

Duct is most often supplied on standard reels with a pre-installed pull-cord and secure end plugs. These plugs protect against ingress of dirt and other contamination. To lock the pull-cord in position to prevent accidental pull-out, these plugs should be retained and refitted to the installed duct and remaining unused duct.

The installer should carry a supply of end plugs, to cap off duct that has been installed in the home until the duct is populated with cables. The installer should satisfy himself that the duct is clean and suitable for use, or scrap the remaining product.

***NOTE 2** The viability of stored duct without plugs is suspect.*

The duct can be routed across walls or along timber studs and joists, and fixed using standard cabling clips and ties, using conventional installation practices.

The duct should not be routed under or between moveable services or other objects that could cause crushing.

The duct may be buried in plaster or floor screeds.

The minimum recommended bend radius should typically be 150 mm, but in all cases the manufacturers' specification should be adhered to.

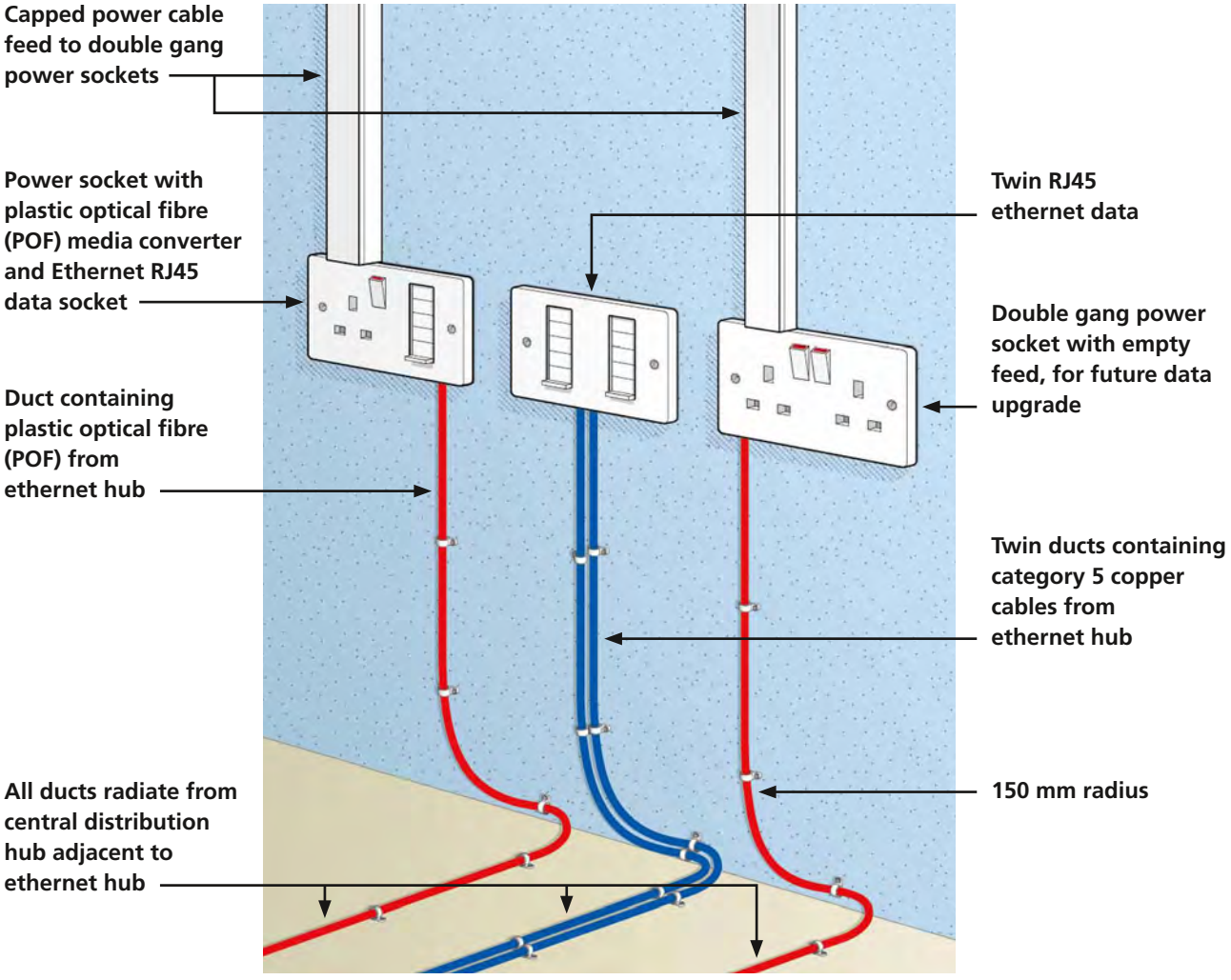
A double sweep should be used when negotiating internal or external corners as shown in Figure 4.

After populating the duct with the required data cables, foam plugs should be fitted into the annular gap at both ends to prevent ingress of dust or insects.

7.4.6 Fire resistance

NOTE Attention is drawn to all elements of the digital infrastructure installation with the appropriate fire regulations for domestic dwellings.

Figure 4 – Cable ducting diagram



Source: Miniflex

8 Installation testing

The completed infrastructure installation should be tested as fully operational. The results of the tests should be documented, and included with the documentation passed to the homeowner or occupier.

***NOTE** The responsibility for testing the installation lies with the installing contractor.*

The balanced cabling from the home distributor to the telecommunication outlets should be tested in accordance with BS EN 50346 to confirm that the transmission performance meets the permanent link requirements of Class D of BS EN 50173-1 (or Category 5e of ANSI-TIA-568-C.2).

All-silica optical fibre cabling from the home distributor to the telecommunication outlets should be tested in accordance with BS EN 50346 to confirm that the transmission performance meets the permanent link requirements of BS EN 50173-1 (or ANSI-TIA-568-C.0).

Plastic optical fibre cabling from the home distributor to the telecommunication outlets should be tested in accordance with BS EN 50346 to confirm that the transmission performance meets the permanent link requirements of BS EN 50173-1.

9 Documentation and handover

All outlets at the home distributor and throughout the dwelling should be clearly labelled in accordance with BS EN 50174-1.

The labelling of outlet sockets face-plates will be unacceptable if located on the exposed face of the socket. The label should be fixed within the faceplate back box. The labelling should be firmly located to ensure it is not displaced when the faceplate is removed.

The location, dimensions and/or capacity of pathways into which information technology cabling has been installed should be recorded together with details of any mitigation measures applied to provide the required environment in accordance with BS EN 50174-1. These recordings should include the position of the CPE equipment within the primary distribution space.

This documentation should be passed to the occupier of the property when they move into the dwelling.

The documentation should include digital installation instructions, and should be passed to subsequent occupiers.

Bibliography

Standards publications

BS EN 61386– 1, *Conduit systems for cable management – Part 1: General requirements*

BS EN 61386– 21, *Conduit systems for cable management – Particular requirements – Part 21: Rigid conduit systems*

BS EN 61386– 22, *Conduit systems for cable management – Particular requirements – Part 22: Pliable conduit systems*

BS EN 61386– 23, *Conduit systems for cable management – Particular requirements – Part 23: Flexible conduit systems*

BS EN 61386– 24, *Conduit systems for cable management – Particular requirements – Part 24: Conduit systems buried underground*

Other publications

[1] Data Ducting Infrastructure for New Homes: Guidance Note. CLG, March 2008.

[2] Stephen Thorpe and Habinteg Housing Association. Wheelchair housing design guide (2nd edition). BRE Press, February 2006.

Further reading

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

BT Openreach – Builders' Guide to telecommunications infrastructure and installation, May 2007.

NICC Report. April 2010 (full reference to be confirmed)

National Joint Utilities Group – Guidelines On The Positioning And Colour Coding Of Utilities' Apparatus. NJUG, April 2003.

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