



Northpower Fibre UFB Service Agreement

Service Description for PON Fibre Access Service (PONFAS)

Version 1.0

1. Interpretation

- 1.1 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 General Terms and the Operations Manual apply to this Service Description unless expressly provided otherwise.
- 1.2 References to the Operations Manual are references to the Operations Manual for PONFAS.
- 1.3 New definitions to include in Operations Manual
- 1.3.1 **Building Cable** means a fibre between the ETP at the Premises entry point (or in the case of an MDU the building OFDF) and the ITP at the ONT position.
- 1.3.2 **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 a Service Provider 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;
- 1.3.3 **PONFAS Distribution Service** means a dark fibre service that connects a single Premise to a Splitter located in the FFP that serves that Premise comprising the Distribution Fibre, Lead-in and Building Cable;
- 1.3.4 **PONFAS Feeder Service** means a dark fibre service that comprises a Splitter in a FFP, and a Feeder Fibre that connects a FFP to the local Central Office;
- 1.3.5 **Distribution Fibre** means a fibre between the FFP and the Fibre Access Point at the Premises boundary;
- 1.3.6 **Feeder Fibre** means a fibre between a Splitter located at the FFP and the local Central Office OFDF, and is part of the PONFAS Feeder Service;
- 1.3.7 **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.
- 1.3.8 **Lead-in** means a fibre between the Fibre Access Point at the Premise boundary and the ETP at the Premise (or in the case of an MDU, the building OFDF).
- 1.3.9 **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. General Terms

- 2.1 The General Terms in the LFC Reference Offer apply to provision of PONFAS 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 General Terms are appropriate for the provision of PONFAS as notified by the LFC on 40 Business Days' notice.
- 2.2 PONFAS:
- 2.2.1 Is not a Base Wholesale Service as defined in clause 1.3 of the General Terms;

2.2.2 Is not subject to a Price Cap. Subject to clause 2.2.3 below changes to the PONFAS Core Charges and Ancillary Charges shall be treated as if the changes were under a Price Cap for the purposes of clauses 24.4(a) and 24.5(a) of the General Terms and therefore CIP approval for such changes is not required.

2.2.3 Changes to PONFAS Core Charges and Ancillary Charges may be made by the LFC on written notice to Service Providers without any additional process contemplated in 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 Agreement Changes set out in the General Terms except that:

2.3.1 The Change Management Forum's prior approval of any such proposed Agreement Change under clauses 24.1 and 25 of the General Terms is not required;

2.3.2 CIP approval of any such proposed Agreement Change will not be required under clauses 24.1(d)(ii) and 24.8 of the General Terms; and

2.3.3 The Service Providers may not propose any Agreement Change in relation to this Service Description in accordance with clause 24.1(b) of the General Terms.

3. 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 a Service Provider must purchase to take PONFAS:

The PONFAS Feeder Service, that comprises an LFC-supplied Splitter located at an FFP and a single Feeder Fibre from the Splitter to either:

(a) The MOFDF at the LFC Central office; or

(b) Where the Service Provider is taking the Central office and POI Co-location Service, an LCA Connector on an OFDF on the Service Providers Footprint at the LFC's relevant Central office, via the MOFDF at the relevant Central office. The Central office and POI Co-location Service is a separate and optional service that allows Service Providers to host their network equipment in the LFC's relevant Central office.

3.2.1 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 splitter in the local FFP, where the local FFP is the FFP that serves the geographic area in which the End User Premises is located;

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

3.3 PONFAS is an input service which a Service Provider can use as a building block to combine with other UFB Services (or with the Service Provider'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 at Premises within UFB1 Candidate Areas as advised by the LFC and defined in the Operations Manual. For the avoidance of doubt, PONFAS is not available:

4.1.1 To NBAPs;

- 4.1.2 In UFB2 Candidate Areas and Greenfield areas adjacent to UFB2 Areas;
- 4.1.3 In other Coverage Areas where LFC fibre is available outside UFB1 and UFB2 Areas and their adjacent Greenfields.

Installation Services

- 4.2 PONFAS includes a Standard Install as set out in the Operations Manual.¹ The LFC will provide Non-Standard Installs for PONFAS as an 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 FFP, as referred to in the Operations Manual, to the PONFAS Feeder Service 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 first PONFAS Distribution Service connected to a PONFAS Feeder Service from the termination point at the Premises, as referred to in the Operations Manual, to the FFP to ensure the PONFAS Distribution Service is within the technical specification for fibre set out in Appendix B. Subsequent PONFAS Distribution Services utilising the same PONFAS Feeder Service cannot be tested without disrupting working PONFAS services.

Additional Services

- 4.6 If the Service Provider 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 Service Provider ONTs and other CPE in the Premises; or
 - 4.6.3 Installation and testing of Service Provider equipment (as defined in the Central Office and POI Co-location Service Description) and services.

then 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 Service Provider. The services in clauses 4.6.1 are available on terms as set out in this Agreement.

Service Characteristics

- 4.7 PONFAS is a point-to-multipoint fibre service that provides Service Providers with the ability to provide passive optical network services to a number of Premises, as defined in 4.10.
- 4.8 To provide a passive optical network service to an End User, a Service Provider requires:
 - 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 Service Provider can place an order for a PONFAS Distribution Service from the End User Premises;
 - 4.8.3 The Service Provider electronics that connect to the PONFAS Feeder Service within the Central Office, such as an OLT. These electronics may be located in the Central Office, using the Central Office and POI Co-Location service or a remote location

¹ Standard Install parameters may differ between LFCs.

and connect to the PONFAS Feeder using DFAS or using a 3RD party backhaul service;

- 4.8.4 The Service Provider electronics that connect to the PONFAS Distribution Service at the Premises, such as an ONT.
- 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. (Our aerial network has multiple FFP's) 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 primary splitter to the MOFDF in the local Central Office that the FFP is associated with;
 - 4.10.3 Multiple secondary feeder fibres to secondary FFPs and splitter. The secondary FFP must be associated with a live primary FFP;
 - 4.10.4 A default Splitter is provided as part of the standard service. Different splitter ratios may be available by agreement between the LFC and the Service Provider, see Appendix B;
- 4.11 The FFP houses multiple Splitters and facilitates connectivity between the PONFAS Distribution Service and the PONFAS Feeder Service;
 - 4.11.1 An FFP is associated with a single Central Office, which is the termination point for any PONFAS Feeder Services provided to that FFP;
 - 4.11.2 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;
 - 4.11.3 The FFP may be either:
 - (a) An 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 24 connections to Premises; or
 - (c) Aerial FFPs, which the primary is designed to support up to 24 connections to Premises and the secondary is designed to support up to 4 connections to Premises.
 - 4.11.4 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;
 - (b) All PONFAS Distribution Services connected to Premises within the new geographic area will only be served from the new FFP. The Service Provider must purchase a PONFAS Feeder Service to the new FFP to order PONFAS Distribution Services to Premises associated to the new FFP;

Service Requirements

- 4.12 To use PONFAS, the Service Provider must have the capability to access and interconnect with the PONFAS Feeder Service, either by:

- 4.12.1 Co-locating Service Provider equipment (as defined in the 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
- 4.12.2 Where the service does not take the Central office and POI Co-location Service at the relevant LFC Central office, by taking a jumpering Service at the relevant LFC Central office MOFDF to connect PONFAS to either:
 - (a) A Direct Fibre Access Service
 - (b) A LFC or third party backhaul service from the LFC's relevant Central office MOFDF to connect to Service Provider equipment (as defined in the Central office and POI Co-location Service Description) elsewhere

Additional Service Characteristics

- 4.13 The technical specifications of PONFAS are set out in Appendix B.
- 4.14 The LFC will provide certain support and other assistance as part of the PONFAS including:
 - 4.14.1 An automated facility for Service Requests;
 - 4.14.2 An automated facility for fault notifications; and
 - 4.14.3 A tool to assist the Service Provider in determining the location and availability of the PONFAS (pre-qualification).
- 4.15 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.
 - 4.15.1 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 Service Provider Premises; however, it will not exceed 10kms for standard paths.
 - 4.15.2 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 is assuming 1:32 splitter, -28.5dB at 1550nm excluding any legal intercept device. This optical loss may include the following elements:
 - (a) PONFAS Distribution Service fibre from the ITP at the Premises to the associated FFP; This includes the Lead-in, any splicing within the ETP and Building Cable;
 - (b) Connection of the PONFAS Distribution Service to the PONFAS Feeder Splitter or Splitters within the FFPs;
 - (c) The Splitter
 - (d) Connection of the Splitter to the Feeder Fibre;
 - (e) The Feeder Fibre from the Splitter to the Central Office OFDF;

It excludes optical loss across:

 - (a) The ONT;
 - (b) The fibre from the ONT to the ITP, including connection to the ITP;
 - (c) The tie cable from the Central Office OFDF to Service Provider Footprint provided under the Central Office, if applicable;

- 4.15.3 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.
- 4.15.4 The Service Provider 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;
 - (b) Any extension of the PONFAS Feeder from the Central office, by connecting to a linking service, such as DFAS using a Jumpering Service;
 - (c) Any additional loss caused by the insertion of a Service Provider splitter or combiner past the PONFAS Service Demarcation Points.

4.16 PONFAS specifically excludes:

- 4.16.1 Provision or maintenance of any cabling or connection or active device beyond the Service Demarcation Points described in clauses 5.1 and 6.2;
- 4.16.2 Configuration, monitoring, operation, on-going support or maintenance of Service Providers' or End Users' applications, equipment or networks; and
- 4.16.3 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.
- 4.16.4 The PONFAS does not explicitly 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 fault reported by the Service Provider is found to be caused by the Premises equipment (CPE) or the wiring at the Premises beyond the service demarcation point, then the Service Provider may be charged the "No fault found" Ancillary Charge in the 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 Service Provider-facing interface is the connector on the patch panel. This Service Demarcation Point is internal to the LFC network and is not accessible by the Service Provider.

6. PONFAS Feeder Service Demarcation Point

- 6.1 The Service Demarcation Point for the PONFAS Feeder Service at the FFP is the 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 Service Provider.
- 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 a Tie Cable between the MOFDF and the Service Provider's LCA Connector on the Service Provider's OFDF in its Central Office and POI Co-location Service Footprint.

8. Service Provider Responsibilities

- 8.1 Other Service Provider responsibilities are detailed in the General Terms and Operations Manual.

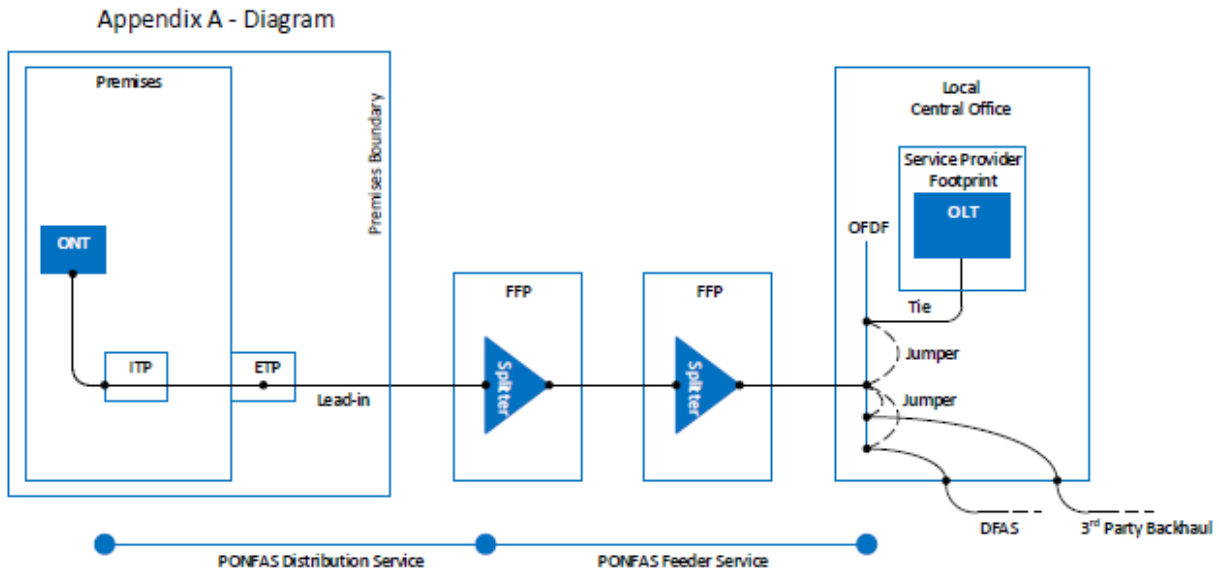
8.2 The Service Provider will be responsible for all of the design, specification and commissioning of their equipment and plant (both active and passive) connected to PONFAS.

9. Service Levels

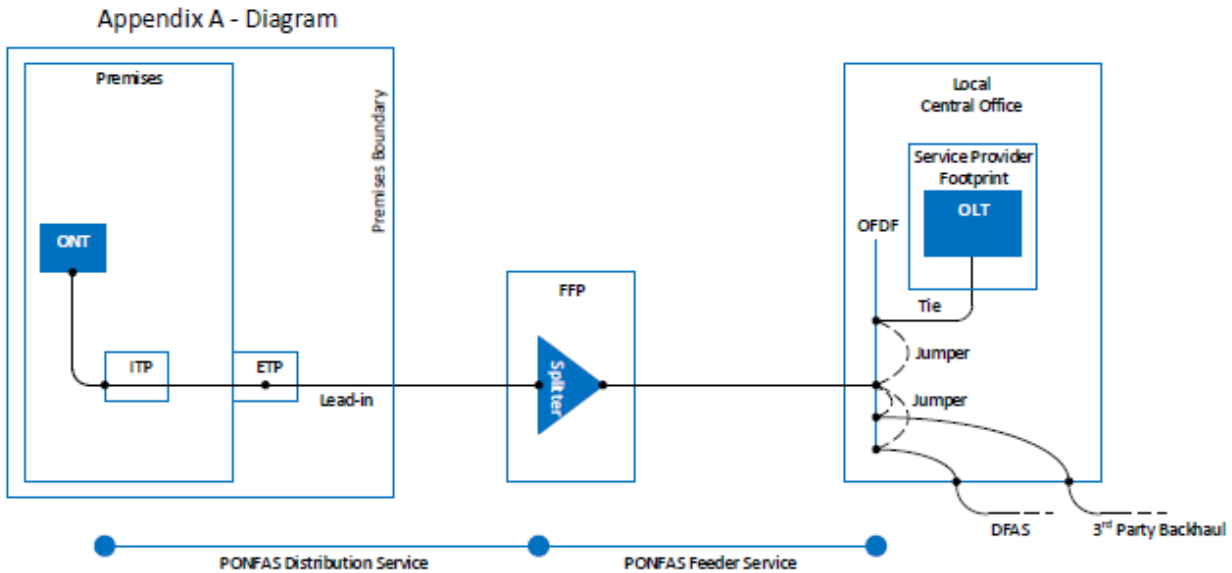
9.1 Service Levels for PONFAS are set out in the Service Level Terms for PONFAS.

Appendix A – Diagram

Overhead architecture



Underground architecture



This is generic diagrams showing the standard configuration and Service Demarcation Points for our overhead and underground architectures. It is not intended to represent every situation or detailed physical architecture. The following points should be noted:

- The FFP may be in a cabinet, pillar, underground pit, in a building frame or closure or located in a pole closure;

- 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 Service Providers;
- Service Providers may not undertake fibre activity within the Central Office, except within their own Service Provider Footprint that they have purchased as part of the Central Office and POI Co-location service.
- In MDUs where the LFC has provided fibre cabling within the building to individual Premises, the termination point is described in the Operations Manual.

The diagrams also show the optional interconnection of the PONFAS Feeder service either by a Direct Fibre Service or a third party backhaul using an additional Jumpering Service.

Appendix B – Technical Specification

Technical Specification

Fibre	External fibre must comply with ITU-T specification G.652D or G.657A. Internal building fibre cables must meet appropriate fire regulations i.e. be Flame-Retardant, Non Corrosive, Low Smoke, Zero Halogen (FRNC/LSZH) .
PONFAS Distribution Service Connector type	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.
PONFAS Feeder Service Connector Type	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.
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) 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>In the event of a fault restoration testing will be to the standard in Optical Performance table below.</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>