



WHOLESALE REFERENCE OFFER*

PASSIVE INFRASTRUCTURE PRODUCT SPECIFICATION

JUNE 2022

*Fibrus offer wholesale access in areas where public funding has been used to build the Network. Fibrus Networks is currently building the Network to achieve optimal performance and to support future Services. Fibrus Networks will inform you of product availability during the onboarding and ordering process.



Contents

Introduction	3
Accreditation	4
Wholesale Passive Infrastructure Product	4
Overview	4
Duct Access.....	6
Chamber Access	6
Pole Access.....	7
Street Cabinet Access	8
Wholesale Passive Infrastructure Ordering	11
Passive Infrastructure Service Management	13
Billing	14

Introduction

This is the Wholesale Reference Product Specification for Fibrus Passive Infrastructure. Fibrus provides Retail Service Providers (RSPs) and Communication Providers (CPs), from herein referred to collectively as RSPs, with access to deploy equipment on or in passive infrastructure within the Fibrus network in areas where public funding has been used. Fibrus may also offer or accept requests for other passive infrastructure access outside of public funded areas where capacity and operations allow. This document outlines the wholesale products available, order handling, billing and service management.

This Product Specification is designed for use by RSPs who are Wholesale partners of Fibrus Networks (Fibrus). For information on how to become a Wholesale partner with Fibrus please see our guide *How to Become a Wholesale Customer* available at <https://hyperfastni.com/wholesale-partners>.

This document should be read in conjunction with the current Fibrus Networks Wholesale Services Framework Agreement, Wholesale Price List, Wholesale Access Service Level Agreement and Wholesale Access Order & Fulfilment documentation, which are available on the Fibrus website at <https://hyperfastni.com/wholesale-partners>.

Fibrus' approach is to enable wholesale customers to self-serve their requirements via direct digital access to the systems capable of high-volume transactions alongside dedicated relationship management to ensure their needs are met and to deal with specific requirements. The Operator Wholesale Gateway (OWG) is the ordering and fault management system for Fibrus wholesale products and services. However, the complex nature of Passive Infrastructure requires interaction between the RSP and their Wholesale Relationship Manager.

Passive Infrastructure products may be used in conjunction with other Fibrus wholesale products e.g. Dark Fibre or with Third Party physical infrastructure. For the avoidance of doubt, any access to Third Party passive infrastructure and related charges are the responsibility of the RSP.

Accreditation

When working in the Fibrus network, RSPs will need to be accredited to undertake surveys and to install and maintain your own apparatus in accordance with applicable engineering and health and safety standards.

Installation will include sub duct, cables, blown fibre tubing and blown fibre, core drilling, civils work, and splicing and testing activity. RSP operatives, agents and contractors working on Fibrus infrastructure must be accredited for Safety and Civils as well as non-Civils work. For ease of accreditation Fibrus will accept Openreach non-civils accreditation as the standard for working on the Fibrus network.

RSPs will be asked to provide proof of accreditation for relevant work before commencing work on Fibrus infrastructure and their employees, agents and contractors must carry proof of required accreditation on their person at all times.

Wholesale Passive Infrastructure Products

Overview

The Fibrus network architecture and design relies upon reuse of existing third party physical infrastructure where possible to deploy the Fibrus network solution. For example, Openreach PIA infrastructure is used extensively for both overhead and underground network deployment. As such, Fibrus often does not own contiguous, end-to-end physical passive infrastructure to support the FTTP network.

Fibrus deploys its own physical infrastructure where determined to be most efficient or effective to serve end customers. Fibrus Wholesale Passive Infrastructure products allow RSPs to access Fibrus duct, pole and street cabinet infrastructure where feasible and where required under public funded network deployment.

The passive infrastructure facilities provided are:

- **Duct Access** - facility in Fibrus duct
- **Chamber Access** - facility in Fibrus underground chamber
- **Pole Access** - facility on Fibrus pole
- **Cabinet Access** – facility in Fibrus street cabinets

Duct Access and Chamber Access products are subject to a minimum term of 5 years whilst Pole Access and Cabinet Access products have a minimum term of 12 months, please refer to the Fibrus *Wholesale Price List* and *Wholesale Access Service Level Agreement documents*, available at: <https://hyperfastni.com/wholesale-partners>.

A schematic of Fibrus physical network is illustrated in Figure1 below:

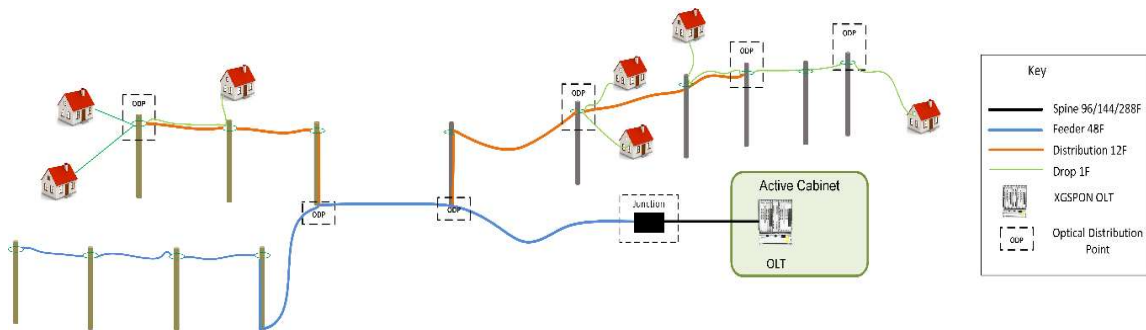


Figure 1 – Physical Infrastructure Overview

The Fibrus Wholesale Passive Infrastructure products utilise physical assets deployed to support the Fibrus FTTP network deployment. The products available to support the use of these facilities are described below. Fibrus Wholesale Passive Infrastructure products may only be used to provide Public Electronic Communications Services and / or Public Electronic Communications Network (both of which are defined in the Communications Act 2003) and as set out in Ofcom’s statement in June 2019.

Duct Access

Typically, Fibrus will deploy duct in its Spine network, defined as infrastructure from the Fibrus Active Cabinet Splice Chamber to the Fibre Aggregation joint located at the first Optical Distribution Point (ODP) or other aggregation point in the network.

Duct access has the following product elements:

Code	Wholesale Passive Infrastructure	Description
PDSR	Facility in Spine Duct - Rental	Rental in Spine duct per linear metre. Direct cable, Blown Fibre Tubing (BFT) or subduct
PDSI	Facility in Spine Duct - IRU	IRU in Spine duct per linear metre for direct cable, Blown Fibre Tubing (BFT) or subduct

Note: The second product variant for duct access is to help facilitate investment decisions, with a 20-year Indefeasible Right to Use model (IRU).

Design Specification

Duct access is available to the following specifications:

- Direct cable, Blown Fibre Tubing (BFT) or subduct up to **maximum** 25mm diameter

Chamber Access

Fibrus build chambers in varying sizes to support the FTTP network deployment. Such chambers may be integral to the Fibrus physical network or be required to support Fibrus access to third party duct and pole network e.g. Openreach PIA. Fibrus will offer products to facilitate RSPs entering the Fibrus duct infrastructure via Fibrus chambers and for the hosting of facilities within Fibrus chambers.

Chamber Access has three product elements defined as:

Code	Wholesale Passive Infrastructure	Description
PCFB	Splice Chamber Breakthrough	Splice Chamber Breakthrough is a one-off cost to enter a Fibrus chamber
PCFE	Splice Chamber Facility Entry	Splice Chamber Facility Entry is the rental per cable, BFT or sub duct entry
PCFA	Splice Chamber Facility Apparatus	Splice Chamber Facility Apparatus is the rental per closure, joint or similar (where space available)

Design Specification

Chamber access is to have the following specifications:

- Chamber breakthrough is per entry up to a maximum of 110mm

- Cable Facility will be per direct cable, Blown Fibre Tubing (BFT) or subduct up to **maximum** 25mm diameter
- Apparatus in Chamber is **per hosted apparatus** and only available where space exists in line with current engineering principles.
- Apparatus and supporting brackets specifications must be submitted for approval prior to installation

Pole Access

Fibrus erect poles in varying locations to support the FTTP network deployment. Such poles may be integral to the Fibrus physical network or be used to support Fibrus access to third party duct and pole network e.g. Openreach PIA. Fibrus offers products to enable RSPs to access Fibrus pole infrastructure to deploy their access fibre and service customers from termination points, where space exists in line with current engineering principles.

Pole Access products are defined as:

Code	Wholesale Passive Infrastructure	Description
PPFC	Pole Facility Cable	Facility to locate cable on single pole with the rental per cable
PPFS	Pole Facility Single User Termination	Pole Apparatus Facility with rental per closure, joint or similar feeding a single user
PPFM	Pole Facility Multi User Termination	Pole Apparatus Facility with rental per closure, joint or similar feeding multiple users

Design Specification

Pole access will adhere to the following specifications:

- Cable must be installed to appropriate specifications
- Cable Facility will be per cable, Blown Fibre Tubing (BFT) or subduct where space exists in line with current engineering principles.
- Single end user attachment is **per hosted apparatus** where space exists in line with current engineering principles.
- Multi end user attachment is **per hosted apparatus** where space exists in line with current engineering principles.

Non-standard Installations

There will be additional charges raised in the event of non-standard installations. Our standard installation service covers the installations defined above. RSPs will provide Fibrus Wholesale with the specifications for all items including but not limited to cable, sub duct, BFT, apparatus, termination points, joints and supporting brackets in advance of deployment. It is the responsibility of the RSP to inform Fibrus of any changes in the provided specifications as they occur from time to time.

It is the RSP's responsibility to assure connections meet these criteria; a charge will be levied for deployments failing to meet these conditions. It is the RSP's responsibility to ensure deployment by its operatives, agents or contractors causes no damage to Fibrus or third party infrastructure. The RSP will be fully liable for all costs of repair or reinstatement where such damage occurs. Non-standard Installations will require a survey to define the work required and any additional charges to be levied.

Street Cabinet Access

Fibrus deploys street cabinets within the optical fibre network and provides wholesale access for RSPs to cabinet space in or adjacent to Fibrus active cabinets where public funding has been taken.

These street cabinets are not temperature controlled and are limited in size due to the impact on the environment and to meet the requirements of authorities and communities. Fibrus cabinets are hub locations within the coverage area of a network configuration providing access to network serving customer premises and housing backhaul equipment with connectivity to Fibrus core sites.

RSP Equipment may be accommodated within an existing Fibrus cabinet, subject to survey, quote and order. Due of the physical size of cabinets, third-party access to space inside cabinets may require the deployment of a second cabinet alongside or nearby to the desired cabinet, which Fibrus can facilitate. This process is dependent on the agreement of local stakeholders, including landowners where the cabinet is on private land, local Parish and County councils, and local highways bodies, hence the time to deploy is variable. When providing additional cabinet space, Fibrus will provide duct/cable capacity to access the existing cabinet in addition to power if required.

Street Cabinet access has the following product elements:

Code	Wholesale Passive Infrastructure	Description
PACU	Active Cabinet Space	1U Active Cabinet Space in existing active cabinet (where available)
PAAU	Adjacent Cabinet Space	1U Space in Cabinet Adjacent to Fibrus Active Cabinet
PACP	Cabinet Power	48V Power Supply
PACB	Battery Backup, Rectifier/Regulator	Battery back-up to support short term power outages

All Street Cabinet Access products are subject to survey and quotation due to the unique nature of each site.

Design Specification

The picture below shows an example Fibrus cabinet rack, populated with equipment.

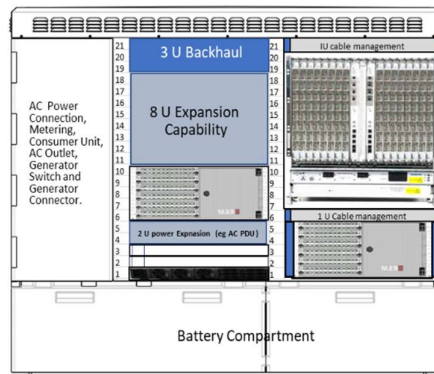


Figure 2: Example Cabinet Configuration

Street cabinets can provide (per provider on an assumed 3-way sharing scenario) up to:

- 5U of equipment (in a typical existing cabinet)
- 5U of equipment (in a typical new-build cabinet for third-party use)
- The rack is a standard 19" rack and has a minimum 300mm depth.
- Space in front of the rack is limited to 100mm.

Cable management is shared between all cabinet users. DC power cable management is via cable retention rings and trays for DC power. Fibre cable management utilises fibre guide loops.

Note: The use of Street Cabinet Access products may require the use of other Fibrus or Third Party passive Infrastructure products e.g. Junction Box access and/or hosting. Access to Third Party passive infrastructure and related charges are the responsibility of the RSP.

Environmental

The interior environment is designated to, but does not guarantee, compliance with ETSI EN 300 019-1-3. Forced air cooling is provided and equipment should draw cool air from the front of the rack and exhaust to the rear. The cabinets are not temperature controlled. Ambient air temperatures are typically between -5°C and $+60^{\circ}\text{C}$ in extremes. Relative humidity can vary between 10% and 100%, and so conformal coated components are recommended where possible.

[**Note:** Commercial grade parts often fall short of maximum temperature requirements and may fail. Fibrus uses industrial temperature hardened parts.]

Power

Fibrus street cabinets take their power from the local AC power grid. A DC 48V power system is used to provide power to telecoms equipment. RSPs seeking cabinet access will be required to specify their power requirements at the time of order. All equipment is grounded through chassis connections or grounding point connections to the rack or cabinet bonding points, which are connected to a ground electrode installed by Fibrus.

Additional power and Battery back-up may be available on request and subject to survey, design and quotation. Battery back-up aims to support short term power outages e.g. up to 4 hours, depending on environment and power usage in each cabinet.

RSPs are responsible for the electrical safety of equipment.

Fibrus maintains exclusive responsibility for making connections to the cabinet. The RSP will provide and connect their equipment side using appropriate DC power cables, providing enough cable to terminate on the DC power clamps. A Fibrus engineer will check the connection, make the final connection to the DC supply, and energise the power breakers. Fibrus cannot guarantee the quality or stability of AC power supplies within the cabinet.

Cable Ingress/Egress

Cable ingress and egress is managed via ducts which terminating in Fibrus underground chamber(s) adjacent to the cabinet. An RSP may bring in cables with a combined diameter that does not exceed 25mm (e.g. a bundle of cables must fit within a 25mm duct).

Cable termination must be accomplished within the Provider's rack space or within a small portion of the provided cable termination space (subject to agreement). All cables must be clearly labelled with the RSP service reference number provided by Fibrus.

Wholesale Passive Infrastructure Ordering

Overview

Ordering and delivering Passive Infrastructure products is a complex process requiring interaction between the ordering the RSP and their Fibrus Wholesale Partner for enquiry, definition, quotation and order acceptance before product design and build.

Small or single requests can be managed via email or the OWG whereas larger requests will require an agreed project plan. Fibrus has defined a standard approach summarised below:

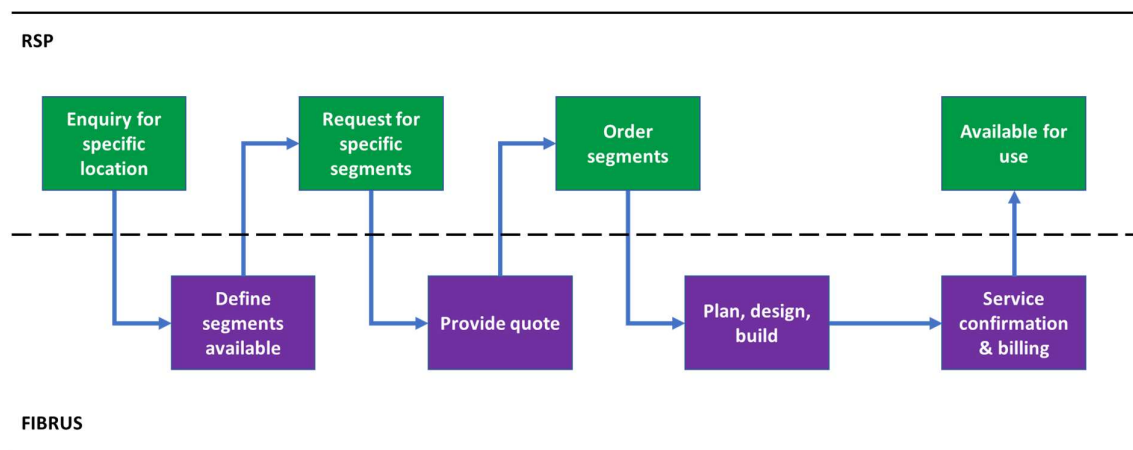


Figure 3 – Ordering Process Flow

Enquiry and Availability

RSP should contact their Fibrus Wholesale Partner to register interest in Passive Infrastructure products in specific location(s). Fibrus will review the enquiry and subject to clarification will confirm a list of eligible product availability in the area of interest.

Pricing

In line with the Fibrus Wholesale Price List and the RSP providing the information required, the RSP may request pricing for specific products at their specified locations. Following a completed request, Fibrus will provide a quotation to the RSP as an offer letter with the relevant standard business terms. (**Note:** where applicable there may be a survey cost to RSP, which is defined in Fibrus Wholesale Price List available at <https://hyperfastni.com/wholesale-partners>).

Acceptance and Order

If the RSP accepts the offer including terms and conditions, the RSP can place an order and agreements are signed and Fibrus will process the order.

Plan to Build

The RSP, on confirmation of the order, will commence planning and design activity, leading to network build and inventory recording. The RSP will provide Fibrus with planned dates for installation. In certain activities, the RSP and Fibrus will have to work together to deploy infrastructure eg for Splice Chamber Breakthrough, and it is the responsibility of the RSP to co-ordinate such activity. Once the build process has concluded the RSP will confirm completion to Fibrus, including inventory records as applicable.

Confirmation and Billing

Fibrus will confirm the recorded service to the RSP and commence the generation of billing for the service.

Escalation Process

Where an RSP requires to escalate an order or part thereof it must contact their wholesale relationship manager. Orders may only be escalated where they are beyond SLA parameters.

Passive Infrastructure Service Management

Fibrus operates to a principle of enabling RSPs to manage their network and customers directly. As such, it is a fundamental principle that a RSP must prove any service issues or faults are outside its own network and equipment before raising a trouble ticket.

Where the RSP cannot identify and remediate the issue, a trouble ticket can be raised within

OWG for the attention of Fibrus Wholesale. Each trouble ticket should contain the following information:

- Infrastructure affected as defined in inventory
- Geographic location inventory
- Nature of trouble
- Time of first alarm or notification

Trouble Ticket Resolution Process

Trouble tickets should only be raised when the CP has identified the trouble as being within the Fibrus network or cannot localise the source of the trouble. The five key steps in trouble ticket resolution are:

- Trouble ticket reported – RSP
- Trouble diagnosis and isolation – Fibrus
- Trouble repair - Fibrus
- Trouble ticket updated and closed – Fibrus
- Customer updated - RSP

To complete diagnosis and repair Fibrus may be required to work in conjunction with RSP personnel. The RSP will be responsible for the availability and capability of such personnel and any resultant impact on fault duration.

Escalation Process

Where a RSP requires to escalate a trouble ticket for resolution it must contact their Wholesale Relationship Manager. Trouble tickets may only be escalated where they are beyond SLA parameters.

Outages

Planned Outages

It is recognised that Planned Outages are a necessary, normal and regular occurrence. Where a Planned Outage will impact on the Passive Infrastructure services provided to a RSP, the RSP will be notified by email, including a description of the outage, customer impact, date, time and expected duration. Fibrus will endeavour at all times to carry out Planned Outages during the preferred hours of 00:00 to 06:00.

Unplanned Outages

Where an outage occurs that impact on multiple end-customers, Fibrus will inform RSPs to enable them manage operations and customer expectations effectively.

Billing

All connection, usage and recurring charges associated with the provision of the Passive Infrastructure products are charged on the next billing cycle following completion of an order. All charges are as defined in the contractual agreement with the RSP and/or as published where appropriate.

Any queries regarding billing and charges can be raised with the Wholesale Relationship Manager for resolution.