



## Customer Interface Publication: CIP044

**KCOM GROUP Limited**

### **DARK FIBRE DESCRIPTION AND TECHNICAL CHARACTERISTICS**

Issue: Version 1.0

August 2022

Users of this document should not rely solely on the information in this document but should carry out their own tests to satisfy themselves that terminal equipment will work with the networks of KCOM Group Limited.

This document does not form a part of any contract with KCOM Group Limited customers or suppliers. KCOM Group Limited shall have no liability in contract tort or otherwise for any loss or damage, howsoever arising from use of, or reliance upon, the information in this document by any person.

Publication of this Customer Interface Information Document does not give or imply any license to any intellectual property rights belonging to KCOM Group Limited or others.

© KCOM Group Limited

37 Carr Lane Kingston upon Hull HU1 3RE



## Contents

Contents .....	2
1 Introduction/Scope .....	3
2 Service Description .....	4
Scenario 1 End-user premises to KCOM's ODF .....	4
Scenario 2 End-user Premises to Third Party Premises (CP Premises).....	5
Scenario 3 End-user Premises to End-user Premises .....	5
3 Service Features .....	6
3.1 Optical Fibre Cable Characteristics .....	6
3.2 Optical Fibre Specifications .....	6
3.3 Optical Loss for the Dark Fibre Service .....	6
3.4 Splicing and Optical Losses .....	7
3.5 Repair (Trouble to Resolve – T2R).....	7
4 Customer Interfaces.....	8
4.1 Rack Mounted Patch Panel .....	8
4.2 Wall Mounted Fibre Enclosure .....	8
5 Optical Safety.....	9
6 Environmental Specifications .....	9
7 Availability .....	9
8 Glossary and Definitions .....	10
9 References.....	10



## 1 Introduction/Scope

This customer interface publication (CIP) has been created to describe and detail the technology to provide the KCOM Dark Fibre service. This service is available as part of the Reference Offer for the Provision of Dark Fibre.

KCOM wholesale, the wholesale division of KCOM Group Limited provides this service to Communications Providers (CPs), facilitating third party utilisation of a single fibre or fibre pair of cables between two addresses in the Hull Area. The service is delivered without active equipment and is not managed or monitored.

Terms and abbreviations used in this document are included in section 8 of this document and in the Reference Offer for the Provision of Dark Fibre.

Changes to the technical architecture and network interface detail that affect the correct working of the service will be published by KCOM Group Limited within documents published on the KCOM website.

This service may be subject to change due to changes in the UK industry standards and specification forums. It may also be impacted by a change in regulatory requirements applicable to these specifications.

Enquiries relating to the technical content of this document and the availability of other publications should be directed to:

FAO KCOM wholesale sales  
KCOM Group Limited  
37 Carr Lane  
Kingston upon Hull. HU1 3RE

Telephone: 01482 602100  
E-mail: [wholesalesales@kcom.com](mailto:wholesalesales@kcom.com)



## 2 Service Description

The service constitutes the installation and maintenance of a single or fibre pair fibre optic cable end to end between two addresses on the Hull area, available 24 hours a day, 365 days a year.

There are three main scenarios listed below, each having two variants depending on geography.

Dark Fibre is available in the following configurations:

- a) connecting end-user premises and KCOM’s ODF site or third-party premises;
- b) connecting an end-user premises and another end-user premises.

KCOM’s “ODF Site” is defined as “the site of an operational building that houses an optical distribution frame”; cabinets housing ODFs are intermediate nodes and do not qualify for connection.

### Scenario 1 End-user premises to KCOM’s ODF

#### Scenario 1a (same serving and terminating exchange)



#### Scenario 1b (different serving and terminating exchange)\*



\*may pass through one or more exchanges without terminating

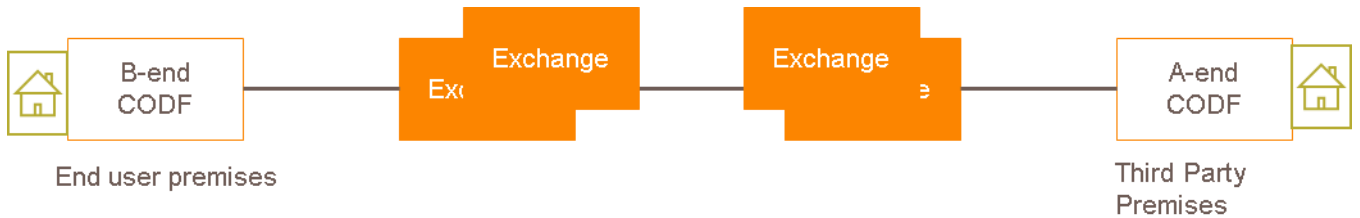


Scenario 2 End-user Premises to Third Party Premises (CP Premises)

2.1.1.1 Scenario 2a (same serving and terminating exchange)



2.1.1.2 Scenario 2b (different serving and terminating exchange)



\* may pass through one or more exchanges without terminating

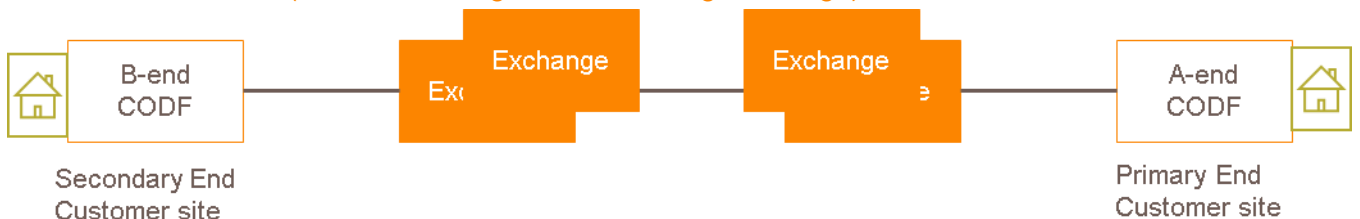
Scenario 3 End-user Premises to End-user Premises

Similar technical delivery to scenario 2, only definition of sites differs. This service would be to connect 2 x CP's end customers together.

2.1.1.3 Scenario 3a (same serving and terminating exchange)



2.1.1.4 Scenario 3b (different serving and terminating exchange)



\*note pass through one or more exchanges not terminating

- This mirrors the EDAS scenario for an active circuit



### 3 Service Features

#### 3.1 Optical Fibre Cable Characteristics

Key features of the service are :

- Fibre cable to be used in the Dark Fibre product will conform to ITU–T G652.A,B,C or D or G.657A1,A2 with the overall performance of the fibre providing the service meeting or exceeding ITU–T G652.A.
- The DF service will be accessed via optical termination equipment installed by KCOM.
- The point of demarcation for the DF service will be the port on the optical termination equipment supplied by KCOM, for each of the fibres that make up an instance of that service.

Product options are for :

- Single Fibre on single route – single fibre between two end points
- Fibre pair on single route – two fibres within the same cable segments along their entire length.

#### 3.2 Optical Fibre Specifications

The fibre for any span within the DF service will conform to ITU–T G652.A,B,C or D or G.657A1,A2 with the overall performance of the fibre providing the service meeting or exceeding ITU–T G652.A. An optical loss figure will be provided by KCOM for any particular dark fibre service. The loss at build will be specified at both 1310nm and 1550nm. The following are not measured or controlled as part of the DF service:

- Chromatic Dispersion Compensation
- Polarization mode dispersion (PMD)
- Latency
- The refractive index of the optical fibre (although typically this is approximately 1.47)

Differential optical loss between fibres in a DF fibre pair service will be a maximum of 1.9dB at 1550nm.

#### 3.3 Optical Loss for the Dark Fibre Service

Optical loss calculations and measurement will follow KCOM current practice as documented below for its optical infrastructure. All planning and maintenance loss figures will be inclusive of all specific fibre splices and the SC/APC connectors at either end on the fibre patch panels of the DF service.

In order to aid the CP using the DF service, information on the optical loss will be presented in a timely manner as follows :

- The estimated fibre route length for any DF service will be calculated by the fibre planner using cable distances from KCOM inventory systems. A 5% margin will be applied to such distance to allow for unforeseen routing obstacles such as street works. The optical path loss will then be calculated by using the route length and planning multiplier of 0.35dB/km at 1310nm and 0.25dB/km at 1550nm. This figure will be given to the CP as an estimate of optical loss for each individual fibre end to end.



- On completion of the planning phase, the fibre route length for any DF service will be confirmed by the fibre planner using cable distances from KCOM inventory systems, plus the 5% routing allowance. The optical path loss will then be calculated by using the route length and planning multiplier of 0.35dB/km at 1310nm and 0.25dB/km at 1550nm. These updated figures will be given to the CP as an estimate of optical loss for each individual fibre end to end.
- An OTDR (Optical Time-Domain Reflectometer) will be used to measure the actual length of the optical network. The optical loss is measured using an OPM (Optical Power Meter) and Light Source (LS). These figures for the DF service will be given to the CP at both 1310nm and 1550nm. All testing will be completed in a single direction.
- The optical loss figures, at which this particular DF service will be considered as faulty (maintenance loss) will be calculated and given to the CP. These loss figures are calculated as follows: the actual (as opposed to planned) route length and maintenance multipliers of 0.5dB/km at 1310nm and 0.35dB/km at 1550nm.

Depending on the actual route length, additional budget will be added to the maintenance loss per the table below.

Actual Route Length	Additional Budget dB	
	1310nm	1550nm
0 – 20km	3	3
>20km	2	2

### 3.4 Splicing and Optical Losses

KCOM will make every effort to ensure splice losses are less than 0.3dB @ 1310nm in line with ITU-T L.12[3] recommendations. Losses greater than 0.3dB may be found if uni-directional measurements are performed with an Optical Time Domain Reflectometer (OTDR) but this will be caused by back scatter and not the splice.

All measurements are to be completed at 1310nm and 1550nm.

Overall performance must fall within the overall power loss budget to be accepted.

### 3.5 Repair (Trouble to Resolve – T2R)

Testing of the DF service will follow KCOM's standard practice as described below for all Optical Fibre within its network.

A set of actual optical loss figures for the DF Service, drawn from an OTDR trace, will be provided to the CP on commissioning; this may be compared with those deemed by KCOM to be the maximum acceptable optical loss figures for that service. Any loss greater than these values will mean the KCOM optical path is deemed faulty. It is the responsibility of the CP to notify KCOM when it believes any DF service is faulty. It must pass across to KCOM the Circuit IDs relating to the faulty circuit. Optionally, the CP may provide an OTDR trace of the faulty fibre, which may reduce the time taken by KCOM to repair the service. It will be necessary for KCOM to access at least one end of the DF service fibres for testing. In the situation where the CP or its agents are unable to help, KCOM engineers will disconnect the optical transmission equipment attached to the fibres in order to perform T2R. It may be



necessary for the equipment at both ends of the optical fibre system making up a particular Dark Fibre service to be disconnected: The KCOM engineer will do this.

KCOM or its agents will test the optical path(s) using test equipment provided by KCOM or its agents. After testing and repair, KCOM will clean the fibre connectors, reconnect any links they originally disconnected and then hand back the Dark Fibre service to the CP.

## 4 Customer Interfaces

The customer interface for the Dark Fibre service will be a number of captive female optical connectors dependent upon the Dark Fibre service type.

- It shall be the customer's responsibility to provide a connection from the KCOM optical patch panel into optical transmission equipment owned by the customer for any and each instance of the Dark Fibre service;
- The optical connectors will be of type single SC/APC (BS EN 50377-4-2 grade B=C).
- The optical connector(s) provided by the customer using the Dark Fibre service must be of the correct type and quality in order for the Dark Fibre service to operate correctly;

### 4.1 Rack Mounted Patch Panel

The Splice and Patch panel is designed to be installed into a 19" rack. Optionally, the Splice and Patch panel may be fitted instead into an ETSI 535mm rack. There are two options available:

- 12 port upgradeable to 24 optical port panel.
- 24 port upgradeable to 48 optical port panel.

Because of restricted outlet space in the Splice and Patch Panels supplied by KCOM, if a CP wishes to load a 48 fibre patch panel beyond 36 fibres, the Customer patch cables must be of diameter 2mm or smaller. The Splice and Patch Panels are 1U high and utilise SC/APC connectors for service connections.

Dark Fibre patch panels are the property of KCOM. In instances where more than one CP is delivering service within a single location, KCOM will provide a patch lead from this to an individual CP's termination point.

Connector interface: Hardened SC/APC female connectors.

An SC/APC patch cable is required to interface to CP equipment and will need to be provided by the CP or its agents

### 4.2 Wall Mounted Fibre Enclosure

Where space is limited or at a premium a Wall Mounted Box can be used. These wall boxes will accept either cable or Blown Fibre Tubing. These will be available in 2, 4 or 8 port configurations with SC/APC optical connectors.

Connector interface: Hardened SC/APC female connectors.

An SC/APC patch cable is required to interface to CP equipment and need to be provided by the CP or its agents.





## 5 Optical Safety

All transmission equipment connected to KCOM's network must either incorporate sufficient safety features (ALS/ALR/APSD) and/or not exceed Class1M. This ensures that the maximum optical power hazard level of accessible emission to which KCOM engineers working on the network may be exposed is no greater than Class1M per :

- IEC 60825-2 2004 Safety of laser products – Part 2 : Safety of optical fibre communication systems (OFCS)

All Visual Fibre Identifiers, aka Visible Light Sources, must adhere to Class2 laser per :

- IEC 60825-1 2014 Safety of laser products – Part 1 : Equipment classification and requirements, and must not exceed an optical power of 1mW

CPs shall confirm their adherence to this requirement as part of the establishment process to consume the product. All equipment fitted by the customer must not at any time in operation exceed the stated optical safety specifications in any mode or fault scenario. The use of technology that could be configured electronically to exceed the optical safety specifications is not permitted.

Higher optical powers present a significant risk to KCOM engineers working on the network. Any laser power levels identified, or reasonably suspected, to be above the agreed safe limit will be immediately isolated from the KCOM network on safety grounds. This may cause an interruption of service whilst an investigation takes place and may ultimately result in KCOM terminating the service.

## 6 Environmental Specifications

Services provided within a controlled environment :

- Ambient temperature : 0°C to +40°C
- Relative Humidity 5% to 95%

Services provided within an external housing :

- Ambient temperature : -25°C to +55°C
- Relative Humidity 8% to 95% (non-condensing)

## 7 Availability

The service will only be available within the Hull Area. KCOM will provide Dark Fibre where there is existing fibre available but, where no fibre is available, KCOM will assess alternative route options. If no alternative routes are available:

- Where the supply of new fibre is a Network Adjustment, KCOM will assess whether provision of that fibre is reasonable. Where it is reasonable, KCOM will supply the Service. Where it is not reasonable, KCOM has no obligation to supply the Service, and KCOM will advise the CP of its intentions in these circumstances as soon as is reasonably practicable; or



- Where the supply of new fibre constitutes a Network Extension, KCOM will assess the commercial feasibility of supplying new fibre but there shall be no obligation for KCOM to supply the Service.

## 8 Glossary and Definitions

CIP	Customer Information Publication
COSHH	Health and Safety Executive - Control of Substances Hazardous to Health
CP	Communications Provider
Exchange Site	Means the site of an operational building of KCOM as advised by KCOM
Hull Area	the area defined as the 'Licensed Area' in the licence granted on 30 November 1987 under section 7 of the Telecommunications Act 1984 to Kingston upon Hull City Council and Kingston Communications (Hull) plc
ITU-T	International Telecommunications Union – Telecom Standardisation Sector
OTDR	Optical Time Domain Reflectometer
BS	BSI British Standards Institute
CP	Communications Provider
NTE	Network Terminating Equipment
NTP	Network Termination Point
OLT	Optical Line Terminator
ONT	Optical Network Termination

## 9 References

[1]	ITU-T G.652	Characteristics of a single-mode optical fibre and cable
[2]	ITU-T G.657	Characteristics of a single-mode optical fibre and cable
[3]	BS EN 60825-1	Safety of laser products – Part 1: Equipment classification and requirements
[4]	BS EN 60825-2	Safety of laser products – Part 2: Safety of optical fibre communication systems (OFCS)
[5]	BS EN 50377-4-2	Connector sets and interconnect components to be used in optical fibre communication systems
[6]	ITU-T Rec.L.12	Optical fibre splices