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# Technical Manual For Physical Co-location Service

as defined in the  
open eir<sup>1</sup> Access Reference Offer  
Service Schedule 101

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<sup>1</sup> open eir is a trading name of eircom limited, Registered as a Branch in Ireland Number 907674, Incorporated in Jersey Number 116389, Branch Address : 2022 Bianconi Avenue, Citywest Business Campus, Dublin 24 D24 HX03, Ireland

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## Version Control

Version	Status	Update	Effective Date
V4.0	Final	D10/18 changes.	31/05/2019

This document follows change control procedure:

**Proposed** is defined as a document status when the approved document is uploaded to Proposals Section of open eir Website.

**Final** is defined as a document status when the approved document is uploaded to the relevant section of the open eir Website following the publication period.

### For information:

- Historical Document History Table located at end of Document.
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Any use of gender-specific language in this document has no particular relevance
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## 1. Introduction

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This Technical Manual contains a set of ‘best practice’ technical procedures to be followed by the Telecommunication Industry. These procedures relate to the implementation of Physical Collocation Services in Access Provider exchange facilities in connection with Local Loop Unbundling in accordance with the Local Loop Unbundling regulations currently in force.

### 1.1 The role of ComReg

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At the request of the telecommunications industry in Ireland ComReg has led an industry initiative to develop the operational processes required to support Local Loop Unbundling. This Technical Manual is part of that initiative.

### 1.2 Scope

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This Technical Manual and the techniques described herein apply to the Physical Collocation Service, as defined by open eir in its Access Agreement.

The scope of this document is limited to statements of best practices to be followed in relation to implementation techniques by Operators within Access Provider exchanges and specifically excludes areas such as :

- technical standards relating to Copper Loop Frequency Management Plan
- pricing of Local Loop Unbundling services offered by open eir.

It also includes statements on the site preparation activities to be followed by Access Providers.

### 1.3 Definitions

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Operator	referred to as Licensee upon signature of a Physical Collocation Licence Agreement
Access Provider	referred to as Licensor upon signature of a Physical Collocation Licence Agreement i.e. open eir
Operator Staff	means any employee, agent or contractor of the Operator

All other terms shall have the meaning conferred on them by the Licence Agreement.

### 1.4 Description of Physical Collocation Service

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A full description of the Physical Collocation Service is available in the Access Agreement.

### 1.5 Standards

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All equipment and plant deployed as part of the implementation of the service shall comply with the relevant national and international standards, as appropriate.

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## 1.6 Document Status

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This Technical Manual has been produced by the LLU Industry Forum after an initial industry consultation on the best practices to be applied in the delivery of the service to Operators. It takes account, where relevant, of the operational processes described in the associated document – Process Manual for open eir Physical Collocation Service [2].

Changes in the provisions of the base documents (Refs. and [2].) in the future will result in a review of this Manual and possible consequential revision.

## 1.7 Change Management

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This document is part of an interlinked set of documents, namely:

- ✔ Inter Operator Process Manual for Physical Co-location
- ✔ Inter Operator Process Manual for the open eir services Unbundled Local Metallic Path and Line Sharing
- ✔ *open eir's* Access Agreement.
- ✔ Physical Collocation Licence Agreement

The development of this document may necessarily lead to changes in the other related documents. Therefore, where such changes are identified, they will be annotated in this document and actions placed on the other documents for consideration of the issues and changes.

Prior to the publication of this document, the working group of the industry forum shall submit it to the full industry forum for approval.

The document set shall be reviewed as and when appropriate but at least at three monthly intervals, so that lessons learned from the practical implementation of the products and processes can be rapidly used to inform and shape the product descriptions and the working relationships between the parties.

Change management will list the changes made, the source of those changes, and the underlying reasons for the change.

## 2. Physical Colocation Environment

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### 2.1 Physical Elements

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A number of discrete elements combine to deliver the Service. These components are provided by the Operator or by the Access Provider (AP) – open eir, as appropriate. Exceptionally in the case of the Operator fibre(s) providing connectivity to their network, while it is the property of the Operator, it is run into the exchange facility by open eir from the external manhole to the Operator Optical Distribution Frame (Operator ODF).

These elements and their relationships are shown diagrammatically in Figure 1.

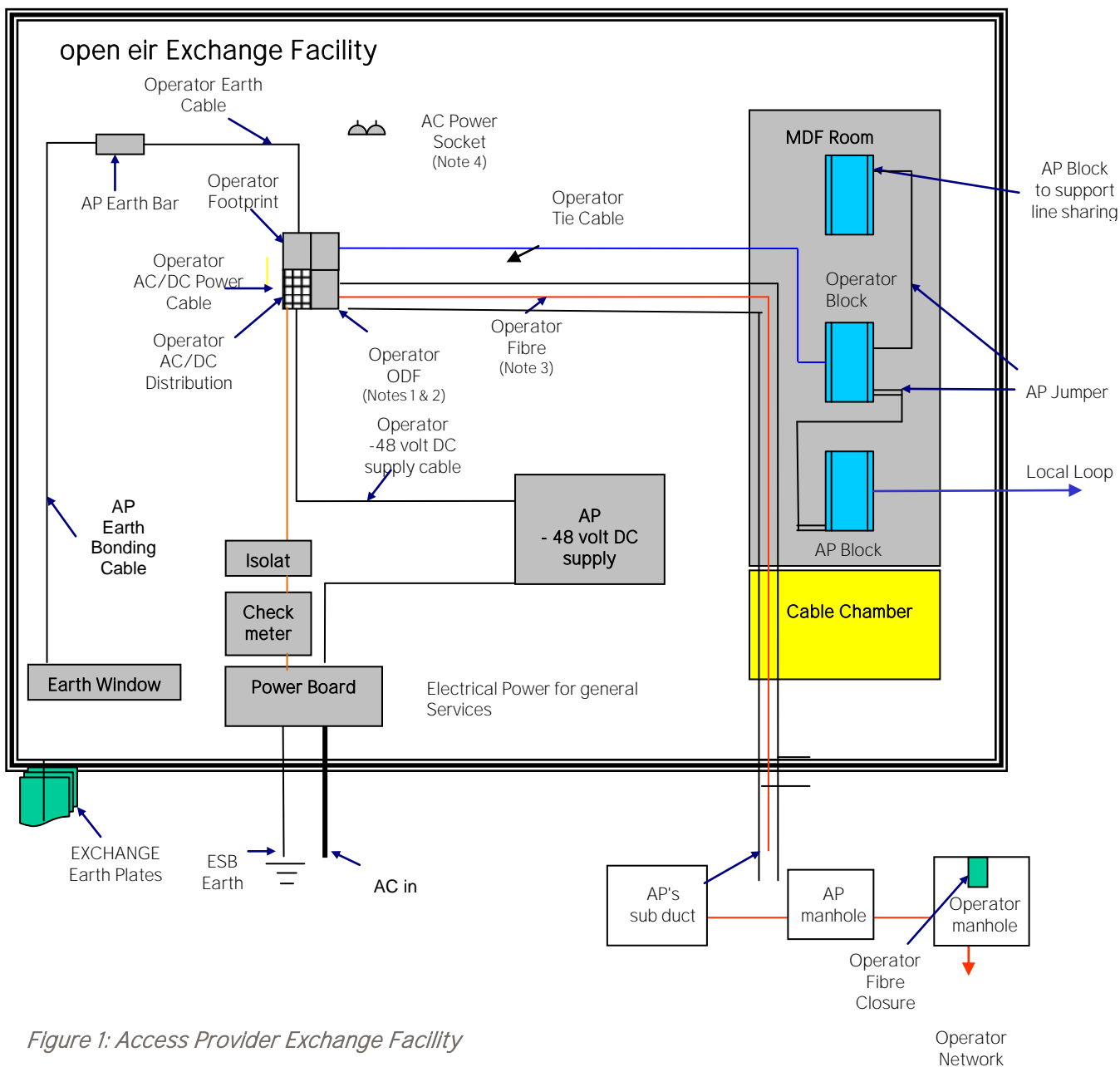


Figure 1: Access Provider Exchange Facility

- Note 1: Operator ODF may be physically located in Operator Rack on FP
- Note 2: This will be a fibre patch cord within the Operator Rack when the Operator ODF is in the Rack.
- Note 3: This fibre optic cable belongs to the Operator -, it will be blown by the Operator from the Operator manhole to the Operator ODF through external and internal 14/10mm sub-duct installed by open air (see 3.2).
- Note 4: General-purpose 13A Twin Socket switched outlets (BS1363)

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## 2.2 Operator Footprint (Operator FP)

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While Figure 1 shows a single Operator FP, it must be recognised that the following configurations may exist:

- a) A single Operator FP may exist in any one aisle;
- b) There may be several Operator FPs from a variety of Operators in any one aisle;
- c) Operator FPs may be mixed together in any one aisle
- d) Footprints may be positioned back-to-back or side-to-side

Accordingly, the techniques described in this Technical Manual shall also provide for any necessary inter-connection between Operator FPs either in the same aisle or between aisles. Equipment interconnection between Operator FPs shall use the dedicated cable management infrastructure in all cases.

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## 2.3 Operator ODF

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The Operator ODF, if any, will be on the Operator footprint.

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## 2.4 Service Implementation Activities

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After a site offer has been agreed between open eir and Operator, the implementation of the service consists of two primary activities, namely:

- a) Site preparation by open eir, and
- b) Operator activity within open eir exchange facility

These are described in the sections 3 and 4 below.

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## 3. Site Preparation by the Access Provider (open eir)

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Further to the elements identified in Figure 1, open eir will carry out a number of preparatory works on the site following execution of a Licence Agreement. The following non-restrictive list indicates these general activities:

- a) Installation of the Operator 14/10mm external subduct between the Operator manhole and the AP cable chamber;
- b) Installation of 14/10mm internal sub-duct from the exchange cable chamber to the Operator's allocated footprint within the telephone exchange;
- c) Installation of the Operator Block on the MDF;
- d) Installation of AP Earth cable from earth window to AP earth bar and associated AP cable trays;
- e) Installation of AP Earth Bar;
- f) Installation of AP cable tray to support licensee's AC/DC cable from footprint to AC/DC distribution;



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- g) Installation of AP cable tray to support licensee's earth cable from Earth Bar to Licensee footprint;
  - h) AP AC/DC Distribution;
  - i) AP AC/DC power equipment and associated cabling and cable trays (including trays for power) where required,
  - j) AP cable trays to support cable run for licensee's tie cable and fibre where required,
  - k) Provisioning of new OPES and sealing of changes where required
  - l) Compression or extension of the AP MDF to support Operator Block\* where required;
  - m) Clearance of space if required (eg removal of redundant equipment);
  - n) Construction Work;
  - o) Installation of AP raised floor (where applicable);
  - p) Provision of AC Power supply to AP DC Rectifiers feeding Operator Equipment;
  - q) Upgrading of utility electrical supply to support increase load directly attributable to Equipment;
  - r) Upgrading of AP electrical main board to support increase load directly attributable to Operator equipment;
  - s) Provision of additional AP lighting, AP fire detection specifically for the Equipment;
  - t) Provision of the AP Air-Conditioning/ventilation to cater for any additional cooling load directly attributable to Operator equipment.
  - u) Confirmation of a route from the unpacking area to the footprint

This work will be undertaken as part of the overall provision of a serviced footprint to the Operator(s) in accordance with the provisions of Reference [2]. Section 3.

### 3.1 Site Survey

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open eir will survey the exchange location in accordance with the provisions of Reference [2]., section 3.

### 3.2 Running of Operator fibre(s) from external manhole to Operator ODF

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The following procedure is proposed for the preparation and installation of the sub-duct and the Operator fibre from the Operator manhole to the Operator ODF. All works carried out must comply with open eir standard practice. Materials provided by the Operator to open eir must be of open eir standard and specification.

See Appendix 1A for sub-duct and fibre cabling scenarios from the Operator Physical Co-Location rack to an external manhole.

open eir will nominate one or more manholes, which provides a route for the installation of the **Operator's fibre** to the exchange cable chamber. This manhole will be located local to the specified exchange but not within the exchange campus. Where possible open eir will nominate two manholes on either side of the exchange to facilitate Operator diverse access. The agreed manholes will, where possible, be common to those for the provision of the In-Span Interconnect Service.

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Note that in the case of “CoLo CEI Backhaul Connection” the Operator may have achieved accreditation for “access to open eir’s Underground Utility Boxes” as part of the Duct Access product. In this case the manhole may instead be a suitable open eir Underground Utility Box nominated by open eir.

The Operator will construct its manhole within 10 metres of open eir’s manhole(s) provided that there are no restrictions within the 10 metres. Where the distance exceeds 10 metres, this will be subject to agreement. The Operator will be responsible for laying a single duct from Operators manhole to open eir’s manhole. **The point of entry for the Operators duct, into open eir’s manhole wall will be nominated by open eir.** All work entailed in breaking into open eir’s manholes for the installation of this duct will be supervised by open eir’s personnel.

At all sites duct space will be maintained to allow for the blowing in of a cable of size equal to the largest fibre cable existing. Sub duct of size 14/10mm and complying to the specification in Appendix 2 will be used for the installation of Operator fibre at all Co-Location sites. Exceptionally where congestion of ducts does not allow for the utilisation of sub duct Operator optic fibre cable may be pulled in independently. In these exceptional instances the Operator will be notified. Liability in terms these cables will rest with the Operator. open eir will endeavour to ensure all due care is taken if such circumstances arise.

The Operator will supply open eir with 14/10mm sub-duct unbroken (of the standard in Appendix 2 Indicative Specification of Operator Sub-Duct), of a length sufficient to cover distance from Operators manhole to exchange cable chamber.

open eir will pull in this 14/10mm sub-duct from the Operators Manhole to exchange cable chamber.

open eir will provide and will pull in suitable 14/10mm sub-duct from the exchange cable chamber to the Operator’s allocated footprint.

Note that open eir reserves the right to instead require the Operator to provide/install the sub-duct.

The Operator will provide Operators unbroken fibre optic cable in accordance with specification in Appendix 1 (Indicative Specification of Operator Fibre Cable, internal/external cable). This cable to be of a length sufficient to cover distance from Operators manhole to Operators ODF located within allocated footprint. Additional cable length to be provided for jointing purposes at Operators manhole and termination at Operators ODF.

The Operator will blow in the Operators fibre optic cable within the 14/10mm sub-duct provided.

Pre-commissioning acceptance test will be carried out by the Operator on the Operator’s optic fibre cable prior to jointing or termination of optic fibre cable. All jointing of fibre optic cables to be carried out by Operator in Operators manhole or elsewhere within the Operators network (unless Operator has achieved Duct Access “access to open eir’s Underground Utility Boxes” accreditation). Operator will carry out termination of Operators fibre optic cable at the Operators ODF within the allocated footprint.

Where visible in open eir’s duct network or boxes Operators optic fibre to be clearly identified with appropriate marker or label supplied by Operator. The marker to be of a standard to provide an environmental seal to a pre-printed or hand-written label identifying the cable. Coding convention for Operators fibre optic cable to be proposed by the Operator and approved by open eir.

### 3.3 Maintenance of Operators Optic Fibre Cable

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It is the responsibility of the Operator to test and localise faults in the Operators fibre optic cable. As far as possible, localisation of fault should be carried out remotely. If this is unsuccessful localisation of fault should be carried out at Operators ODF and or fibre optic joint located in Operators manhole.

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If a service affecting fault is localised into the optic fibre cable routed from Operators manhole to Operators footprint and the recommendation is that the cable is to be replaced. The cable must be replaced without the inclusion of extra joints. Blowing in of a replacement optic fibre cable from Operators Manhole to Operators ODF will be carried out by the Operator (see attached Appendix 4 "open eir's committed response times on Operators Optic Fibre cable Breaks" for sites where internal sub-duct was not provided). When completed redundant optical fibre cable to be recovered. All Costs to be borne by Operator.

The replacement of fibre in the event of non-service affecting faults will be scheduled between open eir and Operator.

### 3.4 Provision and Management of Exchange Opes

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open eir will survey the exchange in question and identify the exchange opes available. In the event that there is insufficient capacity available open eir will estimate the opes required having regard to the locations of the Operator FP and the MDF. open eir will then arrange for their provision. Opes will be re-sealed by the Access Seeker, where the original seal has been broken by the Operator. In the event of the exchange opes being in an unsealed state, prior to commencement of work, this should be noted to the open eir representative prior to commencing any work. The Operator will then log this in the "Installation Equipment Safety Certificate" as detailed in Appendix N of the Inter Operator Process Manual. Training will be provided to the Operator in implementation of open eir guidelines. Guidelines on exchange opes seals can be found in appendix 5.

### 3.5 Provision of Cable Management (Cable Trays)

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Cable management systems (cable trays) will be provided (if not already available) by open eir to facilitate the running of cables by the Operator from the FP to the MDF, the AC/DC power distribution cabinet, and the earth system.

### 3.6 Provision of DC/AC Power Distribution

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An Operator may choose to have an AC or DC power supply provided by open eir to service their equipment.

#### 3.6.1 DC Power Distribution:

The provision of -48 volt DC power to each Operator requesting Physical Co-location will be carried out as follows by open eir:

1. Each Operator will be provided with access to a dual-supply -48 volt DC distribution point.
2. open eir will arrange installation and commissioning of each distribution point subject to all information requested on the order form being supplied;
3. open eir will be responsible for monitoring and maintenance of the DC power supply to the distribution point
4. The Operator will be responsible for the provision, installation, and maintenance of all power cabling from the distribution point to their equipment. The power cables must be correctly rated to carry the maximum current, have the outer sheaths correctly identified and comply with the standards below
  - Conductor Identification: ET101:2008 (Ref IEC 60364)
  - Conductor Current Carrying Capacity: ET101:2008 (Ref IEC60364)
5. The Operator will be responsible for the provision, installation, and maintenance of earth suitable rated cables to their equipment.

Note: Distribution point refers to 'best fit' MCCB or Fuse position as appropriate to the site at open eir's discretion.

In the case of a higher DC power consumption being required at a future date by an Operator (e.g. due to customer growth) the Operator will request additional DC power from open eir. open eir will revert with a price and timescale for the provision of this additional power.

#### 3.6.2 AC Power Distribution:

Existing AC power will be available for use within the exchange areas, for test equipment only. Open eir will nominate an existing 13 AMP socket per suite for Operator use. Note that trailing leads are not to be left in-situ and that this 13A socket may not be used to power permanently fixed devices. Any portable devices used shall be subjected to Portable Appliance Testing by the Operator. Certification for same shall be available on request.

An Operator may choose to have an AC or DC power supply provided by open eir to service their equipment

In all cases where CoLo is being installed in a new site with AC power provided by open eir, or where an Operator chooses to replace the existing open eir DC power with open eir AC power, then open eir requires that a new dedicated sub-distribution board be installed for the Operator which will include suitable isolation that is in keeping with the power overload discrimination of the site and shall include a power check meter. Such a power meter can be used by both parties to validate the requested power.

All AC power work must be carried out by competent personnel representing the Operator

### **3.7 Provision of Earth Window**

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open eir will carry out all tasks in respect of the provision of a point of connection for Operators to the exchange earth window. A full site survey will identify the earth window in the cable chamber or MDF area and survey the earth cable run to the Operator FP. open eir will provide an earth bar with suitable connection points in the general area of the Operator FP and shall bond this earth bar to the exchange earth window using a properly-dimensioned unbroken earth cable. This work may include any earth cable, cable tray and ope build required to provide this Earth Connection Point to Operators footprint.

For earthing and bonding specifications see below:

- Earthing, and Bonding Specification: ET101:2008 (Ref IEC 60364) / **I.S.10101**
- Earthing and bonding of ICT equipment powered by -48 VDC in telecom and data centres ETSI EN 300 253 V2.2.1 (2015-06)

### **3.8 Allocation of MDF blocks and Jumpering**

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As part of the Site Offer, OLO block termination positions will be identified on the MDF. The MDF blocks will be supplied by the Operator and installed by open eir. Where QM frames and multiple frames are present within the open eir exchange, the provision of the Operator block will be dealt with on a case by case basis as follows:

#### **QM Frames**

To facilitate the availability of Operator terminations it is necessary to terminate blocks at optimum zones throughout the MDF. Regardless of the quantity of terminations required a block must be fitted in these optimum positions to allow for an equal distribution of service to customers. In view of the difficulties encountered in dealing with QM frames no rules or policy can apply in determining number of termination blocks, or position of these blocks. The number of Operator termination blocks required on QM frames will be determined by open eir.

From a frame management perspective where there is a request for terminations on QM frames each QM frame must be assessed on an individual basis.

### Multiple MDF's

Where multiple MDF's exist within an exchange, Operator termination blocks are installed on each frame. Operator to split tie cable to facilitate termination of allotment on these blocks. This allows for distribution of Operator terminations to each frame. In no circumstances will open air tie cables be used to provide path for Operator circuits from one MDF to the other. If more Operator terminations are required on either MDF, a new Operator tie cable will have to be run and another termination block installed.

On multiple frames where it is found that there is only space available to site the Operator termination block on one MDF, the AP will rationalise (cable compression) cables on the second or other MDF's so as to allow for the siting of Operator termination block.

From a frame management perspective where there is a request for terminations in exchanges where multiple frames are sited each multiple frame must be assessed on an individual basis.

*Note : The following information relates to MDF blocks in open air exchanges. Other Access Providers may use different standards and these will be described, as necessary, in future editions of this Technical Manual.*

The following two standards are used by open air in the provision of Operator Blocks on the MDF :

#### QUANTE Blocks

Quante blocks, protection cassettes & wiring tool (manufacturer's code in brackets):

5532932	Q. ID3 BLOCK 512PR - 8PR MODULE	(15-512-00000)
5532933	Q. ID3 BLOCK 128PR - 8PR MODULE	(15-628-00000)
5532934	Q. ID3 BLOCK 104PR - 8PR MODULE RIGHT	(15-604-00000)
5532936	Q. ID3 BLOCK 100PR - 10PR MODULE RIGHT	(15-600-00000)
5532938	Q. OVERVOLTAGE PROTECTION 10PR RIGHT	(62126-504 00)
5532940	Q. OVERVOLTAGE PROTECTION 8PR RIGHT MAG	(62126-505 00)
5532942	Q. WIRING TOOL FOR ID3000	(62397-513 00)

#### Siemens Blocks

Siemens Series 2000 blocks, protection cassettes & wiring tool (manufacturer's code in brackets):

5592170	S2000 TERMINATING BLOCK 128PR	(S30264-C39104-A113-D12)
5591977	S2000 TERMINATING BLOCK (LH) 104PR	(C39104-A110-D101)
5591976	S2000 TERMINATING BLOCK (RH) 104PR	(C39104-A110-D1)
5532334	PROTECTOR CARD 8D (8X2) LEFT	n/a
5532999	PROTECTOR CARD 8D (8X2) RIGHT	n/a
5592177	S2000 PROT. CASS.LH (OBSOL. USE 5532334)	(S30264-D1008-S5)
5592176	S2000 PROT. CASS.RH (OBSOL. USE 5532999)	(S30264-D1008-S51)
5599900	S2000 BLOCK WIRING TOOL	(C39407-A175-A3)

Any deviations from the above MDF Block specification will be flagged in the Site Offer in which case the Operator may have to adjust his method of terminating the Tie Cable on the MDF Block, or the capacity of the tie cable itself (see section 4.13 below), or both.

Accessories such as labels, test cords etc. are also available for the above blocks.



Blocks are available, as above, in 104 pairs (for Cable / line / UG side) with only 100 pairs used, or 128 pair / 512 pair for exchange side.

Contacts are IDC (Insulation Displacement Contact), wires to be used are SOLID, with diameter 0.32 to 0.63 mm.

The Operator MDF block must support gas-discharge tubes for lightning protection.

Cables currently used by open eir are:

All standard *open eir* external cables (excluding Drop Wire, paper-insulated or 0.9 conductor),  
 All standard open eir internal cable equipment,  
 Category 5 cable (4-pair or 25 pair solid wires),  
 Suitable cables as supplied by Ericsson / Alcatel etc for exchange side wiring.  
 Insulation on the wires can be solid or cellular for use in these blocks (if an air-block is to be employed, insulation on the wires MUST be solid)

As well as installing the Operator Block(s) on the MDF, open eir will also be responsible for all jumpering on the MDF using jumper wire conforming to the specification below.

*Special Note: The following data is provided for information purposes only and relates to current open eir practice in respect of MDF jumpering practices.*

Jumper Wires to be used are:

- 5522151 Wire Jumper 1pr 0.5/0.9mm (Black/Yellow)
- 5522981 Wire Jumper 1pr 0.5mm Green/Red SPECIAL

Both types of Jumper Wire have SOLID 0.5mm conductor, with insulation giving overall diameter of 0.9 to 1.0 mm. Standard insulation colour is Black/Yellow.

For High Voltage (eg ISDN) or special circuits, insulation colour is Green/Red.

NOTE: coloured markers are available for both types of blocks which can be used to highlight particular circuits.

*open eir* uses single pair insulated wire for jumpering at the MDF and cabinets (conductor diameter = 0.5mm). The overall diameter is 0.9mm to cater for high-density MDF termination blocks. The PVC insulation is thus cross-linked for added strength.

### Conductors

Each conductor consist of a solid wire of standard annealed copper, smoothly drawn, circular in cross section, uniform in quality, free from defects and uniformly coated with pure tin. The tinned wire passes the tinning test in BS No.3360. The diameter and resistance of the conductor are in accordance with Table 1 **Error! Reference source not found.**below. All measurements are nominal and have a spread of ±5%.

Jumper	Conductor		Insulation	% Elongation after removal from Completed Wire
Type	Diameter (mm)	Resistance ( $\Omega$ ) per 1000m at 20°C	Radial Thickness mm	

1	0.5 mm	90 $\Omega$	0.2 mm	15%
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*Table 1: Characteristics of Jumper Wire*

The conductor shall be uniformly covered with insulation comprising of cross-linked PVC and fire resistance in accordance with either BS 4066 Part C or BS2011 Part 2 Test PZ.

The jumper wire will have undergone insulation tests, breakdown tests and Spark tests.

### 3.9 Provision of Telephone Line for Operator use

open eir will make a PSTN telephone line available for use by the Operator where requested as per the ordering process in the Inter Operator Process Manual. This line will be provided within the Operator footprint for the purpose of voice calls, remote diagnostics and fault finding. The Operator will be invoiced for this line as a retail customer, whereby all associated rental and traffic charges will be paid by the Operator without recourse to the disputed payments procedure in the ARO. The security and use of the line is the sole responsibility of the Operator. The NTU will be provided by open eir.

## 4. Operator Activities in the Access Provider Exchange Facility

### 4.1 Basic Principles

As a general principle, the person or entity representing the Operator in the implementation of the Service should be notified to open eir within a reasonable period prior to his arrival on site to carry out the activities that follow below.

Excluding the necessary order processing activities associated with the Service and which are described in Ref. [2]., a number of activities need to be followed by Operator(s) and Access Provider(s) in order to physically deploy the components necessary to implement the Service. These are shown sequentially in Figure 2 and show the activities carried out from when the Operator first arrives at open eir exchange facility.



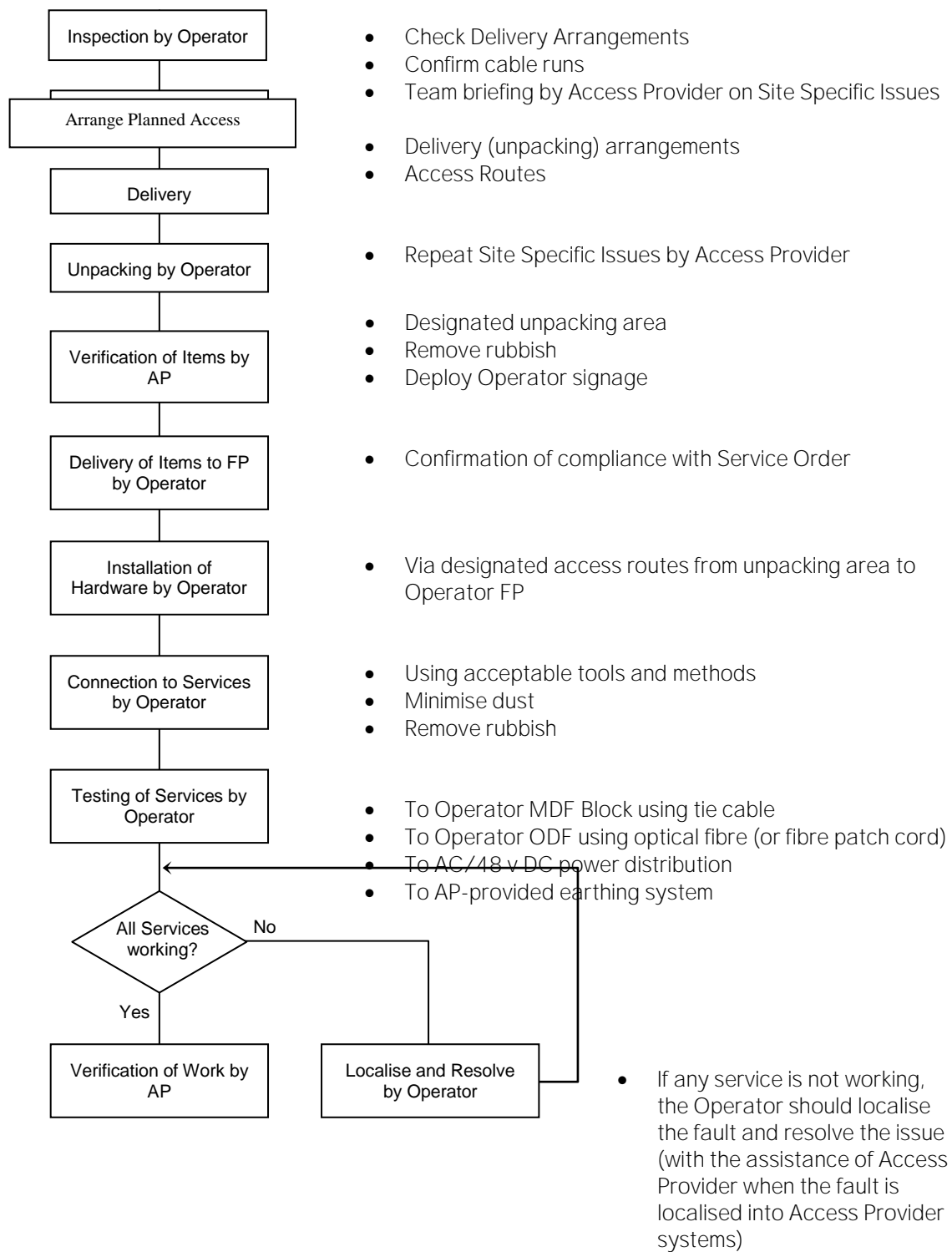


Figure 2: Outline of Activities by Operator



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#### 4.2 Inspection by Operator

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In association with the local Access Provider representative, the initial inspection of the site will be used by the Operator to complete the following tasks:

- a) General inspection and familiarisation with the site layout and features, as advised by open eir;
- b) Identification of delivery and unpacking locations;
- c) Confirmation of cable runs and any special features (for example, any bending radius constraints for optical fibre cable);
- d) A full briefing by open eir on all site-specific features.

This inspection may take place on the occasion of the handover of the FP to the Operator.

---

#### 4.3 Arrange Planned Access

---

At the initial inspection, and having identified the effort needed to complete his work, the Operator should book the required Access Provider resources as per the Inter Operator Process Manual in order to ensure their availability on the selected date, for example:

- a) Reserve an escort
- b) Reserve an unpacking area;
- c) Reserve an access route from unpacking area to Operator FP;
- d) Agree how any rubbish will be removed from the site.

---

#### 4.4 Delivery

---

The Operator must be present to take delivery of his equipment. Delivery of the Operators equipment and plant will be done on the agreed date to the designated delivery area in open eir exchange facility. As some time may have elapsed since the initial briefing, open eir will repeat the briefing on all site-specific features.

No equipment should be delivered to site unless the installation team are available to unpack and deliver the equipment to the footprint.

---

#### 4.5 Unpacking by the Operator and Safety Demands

---

The Operator shall deploy the necessary safety signs and signals prior to commencing his work. See also section 4.8. This activity is additional to any obligation on the Operator to comply with the statutory Health and Safety legislation.

On the day of delivery, the Operator will unpack his equipment in the designated unpacking area<sup>2</sup> prior to moving it to the Operator FP. Unpacking activities must not be carried out in any area other than the designated unpacking area.

All rubbish must be removed on the same day and will not be allowed to accumulate.

---

#### 4.6 Verifications of Items by open eir

---

Immediately following the unpacking of the equipment by the Operator and prior to its removal to the Operator FP, open eir will have the opportunity to verify that the items delivered are in conformity with the Collocation Equipment Register as described in the Inter Operator Process Manual. Should open eir not be available, such verification will not take place and the equipment will be moved to the Operator FP.

---

<sup>2</sup> Storage of equipment on the Access Provider site is not permitted.

---

#### 4.7 Delivery of Equipment to Operator FP

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Following unpacking and any verification, the Operator should then move his equipment and/or plant from the unpacking area to the Operator FP. The designated and reserved access route must be used in all cases. The wheeling in of racks with pre-installed equipment is permitted, and should be flagged to open eir in the relevant Methods Statement.

#### 4.8 Installation of Hardware by the Operator

---

Once the equipment is delivered to the Operator FP, installation may commence. All installation work shall be carried out using agreed methods and to agreed standards (as described in this Manual) and using tools that are fit for purpose. All work equipment and other items required to complete the job shall be provided by the Operator from his own resources.

The Operator shall take all necessary precautions to prevent dust and any physical or electrical interference to adjacent equipment and systems.

Electrically-operated tools and test equipment will be powered from the designated mains power outlets which open eir will provide adjacent to the Operator FP.

During the installation period, and at all other times when there is on-site Operator activity, the Operator shall deploy appropriate signage, containing his official logo, in all locations of activity to indicate his presence.

The Operator will fix his rack(s) to the floor using a method appropriate to whether it is being fixed to a concrete or a false floor. Overhead fixing to the cable management system (cable tray) shall use proper bolting mechanisms of suitable dimensions with all bolts and fixings de-burred.

All rubbish and spoil must be removed on a daily basis.

#### 4.9 Connection to Services by Operator

---

Having installed his equipment, the Operator may then connect this equipment to the necessary services provided by open eir, as follows:

- a) To earthing system;
- b) To Operator ODF;
- c) To Operator MDF block using tie cable run in designated cable runways;
- d) To AC or 48 volt DC power distribution board.

#### 4.10 Termination of Operator Fibre

---

The Operator will terminate his fibre(s) on the Operator ODF. This fibre will have been blown through 14/10mm sub-duct by the Operator from Operator manhole to the Operator ODF (see section 3.2 above). The running of this sub-duct by Access Provider and open eir and the route taken must comply with any constraints imposed by the minimum bending-radius of the cable. Project planning by open eir may see this sub-duct pulled through before the Footprint is in place and fully serviced.

The fibre will be blown from the Operator manhole to the Operator footprint without the inclusion of any joints..

#### 4.11 Termination of Fibre on Operator ODF

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The Operator will terminate his fibre on the Operator ODF in accordance with his normal practices.

---

#### 4.12 Specification of Operator external Sub-Duct

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Sub-duct will be provided by the Operator in accordance with section 3.2 above. This sub-duct shall emulate the indicative specification contained in Appendix 2. While an Operator may choose to use a different specification, the sub-duct shall, as a minimum, comply with or exceed the physical, mechanical, and chemical characteristics listed in Appendix 2. The Operator shall advise open air of the safe pull strength for the sub-duct to be used. In principle, the Operator fibre cable and sub-duct must be compatible with each other at all times regarding ease of installation.

#### 4.13 Specification of Tie-Cables

---

All Tie-Cables used by the Operator between the MDF and the Operator FP shall emulate the specification contained in Appendix 3. This specification details cable with tinned copper conductors, PVC insulated to a special colour code, and PVC sheath. The preference is to use 100-pair cables or multiples thereof, compatible with the capacity of the Operator MDF block.

The cable is intended to be terminated in Insulation Displacement Connectors (IDC) but may be soldered or wrapped.

Tie cables must be run in the designated cable run.

#### 4.14 Connection to 48 volt DC and AC Distribution Point

---

The Operator will be responsible for the provision of all power cabling from his distribution point to his equipment. The Operator shall connect his equipment to the 48 volt DC or AC distribution point using power cabling which conforms to BS6007 and to the relevant ETCI National Rules for Electrical Installations, and ETSI standards for telecommunications installations. Cabling dimensioning will be determined by the Operator and communicated to the AP on the order form. The AP will not permit any cable to be installed which poses a risk to its buildings or occupants.

AC/DC power cabling shall be run in the supplied labelled power cable trays by the Operator in a secure and tidy manner. Cables should be tied at 2 metre intervals for tidiness. The Operator may place an identification tag or label on his cables.

All AC/DC power work must be carried out by competent personnel representing the Operator.

#### 4.15 Connection to Exchange Earthing System

---

The Operator will be responsible for the earthing of their equipment. The Operator must connect his equipment and rack to the earthing connection point provided by open air in the general area of the Operator FP (see section 3.7 above). It must be recognised that this is not the mains earth.

The earthing cable from the Operator FP to the exchange earth window shall be at least of the same current carrying capacity as the earthing cable from the Operator AC/DC distribution point to the earth window, typically 70mm<sup>2</sup>. This cable should be insulated throughout its length and should be terminated on the earth window bar at a position indicated by open air. This position should be suitably labelled by open air to indicate the Operator using it. All connections should be made to ensure a good electrical bond between the terminating cable and the brass material of the earth window with the appropriate cable terminating lug.

The earthing cable from the Operator FP shall follow the designated cable run from the Operator FP to the earthing connection point. The cable should be run as straight as possible, keeping the bending radius not less than 2.5 times the Cross Sectional Area of the cable.

---

The utilisation of the earth connection point by the Operator shall be entered by open eir on a Display Notice adjacent to the facility. Additionally, a second notice should also be displayed by open eir warning against unapproved disconnection of any cable from this earth connection point.

All earthing work must be carried out by competent personnel representing the Operator.

#### 4.16 Sealing of Exchange Opes by Operator

---

When installing cables between the Operator FP and the MDF room (which also includes the earth window), the Operator will have to break fire-seals around exchange opes. These must be resealed on the same day as they were opened. Where the Operator has to return the following day to continue or complete the job, a temporary fire seal may be used overnight using an appropriate material. When the job is completed, the Operator must provide a permanent seal. In the event of the exchange opes being in an unsealed state, prior to commencement of work. The Operator will log this in the "Installation Equipment Safety Certificate" as detailed in Appendix N of the Inter Operator Process Manual. Responsibility will then revert to the AP to provide a permanent seal.

The purpose of fire stopping (sealing) cable opes is to:

- a) Prevent the passage of combustion products from one compartment or room to another;
- b) Prevent smoke interfering with the integrity of escape routes;
- c) Minimise possible damage to telecommunication equipment by corrosive by-products of combustion.

The quality and properties of the seal must ensure that all cable and service opes through walls and floors are adequately sealed against the passage of fire, smoke, and gases.

Appendix 5 lists of the products that may be used to seal OPES:

#### 4.17 Testing of Services by Operator

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The Operator may then verify that all services are functioning correctly using appropriate non-invasive methods.

#### 4.18 Localise and Resolve Fault(s)

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If any service is not working, the Operator should localise the fault and resolve the issue. In the event that the fault is localised into Access Provider systems, open eir will resolve in accordance with the provisions of the Inter Operator Process Manual.

#### 4.19 Verification of Work by open eir

---

On the conclusion of the work by the Operator, open eir will verify that the installed equipment is compliant with the project plan. Failure to comply with the project plan should be referred to the Operator Project Manager in the first place for resolution, or, depending on the issue, the person nominated at the first project meeting or identified from time to time by the Operator.

This examination will also ensure that the correct fixing techniques and practices have been used throughout the installation.

open eir will also ensure that the site has been left in a clean and safe condition.

---

## 5. References

---

*open eir's Access Reference Offer, version 2.0, 11/06/2012[2].*  
*Process Manual for open eir Physical Collocation Service, version 15.5, 16/02/2012*

## Appendix 1 - Indicative Specification of Operator Fibre Cable

### 1. Outer diameter of fibre cable

The fibre optic cable must blow into a 14/10mm sub-duct over a reasonable blowing distance. For optimal blowing distances the ratio of cable outer diameter to sub-duct inner diameter is less than 70%. Substantial blowing distances are generally achievable at ratios up to ~ 80%. Operators can review the cable blowing performance data supplied by the cable manufacturer when selecting a cable that is suitable for this application.

### 2. All Dielectric

There must not be any metallic elements in the cable

### 3. Cable Weight

The weight of the cable should be no more than the weight specified for the general duct and pole access products.

### 4. Labelling on the outer sheath of cable

The outer sheath of the cable should be clearly marked with :










- Date of manufacture (**DD MM YY**),
- the name of the cable manufacturer, (**Cable\_Manufacturer**),
- the fibre count and fibre type (**Fibre Count Fibre\_Type**)
- the operator that owns the cable (**Operator**)
- A meter mark (**XXXm**)

Example -- 01 05 18 Nexans 36F G.652D Openeir 1010m

### 5. Colour coding of fibres within the tubes

Fibres should be colour coded as per the TIA-598-A Fibre Optic Cable Standard Colour Guide summarised below.

#### TIA-598-A Fibre Optic Cable Standard Colour Guide

1 Blue		7 Red	
2 Orange		8 Black	
3 Green		9 Yellow	
4 Brown		10 Violet	
5 Slate (Grey)		11 Rose (Pink)	
6 White		12 Aqua	

### 6. Colour coding the tubes containing fibres

Assuming the cable is constructed with multiple fibre tubes (fibre elements) each containing up to 12 fibres then the tubes should follow the TIA-598 colour coding practice as above.

#### Internal/external rating

If for some extraordinary reason the fibre cable is deployed in the exchange without the use of a LSOH sub-duct then the cable must have a LSOH sheath.

The following table summarises the expected attributes of the 12, 24 and 96f blown fibre cables

Blown Fibre Cable attribute	Units	Cable description
Construction type		<b>Blown fibre cable construction with no metallic elements</b>
Colour coding		TIA-598-C for tubes and fibres in tubes
Fibre type		Fibre must conform to to ITU-T G. x standards for single mode fibre 250µm coating diameter is in use today in Open air. 200µm is not in use today in Open air.
Number of fibres per tube	#	Typically 12 x 250µm coated fibres per tube (cables based on 200µm typically use 24F per tube)
Expected cable OD range	mm	Maximum ~8mm for higher fibre count cables, OAO should consider relationship between blowing performance of selected cable in a 14/10 sub-duct.
Size of sub-duct that cable will blow into	mm	10mmOD/8mmID for lower fibre count cables and 14mmOD/10mmID for higher fibre count cables
Expected weight	kg/km	expect ~20kg/km for lower fibre count cables and ~50kg/km for higher fibre count cables
Expected Bending Radius without tension		~20 times outer diameter
Expected Temperature ranges, Operation, Installation, Storage	°C	-40 to +70 -15 to +60 -40 to +70
Marking of cables	Marking	Cable Code, Year of Manufacture, Week of Manufacture, Manufacturer, Fibre count, Fibre Type, Name of the Network Operator, Meter Count.

Overhead Fibre Cable attribute	Units	Cable description
Construction type		<b>Overhead ADSS fibre cable construction with no metallic elements suitable for deployment on average</b>
Colour coding		TIA-598-C for tubes and fibres in tubes
Fibre type		Fibre must conform to to ITU-T G. x standards for single mode fibre.
Number of fibres per tube	#	12 x 250µm coated fibres per tube (cables based on 200µm typically use 24F per tube)
Expected cable OD range	mm	Maximum ~10mm
Expected weight	kg/km	~60kg/km for higher fibre count cables
Expected Bending Radius without tension		~20 times outer diameter
Expected Temperature ranges, Operation, Installation, Storage	°C	-40 to +70 -15 to +60 -40 to +70
Marking of cables	Marking	Cable Code, Year of Manufacture, Week of Manufacture, Manufacturer, Fibre count, Fibre Type, Name

## Appendix 1A - Fibre cabling from Operator Physical Co-Location rack ODF to external manhole

### 1. Summary

A fibre cable route between a rack licenced to an Operator as part of the open eir Physical Co-Location product in an exchange and an open eir nominated external location may include sections of underground and overhead network infrastructure. The operator may elect to deploy a single cable type that is suitable for overhead and underground deployment along the full length of the cable route or equally may elect to deploy overhead and underground fibre cable types on overhead and underground sections respectively.

Fibre cables that do not have a LSOH outer sheath must be deployed in a low smoke zero halogen (LSOH) sub-duct when they are deployed inside a building

At the building entry point a LSOH sub-duct is coupled (with a gas block) to an external grade 14/10mm sub-duct which is deployed in the UG infrastructure. Where the fibre cable route includes sections of overhead infrastructure it may be necessary to transition from an underground cable type to an overhead cable type if the cable used in the underground sections is not suitable for deployment overhead. Fibre cables that leave a chamber and are routed up a pole are placed in a UV rated 14/10mm sub-duct.

Gas block terminators are applied at a number of locations along the cable route.

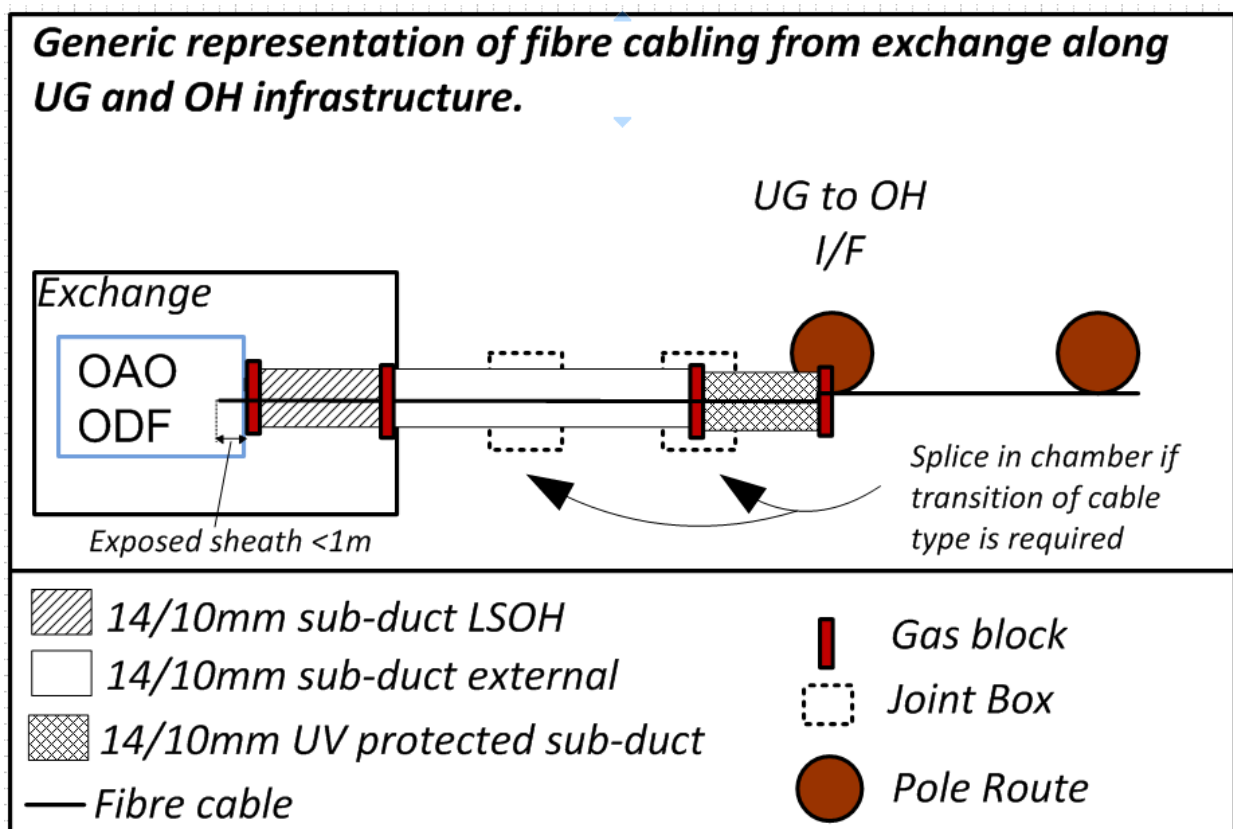


Figure 3 – Generic representation of cabling routing along a mix of UG and OH infrastructures



There are a number of deployment scenarios depending on the cable type(s) used. Three deployment scenarios are detailed below.

## 2. Deployment Scenario #1

In this scenario a single blown fibre cable type is used. The outer sheath of the cable can be LSOH however the sheathing need not be LSOH type once it is deployed in a LSOH sub-duct internally.

Two types of 14/10mm sub-duct are used along the two different parts of the route (internal exchange, and external UG):

- an external grade 14/10mm sub-duct is deployed between the joint box and the exchange building entry point.
- At the exchange building entry point this sub-duct is coupled (with a gas block connector) to a LSOH 14/10mm sub-duct which is routed to the ODF.

No more than 1m of an external cable sheath (assuming non-LSOH sheath) can be left exposed internally.

In this scenario the splice point will be in an OAO chamber and the cable from the exchange will be routed in and out of this OAO chamber for splicing. Note: alternatively see "CoLo CEI Backhaul Connection" service described in the Physical Co-Location product description document

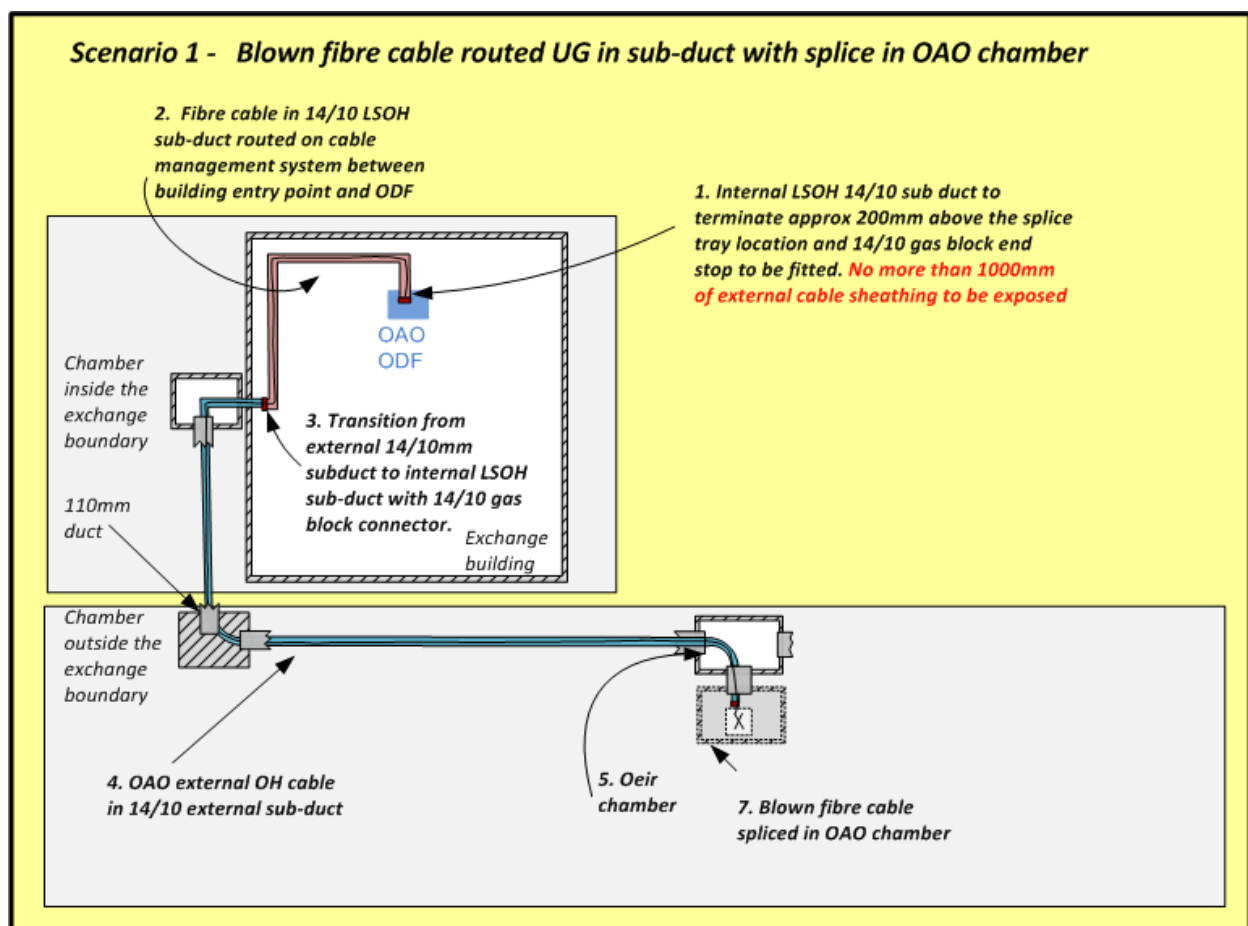


Figure 4 - Scenario 1 routing a fibre cable through infrastructure

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### 3. Deployment Scenario #2

Scenario #2 is based on route which has both overhead and underground sections.

An overhead (OH) cable is used in both the overhead and underground sections of the route between the interface pole and the Operator ODF in their licenced Physical CoLocation rack and the OH cable is blown to the ODF; this assumes that the overhead cable is suitable for blowing in a 14/10mm sub-duct and the cable is placed in a LSOH sub-duct in the exchange.

With this method a splice is not required to transition from the overhead route to the underground route or from internal cable to external cable.

An operator should use Scenario #3 if they would like to introduce a splice between the interface pole and the ODF.

Three types of 14/10mm sub-duct are used along the three different parts of the route (internal exchange, external UG, external on pole) to create a sub-duct path between the exchange ODF and the overhead interface pole:

- A UV protected 14/10mm sub-duct is deployed on the pole and routed underground to a joint box close to the I/F pole. This sub-duct is coupled using a gas block coupler to a 14/10mm sub-duct routed back to the exchange. Capping steel is applied for protection over the sub-duct on the pole.
- an external grade 14/10mm sub-duct is deployed between the joint box close to the I/F pole and the exchange building entry point. At the joint box close to the I/F pole this duct is coupled (with gas block) to the UV protected sub-duct from the I/F pole; at the exchange building entry point this sub-duct is coupled (with a gas block connector) to a LSOH 14/10mm sub-duct which is routed to the ODF.
- A LSOH 14/10mm sub-duct is deployed between the building entry point and the ODF

Gas blocks are deployed at the ODF, the building entry point and the overhead interface. No more than 1m of an external cable sheath (assuming non-LSOH sheath) can be left exposed internally.

The figure below shows a sketch of Scenario #2.

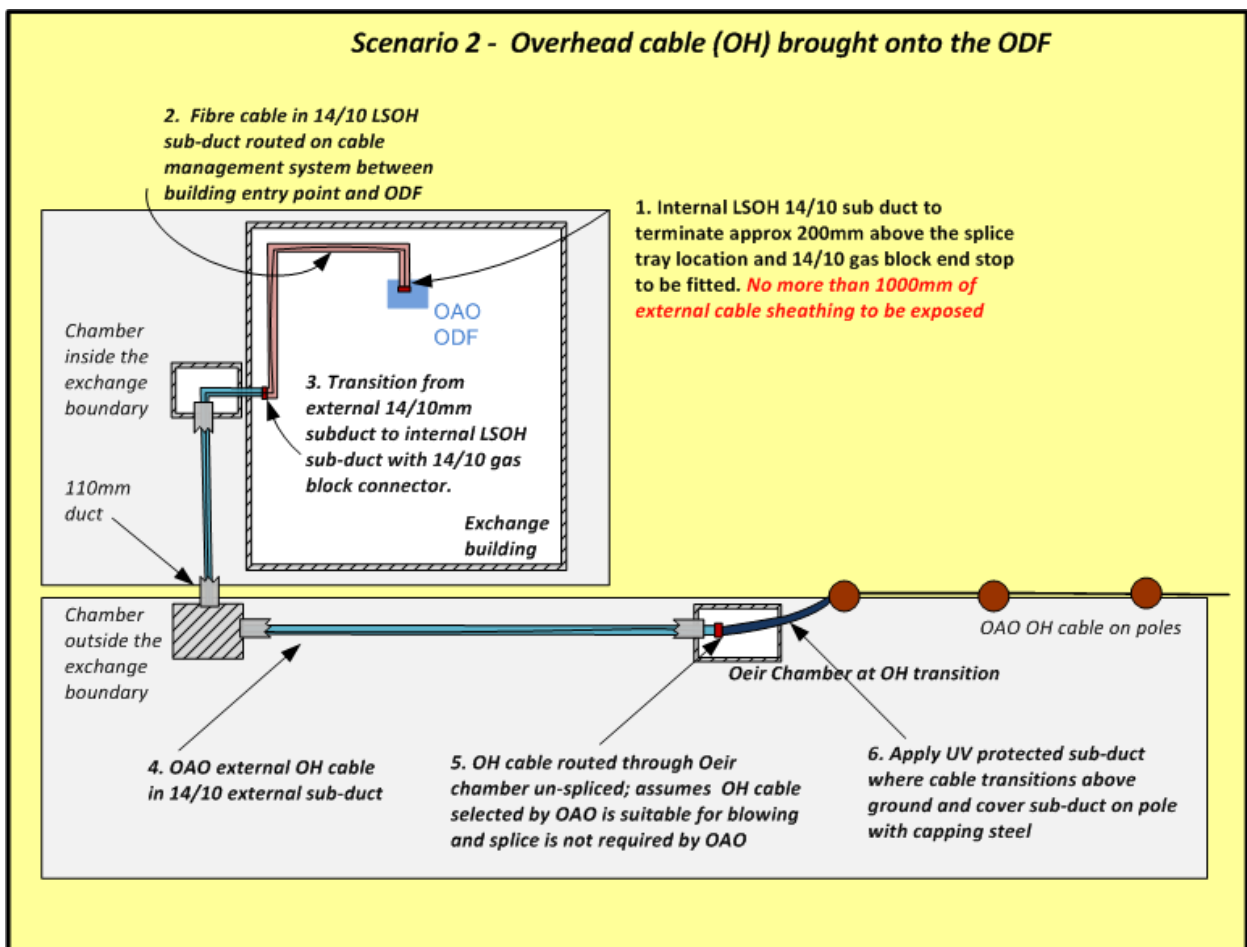


Figure 5 - Scenario 2 routing of single cable type suitable for UG and OG infrastructure

#### 4. Deployment Scenario #3

Scenario #3 includes a splice location between the interface pole and a joint box outside the boundary wall of the exchange. The splice point will be in an OAO chamber and the cable from the exchange will be routed in and out of this OAO chamber for splicing. Note: alternatively see "CoLo CEI Backhaul Connection" service described in the Physical Co-Location product description document.

In this scenario the operator has the option of introducing a LSOH cable rated for internal and external use between the splice point and ODF or using the OH cable as in Scenario #1.

The figure below shows a sketch of Scenario #2.

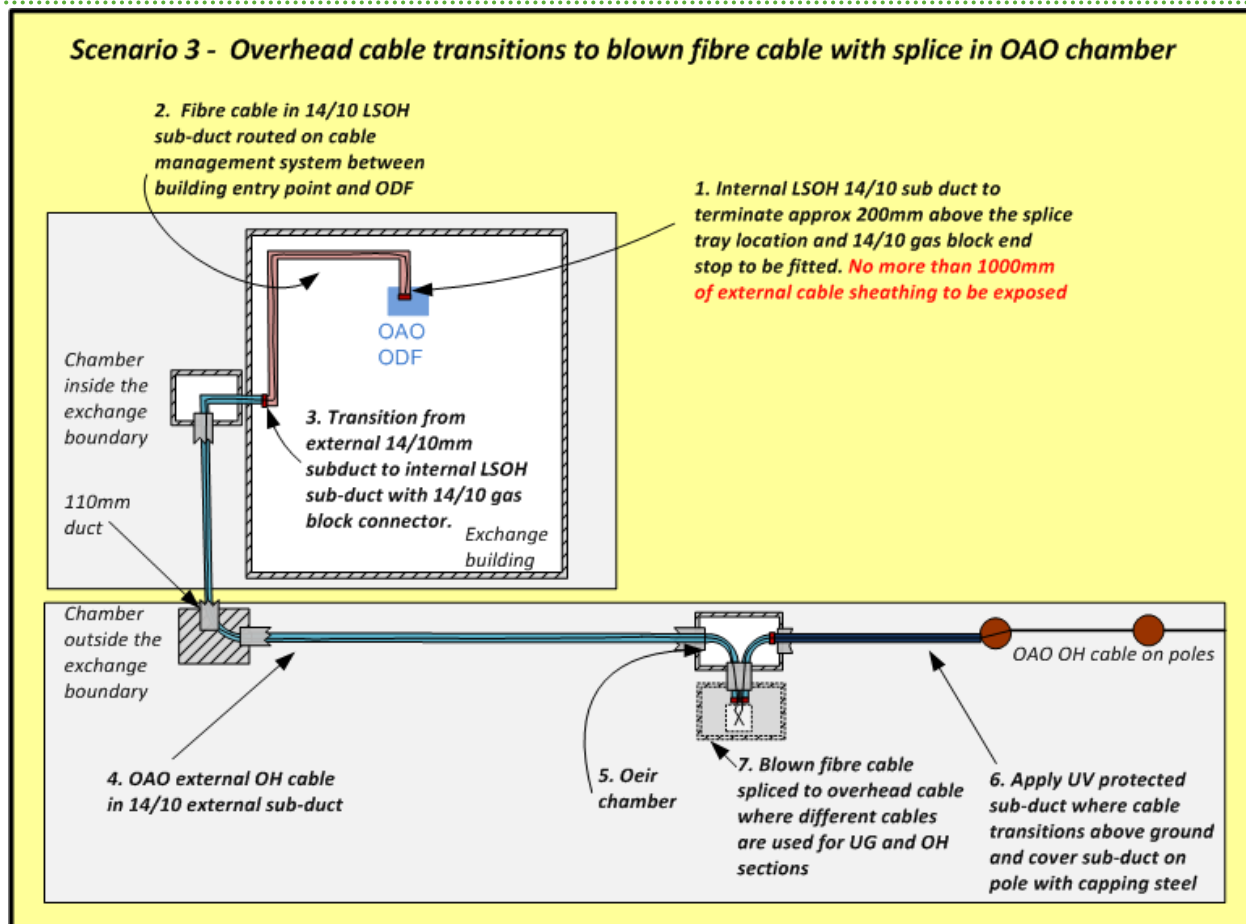


Figure 6 - Scenario 3 routing of UG and OH cable along UG and OH infrastructure sections respectively

## 5. Fibre cable selection

The responsibility for selecting the fibre cable to be used in the 14/10mm sub-duct rests with the OAO.

## 6. Related Documents

- Technical Manual for Physical Co-location
- Guidance to operators implementing duct access
- Guidance to operators implementing pole access

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## Appendix 2 - Indicative Specification of Operator Sub-Duct

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#### 1. Scope

This specification details the requirements for the supply of low-friction empty or pre-roped sub duct to Openeir.

#### 2. Introduction

2.1 The sub-duct shall be manufactured from high-density polyethylene (HDPE). The inner low friction liner shall be an inert polymeric compound. The internal wall shall be free from imperfections along its total length.

2.2 The finished product shall be free from cracks, holes, foreign inclusions or other defects which would impair its performance

### 3. Raw Materials

Description	Value	Units	Test Method
1 a Density of Base Polymer	≥944	kg/m <sup>3</sup>	ISO 150 1183/A
b Density of Pigmented Compound	≥950	kg/m <sup>3</sup>	ISO 150 1183/A
2 Melt Flow Rate: 190°C	<0.40	g/600s	ISO 1133 2.16 kg/190°C
3 Colour	Natural	—	Per Colour Plaque to be Provided by Manufacturer
4 Antioxidant Content (where applicable)	0.1-0.2	%	BS2782-434D
5 Carbon Black Content (where applicable)	2.0-2.5	%	ISO 6964
6 Moisture Content	0.1 max	%	—
7 Thermal Stability: Ox. Ind. Time	>20	min	BS EN ISO 11357-6:2013
8 Tensile Strength at Yield	≥22	MPa	ISO 150 527-2 23°C @50mm/min
9 Elongation at Break	≥400	%	ISO 150 527-2 23°C @50mm/min

### 4. Dimensions

4.1 The sub-duct shall be circular in cross section and the wall thickness shall be uniform.

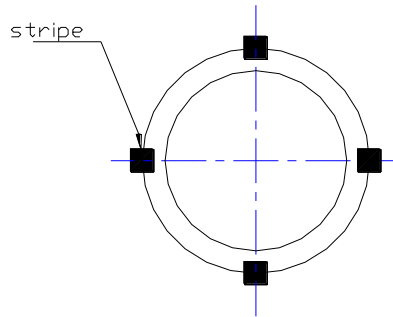
Nominal Size mm	Outside Diameter mm	Wall Thickness mm	Ovality %
14	13.95 to 14.10	1.85 to 2.05	< 3% @ manufacture pre-coiling & <5% off the drum
10	10.0 to 10.1	0.90 to 1.05	< 3% @ manufacture pre-coiling & <5% off the drum

*Figure 7 - Sub-duct dimensions*

4.2 The ovality of the duct shall be less than 3% during manufacture (before coiling) and less than 5% when measured on the layer of duct adjacent to the barrel of the supply drum (immediately after unspooling). The ovality measurements shall be taken at a temperature of 23 ± 2 °C.

$$\text{Per cent Ovality} = \frac{(\text{Measured Max O/D} - \text{Measured Min O/D}) \times 100}{\text{Average O/D}} \times 4.3 \text{ Stripes}$$

4.3 A single sub-duct should have a blue stripe (as per tube 1 of a tube assembly) shown in table below.



Tube number	Type of striping	Striping colour	Ral Striping
1	Quad	Blue	5005

Figure 8 - Strip detail

4.4 Bend Radius

Sub- Duct Size (mm)	Bend Diameter (mm)
10/08mm single	270mm
14/10mm single	340mm

4.5 Calibration

When specified, for empty ducts the clear bore of each length shall be proved by blowing through a plastic ball sized 75% of the inner bore.

## 5. Mechanical Properties of the duct

Physical Attribute	Test Method	Expected performance	
		14/10mm	10/8mm
<b>Tensile</b>	IEC 60794-1-21 Method E1	1000N	300N
<b>Crush - Residual Deformation of Product</b>	IEC 60794-1-21 Method E3	2000N	500N
<b>Impact</b>	IEC 60794-1-21 Method E4	5J	3J
<b>Bend</b>	IEC 60794-1-21 Method E11B	Diameter=340mm	Diameter=270mm
<b>Repeated Bending</b>	IEC 60794-1-21 Method E6	Diameter=340mm	Diameter=270mm
<b>Kink</b>	IEC 60794-1-21 Method E10	Diameter=120mm	Diameter=70mm
<b>Resistance to internal pressure</b>	IEC 60794-1-22 Method F13	2,5 × 16bar =40bar at 20 °C for 0,5 h. 1,3 × 16bar=21bar at 40 °C for 24 h.	2,5 × 12bar =30 bar at 20 °C for 0,5 h. 1,3 × 12bar=15.6bar at 40 °C for 24 h.
<b>Abrasion</b>	IEC 60794-1-21 Method E2B	Legible marking	
<b>Environmental Stress Crack Resistance</b>	Manufacturer method	The sample has no cracks in it.	
<b>Heat Reversion</b>	ISO 2505 Oven method	<3%	
<b>Coil Set</b>	Manufacturer method	<100mm.	
<b>Friction</b>	Manufacturer method	<0.09	



---

## 6. Pre-installed rope when requested

When requested the sub-duct shall be supplied with a continuous length of a suitable type and strength of cable pulling medium inserted at the time of sub-duct manufacture. The pulling medium will be inserted in such a way as to ensure an excess of between 3% and 5% is evenly distributed throughout the entire length of the sub-duct on the drum. The product will be manufactured in such a way as to ensure that there is no bond of the cable-pulling medium to the inside sub-duct wall.

## 7. Sub-duct Markings

Single sub-duct and sub-duct in assemblies shall be permanently heat foiled marked in black lettering at least 5mm high, at 1-metre intervals with the following information:

*The name of the network Operator*  
Sub-duct Size (X/Ymm)  
Sequential Metre Count Remaining on Drum  
Manufacturer's Name and Batch No.

## Appendix 3 - Indicative Specification of Operator Tie Cables

### 1. Conductors

#### Material

Each conductor shall consist of annealed copper, circular in cross-section, uniform in quality and free from defects. The properties of the copper shall be in accordance with IEC Publication 28, International Standard of Resistance for Copper.

#### Coating

The conductor shall be uniformly coated with pure tin except for the 1.38mm diameter insulated earth conductor which shall be plain.

#### Dimension

The diameter of the conductor shall be in accordance with Table 2.

### 2. Electrical Requirements

The resistance of the conductor shall be in accordance with **Error! Reference source not found.**

Conductor		Insulation	Insulated Conductor
Diameter	Resistance per 1000m at 20°C (maximum)	Radial Thickness (minimum)	Overall Diameter (maximum)
mm	Ohms	mm	mm
0.5 +/- 0.02	97.8	0.15	0.95
1.38 nom	12.4	0.55	3.50

*Table 2: Conductor Dimensions and Resistance*

Note to Table 2 :The resistance value is in accordance with IEC Publication 344 for tinned copper conductors with twisting and cabling lay factors greater than 16 for the 0.5mm diameter conductors and for plain copper conductor for the 1.38mm diameter insulated earth conductor. To permit various methods of providing this latter conductor the resistance value allows twisting and cabling factors greater than 16.

### 3. Additional Cable Characteristics

*Additional cable characteristics are provided in the Tables below.*

No. of Pairs	Cabling Element	Sheath Radial Thickness Minimum mm	Cable Overall Diameter Maximum mm

2	1 - 2	0.65	4.5
3	1 - 3	0.65	4.8*
4	1 - 4	0.65	5.8
6	1 - 6	0.6	6.8
10	1 - 10	0.6	8.3
12	1 - 12	0.7	9.1
15	1 - 15	0.7	9.8
20	1 - 20	0.8	10.7
25	1 - 25	0.8	11.4
30	1 - 30	0.9	12.2

*Table 3: Make-Up and Dimensions of Cable-Layer (Pair)*

The value for the maximum permitted overall diameter is dictated by installation practice.

No. of Pairs	Size of Unit	Sheath Radial Thickness Minimum mm	Cable Overall Diameter Maximum mm
10	1 x (1/2 x 20)	0.6	8.6
20	1 x 20	0.7	12.0
30	3 x (1/2 x 20)	0.8	14.0
40	4 x (1/2 x 20)	0.9	15.0
50	5 x (1/2 x 20)	1.0	17.0
80	4 x 20	1.2	22.5
100	5 x 20	1.5	27.0
160	8 x 20	1.7	30.3
320	16 x 20	2.2	39.5

*Table 4: Make-Up and Dimensions of Cable-Unit*

Pair Size	10 Pr	20 Pr	30 Pr	40 Pr	<u>50 Pr</u>	80 Pr	<u>100 Pr</u>	160 Pr
Number of Units								
Centre 1 <sup>st</sup> Layer	1/2	1	3 x 1/2	4 x 1/2	<u>5 x 1/2</u>	1 6 x 1/2*	1 <u>8 x 1/2*</u>	4 x 1/2 6
Unit No.	Colours of Unit Lappings							
1	Orange	Orange	Orange Green#	Orange Green	<u>Orange</u> <u>Natural</u> <u>Green#</u>	Orange Orange Natural Green	<u>Orange</u> <u>Orange</u> <u>Natural</u> <u>Natural</u> <u>Green</u>	Orange Green Orange Natural Natural Natural Natural Green
2								
3								
4								
5								
6								
7								
8								

Table 5: Make-Up and Unit Identification Colours – 20 pr Unit

Notes:

- 1/2 refers to sub-units of 10 pairs.
- Each of these cables include the single 1.38mm diameter insulated earth conductor.
- At the manufacturer’s discretion the first layer may be made up of sub-units of 10 pairs, or units of 20 pairs.  
# The Green colour lapping shall be applied to the last 1/2 unit.

Temperature at which Insulation Resistance is measured (°C)	Minimum Insulation Resistance for 1000 metres of cable (M Ohms)
10	500
11	400
12	310
13	240
14	190
15	150
16	120
17	110
18	79
19	62
20	50
21	41
22	32
23	28
24	23
25	19
26	16
27	13
28	11
29	9
30	8

Table 6: Minimum Insulation Resistance of Completed Cable

## Appendix 4 - open eir's committed response times on Operator's fibre Cable Breaks

Note that the below applies in sites where the Operator fibre cable has not been blown through internal sub-duct provided by open eir.

The Open eir response from initial call to NMC confirming cable and sub-duct delivered to site, to an open eir on site presence will be 2 Hours. The time to replace the existing fibre with a replacement fibre depends on the length of fibre to be replaced and the availability of spare duct space at the particular exchange. **(All emergency roadwork's notification and approvals from local authorities will be the responsibility of the Operator. Restoration times indicated below are assuming all appropriate approvals have been granted)**

The replacement of the Operator Fibre will include the following activities

- Identification of Operator fibre /sub-duct in open eir nominated manhole and Cable Chamber
- Identification of Operator Fibre/sub-duct within exchange racking and into Operator footprint
- Identification of spare duct from open eir nominated manhole to cable chamber
- Survey route from cable chamber to Operator footprint for replacement fibre/sub duct
- The breaking of out fire seals and duct seals to allow for installation of replacement fibre/sub-duct
- Rod and Rope new duct line from open eir nominated manhole to cable chamber
- Draw in sub-duct and fibre from open eir nominated manhole to cable chamber/ footprint
- Pull out existing fibre and sub-duct
- On completion all ducts sealed and all fire breaks to be resealed

Fibre provided by Operator should be inclusive of length required for jointing at Operator manhole and for terminating at Operator ODF. The fibre will also be inclusive of a 15-20Mts loop that will be resistant in the cable chamber. open eir committed times are as follows.

Length(Mts.)	Scheduling & Travelling Time to site (Hrs) from call	Restoration time for new fibre install into spare duct (Hrs) from call	Recovery time of old fibre (Hrs)
50	2	5	1
100	2	8	2
150	2	11	2.5
200	2	14	3.5
250	2	17	4

If no additional duct space is available the in-situ fibre will have to be pulled out before replacement fibre is installed with the following committed times.

Length(Mts.)	Scheduling & Travelling Time to site from call	Restoration time for new fibre install into existing duct from call
50	2	6
100	2	10
150	2	13
200	2	17
250	2	21

The Operator will be liable for all costs incurred. This will include overtime rates for work outside normal hours.

## Appendix 5- Sealing of Exchange Opes

Listed below is a suggest list of materials that open air uses in complying with the Health and Safety Policy, in regard to Sealing of Exchange Opes. However, other products that comply with B.S. 476 Part 8 and that give a minimum of 1-hour fire resistance will also satisfy this requirement.

Material	Supplier
Dufaylite Mineral Fibre Board	Seal Systems Irl. Ltd.
Pyrobatt 120 Mineral Fibre Board	Pan Protection Systems Ltd
Nelson CPS Composite Sheet	Seal Systems Irl. Ltd.
Nelson FSP Firestop putty	Seal Systems Irl. Ltd
Intumescent Putty	Pan Protection Systems Ltd
Bromastic Intumescent Sealant (tube)	Pan Protection Systems Ltd
Soudal Fire Silicone B1 FR (tube)	Seal Systems Irl. Ltd
Soudal Firecryl (tube)	Seal Systems Irl. Ltd
Nelson PLW Firestop Pillows (2 sizes)	Seal Systems Irl. Ltd
Envirograt Firestop Pillow	Pan Protection Systems Ltd.
Nelson FSC3 Firestop Coating (3.9 Ltr drum)	Seal Systems Irl. Ltd.

Training can be provided on a one of bases on the use and application of the above. Request for this should be made through your account manager.

## Version Control History

Version	Status	Update	Effective Date
1		First draft based on initial view of author on main chapter headings. Basis of kick-off meeting on 20 April. Document seen by Access Provider and Operators.	20.04.01
1.1		Description of high-level tasks plus output of meeting with industry on 20 April, including input proposals from industry arising therefrom.	27.04.01
1.2		<ol style="list-style-type: none"> <li>1. Review of v1.1 at Meeting 2 of 27.4.01.</li> <li>2. Editorial corrections and re-structuring (use terms Access Provider and Access Seeker throughout instead of OLO and eircom).</li> <li>3. Output tasks from Meeting 2 of 27.4.01.</li> <li>4. Alignment with Process Manual.</li> </ol>	03.05.01
1.3		<ol style="list-style-type: none"> <li>1. Review of v1.2 at Meeting 3 of 03.05.01.</li> <li>2. Output tasks from Meeting 3 of 03.05.01.</li> <li>3. Reference in section 4 to Specifications in Appendices <b>being 'indicative'</b></li> <li>4. Editorials</li> </ol>	10.05.01
2.0		Clarification of method of running Operator fibre to Operator ODF	15.05.01
2.1		Inclusion of comments from ESB fibreco	21.05.01
2.2		Amended to correlate with the Licence Agreement for Physical Co-location	11.09.01
2.32		Amended as part of overall IPN / TM industry review	01.02.02
2.33		Amended as part of an overall review with industry.	03/04/032
2.34		Updated section	22/04/08
2.34		Re Branding	30/09/15
V3.0	Final	This document is based on V2.34 Implementation of Standardised Change Control.	16/06/2017
V34.0	Final	D10/18 changes	31/05/2019