



Openreach Developers' Guide

Telecommunications infrastructure and installation

Date: 5th April 2013

Version: 7.0

Notice

BT maintains that all reasonable care and skill has been used in the compilation of this publication. However, BT shall not be under any liability for loss or damage (including consequential loss) whatsoever or howsoever arising as a result of the use of this publication by the reader, his servants, agents or any third party. In the event of a discrepancy between the contents of this document and the contract, the Terms & Conditions shall take precedence. This is a living document and will be subject to update and change. The information within this document is provided for information purposes only. The Contract and Price List take precedence.

CONTACTING YOUR NEAREST NEW SITES OFFICE

Openreach New Sites offices are located throughout the United Kingdom.

Their contact details can be found below:

Bedford	0800 023 4050	Belfast	0800 085 7546	Bristol	0800 212 288
newsite.bedford.g@openreach.co.uk		newsite.btni.team@bt.com		newsite.plymouth@openreach.co.uk	
Crayford	0800 731 6962	Edinburgh	0800 389 8364	Glasgow	0800 389 8439
newsite.crayford@openreach.co.uk		newsite.edinburgh@openreach.co.uk		newsite.glasgow@openreach.co.uk	
Ipswich	0800 592 389	Kidderminster	0800 731 6901	Leeds	0800 212 874
newsite.ipswich@openreach.co.uk		newsite.kidderminster@openreach.co.uk		newsite.newcastle@openreach.co.uk	
Liverpool	0800 731 7208	Manchester	0800 731 7208	Newcastle	0800 212 874
newsite.manchester@openreach.co.uk		newsite.manchester@openreach.co.uk		newsite.newcastle@openreach.co.uk	
Nottingham	0800 731 8138	Oxford	0800 023 4050	Plymouth	0800 212 288
newsite.nottingham@openreach.co.uk		newsite.bedford.g@openreach.co.uk		newsite.plymouth@openreach.co.uk	
Romford	0800 731 7346	Sheffield & Lincs	0800 389 8439	Southampton / Thamesway	0800 234 6752
newsite.romford@openreach.co.uk		newsite.glasgow@openreach.co.uk		newsite.southampton@openreach.co.uk	
Southdown's	0800 234 6753	Swansea	0800 731 4815		
newsite.southdowns@openreach.co.uk		newsite.swansea@openreach.co.uk			

National Freephone 0800 616 866

If dialled from a BT landline within the area of your development then this will connect you to your nearest Openreach New Sites office.

More useful contact information and links can be found on the back cover of this publication.

Contents

INTRODUCTION	4
Openreach and why we make a good provider	4
Copper and fibre usage on developments	4
What will we do to assist you with your development?.....	5
What we need when you contact us	6
New work affecting existing plant	7
Quality Statement	7
EXTERNAL INFRASTRUCTURE	8
Duct Laying	8
Box Laying.....	12
Service Pipe Presentation to Property	18
INTERNAL INFRASTRUCTURE	21
General cabling information.....	21
Copper	25
Fibre	26
Fibre for flats (Multiple Dwelling Units).....	32
APPENDICES.....	36
Abbreviations / Key terms used	36
New Sites stores.....	37
Site offices.....	39
Revision history	40

1. INTRODUCTION

1.1 Openreach and why we make a good provider

As a developer, you're at the heart of the projects that are shaping our country, so the decisions you make regarding telecommunications are vital. That's why you should work with us.

With Openreach, you can offer your customers the widest selection of communications providers and services possible. Our network is maintained by more than 21,000 field engineers working nationwide. And we're ploughing £2.5billion into bringing superfast broadband within reach of two-thirds of the UK by 2014.

But it's not just the quality, reliability and reach of our network that makes it the obvious choice. There's also our knowledge. We can share our in depth knowledge of the products and services that people will use and an understanding of the wired data network that should be installed during construction. Openreach will assist you in delighting your customers by delivering a home that is ready to receive and consume the growing range of connected services over multiple devices.

As a developer, every decision you make has to be right – or it could mean wasted time and money. We'll guide and support you every step of the way. Together we can plan, design and build a network that gives your customers access to the very latest services offered by the widest range of communications providers.

1.2 Copper and fibre usage on developments

Copper and fibre sites

On some sites we use a mixture of copper and fibre to supply the external infrastructure to the properties. Your Newsite Representative will confirm the best technology that will be utilised on your development.

Fibre Only sites

For Fibre Only sites we will provide a pure fibre infrastructure, with fibre provided all the way from the exchange to the customer premises (FTTP). Fibre will be the only communications infrastructure to the site, and will provide all voice and broadband services. Customers will be able to benefit from superfast download and upload speeds.

The network will be installed and ready to go subject to the customer contacting their Communications Providers to request service.

How does FTTP work?

The key difference with Fibre to the Premises is that fibre is provided all the way from the exchange to the premises. Unpowered optical splitters enable a **single fibre to serve up to 32** homes and businesses.

1.3 What will we do to assist you with your development?

The New Sites team is here to assist you provide a communications network to meet your customers' needs. We can help you at every stage of your development.

Plans

It's important that you contact us with your plans as early as possible.

Our New Sites Designers (NSD) will design our network infrastructure including duct routes, joint boxes and manholes etc. and provide you with that plan.

We also offer you a free service to help you identify our underground network and therefore avoid costly damage.

Simply contact "Dial Before You Dig" by email at dbyd@openreach.co.uk

A local New Sites Representative

Our local, named New Sites Representative will help guide you through the end to end process – offering friendly advice and an interface between yourself and Openreach.

Stores

As part of our service, we will supply all the material items you need to build and install the Openreach network on your site free of charge (excluding modular footway boxes) and arrange to have them delivered direct to your site.

Payment Policy and Home Builders Federation agreement

Payment for the construction and installation of the Openreach network on new developments may be made on a per unit basis, at a rate agreed between Openreach and the Home Builders Federation.

More contract information including terms and conditions and payment of invoices can be found on the [Openreach portal > Connecting your development](#)

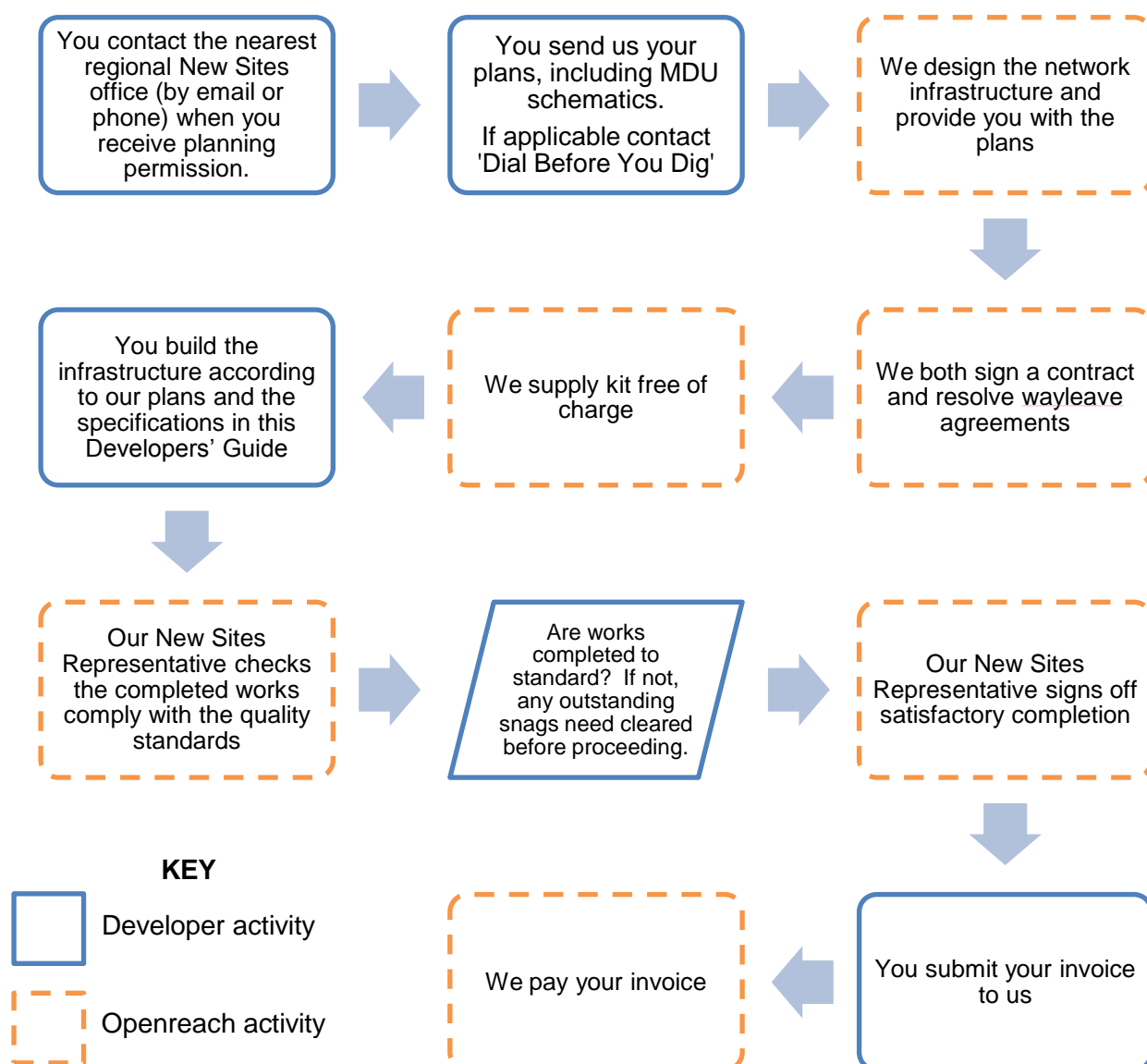
1.4 What we need when you contact us

You can contact your local New Sites office by calling: **0800 616 866**.

To make the process as smooth as possible, and allow us to integrate our plans, it is important you contact us as soon as you achieve planning permission.

It would be helpful if you had the following information when you first call:

- The name and location of your development
- The type of units – flats and/or houses
- The number of units
- Expected start and completion dates for your development
- Your contact details



Process for liaising with Openreach for the planning of telecommunications infrastructure to New Sites

We will also require:

- Confirmation that planning permission has been granted
- Details of your site location and a scaled layout plan
- Floor plans for all the properties on the development with plot numbers – ideally in electronic pdf format (less than 4MB file size)
- Your consent in writing to install, maintain, adjust, repair or alter any Openreach plant that runs through your development i.e. a signed Wayleave agreement

1.5 New work affecting existing plant

If your construction work has the potential to affect our plant, if it interfaces with the public highway, **or you wish to make alterations which affect our plant** within the boundaries of your site, you must inform our “Network Alterations” team.

Either way, after receiving your proposals, we'll look at our records to assess the possible effects of the work and inform you of the outcome in terms of cost to you (if any) and the precautions that your contractors will need to take.

For a small charge we can supply electronic or paper copies of our plant maps by emailing: stoke.incoming.notices@openreach.co.uk or by calling 0800 169 3849.

1.6 Quality Statement

The quality of service we provide to our communication providers depends largely on the reliability of a well-constructed and robust infrastructure. Any non-compliance with the quality requirements must be rectified to a good standard to enable us to provide the quality of services we offer.

If at first fix, the workmanship is of poor quality or during commission it is found that the wiring is faulty or equipment has been damaged, the time and cost incurred correcting this will be at your expense.

Footway and carriageway boxes must be of the required size, shape and construction standard, ducts must be provided at the appropriate entry points into the boxes, tubing needs to be kept clear and internal cabling routed and fixed in a quality fashion.

Your New Sites Representative will conduct regular checks on in progress and completed works. Defects found will be brought to your attention and recorded in a New Site Log to be kept on site. Once the corrective action has been completed or within a timescale agreed to by the developer/site manager and New Sites Representative, a recheck of the work will be carried out.

Many of our quality standards are designed to promote safety, security and reliability in the network therefore it is very important that our quality statements are strictly adhered to.

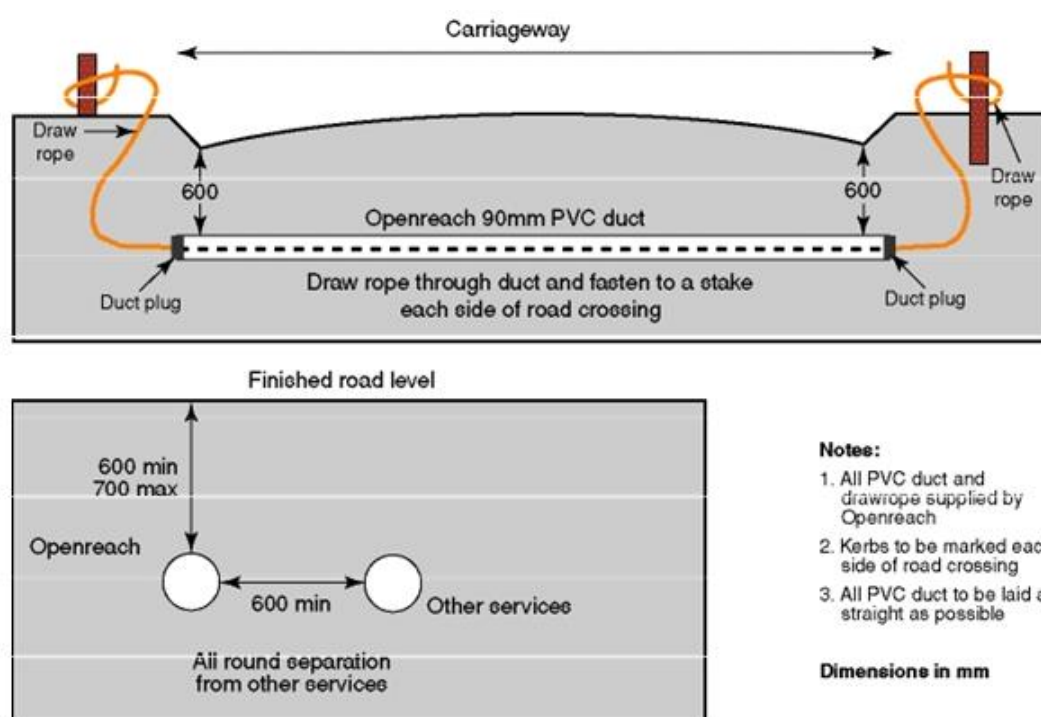
If in any doubt about any of the required quality standards please contact your local New Sites Representative. They will be happy to provide you with further information on request.

2. EXTERNAL INFRASTRUCTURE

2.1 EXTERNAL INFRASTRUCTURE – DUCT LAYING

2.1.1 Carriageway road crossings

- Where our duct crosses a carriageway, adjoining kerbs must be temporarily marked to note positions.
- Openreach **duct should be laid on an outer edge of the service trench**, to enable box building. A draw rope should be inserted through the duct and secured to the marker posts at both ends of the crossing. The appropriate **plug – 4B socket end and 4C spigot**



Road crossing laid on new estates by a developer

Figure 1 Road crossing laid on new estates by a developer

- Duct laid** beneath a carriageway crossing must be **600mm depth** from the cover of the final surface levels and, for engineering reasons (**NJUG 7**), separated from other services **laid in parallel by 600mm** (to permit us to install underground joint boxes without the need for bends). **150mm** of separation is permissible, if the duct is laid at right angles.
- Cable marker No. 2** is required at the site entrance/boundary, to ensure link up identification for our contractors.

2.1.2 Footway - recommended arrangement

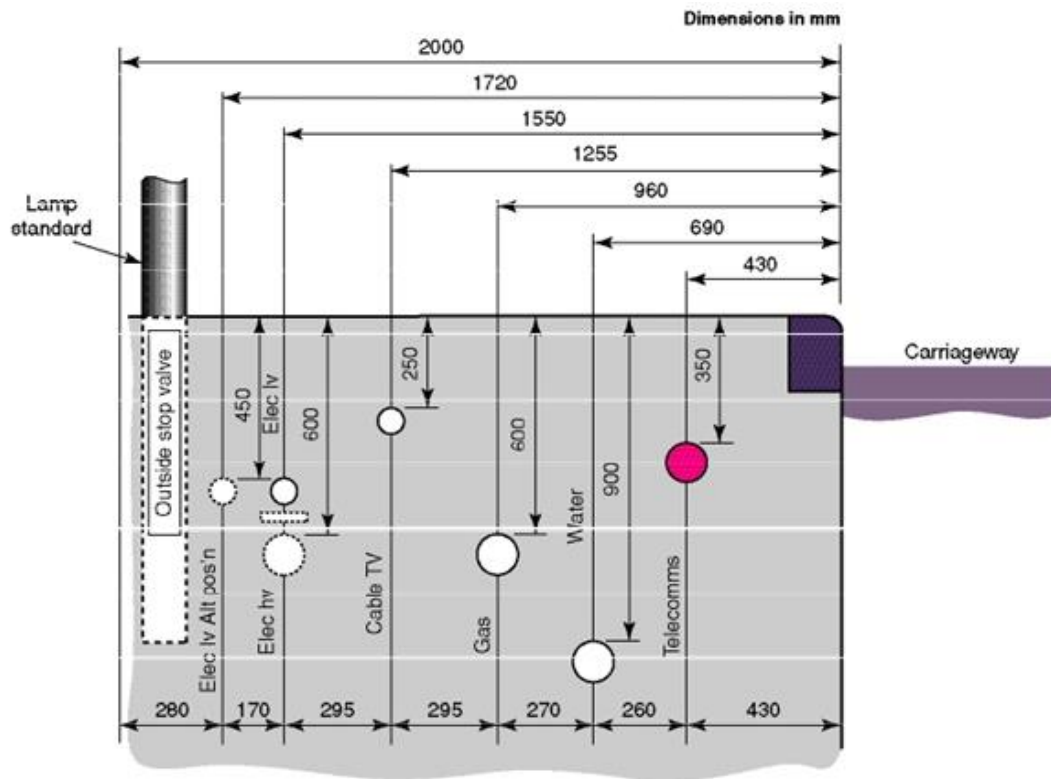


Figure 2 Relative utility positions in a 2 metre footway

2.1.3 Ducting to the Building

Duct to the premises/building must be laid at a minimum depth of 350mm; 450mm under a soft surface, and be as straight as possible.

2.1.4 Service pipe information

The options of service pipe ducting are in the table below:

Type of unit	Copper	Copper & Fibre	Fibre only
House	Duct 56 (50mm)	Duct 56 (50mm)	Duct 25/17 (25mm)
Small apartment block	Duct 56 (50mm)		
Large apartment block	Duct 54 - or multiples thereof (90mm)		

Drop Duct 25/17 is connected to a Duct 54/56 Swept Tee Connection using a Connector Duct 56/25. The Duct 25/17 minimum bending radius is 450 mm.

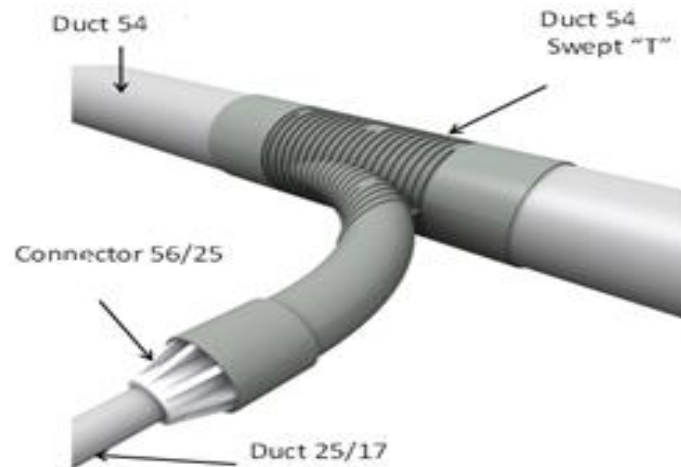


Figure 3 Duct 54 Swept "T"

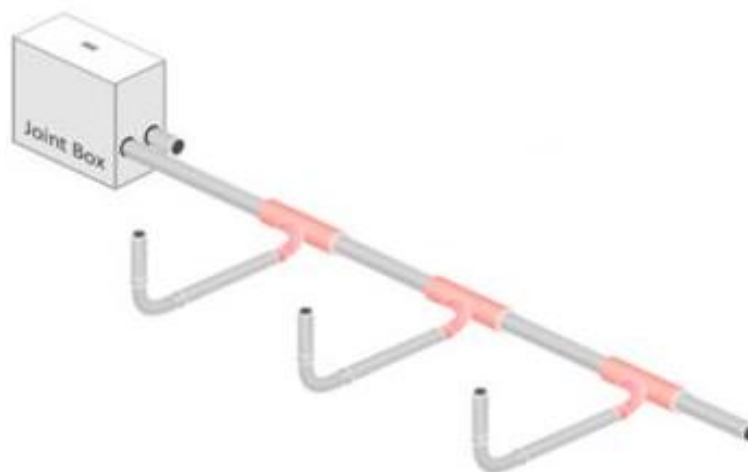


Figure 4 Run of Duct 54 Swept "Ts"

2.1.5 Ducting General Principles

- All runs should be laid as straight as possible. If needed, you can carefully bend the ducts or use pre-formed bends supplied by us.
- There should be no more than one pre-formed 90° bend in any single run of duct.
- Pre-formed 90° bends should not be installed in any duct linking two joint boxes.
- Footpath or service strip ducting must be laid at 350mm depth of cover and 450mm depth of cover within premises.
- All space alongside the duct must be backfilled with granular fill to a minimum thickness of 75mm.
- All ducts must be provided with a draw rope after installation, unless it's agreed locally to substitute the draw rope for a lead-in cable.
- Please notify your New Sites Representative when the duct has been laid and is ready for inspection.

Recommendations on the positioning of utilities mains and plant for new works can be seen in Figure 2. The latest information can be obtained from the National Joint Utilities Group, <http://www.njug.org.uk/>

2.1.6 Fibre and Copper sites

For sites with fibre and copper service you **must** install a single fibre tube next to the draw rope on each plot, running it from the agreed joint box to the agreed position at the premises.

The fibre tubing will be 2.7/6mm, Blown Fibre Tubing (BFT):

- At the building entry point leave a 2 metre tail.
- A 3 metre tail is required at the first jointing chamber.
- Both ends of tubing must be sealed to prevent water and debris entering during and after installation.
- The position of the back box for the internal Customer Splice Point (CSP) should be as close as possible to the point of entry.
- Tubing must be labeled and tied securely in the joint box.
- Draw in tubing in underground duct, using a 7mm diameter hand cabling rod, using a 6mm coupling; install the tubing at hand tension only.
- The minimum bend radius for the tubing is 72mm.
- The maximum distance the external tube can be installed into the building is 2 metres. If the distance from the point of entry is greater than 2m then the tube needs to be connected to an internal single 2.7/6mm 'Reduced Fire Hazard' tubing. (RFH)
- RFH must only be installed within the fabric of a building. This type of tubing is unsuitable for installation in an external environment.
- RFH should be fixed to walls, surface mounted, using white 6.0 mm cleats as a distance of 400 mm on the horizontal & 300 mm on the vertical.
- Approved tubing caps will be supplied free of charge by Openreach.

2.1.7 Duct Sealing

It is your responsibility to ensure ducts are sealed at your premises.

It is **imperative** duct sealing be completed to a good standard to prevent the ingress of hazardous gases or water from leaking into internal structures. If tests are positive or you suspect gas at any time, **stop** and follow all the necessary site safety reporting protocols. Record the information in the site log and notify your New Sites Representative at your earliest opportunity so that the integrity of the gas seals can be checked, and replaced where necessary. The table below gives details on how to seal ducts:

Application	Seal	Degree of sealing
Duct 54D (90mm) whilst laying	Plug Duct 4B, socket end or 4C, spigot end	Ingress of foreign matter
Duct 54D (90mm) open ended without cable	Duct Seal 1A. If the duct is to be cabled within 30 days then use a Plug Pressure 1	Ingress/egress of gas or water
Duct 54D (90mm) open ended with cable	Duct Seal 1A or 1B, depending on cable diameter and quantity of cables	Ingress/egress of gas or water
Duct 56 (50mm)	New seal 56 - item code - 066165	Ingress/egress of gas or water
Duct 25/17 (25mm) – fibre network only	New seal 25/17 - item code - 066166	Ingress/egress of gas or water
For any duct entries where none of the above may be utilised	RISE Duct Seal 100WG or 150WG depending on size and number of ducts to seal	Ingress/egress of gas or water

2.2 EXTERNAL INFRASTRUCTURE – BOX LAYING

2.2.1 Carriageway chamber

The new JBC4(N) New Sites Carriageway Chamber is a low-cost, double-brick construction chamber, for provision by developers only. It uses the standard 'Carriageway No.4 Frame & Cover' and standard Cable Bearers. The 915mm x 445mm opening of the chamber allows it to house the same copper joints typically installed into a JBF104.

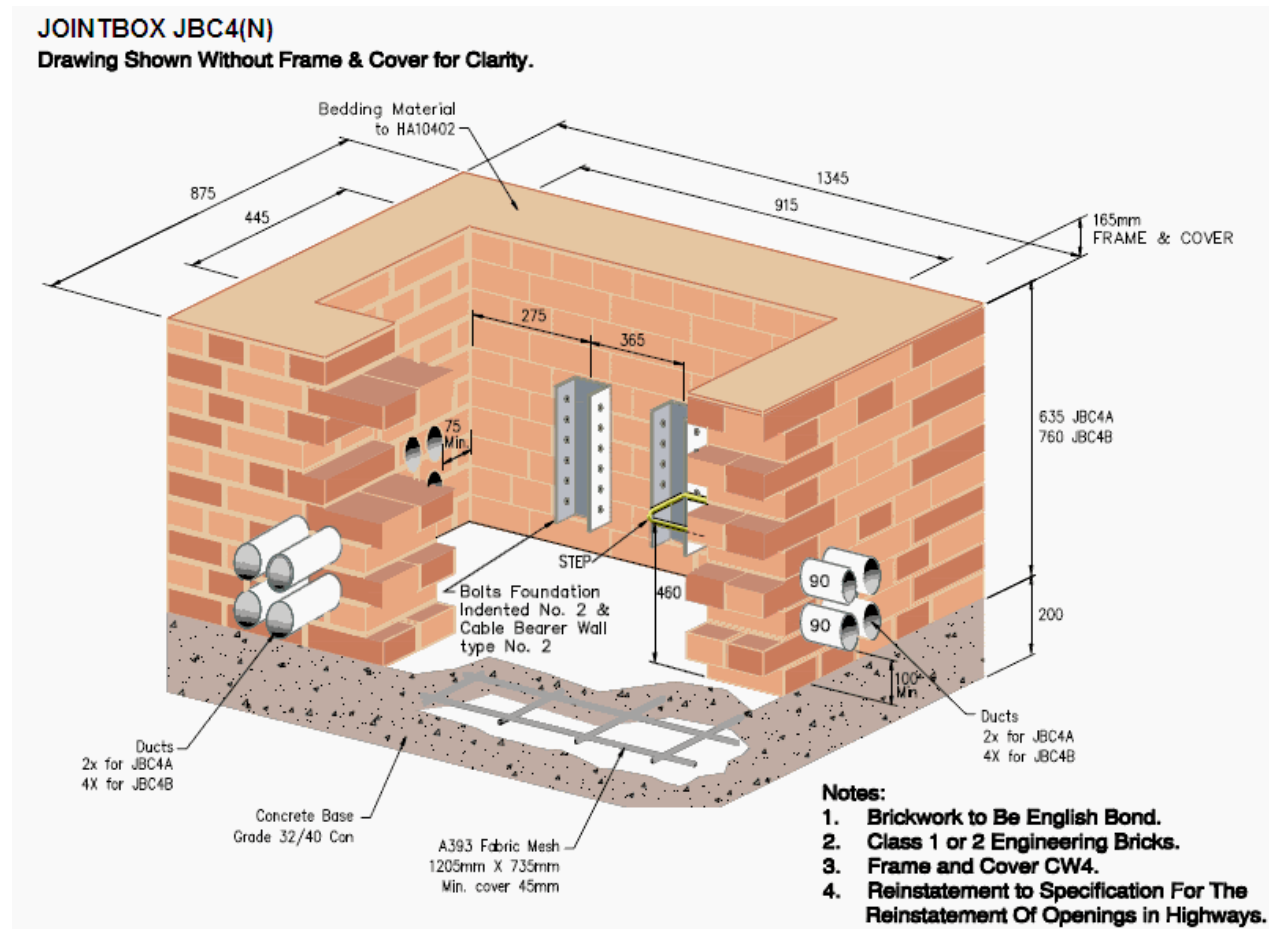


Figure 5 Typical Jointbox JBC4(N)

This illustration is a guide. Detailed technical drawings are also available from your New Sites Designer.

Box design and specification may vary. This will be determined by the duct lay-out and whether multi-way ducts or major road crossings need to be incorporated into the network design.

2.2.2.1 Carriageway chamber construction

Materials

- Bricks: Grade B to BS EN771 & BS EN772.
- Cement: BS12 Portland Cement.
- Concrete: Grade 32/40 reinforced concrete with A393 Grade Mesh at 70mm Cover - BS EN 206.
- Mortar: Designated within BS 5628; Part 1 Requirements for Mortar Table 1; Type (i) BS 5628.

Base

- Concrete Grade 32/40.
- A393 Grade Mesh at 70mm Cover.

Brickwork

- All brickwork to be keyed in at corners and pointed.
- All Brickwork shall be constructed with a 10mm joint thickness of cement mortar and shall be of English Bond.

Frame and Cover

- Carriageway No.4 Frame and Cover to be set on a mortar bed and fitted squarely to box structure to Highway Agency Document standards HA104.
- BT Item Code 057246 Frame & Cover Carriageway 4E.
BT Item Code 057250 Frame & Cover Carriageway 4E Lockable.
- Lifting keys for this cover can be purchased from:
TW Engineering, Angular House, Eagle Road,
Quarry Hill Industrial Park, Ilkeston, Derbyshire DE7 4RB.
Tel: 0115 932 3223 - Description: Lifter Manhole Cover 4B.

Duct Entries

- Where the duct enters the chamber the duct shall enter flush with the wall.
- Duct must not enter through corners and be no less than 75mm from the side wall.
- Duct to enter wall 600 mm minimum depths from top of frame.
- Duct to clear base by 100mm minimum.

Ironwork

- Fit all Bolts, Cable Bearer Wall Types and Bracket Cable Bearer as supplied.
- A single step shall be fitted as defined in the drawing.

Internal Dimensions

The Carriageway No.4 Frame & Cover with a suitable Mortar bed will sit 165mm above the brickwork. The brickwork construction will have a 915mm x 445mm opening and an 800mm or 925mm depth.

Any deviation from these measurements must be authorised by your New Sites Representative.

2.2.2 Jointing chamber construction

The diagrams and specifications you see here illustrate the most frequently used joint boxes at new developments (i.e. [JBF 104](#) and [JBF 106](#)). However, joint box designs and specifications may vary, depending on the duct layout and whether multi-way ducts or major road crossings need to be incorporated into the network design.

Materials

- Bricks: British Standard EN771-1, Engineering.
- Cement: British Standard EN197-1:2000 ordinary mix, 3 parts sand to 1 part cement.

Specifications

- Base: 150mm concrete, clean and level.
- Brickwork: Keyed in at the corners and pointed.
- Frame and cover: Set on a mortar bed and fitted squarely to the box structure. You can purchase lifting keys (key No. 5, item code TW1731) for the covers from TW Tools, <http://www.twtools.co.uk>
- Duct entries: Must not enter through corners and be no less than 75mm from the sidewall. Should enter wall at a minimum depth of 350mm from the top of the frame, cut flush and clear the base by a minimum of 100mm.
- Bolts: Bolts must be fitted in each box to allow ironwork to be installed.
- Step(s): One step is required in all boxes deeper than 700mm. Two steps are required if the depth of the box is more than 1050mm.

Internal dimensions

- JBF 104(C): 915mm(l) x 445mm(w) x 750mm(d)
- JBF 104(D): 915mm(l) x 445mm(w) x 900mm(d), the minimum depth for boxes either side of road crossings.
- JBF 106(F): 1310mm(l)x610mm(w)x1200mm(d).

At no time must minimum box depth be compromised. If minimum 750mm depth cannot be achieved, consult your Openreach New Sites Representative. The minimum box depth stated for a JBF 104 will accommodate the 4.2 metres of Blown Fibre Tubing (BFT) required to achieve the minimum safe bending radius when joints are in the open work position or in the closed box stored position.

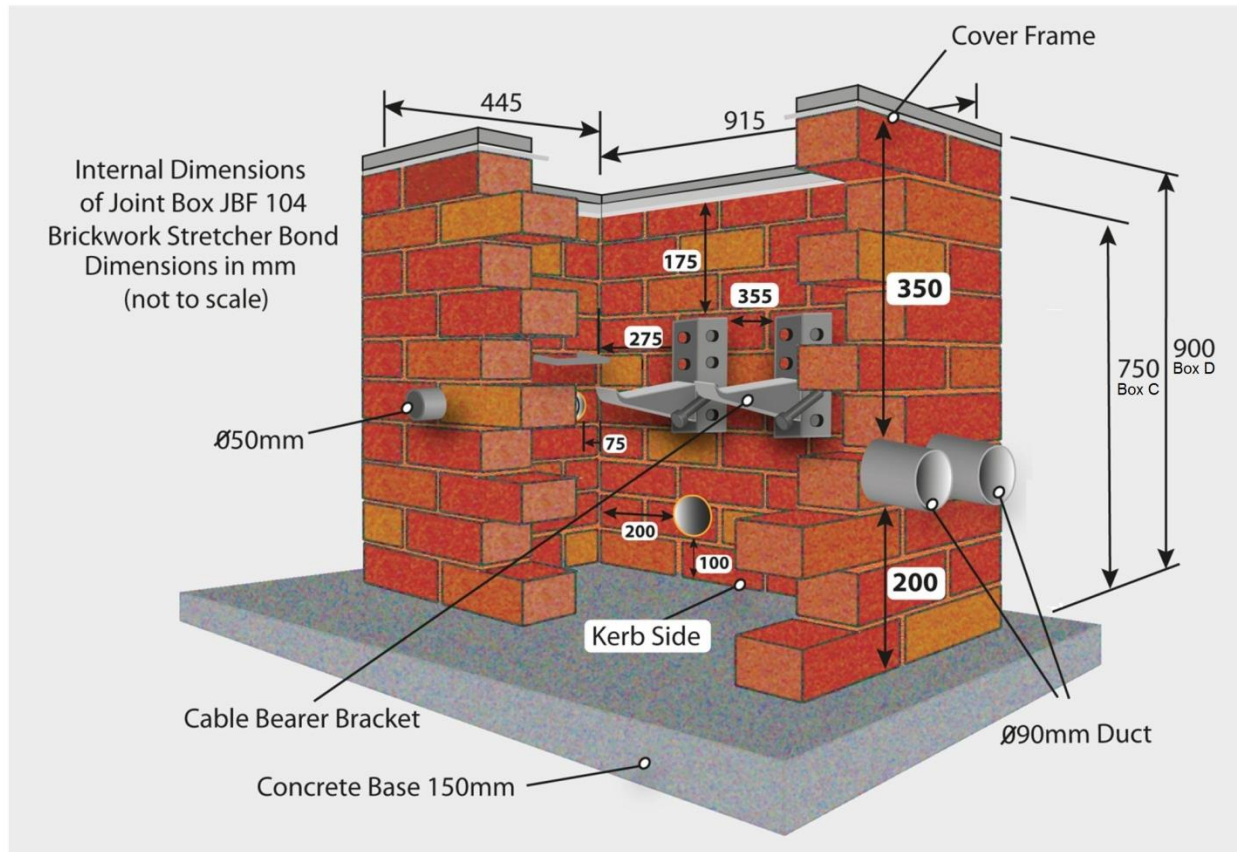


Figure 6 Typical footway chamber (non-traffic) layout of Joint Box Footway - JBF104

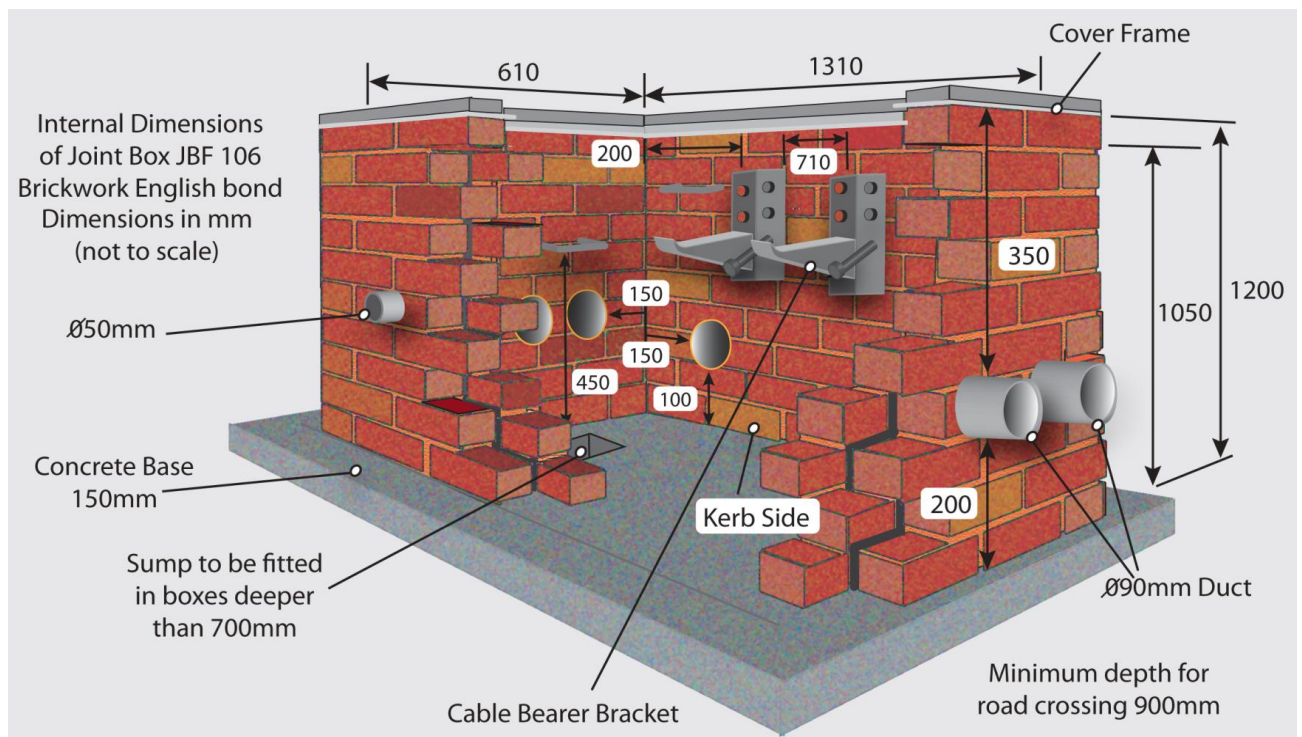


Figure 7 Typical footway chamber (non-traffic) layout of Joint Box Footway JBF106

2.2.3 Pre-formed chamber system

We've approved a pre-formed chamber system – Quadbox, to speed up the installation process. This means that there's no need for specialist box building teams and concrete backfill. The Quadbox needs to be suitable for locking frames and covers.

Quadbox comes in standard 150mm deep structural twin wall ring sections to provide maximum flexibility and strength. Joint box Modular Footways 102, 104 and 106 are the Openreach approved versions (BT specification LN178). You must provide a clean and level 150mm concrete base for them.

Box furniture items slot into moulded pockets within the chamber, eliminating the need to cast-in fixings or drill on site. Duct entries are also easy to achieve, using a standard hole-saw mounted on a cordless drill.

The Quadbox isn't available as a free stores item from Openreach, but can be purchased directly from our approved supplier, Cubis Industries <http://www.cubisindustries.com>. Permission needs to be sought from your New Sites Representative.



Figure 8 Laying the Quadbox



Figure 9 Duct entry being cut using a hole-saw and drill

2.2.4 Non-standard frames and covers

Only approved frames and covers must be fitted on your site. These need to be lockable. Approved frames and covers are identifiable via the embossed markings on each end:

- EN124 (the EU standard), B123 (the class of EN124) and the British Standards kitemark.
- Manufacturer's mark (SID or SGP), the year of manufacture (e.g. 09, 10 and 11) and the BT identifier.

Non-standard frames and covers pose a health and safety risk to our engineers, and they cannot attempt to lift them.

If you are planning to install frames and covers that are not supplied by Openreach e.g. for block paving, or you have any doubts about what frames and covers to use, advice should be sought from your New Sites Representative.

2.2.5 Security

A new range of lockable footway frames and covers are supplied by BT for protecting the network. The covers have turnbuckle locks and fit into a reinforced frame that is bolted to the joint box during installation. The frame has tabs which need to be bent down and bolted to the walls of the structure. An installation kit is provided for each frame.



Figure 10 Photo of the frame for the lockable cover. Note the “tabs” bent down and bolted to the walls of the structure.

2.3 SERVICE PIPE PRESENTATION TO PROPERTY

2.3.1 Copper installation

2.3.1.1 Installation for houses

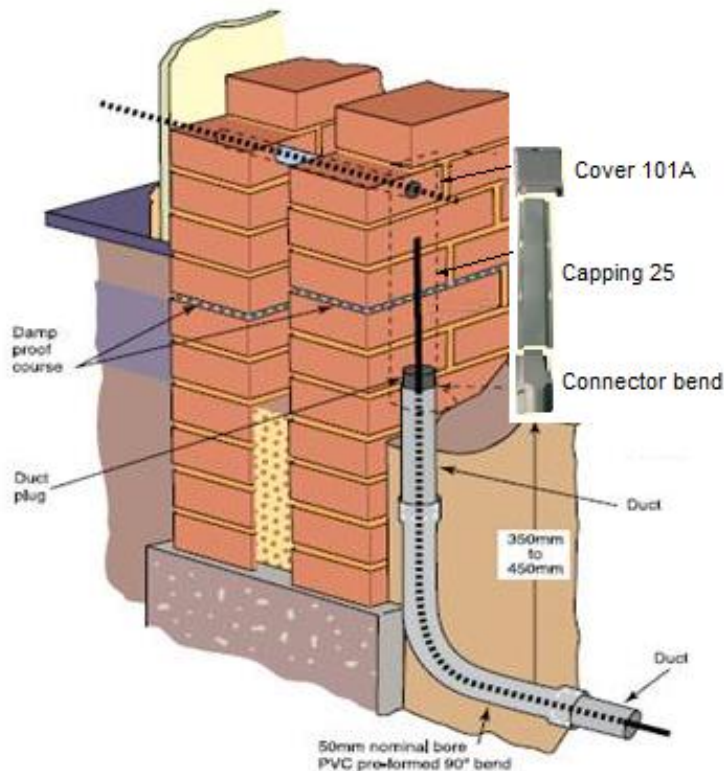


Figure 11 Service pipe presentation to a dwelling house

- Lay Openreach grey duct from the footway joint box (with the socket end presented to the joint box) and terminate it with a pre-formed 90° bend on the outside wall of the house. Keep duct runs to a minimum depth of cover of 350mm beneath the proposed finish level (450mm under a soft surface).
- Supply and install standard 20mm electrical conduit through the cavity wall at a point vertically above the end of the service duct.
- All duct must be provided with a lead-in cable after installation. Leave a 1m tail at the house end of the duct and a 3m tail the chamber end of the duct.
- The service duct must cut level, two bricks below the damp proof course and must be sealed at both ends, using duct plug 1A to prevent foreign matter getting in.
- External capping 25 and connector bend 4 should be fitted, as required.
- You must also install a single fibre tube next to the draw rope on each plot, running it from the agreed joint box to the agreed position at the premises. This would not be applicable for "copper only" sites.

Please note that:

- All internal wires and sockets beyond the master Network Terminating Equipment are you/your customer's responsibility.

2.3.1.2 Copper installation for apartments and small business properties

You should agree an appropriate method of cable entry with us at the design stage. If you need to make changes along the way, please don't forget to agree them with us first.

Each property must have its own cable running from the main entry point, or as agreed at the initial site meeting/proposal stage. The cables to each property are owned by Openreach and must be terminated on an Openreach master socket, which should be easily accessible for maintenance.

Please note that our wiring should never be terminated directly onto multimedia sockets. If it is and if a fault develops that requires the attention of an Openreach engineer, your customer may incur charges from their communications provider.

- Lay Openreach grey duct from the footway joint box, with the socket end presented to the joint box and terminated with a 90° pre-formed bend on the inside of the site wall.
- Keep duct runs to a depth of 350mm/450mm beneath the proposed external ground level
- The section of duct that passes through the wall/floor must be coated with solvent cement compound 21 and then a dry 3:1 sand/cement mixture.
- Any joints inside a property should also be coated with solvent cement compound 21.
- Wiring within cavity walls must be installed within 20mm conduit (to ensure easy maintenance).
- The Openreach duct should be as close to the finished wall as possible
- **Please note that it is your responsibility to ensure that all duct seals have been installed correctly (see duct seal section for more information) to provide the ingress of gas and water.**

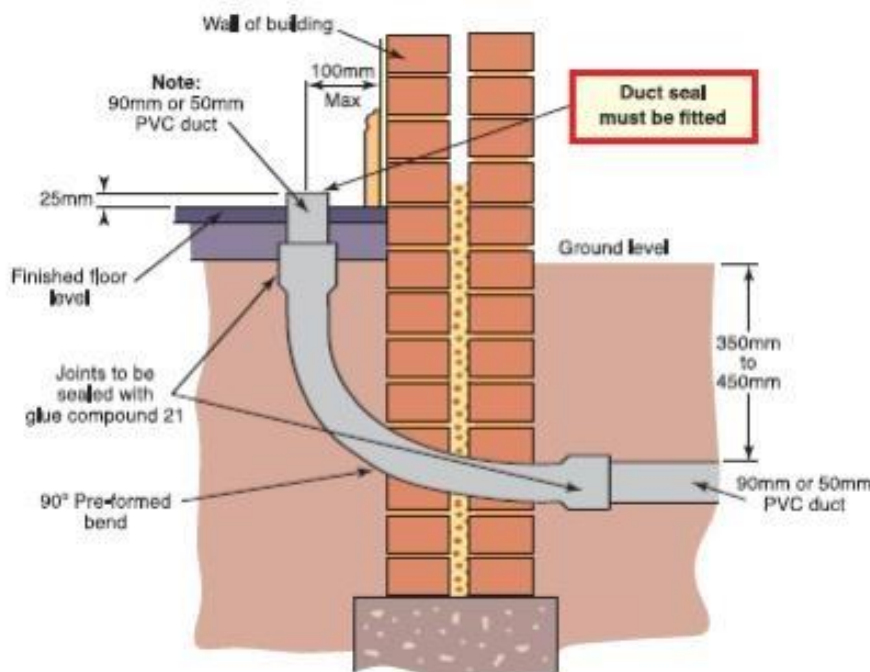


Figure 12 Location of duct and importance of duct sealing

2.3.2 Fibre installation

2.3.2.1 Installation for houses

You will provide Duct 25/17, which is used solely for fibre delivery, to the agreed position in each property. Each house will have one 6mm Blown Fibre Drop Tube (BFT) installed from the BFT Manifold box as per the site plans agreed with Openreach.

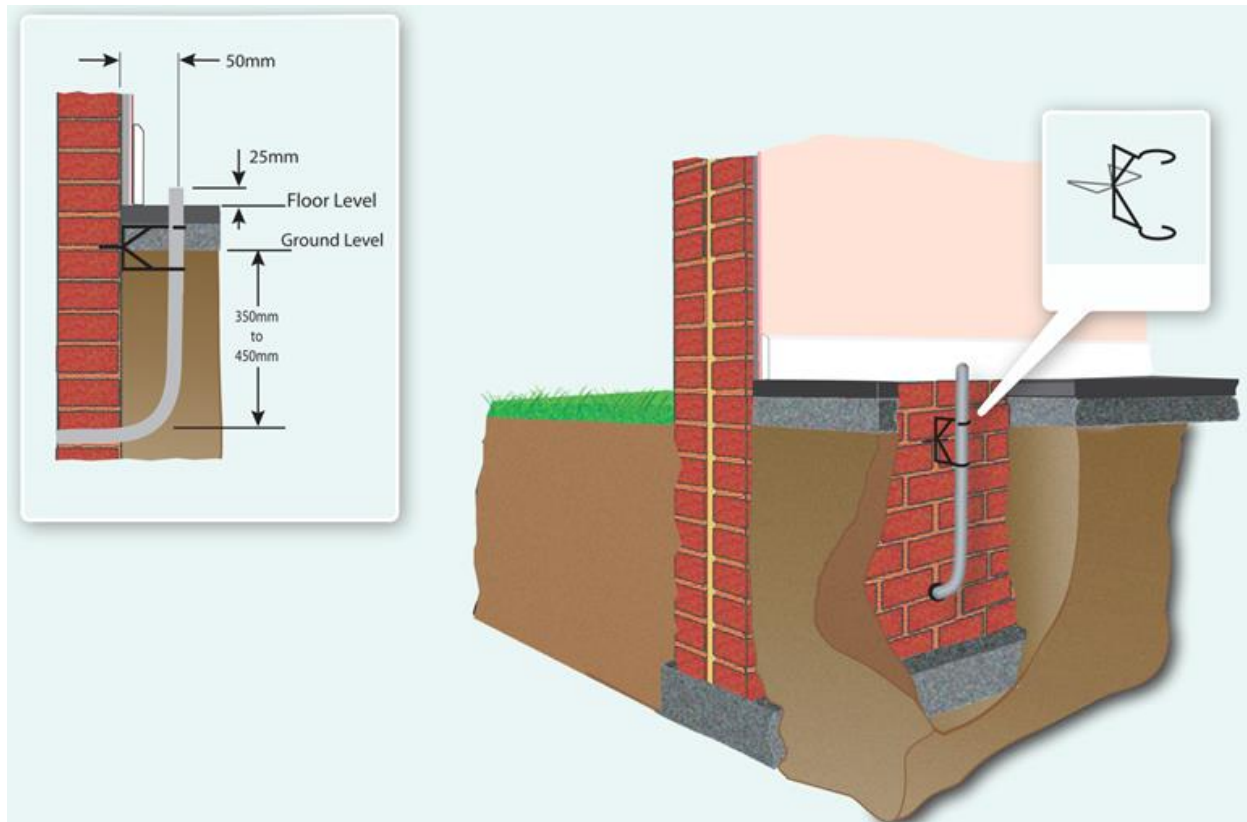


Figure 13 Schematic of blown fibre tubing delivery to premises

3. INTERNAL INFRASTRUCTURE

3.1 GENERAL CABLING INFORMATION (COPPER AND FIBRE)

3.1.1 Cable types

Cables within customer premises must conform to the relevant fire regulations. External type cable can be taken up to **2 metres** from the internal building entry point. From that point onwards all cable must either be of retarded, reduced or limited fire hazard properties.

Cable types possessing such properties are RFH (Reduced Fire Hazard) or LFH (Low Fire Hazard) cables. Cable not possessing these properties must be housed in metallic trunking.

3.1.2 Cable Bending Radii

Cabling installation works, such as cabling directly on wall, cable in trunking or on trays for fixing cables must not compromise bending radii of cables. Pulling force on a 7 tube 2.7/6mm must not exceed 1kn or hand tension. The bending radius of a cable is measured to the inner edge of that cable and equals the **multiplying factor times the cable diameter**.

Minimum bending radius for pulling during installation is twelve times the outside diameter.

3.1.2.1 Copper Cables

The minimum bending radius for copper cables is summarised in the table below.

Copper Cable Type	Minimum Bending Radius
External (PE sheathed)	7 x outside diameter
Internal Twisted Pair (RFH sheathed) <= 20mm	4 x outside diameter
Internal Twisted Pair (RFH sheathed) 21-90mm	6 x outside diameter
Internal Coaxial/Double Braided Cable	6 x outside diameter

See International Standard ISO/IEC 11801 - Generic Cabling Specification for Customer Premises.

3.1.2.2 Cable optical fibre & blown fibre tubing

The Cable Optical Fibre (PELFH sheathed) minimum bending radii is 12 x the outside diameter for both pulling and setting.

For Blown Fibre Tubing run directly on a wall, in trunking or on trays the bending radii are not to be set less than the following:

For 5mm tubes	Bending radius
7 tube cable PE and RFH type	225mm
4 tube cable PE and RFH type	200mm
2 tube cable PE and RFH type	115mm
1 tube cable PE and RFH type	115mm
1 tube unsheathed	100mm desired - 60mm limit

Blown fibre tube bends should be kept to a minimum, with adjacent bends being spaced no less than one metre apart to maintain blowing integrity. The maximum of 28 right angle bends applies to planning limitations of 600m for 5mm tubing.

Installations of trunking, conduit, cable tray or cable grid are **not** to compromise cable bending radii.

3.1.3 Cable separation – power

A minimum separation distance between power (supply or distribution) cables and copper communications cables must be maintained. Separation distance is subject to the voltages and power levels involved.

For fibre only sites for broadband and telephony services then a Blown Fibre Tubing containing no metallic components can be run on trays alongside other services. Where copper cables are required for special circuits, e.g. alarm lines, lift lines etc., it may be prudent to maintain the separation distances for Blown Fibre Tubing as copper cables could be installed adjacently at a later date and from a customer perception a separate route may not be possible.

3.1.4 Separation Distances (IEE Regulations)

The developer shall adhere to the following principles for power up to 2kVA and voltages up to 500V:

Cable Types	Distance
Unscreened power lines and unscreened communication cables without a divider	300mm
Unscreened power lines and unscreened communication cables with metallic divider ²⁾	150mm
Unscreened power lines and screened communication cables ¹⁾ without a divider	70mm
Unscreened power lines and screened communication cables ¹⁾ with metallic divider ²⁾	30mm
Screened power lines and unscreened communication cables ¹⁾ without a divider	30mm
Screened power lines and unscreened communication cables ¹⁾ with metallic divider ²⁾	2mm
Screened power lines and screened communication cables ¹⁾ without a divider	15mm
Screened power lines and screened communication cables ¹⁾ with metallic divider ²⁾	1mm

¹⁾ The distances depend upon the way the screen and metallic divider is bonded and earthed.

²⁾ The distance also depends on the material of the divider where a non-ferrous material has been chosen i.e. aluminium.

3.1.5 Cable runs - general rules for cabling

The New Sites Representative will advise you on any cable marking/labelling where required.

All work must be carried out in accordance with the standards in the latest edition of the IEE Wiring Regulation.¹

3.1.6 Securing Cable optical fibre and blown fibre tubing.

Cable Optical Fibre fixed directly on walls must either use shouldered cleats that just grip the cable sheath or you can use plate cable fixings. It is important to **prevent distortion** to the sheath, thus compromising the optical performance of the fibres within the cable.

Blown Fibre Tubing fixed directly on walls should use plate cable fixings, with cable ties, or shouldered cleats that **avoid compressing** the tubing and restricting the path of the blown fibre bead attached to the bundle for installation.

Note:

Care must be taken when securing the tubing to walls & trays that the outside diameter of the tubing is not squeezed or compressed in any way. Any damage of this nature can hamper or prevent service to the end user.

3.1.7 Suspended/false ceiling cabling

Under **NO** circumstances should cables be secured or supported to the suspended ceiling hangers. Appropriate compliant IEE Regulation devices and cabling equipment **must** be used.

3.1.8 Raised floor - under floor containment systems

Segregation of cables must be maintained between telecommunications cabling and other services. Cables shall follow well defined routes and be fixed to the anchor points at regular intervals. Cables **must not** be fixed to floor support legs.

3.1.9 Cabling in risers

3.1.9.1 Fire stopping

It is the installer's responsibility to provide, remove or replace fire-stopping material when working in risers.

¹ Includes but is not limited to installation of trunking, conduit, cable tray, cable grid; bonding and earthing; installation of power supply extensions; skirting

3.1.9.2 Riser cabling

Before work is commenced in riser cupboards installers must make sure that cabling and associated equipment does not interfere with, or is not interfered by other services.

e.g. Un-insulated hot water pipes
unscreened or unshielded mains cables,
fluorescent lighting,
heavy duty electric; switch gear and so on,
supplies to lift motors.

3.1.10 External Cabling

Externally run telecommunication cabling must be of a type designed for external use, comply with bending radius rules and separation distance rules from power supplies.

3.1.10.1 Lightning protection

If we identify your site as being in an area of higher risk than normal from lightning, we may ask you to provide additional protection. For example, we may ask you to provide an earth wire to the Openreach main distribution point, or run copper tape in the ground to the jointing chambers.

3.1.10.2 Next generation access for new build homes - guide

There is an industry guideline 'PAS 2016:2010 – next generation access for new build homes guide' produced by BIS and the British Standards Institution (BSI), available at <http://www.culture.gov.uk/publications/7830.aspx> The document advises you how to pre-wire homes to ensure the best end user experience when Superfast Broadband is used.

3.2 INTERNAL INFRASTRUCTURE – COPPER

3.2.1 Standard Wiring

Please note that while the provision of internal wiring beyond the Openreach master socket will normally be your or your customer's responsibility, you can contract an Openreach engineer to do this work for you. If you're interested, please contact your local New Sites office.

3.2.2 Additional extension sockets (customer owned)

Please note the following:

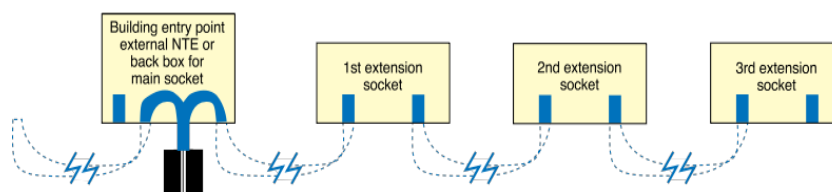
- The wire diameter must be between 0.4mm and 0.63mm, solid or multi-strand (bell/alarm wire is not suitable under any circumstances) i.e. of suitable grade for telephony or data.
- Any faults dealt with onsite by our engineers and proved to be due to your/customer's wiring will be chargeable
- Detailed information on cable installation and separation is provided in the current IEE Regulations for Electrical Installation.

3.2.3 Installation

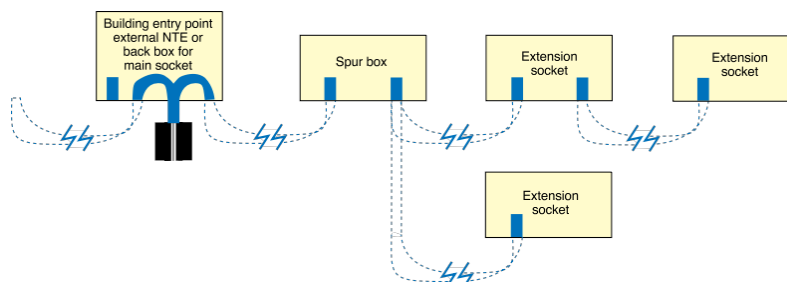
- Extension cabling must run from the back box of the main socket with 300mm left coiled within it for connection.
- Extension sockets must be mounted on single-gang flush steel boxes that conform to current IEE Regulations.
- Extension sockets should be located close to power sockets for easy equipment connection. However, you must leave a minimum of 50mm between telephone cables and power cables throughout. Where this is not practical, telephone and power cables must be separated by an acceptable divider (i.e. of rigid, non-conducting material).

3.2.4 Phone sockets cabling arrangements - guidance

3.2.4.1 Series cable installation



3.2.4.2 Spur cable Installation



3.3 INTERNAL INFRASTRUCTURE – FIBRE

3.3.1 Fibre service to a single premise

The Customer Splicing Point (CSP) is the transition point between the external and internal cables and can be located either externally or internally.

3.3.1.1 External Customer Splicing Point



Figure 22 External Customer Splicing Point covering the Customer Lead In (CLI)

The external CSP comes in a choice of three colours – grey, white and brown.

Dimensions:

Width is 163mm, height 100mm, depth 30mm.

Locating the external CSP:

For drop duct terminating, the CSP should be mounted above the Capping 25 covering the lead in as shown above.

Connectorised cable is used by Openreach to connect the external CSP to the Optical Network Termination (ONT) inside the house.

3.3.1.2 Internal Customer Splicing Point



Figure 24 Internal Customer Splicing Point on internal wall

The internal CSP comes in one colour – white.

Dimensions:

Its dimensions are the same as the external CSP; width is 163mm, height 100mm, depth 30mm.

Locating the internal CSP:

Where the drop duct terminates within the premises the CSP has to be mounted internally and it should be mounted directly above the duct entry as shown in the diagram above. It is the responsibility of the developer to supply suitable internal capping/trunking.

The entry point must also take account of the need to connect internal home wiring for both ordinary voice phone extensions and data network as well as the need to place alongside the Optical Network Termination (with power), and any Communication Provider equipment e.g. a router.

Typical locations are:

- a cupboard e.g. under the stairs.
- an external wall, near TV point in lounge

There should be a double power socket within 1 metre to power the equipment.

3.3.1.3 Slave Customer Splicing Point

It is possible to locate the ONT and Battery Back-up Unit (BBU) further into the house for example in a home office.

This option would need to be agreed with Openreach, and may involve additional costs to you.



Figure 25 Slave customer splicing point concept

3.3.1.4 The ONT, BBU and placement guidelines

The Optical Network Termination Unit (ONT)

The ONT is used to convert the digital signals from the Openreach fibre network to a suitable form to be used by the end user.



Figure 26 The Optical Termination Unit (ONT) – top and side

Dimensions

Indicative dimensions of the ONT are: 195mm (l) x 155mm (w) x 32mm (h). Dimensions are anticipated to reduce in the future, benefitting from technology improvements.

The ports can be seen in the right hand figure above. The optical port connects to the Openreach network using a connectorised cable to the internal or external customer splicing point (CSP).

The Ethernet ports are used to connect up to the customer data equipment or network.

Battery Backup Unit

The battery backup unit ensures telephone calls can still be made should there be any interruption to the mains power supply.



Figure 27 The front of the Battery Backup Unit

Dimensions

Indicative dimensions of the BBU are: 55mm (l) x 155mm (w) x 35mm (h). Dimensions are anticipated to reduce in the future, benefitting from technology improvements.

Placement guidelines

The following applies to positioning the ONT and BBU:

- 400mm above finish level of floor, ideally, but 300mm as a minimum
- Aligned with height of power outlet (double socket)
- Aligned with Customer Lead-In & Customer Splicing Point
- The ONT must be accessible for both end user and Openreach engineer.
- It must be in an environment above +5C but not exceeding 25C
- Where equipment is positioned under the stairs of single dwelling units (SDU) consideration for adequate ventilation must be observed. i.e. this area cannot be used for the storage of bulky items that could reduce or cut off air circulation.

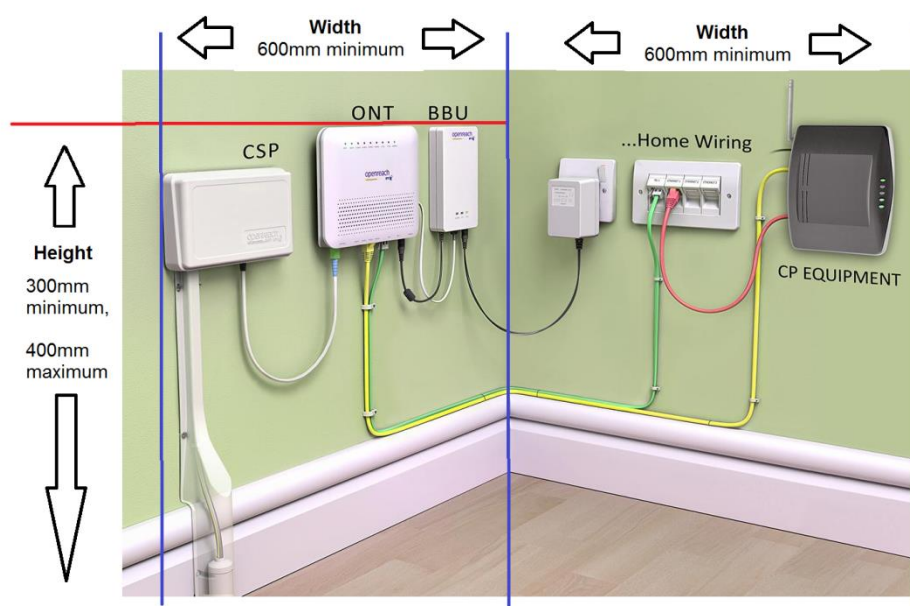


Figure 28 Zoning diagram showing ideal spacing of equipment

3.3.2 Voice wiring

If a minimal voice home wiring installation is required, consisting of a series of interconnected sockets around the house, then one socket should be in close proximity to the ONT. Ideally the socket should be less than 0.5m away. The ONT port and the voice socket should be interconnected by a flying lead (male to male), as shown below or by a flying lead from the back box to the ONT. The 431A jack is available from most electrical wholesalers.

The ONT has a standard telephone socket into which a 431A jack will be plugged in order to connect the ONT to the installed wiring. Two options are shown below.

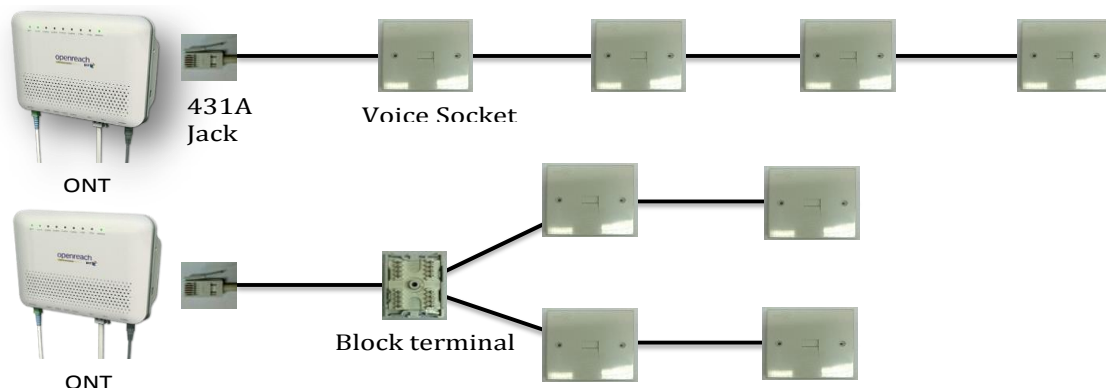


Figure 29 Examples of voice wiring

3.3.3 Data wiring

Data wiring for two or more data sockets, must be star configured utilising Cat 5e cabling (or higher spec) as shown in figure below. This provides the most flexibility for Ethernet-enabling each location within the premise.

The CP router should be located near the ONT connected by Cat 5e wiring in order to connect to each point as required. Both the CP router and ONT should be in close proximity of a double power socket.

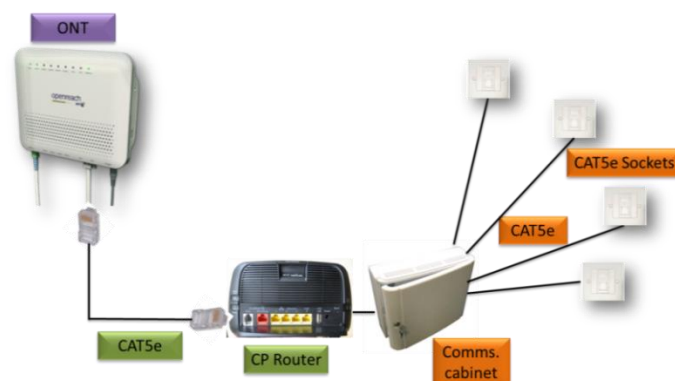


Figure 30 Data Network star formation

Depending on the number of end points, you may choose to install a communications cabinet and patch panel to ease cable management.

3.3.4 Combined Voice and Data Networks

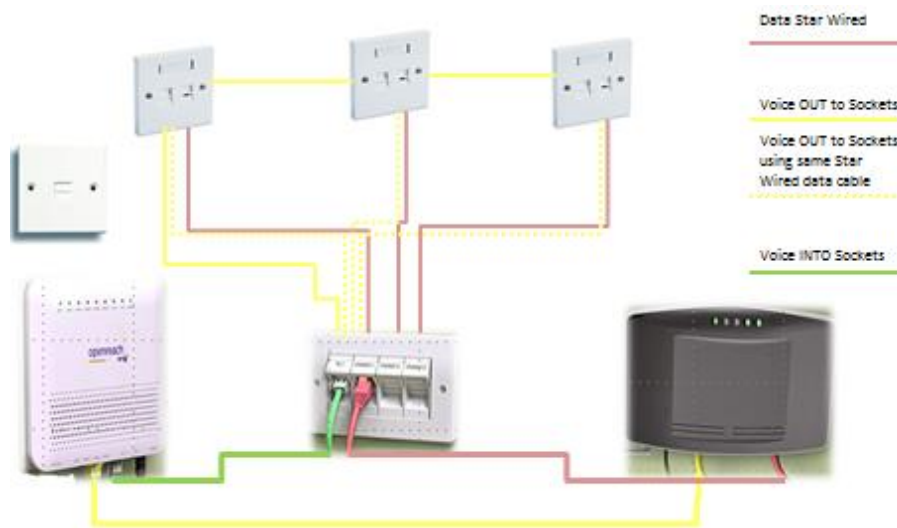


Figure 31 Diagram showing one of the many possible configurations for separate voice and data distribution. It should be noted that a double power socket is required to be in close proximity.

3.3.5 Optional “Comms box” – not supplied by Openreach

Where the drop duct terminates or the CSP has to be mounted in an area of high visual impact the customer could be offered the ‘cost option’ of mounting all the internal components in a ‘Comms Box’ which will house the CSP, ONT, ONT BBU, CP Equipment and Home wiring interface

An example of a ‘Comms Box’ is shown below with an optional Patch Panel:

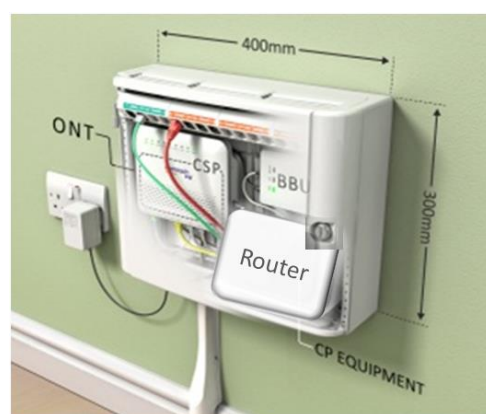


Figure 32 Typical ‘Comms Box’

Note: The ‘Comms Box’ can be used where the drop duct terminates either internally or externally

A suitable supplier of the Comms Box is Prysmian. They can be contacted on 023 8060 8760 or at www.prysmian.co.uk.

3.4 INTERNAL INFRASTRUCTURE – FIBRE FOR FLATS (Multiple Dwelling Units)

If you, or your architect, provide our New Sites Designer with the Mechanical and Electrical (M&E) drawings for the complex, we will agree a telecoms layout with you and provide a design spreadsheet, equipment/cable specs and timeframes for delivery of stores.

3.4.1 Network design

For fibre only Multiple Dwelling Units, some of the new network components are moved into the building depending on the size of the complex. When this is done, a fixed fibre cable will run into each apartment rather than blown fibre tubing. Because of this a manifold is not used.

Larger Multiple Dwelling Units will have splitter nodes fitted internally. Smaller sites may only have internal Fibre Distributions Points. We will explain whether this is the case for your site. Details of internal splitters and Fibre Distributions Points can be found in the “stores” appendix later in this guide.

The locations will be agreed with you by our New Sites Designer. We endeavour to locate our splitters and Fibre Distributions Points in secure cupboards or risers, ensuring they can be easily accessed without using a ladder – at a minimum height of 0.2m and a maximum of 1.5m.

All fire stopping must be in accordance with:

- “The building regulations 2000 (rev.2006) Fire safety, B3 section 7”
- “Fire stopping and penetration seals for the construction industry” ASFP red book
- “Ensuring best practice for passive fire protection in buildings” ASFP

At each apartment you are required to leave a 2 metre length coiled within a back box near to where an ONT would be installed, and 2 metre length at the Openreach Splitter Node/Fibre Distribution Point.

Openreach will install and commission the ONT once permanent power is available.

3.4.2 Installation procedure

We will agree with you whether we install ducting (including the lead in from the box in the street) or whether you do it. However, we would normally ask you to install internal cabling.

We install the splitter nodes and Fibre Distributions Points at our agreed locations and splice the fibres as appropriate.

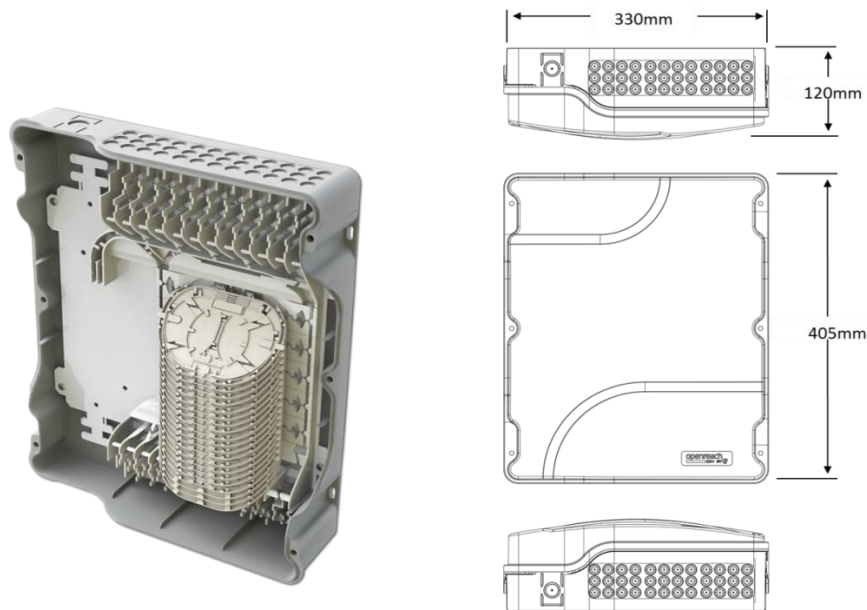


Figure 33 Internal splitter node

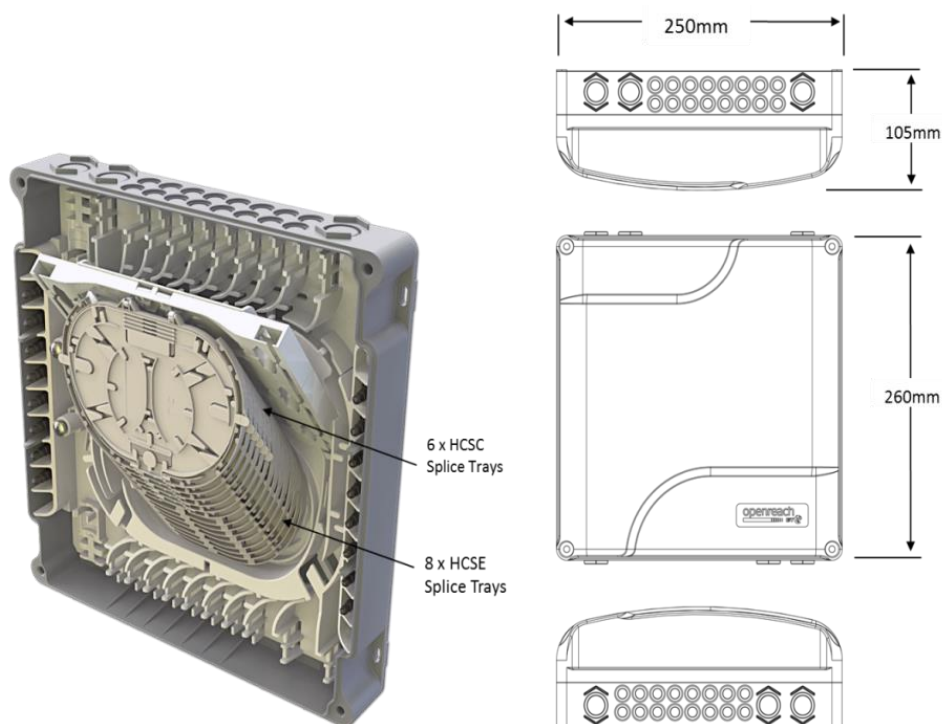


Figure 34 Internal Fibre Distribution Point

The locations will be agreed with you by our New Sites Designer. We will seek to avoid locating our splitters and Fibre Distributions Points in communal areas, preferring secure cupboards or risers. We will also seek to locate these nodes where they can be easily accessed without using a ladder – at a minimum height of 0.2m and a maximum of 1.5m.

3.4.3 Larger Multiple Dwelling Units Network Design example

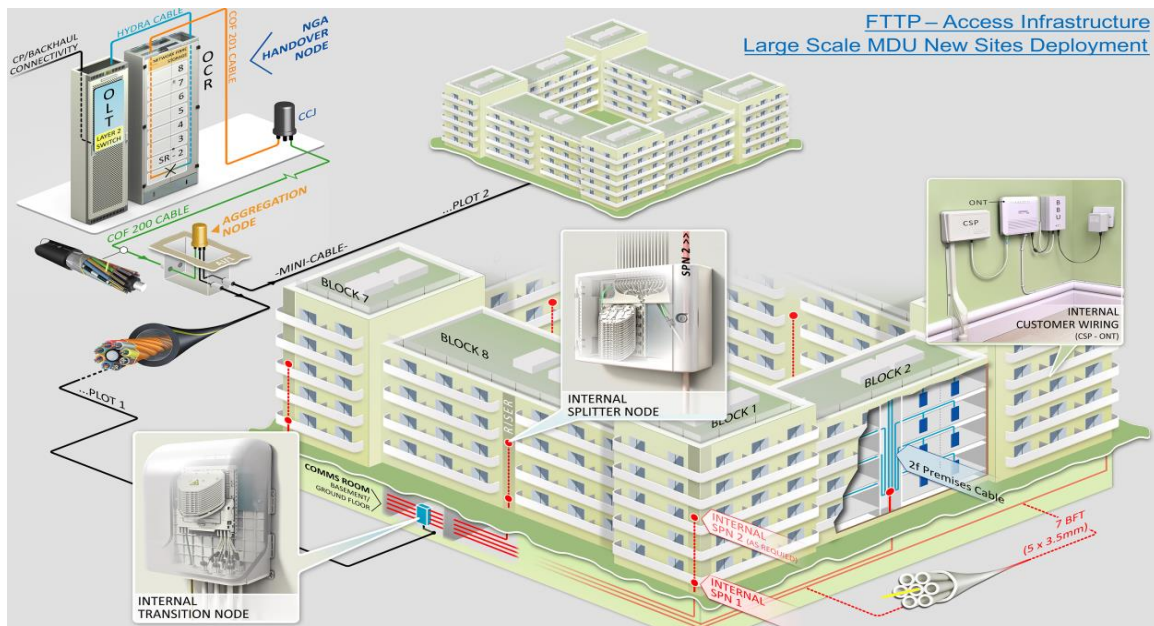


Figure 35 Larger Multiple Dwelling Units design example

The larger Multiple Dwelling Units depicted in figure 35 includes numerous internal splitter nodes whereas the smaller Multiple Dwelling Units in figure 36 (fibre network example) is served via a single splitter, but there are internal Fibre Distribution Points on each floor.

3.4.4 Smaller Multiple Dwelling Units layout example (less than 24 plots) – fibre only

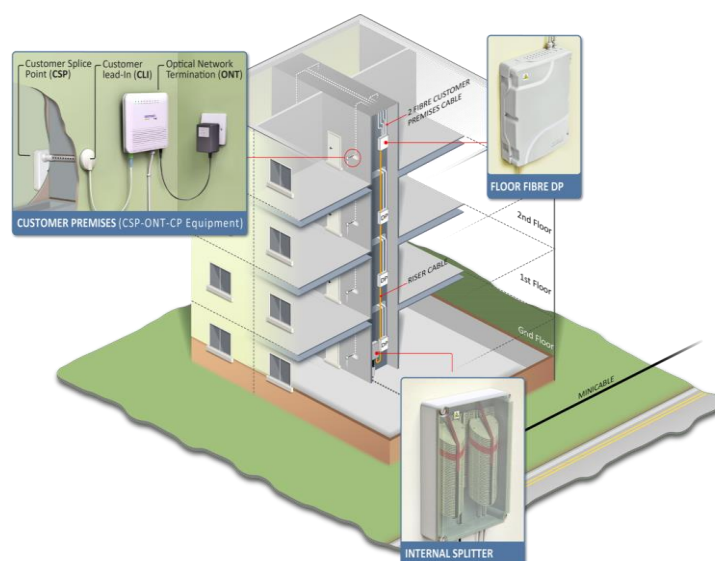


Figure 36 Smaller Multiple Dwelling Units layout example

3.4.5 Customer Splicing Point



Figure 37 Customer Splicing Point closed and open

Customer Splicing Points should be provided at agreed locations inside the apartment for aesthetic and security reasons.

It is imperative that the required 2 metre length of 2 fibre EZ Bend cable is left coiled in the back box and covered by a blanking plate. This will provide easy retrieval to enable our engineers to complete the equipment installation successfully.



Figure 38 A 2 metre coil of EZ Bend cable should be left in the back box

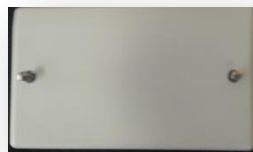


Figure 39 A blanking plate should then be secured over the back plate ready for Openreach provision of the CSP and ONT nearby.

4. APPENDICES

4.1 ABBREVIATIONS / KEY TERMS USED

A		N	
B		NSD	New Sites Designer
BBU	Battery Back-up Unit	NSR	New Sites Representative
BFT	Blown Fibre Tube	NTE	Network Terminating Equipment
BSI	British Standard Institution	O	
C		ONT	Optical Network Termination
CCJ	Cable Chamber Joint		
CLI	Customer Lead In		
CP	Communications Provider	P	
CSP	Customer Splicing Point	Q	
D		R	
E		RFH	Reduced Fire Hazard
F		S	
FDP	Fibre Distribution Point	SCF	Straps Cable Fixing
FTTP	Fibre to the Premises	SDP	Service Distribution Point
G		T	
H		U	
I		V	
J		W	
K		X	
L		Y	
LSZH	Low Smoke Zero Halogen	Z	
M			
MDUs	Multiple Dwelling Units		
M&E	Mechanical & Electrical		

4.2 NEW SITES STORES – ITEM INFORMATION AND PHOTOGRAPHS



Item code: 062665
Description: 2f MPAB (EZ Bend) 500m

Drum Size: Diameter 400mm x Width 220mm



Item code: 062664
Description: 2f MPAB (EZ Bend) 500m

Drum Size: Diameter 400mm x Width 220mm



Item code: 061819
Description: NGA FTTP External CSP Unit (Brown)

Unit of issue: 1
Size: Width 163mm x Height 100mm x Depth 30mm



Item code: 061818
Description: NGA FTTP External CSP Unit (Grey)

Unit of issue: 1
Size: Width 163mm x Height 100mm x Depth 30mm



Item code: 061817
Description: NGA FTTP Internal CSP Unit (White)

Unit of issue: 1
Size: Width 163mm x Height 100mm x Depth 30mm



Item code: 066335
Description: 32 AP Internal Splitter Node

Unit of issue: 1
Size: Width 330mm x Height 410mm x Depth 110mm



Item code: 062652
Description: Internal 24AP FDP (FTTP MDU/MOU)

Unit of issue: 1
Size Width 330mm x Height 410mm x Depth 110mm



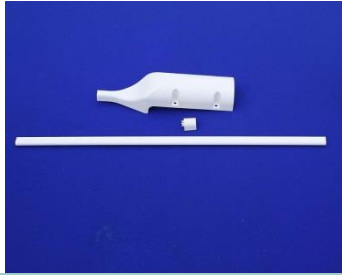
Item code: 069581
Description: FTTP New sites External CLI & OH Adaptor

Unit of issue: 1



Item code: 069582
Description: FTTP New sites Internal CLI Base & Cover

Unit of issue: 1



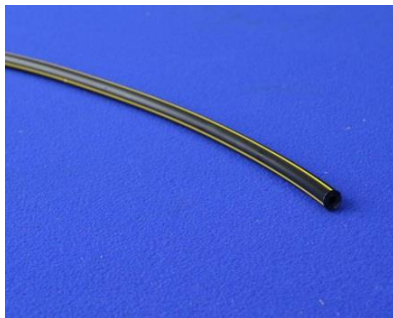
Item code: 069583
Description: FTTP New sites Internal Duct Cover & Tube
Unit of Issue: 1



Item code: 068231
Description: Internal 1 BFT (6/2.7mm)
Unit of Measure: Metre
Drum size: Diameter 400mm x Width 200mm



Item code: 049252
Description: 6 x 2.5mm 1 Blown Fibre Tubing (External)
Unit of Measure: Metre
Drum size: Diameter 400mm x Width 200mm



Item code: 049252
Description: 6 x 2.5mm 1 Blown Fibre Tubing (External)
Unit of Measure: Metre
Unit of Issue: multiple of 300m
Drum size: Diameter 400mm x Width 200mm



Item code: 066167
Description: UG 12BFT (5X3.5MM)
Unit of Measure: Metre
Unit of Issue: Multiples of 1000m



Item code: 046897
Description: Duct 25/17 Drop Duct Heavy Duty for FTTP. To be used for installing fibre to the home.



Item code: 046898
Description: Connector Duct 56/25 for FTTP. To be used for connecting Duct 25/17 to the Duct 54/56 swept tee.
Unit of Issue: 1



Item code: 066165
Description: D56 Duct Seal (Bag of 10)
Unit of Issue: Bag of 10



Item code: 066166
Description: 25/17 Duct Seal (Bag of 10)
Unit of issue: Bag of 10

An order form is available from your New Sites Representative giving you item codes and descriptions of stores items for your development.

4.3 SITE OFFICES

4.3.1 Site Office Lines

If you require construction site office phone lines you'll need to order these through your communications provider as soon as possible. Your communications provider needs to order a ["short duration line for a site office"](#). This is a specific product that will make sure your order follows the right process.

Your communications provider will also ask you for a contact name and number. We want to make sure the right people are talking to each other, so this number should be for someone with the authority to make decisions on the supply of site services when speaking with our survey and planning teams.

4.3.2 Service Distribution Points

A Service Distribution Point is a cabinet you install and own within which we install our Network Terminating Equipment. It avoids the need to wait for site offices to be located on site (a frequent source of delay) and is a solution that should be considered and agreed at the first site meeting between our New Sites Representative and your representative.

All cabling beyond our Network Terminating Equipment will be yours, although we can offer an end to end service and install cabling beyond the Network Terminating Equipment under time related charges.

It's your choice if you wish to go ahead, but installing an SDP before site offices are in place can really help improve your experience:

- **you're in control** – no more contacting Openreach for line shifts, you can manage them in your time and at your cost
- **less hassle** – no need to locate and relocate telephone poles across your development
- **be ready in advance** – provide a suitable/secured SDP in an agreed location and Openreach will connect to it. This can be weeks ahead of your on-site time ensuring your communications are ready to go when you are.

4.3.3 Service Distribution Point Specification

If you choose to install an SDP our NSR will help you agree a suitable location and explain the required specification, but in summary SDP cabinets need to be:

- Robust enough to protect our equipment from damage and lockable
- Suitable for our equipment to be fixed inside easily e.g. screwed onto a wooden back plate
- Large enough to house our equipment: Your New Sites Representative will confirm the exact specification for your site, but typically this would be 1335mm (H) x 300mm (W) x 200mm (D),
- Fixed rather than mobile
- Not shared with other CPs or other utilities (particularly electricity suppliers)
- Safely accessible by our engineers throughout the life of the build

You can find more information on Site Distribution Points at http://www.openreach.co.uk/orpg/home/network/downloads/8156_SDP_Leaflet_Web.pdf

CONTACT INFORMATION

Local NewSites offices (open 08.30 to 16.30, Monday to Friday)

www.openreach.co.uk/newsite

Dial Before you Dig

Email: dbyd@openreach.co.uk

Openreach invoice enquiries

Call 0800 515 465

Wayleaves (including Northern Ireland)

Call 0800 581 525

Email wayleaves.north@openreach.co.uk or

wayleaves.south@openreach.co.uk

Openreach plant maps

Call 0800 169 3849

email stoke.incoming.notices@openreach.co.uk

British Standards Institute document

Next generation access for new build homes

www.culture.gov.uk/publications/7830.aspx

General enquiries/information

<http://www.openreach.co.uk/orpg/home/contactus/contactus.do>

<http://www.openreach.co.uk>

Your Openreach New Sites Representative:

Telephone number:

Revision history

Version	Date of Issue	Author(s)	Brief Description of Change
7.0	05/04/13	Ian Chapman	Revised from v6.0

BT, Openreach, the BT logo and the Openreach identity are trademarks of British Telecommunications plc.

© British Telecommunications plc 2013.

Registered office: 81 Newgate Street, London EC1A 7AJ

Registered in England No: 1800000