



Ultrafast Fibre Input Services Wholesale Services Agreement

Service Description for PON Fibre Access Services (**PONFAS**)

1. Interpretation

- 1.1 The Passive Optical Network Fibre Access Service (**PONFAS**) described in this Service Description will be available from 1 January 2020.
- 1.2 References to clauses or sections are references to clauses or sections in this Service Description unless expressly provided otherwise. The definitions set out in the Input Services Wholesale Services Agreement General Terms (**Input Services General Terms**) and the Operations Manual apply to this Service Description unless expressly provided otherwise.
- 1.3 References to the Operations Manual are references to the operations manual for PONFAS.
- 1.4 In this Service Description, unless the context indicates otherwise:
 - 1.4.1 **PONFAS** means the Passive Optical Network Fibre Access Service described in this Service Description. This is a collection of dark fibre services that, when combined, allow an Access Seeker to offer point-to-multipoint fibre services between equipment located in, or connected to, a Central Office, and multiple Premises served by that Central Office. It comprises the PONFAS Feeder Service and PONFAS Distribution Services;
 - 1.4.2 **PONFAS Distribution Service** means a dark fibre service that connects a single Premises to a Splitter located in the FFP that serves that Premises comprising the Distribution Fibre External Fibre Lead-in and Internal Fibre Lead-in;
 - 1.4.3 **PONFAS Feeder Service** means a dark fibre service that comprises a Splitter in an FFP, and a Feeder Fibre that connects an FFP to the local Central Office;
 - 1.4.4 **Distribution Fibre** means a fibre between the FFP and the Fibre Access Point at the Premises boundary;
 - 1.4.5 **Feeder Fibre** means a fibre between a Splitter located at the FFP and the local Central Office ODF, and is part of the PONFAS Feeder Service;
 - 1.4.6 **FFP** means the Fibre Flexibility Point. This is a location within a Central Office, cabinet, building frame or underground pit that houses the Splitter and facilitates connectivity between the Distribution Fibre, and the Splitter. It also facilitates connectivity between the Splitter and the Feeder Fibre; and
 - 1.4.7 **Splitter** means a passive optical multiplexing device that comprises multiple beam splitters. A Splitter takes a single downstream wavelength from the Feeder Fibre and passively copies it to multiple Distribution Fibres. Upstream wavelengths from the Distribution Fibres are multiplexed into a single upstream Feeder Fibre (Typically, electronics at each end use Wavelength or Time Division Multiplexing techniques to avoid interference between upstream wavelengths from different Distribution Fibres).

2. Input Services General Terms

- 2.1 The Input Services General Terms in the Input Services Reference Offer apply to this Service Description and the supply of PONFAS by the LFC to Access Seekers subject to any modifications, exclusions and clarifications:
 - 2.1.1 set out in clause 2.2 below; and
 - 2.1.2 that are necessary to ensure the Input Services General Terms are appropriate for the provision of PONFAS as notified by the LFC on at least 40 Business Days' prior written notice.
- 2.2 PONFAS:

2.2.1 is not a Base Wholesale Service as defined in clause 1.3 of the LFC's UFB Wholesale Services Agreement General Terms;

2.2.2 is not subject to a UFB Price Cap.

2.2.3 Changes to PONFAS Charges (including any Input Services Ancillary Charges) may be made by the LFC in accordance with the General Terms.

2.3 This Service Description and the PONFAS Operations Manual and PONFAS Service Level Terms may be changed by the LFC using the process for set out in clause 24 of the Input Services General Terms.

3. The PONFAS

3.1 PONFAS is a collection of dark fibre services that, when combined, are suitable for the delivery of consumer and business grade applications requiring point-to-multipoint fibre access. These services enable access to, and interconnection with, the LFC Network.

3.2 A diagram of the configuration for PONFAS is set out in Appendix A. PONFAS consists of the provision of two components both of which an Access Seeker must purchase to take PONFAS:

3.2.1 The PONFAS Feeder Service, that comprises an LFC-supplied Splitter located at an FFP and a single Feeder Fibre from the Splitter to the OFDF at the LFC Central Office.

3.2.2 The PONFAS Distribution Service, that comprises a single fibre from the connector on the ITP at the End User Premises (as applicable) to a port on a patch panel in the local FFP, where the local FFP is the FFP that serves the geographic area in which the End User Premises is located;

3.2.3 The PONFAS Feeder Service is a prerequisite to the supply of the PONFAS Distribution Service (i.e. Access Seekers must first purchase and maintain a PONFAS Feeder Service at the relevant FFP all times while taking the PONFAS Distribution Service from that FFP).

3.2.4 The Input Central Office and POI Co-location Service or Central Office and POI Co-location Service is a prerequisite to the supply of the PONFAS Feeder Service (i.e. Access Seekers must first purchase and maintain an Input Central Office and POI Co-location Service or Central Office and POI Co-location Service at the relevant Central Office all times while taking the PONFAS Feeder Service).

3.3 PONFAS is an input service which the LFC must supply to meet the equivalence standard, as set out in the Undertakings.

3.4 An Access Seeker can use PONFAS as a building block to combine with other UFB Services (or with the Access Seeker's own network or wholesale services provided by other service providers) to provide point to multi-point fibre based telecommunications services to End Users.

4. PONFAS and Implementation Activities

Geographic Availability

4.1 PONFAS is available on the Network within the LFC's UFB1 Candidate Areas only and may (at the LFC's discretion) be made available by the LFC in adjacent UFB1 Greenfield areas as advised by the LFC from time to time, and otherwise as defined in the Operations Manual. For the avoidance of doubt, and in accordance with the Undertakings, PONFAS is not available:

4.1.1 to NBAPs;

4.1.2 in any of the LFC's UFB2 and UFB2+ Candidate Areas, and any Greenfield areas adjacent to the LFC's UFB2 and UFB2+ Candidate Areas; and

4.1.3 in any other UFB Coverage Areas where LFC fibre is available outside of the LFC's UFB1, UFB2 and UFB2+ Coverage Areas and their respective adjacent Greenfields.

For the avoidance of any doubt, **Greenfields** means the subdivision in a UFB1 Coverage Area of a defined geographical site located in a private or public property subdivision, complex or community (evidenced by confirmation that the Premises exist in the LINZ title database) that is passed by the LFC's layer 1 communal infrastructure Network.

Installation services

4.2 PONFAS includes a Standard Install as set out in the Operations Manual. The LFC will provide Non-Standard Installs for PONFAS as an Input Services Ancillary Service.

Termination Point

4.3 PONFAS termination points are set out in the Operations Manual.

Testing

4.4 The LFC will test the PONFAS Feeder Service from the termination point at the FFP, as referred to in clause 6.1, to the termination point at the LFC Central Office to ensure the PONFAS Feeder Service is within the technical specification for fibre set out in Appendix B.

4.5 The LFC will test the PONFAS Distribution Service from the termination point at the Premises, as referred to in clause 5.1, to the termination point at the FFP, as referred to in clause 5.3, to ensure the PONFAS Distribution Service is within the technical specification for fibre set out in Appendix B.

Input Service Ancillary Services

4.6 If the Access Seeker requires additional services such as:

4.6.1 a Non-Standard Install which includes (where required) an extension of the Fibre Lead-in where there is no existing fibre cabling and the installation is outside the parameters set out in the Operations Manual;

4.6.2 any Premises wiring services, including installation and testing of Access Seeker ONTs and other CPE in the Premises; or

4.6.3 installation and testing of Access Seeker equipment (as defined in the Central Office and POI Co-location Service Description and Input Central Office and POI Co-location Service Description) and services,

the LFC may elect to provide the services in clauses 4.6.2 and 4.6.3 on request subject to terms to be agreed between the LFC and the Access Seeker. The services in clause 4.6.1 are available on terms as set out in this Service Description.

Service Characteristics

4.7 PONFAS is a point-to-multipoint fibre service provided by the LFC on the Network and in accordance with the equivalence standard. PONFAS provides Access Seekers with the ability to provide passive optical network services to a number of Premises, as defined in clause 4.10.

4.8 To provide a passive optical network service to an End User, an Access Seeker must have:

4.8.1 a PONFAS Feeder Service that terminates in the FFP that serves the geographic area the Premises is located in; and

4.8.2 one or more PONFAS Distribution Services that connect individual Premises to PONFAS Feeder Service. A PONFAS Feeder Service must be purchased to the relevant FFP before

the Access Seeker can place an order for a PONFAS Distribution Service to an End User Premises;

4.8.3 the Access Seeker electronics that connect to the PONFAS Feeder Service within the Central Office, such as an OLT. These electronics must be located in the Central Office, using the Central Office and POI Co-location service or the Input Central Office and POI Co-location service; and

4.8.4 the Access Seeker electronics that connect to the PONFAS Distribution Service at the Premises.

4.9 A PONFAS Distribution Service provides a single fibre from a connector on an ITP within the Premises to a local FFP.

4.10 A PONFAS Feeder Service provides:

4.10.1 a Splitter located in an FFP. The Splitter ratio defines the number of PONFAS Distribution Services that can be connected to the PONFAS Feeder Service;

4.10.2 a single fibre that connects the splitter to the OFDF in the local Central Office that the FFP is associated with;

4.10.3 a default Splitter is provided as part of the standard service. Different splitter ratios may be available by agreement between the LFC and the Access Seeker;

4.10.4 an included Fibre Patch service between the OFDF that terminates the PONFAS Feeder Service, and the OFDF where the Tie Cable from the Central Office and POI Co-location Service or Input Central Office and POI Co-location Service terminates;

4.10.5 the FFP houses multiple Splitters and facilitates connectivity between the PONFAS Distribution Service and the PONFAS Feeder Service;

4.10.6 an FFP is associated with a single Central Office, which is the termination point for any PONFAS Feeder Services provided to that FFP;

4.10.7 an FFP serves a specific geographic area, where each Premises within that geographic area is associated to a single FFP. That is, the FFP will be the termination point for any PONFAS Distribution Service from a Premises in that geographic area;

4.10.8 a FFP, which may be:

(a) a MDU FFP, which is designed to support the End Users Tenancies in an MDU;

(b) a Cabinet FFP, which is designed to support up to 288 connections to Premises;

(c) a Splice Enclosure FFP, which is designed to support up to 24 connections to Premises; or

(d) a Central Office FFP, which is designed to support Premises served directly from the Central Office; and

4.10.9 if, due to infill of new Premises, the capacity of an FFP is exceeded then a new FFP may be created, where:

(a) the geographic area associated with the new FFP may be derived from multiple adjacent FFPs; and

(b) all PONFAS Distribution Services connected to Premises within the new geographic area will only be served from the new FFP. The Access

Seeker must purchase a PONFAS Feeder Service to the new FFP to order PONFAS Distribution Services to Premises associated to the new FFP.

Service Requirements

- 4.11 To use PONFAS, the Access Seeker must have the capability to access and interconnect with the PONFAS Feeder Service by co-locating Access Seeker equipment (as defined in the Central Office and POI Co-location Service Description and Input Central Office and POI Co-location Service Description) at the LFC's relevant Central Office using a Footprint provided under the Central Office and POI Co-location Service or Input Central Office and POI Co-location Service;

Additional Service Characteristics

- 4.12 The technical specifications of PONFAS are set out in Appendix B.
- 4.13 The LFC will provide certain support and other assistance as part of the PONFAS including:
- 4.13.1 an automated facility for Service Requests;
 - 4.13.2 an automated facility for fault notifications; and
 - 4.13.3 a tool to assist the Access Seeker in determining the location and availability of the PONFAS (pre-qualification).
- 4.14 The signal loss of the optic path will be determined by the length of the fibre, the type of splitter used, the number of splices or connectors, the presence of legal intercept devices, ageing, etc, in accordance with the standards specified in Appendix B.
- 4.14.1 The maximum distance of the PONFAS Feeder Service and the PONFAS Distribution Service will be limited by the physical size of the Central Office coverage area and the route from Central Office to End User Premises or Access Seeker Premises; however, it will not exceed 15kms for standard paths.
 - 4.14.2 The maximum predicted optical loss between each termination point of the PONFAS Distribution Service (at each Premises) and termination point of the PONFAS Feeder Service at the Central Office will be published from time to time by the LFC. This optical loss may be across the following elements:
 - (a) PONFAS Distribution Service fibre from the ITP at the Premises to the associated FFP (this includes the Internal Fibre Lead-in, External Fibre Lead-in and any splicing within the ETP and ITP);
 - (b) connection of the PONFAS Distribution Service to the PONFAS Feeder Splitter within the FFP;
 - (c) connection of the Splitter to the Feeder Fibre; and
 - (d) the Feeder Fibre from the Splitter to the Central Office OFDF.It excludes optical loss across:
 - (e) the ONT;
 - (f) the Splitter;
 - (g) the fibre from the ONT to the ITP, including connection to the ITP;
 - (h) the tie cable from the Central Office OFDF to Access Seeker Footprint provided under the Central Office and POI Co-location Service or Input Central Office and POI Co-location Service;

- (i) connection of the Feeder Fibre to a Fibre Patch Service that connects to the tie cable provided as part of the Central Office and POI Co-location Service or Input Central Office and POI Co-location Service; and
- (j) the Fibre Patch Service.

4.14.3 The maximum variation of loss between the Premises termination points of different PONFAS Distribution Services connected to the same PONFAS Feeder Service is 5dB at 1550nm.

4.14.4 The Access Seeker will be responsible for managing the end to end optical budgets used for each of their specific applications. This loss also needs to take into account:

- (a) an allowance for changes, such as disconnects and connects or fault restoration, which can result in small changes to optical budgets; and
- (b) any additional loss caused by the insertion of an Access Seeker splitter or combiner past the PONFAS Service Demarcation Points.

4.15 PONFAS excludes:

4.15.1 provision or maintenance of any cabling or connection or active device beyond the Service Demarcation Points described in clauses 5.1 and 6.2;

4.15.2 configuration, monitoring, operation, on-going support or maintenance of Access Seekers' or End Users' applications, equipment or networks;

4.15.3 the supply of AC mains & UPS power, accommodation space, heating, ventilation, air conditioning and facilities at the LFC's relevant Central Office or the Premises;

4.15.4 the connection of a PONFAS Feeder Fibre Service to services other than the Input Central Office and POI Co-location Service or Central Office and POI Co-location Service, including but not limited to:

- (a) Direct Fibre Access Services;
- (b) Fibre Interconnection Services;
- (c) third party tie cables;
- (d) LFC Tie Cables that terminate on Chorus ODFs; and
- (e) Input Direct Fibre Access Services; and

4.15.5 the provisioning of a PONFAS Distribution Service to a NBAP;

4.15.6 the provisioning of PONFAS in any of the LFC's UFB2/2+ Candidate Areas and Greenfield areas adjacent to the LFC's UFB2/2+ Candidate Areas until 1 January 2026; and

4.15.7 the provisioning of PONFAS in any other UFB areas which are outside of the LFC's UFB1, UFB2 and UFB2+ Candidate Areas.

4.16 PONFAS does not support the PON protection architectures described in ITU-T G984.1 Gigabit-capable passive optical networks (GPON): General characteristics (03/08) section 14.2.1.

5. PONFAS Distribution Service Demarcation Point

5.1 The Service Demarcation Point for the PONFAS Distribution Service at the Premises is the termination point on the ITP as described in the Operations Manual.

5.2 The PONFAS Distribution Service excludes the wiring beyond the ITP. If a PONFAS fault reported by the Access Seeker is found by the LFC to not be caused by the LFC or any part of the LFC

Network up to the PONFAS Service Demarcation Point, the Access Seeker may be charged the “No fault found” Charge in the Input Services Price List. Note the wiring should comply with the industry standard premises voice wiring requirements which are available at www.tcf.org.nz.

- 5.3 The Service Demarcation Point for the PONFAS Distribution Service at the Access Seeker-facing interface within the FFP is the connector on the patch panel. This Service Demarcation Point is internal to the LFC Network and is not accessible by the Access Seeker.

6. PONFAS Feeder Service Demarcation Point

- 6.1 The Premises facing Service Demarcation Point for the PONFAS Feeder Service at the FFP is the downstream Splitter port connector (or equivalent fusion splice) located in the FFP. This Service Demarcation Point is internal to the LFC Network and is not accessible by the Access Seeker.
- 6.2 The Service Demarcation Point for the PONFAS Feeder Service at the Central Office is the termination point on the OFDF in the Central Office.

7. Tie Cable Connection

- 7.1 Where required, the LFC will provide, using a separate product, a Tie Cable between the OFDF and the Access Seeker’s LCA Connector on the Access Seeker’s OFDF in its Central Office and POI Co-location Service or Input Central Office and POI Co-location Service Footprint.

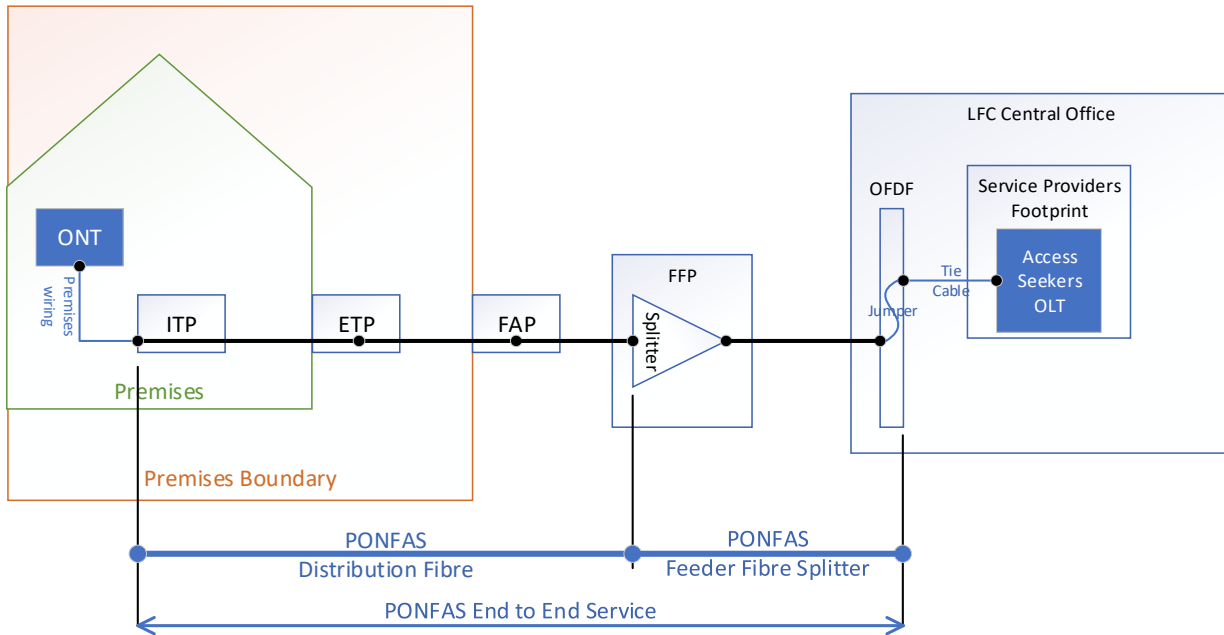
8. Access Seeker Responsibilities

- 8.1 Other Access Seeker responsibilities are detailed in the Input Services General Terms and Operations Manual.
- 8.2 The Access Seeker will be responsible for all of the design, specification and commissioning of their equipment and plant (both active and passive) connected to PONFAS.

9. Service Levels

- 9.1 Service Levels for PONFAS are set out in the Service Level Terms for PONFAS.

Appendix A – Diagram



This is a generic diagram showing the standard configuration and Service Demarcation Points. It is not intended to represent every situation or detailed physical architecture. The following points should be noted:

- the FFP may be underground, in a cabinet, in a building frame or located in a Central Office;
- the PONFAS Distribution Service may be connected directly to a port on the Splitter (i.e. there is no OFDF within the FFP). This is an internal Service Demarcation Point and is not accessible by Access Seekers;
- Access Seekers may not undertake fibre activity within the Central Office, except within their own Access Seeker Footprint that they have purchased as part of the Central Office and POI Co-location service or Input Central Office and POI Co-location Service; and
- in MDUs where the LFC has provided fibre cabling within the building to individual Premises, the termination point is described in the Operations Manual.

Appendix B – Technical Specification

Technical Specification

Fibre	<p>External fibre must comply with ITU-T specification G.652D or G.657A.</p> <p>Internal building fibre cables must meet appropriate fire regulations i.e. be Flame-Retardant, Non Corrosive, Low Smoke, Zero Halogen (FRNC/LSZH)</p>
PONFAS Distribution Service Connector type	<p>Fibre terminations must be SC/APC type connectors (complying with the IEC 61754-4 standard) or alternatively LC/APC also known as LCA type connectors (complying with the IEC 61754-20 standard) as appropriate.</p>
PONFAS Feeder Service Connector Type	<p>Fibre terminations must be SC/APC type connectors (complying with the IEC 61754-4 standard) or alternatively LC/APC also known as LCA type connectors (complying with the IEC 61754-20 standard) as appropriate.</p>
Optic Path	<p>Communal Network performance</p> <p>Total GPON Insertion Loss (ITU-T G984) = $\leq 28.5\text{db}$</p> <p>Network Return Loss = $\geq 32\text{db}$</p> <p>LFC GPON system margin (lifetime ageing factor) = 1.5db</p> <p>Total GPON insertion Loss OLT to ONT design target is = $\leq 27.0\text{db}$ ($28.5\text{db} - 1.5\text{db}$)</p> <p>Optical Fibre Attenuation Co-Efficient (L) (ITU-T G.652. & G657.A) = $\leq 0.4\text{db/km}$</p> <p>Splice Loss (S) = $\leq 0.15\text{db}$</p> <p>Mated Connector loss (C) = $\leq 0.3\text{db}$</p> <p>Mated Connector Reflection = $\geq 55\text{db}$</p> <p>Total Insertion Loss of network (IL) is calculated from $IL = 0.4L + 0.15S + 0.3C$ (excluding PON splitter)</p> <p>Splitter performance</p> <p>1:32 = $\leq 17\text{db}$</p> <p>1:16 = $\leq 14\text{db}$</p> <p>1:8 = $\leq 11\text{db}$</p> <p>1:4 = $\leq 7.3\text{db}$</p> <p>1:2 = $\leq 4.0\text{db}$</p>

Fibre Testing	<p>All commissioning Layer 1 Network testing (LFC site OFDF to end of Communal Network) is by OTDR at two wavelengths, 1310nm and 1550nm using Bi-Directional method in accordance with LFC standard.</p> <p>The methodology used will be based on bi-directionally testing all fibres in the Communal Network required to complete the service.</p> <p>Network test results are provided by agreement verifying performance features. Refer to the Direct Fibre Services Operations Manual for details.</p> <p>All Layer 1 Network restoration testing will be LFC site OFDF to Premises termination point.</p> <p>Testing for power loss will be at either 1310 or 1550 nm.</p> <p>The wavelengths of 1625 nm and 1650nm are reserved for Network maintenance testing purposes, (live GPON network) compliant with ITU-T L.41.</p>
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