

Telstra Dark Fibre

Operations & Maintenance

Manual

VERSION 0.4

October 2024

Commercial-in-Confidence

 **Telstra InfraCo**

Document control sheet

Issue	Issue Date	Nature of Amendment
0.1	SEPTEMBER 2021	First Draft
0.2	FEBRUARY 2022	Amended as per InfraCo updated TSIS + Ops Manual
0.3	FEBRUARY 2024	Amended as per InfraCo updated TSIS + Ops Manual
0.4	OCTOBER 2024	Amended as per InfraCo Updated TSIS + Ops Manua

What's inside

CHAPTER 1	Purpose	5
CHAPTER 2	General	6
	2.1 Dictionary	6
CHAPTER 3	Part A: Ordering and Provisioning (OPM)	10
	3 Procedures	10
	3.1 Quoting and Submitting orders	10
	3.2 Ordering	
	3.3 Target Standard Provisioning Times (SPTs)	10
	3.5 Order variations	12
	3.6 Access to Customer Premises	12
	3.7 Handover documentation	12
	3.8 Termination of an order	12
	3.9 Operational escalation pathway	13
	3.10 Cancellation of a Dark Fibre Service	13
	3.11 Relocation of a Dark Fibre Service	13
	Attachment 1 – Contacts list	14
	Attachment 2 – Handover document	14
	Delivery Document	14
	Order Details	14
	Site Address	14
	SDP Interfaces	15
	Optical Measurements	15
	ODTR Results	15
	Delivery Document	16
	Service Delivery Point Details	16
CHAPTER 4	Part B: Operations and Maintenance (OMM)	17
	4 Procedures for Network Fault Management	17
	4.1 Overview	17
	4.1 Customer responsibilities	17
	4.2 Fault reporting procedure	17
	4.3 Dead on Arrival	18
	4.4 Initiating a fault report via Telstra IP Service Centre IPSC	18

4.5	Fault Management procedure	19
4.6	Fault Management update	20
4.7	Arrangements for truck roll	20
4.8	Fault clearance process	20
4.9	Target response times and target repair times for the service	21
4.10	Procedures for escalation	22
CHAPTER 5	Procedures for Network Maintenance	23
5.1	Planned outages	23
5.2	Late change	23
CHAPTER 6	Telstra Dark Fibre Technical Specifications	25
6.1	Purpose	25
6.2	Scope	25
6.3	Audience	25
6.4	Service Description	25
6.5	Fibre Characteristics	25
6.6	Service Delivery Points	28
6.7	Laser Safety and Power Limits of Customer Equipment	35
6.8	Patch Cords	35
6.9	Optical Fibre Safety Procedures	35
6.10	References	36
6.11	Definitions	37
6.12	Enquires	37

Chapter 1

Purpose

This Operations Manual (“OM”) sets out details of Provisioning, Fault management, Technical Information and maintenance procedures.

Part A describes Provisioning - ordering, testing and handover documents that is required for the Telstra Dark Fibre provided by Telstra to the Customer.

Part B sets out certain operational details of operations and maintenance procedures (including but not limited to forms, tables and contact details) for Services provided by Telstra to the Customer under the Agreement. It is subject to the provisions of the Agreement. The procedures in this OM apply to personnel of both Telstra and the Customer who are involved in the handling of provision, operations and maintenance matters for Services provided by Telstra to the Customer under the Agreement.

The Interface Specifications for Telstra Dark Fibre is provided in Chapter 6 of this document.

Chapter 2

General

2.1 Dictionary

In this OM, a term defined in the Service Schedule has that meaning. In addition, the following words have these meanings:

Agreement means the terms contained in either:

- (a) A Customer Relationship Agreement or Telstra Enterprise Agreement;
- (b) An electronic Customer Relationship Agreement;
- (c) An Access Agreement, or
- (d) Telstra Enterprise Our Customer Term (OCT)

(as applicable) entered into by the Customer with Telstra and of which the Service Schedule forms part.

Business Day means a day on which banks are open for general banking business in Melbourne and Sydney (not being a Saturday, Sunday or public holiday in that place), other than, in any year, 25 December through to 31 December (inclusive).

Business Premise means single and multiple level buildings occupied by the customer.

Charge means the charge(s) for the supply of the Services or associated work calculated in accordance with this Agreement or any other costs or amounts payable under this Agreement.

Customer means the party with whom Telstra has entered the Agreement to supply, amongst other things, the Service.

Customer Transmission Group means the Telstra work group that conducts the investigation and restoration activities referred to in section 4.6.

Customer Premises means a building, structure, premises or site owned, leased or controlled by the Customer and nominated by the Customer, including 3rd party Data Centres as Customer Premises for the purposes of this Agreement.

Customer Premises Equipment or **CPE** or customer equipment means any equipment installed or to be installed on the Customer side of the Network Boundary in connection with the provision of a Service to Customer, including without limitation routers, modems, splitters, filters, Customer premises wiring and client software.

Detailed Feasibility Study is an on-site study undertaken by Telstra to determine whether it is commercially and operationally viable for Telstra to install a Service.

End User Site means the End User Premises or other location from which an End User connects to the Service.

Emergency means an emergency due to an actual or potential occurrence (such as fire, flood, storm, earthquake, explosion, accident, epidemic or war like action) which endangers or threatens to endanger the safety or health of persons, or destroys or damages or threatens to destroy or damage, property.

Fault means there is:

- (a) total loss of end-to-end optical connectivity on a Section of a Service; or
- (b) the end to end insertion loss of each Service or Section of a Service (as applicable) measured at 1310nm and 1550nm exceeds the Threshold Optical Loss.

Fault Escalation Process means the process described in section 4

Fault Report is a notice to Telstra about a Service Difficulty. The use of the word "Fault" in the term "Fault Report" does not mean that Telstra accepts responsibility for all Service Difficulties notified in a Fault Report.

Fault Sequence Number means a numerical identifier used to uniquely identify a reported Fault.

Feasibility Study means any of the feasibility assessments or studies carried out by Telstra

Fee For Service means charges that are determined by Telstra on a time and materials basis in accordance with the OCT for any activities associated with the Service on a time and materials basis e.g. consultancy or works outside of Business Hours.

Fibre means an unlit single mode optical fibre pair between a SDP at an A-end site and a SDP at a B-end, delivered using single mode non-dispersion shifted optical fibre. The unlit single mode optical fibre pair may consist of single fibres from different cable sections, spliced together.

Full National Number or FNN means the alphanumeric number that uniquely identifies a Service.

Incorrect Call Out means a circumstance in which Telstra is entitled to charge the Incorrect Call Out Fee, as described in section 4.8(d) or as otherwise provided in the Agreement.

Incorrect Call Out Fee is defined in section 4.7(d).

Initial Loss Measurement means the end to end insertion loss of each Service or Section of a Service (as applicable) measured at 1310 and 1550nm by Telstra prior to the delivery of the Service to Customer, as adjusted from time to time in accordance with this Service Schedule and recorded in the handover document as Optical Measurements.

IPSC means the IP Service Centre; Telstra Service Restoration Work Group.

Late Change means a condition within the Telstra Network that has, or is likely to have, a Customer impact unless action is taken to rectify the situation as soon as possible.

Network Boundary means the boundary of a Network as ascertained in accordance with section 22 of the Telecommunications Act.

Off Net means when Telstra needs to undertake civil works to extend its Network, in order to fulfil the Order.

On Net (Pre-defined Route) means a route that is pre-defined by Telstra, that can be fulfilled using Dark Fibre that is part of the Telstra Network as at the date the Quote or Order was received, or which requires Telstra to add capacity to its Network in order to fulfil the Order.

On Net (Other Route) means a route that is not pre-defined by Telstra, that can be fulfilled using Dark Fibre that is part of the Telstra Network as at the date the Order was received, or which requires Telstra to add capacity to its Network in order to fulfil the Order.

Optical Connector means the optical interface connector used by Telstra to provide a Service. Unless Customer

is otherwise notified by Telstra, Telstra's standard optical interface connector will be used.

Order means a request for provision of Services, capacity or other matters placed with Telstra by the Customer and includes a varied Order.

Planned Outages means those occasions when Telstra performs scheduled maintenance, upgrades or Repairs to the Telstra Network or the Service and all or part of the Service is not available as a result of this activity.

Remote Area means an area with a population less than 200 people or an area which is located in an ESA that falls within an Extended Charging Zone.

Repair or **Repaired** is defined at paragraph 4.9(c) of this OM.

Repair Time means the period of time that starts when we receive a Valid Service Fault Notification and we have entered all the required information from you in our systems and a fault number is generated and ends on the first to occur of:

- a) The Telstra InfraCo Dark Fibre Service is returned to full working order; or
- b) A temporary repair is performed which allows that service to be used.

Response Time means the period of time that starts when we receive a Valid Service Fault Notification and ends when we tell you that work has commenced to identify the cause of the fault.

Relocation means where the Customer asks Telstra to relocate a Telstra InfraCo Dark Fibre Service (by changing the A end and/or Z end), Telstra may agree to the request in its absolute discretion. If Telstra agrees to the Customer's request, Early Termination Charge may be payable in respect of the change.

SDP or **Service Delivery Point** means the end point at which a Service terminates, which is located on an Optical Connector on an ODF located in a Nominated Building.

Service means the Telstra Dark Fibre service provided under the Service Schedule.

Service Assurance Option Monthly Charge means the charge payable by the Customer if you request, and Telstra agrees to provide, a service assurance option other than the default service assurance option for the Telstra Dark Fibre Service per the Telstra Dark Fibre Operations and Maintenance Manual.

Service Schedule means:

- (a) if the Agreement is a Customer Relationship Agreement, the CRA 250 Service Schedule;
- (b) if the Agreement is not a Customer Relationship Agreement or Telstra Limited Agreement, the service schedule under which the Customer acquires the Telstra Dark Fibre, as applicable, or
- (c) if the Agreement is a Telstra Enterprise Agreement defined by Our Customer Term (OCT)

Single Service Fault means a service difficulty in a single Service.

Significant Business Impact means where the Customer has articulated to Telstra that the affected service is impacting a large number of end users and is potentially brand damaging.

Standard Handover Time or **SHT** means the period specified in paragraph 2.3 as the approximate delivery time for Services where infrastructure for those Services is available.

Target Repair Times means the Repair Times set out in Table 1 in Section 4.9.

Target Response Times means the Response Times set out in Table 1 in Section 4.9.

TCD means, in relation to a Service, 5pm on the “Telstra committed date” as advised by Telstra for that Service in accordance with procedures advised by Telstra from time to time.

Telstra FRC means the Telstra Fault Reporting Centre (sometimes referred to as the “NWSC”).

Telstra Account Manager means the person identified as such by Telstra in the Agreement

Truck Roll means the attendance by a Telstra technician to physically investigate the fault report.

Urban Area means an area with a population density of more than 10,000 people.

Valid Service Fault Notification means a notice you give us, that contains all the relevant fault information we need, including at a minimum the Fault location, distance from a site and the optical loss, and we have responded to that notice with a fault number, ticket or incident reference number. Please refer to the Telstra Dark Fibre Operations and Maintenance Manual for more information.

Wideband Metro Area means the areas from time to time specified by Telstra as wideband metro areas in respect of the Service. A list of these areas is available from Telstra on request.

Wideband Metro Order means an Order for a Service with both SDPs located in a Wideband Metro Area.

Wideband Non-Metro Area means an area that is not a Wideband Metro Area.

Wideband Non-Metro Order means an Order for a Service that is not a Wideband Metro Order.

Chapter 3

Part A: Ordering and Provisioning (OPM)

3 Procedures

3.1 Quoting and Submitting orders

3.1.1 Telstra will provide the Customer with a Quote based on the Customer's desired Dark Fibre solution. The Dark Fibre quote will consist of the following information:

- (a) Quote Number
- (b) A-End and Z-End Addresses
- (c) Product Name
- (d) Number of Fibre Pairs
- (e) Distance (km)
- (f) Term (years)
- (g) Non-Recurring Charge (if any)
- (h) Monthly Recurring Charge; and
- (i) Any Additional Notes

3.1.2 To submit a Dark Fibre order, the Customer must provide all information required by the relevant ordering process, including building contacts, site details and service details.

3.2 Ordering

3.2.1 You may order a Service by entering into an Application Form or separate agreement with us for that Service. We are not obliged to agree any Application Form or separate agreement with you for the Service.

3.2.2 The Dark Fibre(s), SDPs, permitted construction activities and routes for each Service will be set out in the relevant Application Form or separate agreement with us for the Service.

3.2.3 After you have entered into an Application Form or separate agreement with us for a Service, you may request a change to that Service (including in relation to the SDP, routes and A-end point and B-end point). We may (but are not obliged to) agree to such requests, subject to payment of the additional charges contemplated in the Telstra Dark Fibre OCT) and Early Termination Charges may apply.

3.2.4 We reserve the right to discuss with you any additional costs, adjustment to timeframes or necessary modifications due to any reasonably unforeseen circumstances that may arise after the acceptance of your Service order and before delivery. If we are unable to agree then we may withdraw the Service order.

3.2.5 After testing of the Service is complete, we will notify you of delivery and provide a handover document for each Service. You must test each Service and notify us within 30 days of the handover date of any issues and our Customer Commissioning Support Team will carry out 'dead on arrival' actions to assist you establish a working connection, otherwise the Service is deemed accepted by you.

3.3 Target Standard Provisioning Times (SPTs)

3.3.1 The SPTs are subject to the following terms and conditions and depend on the availability of existing Network infrastructure:

- (a) the SPTs are indicative only and the Customer should not rely on the SPTs;
- (b) the SPTs are calculated from the date that the Customer receives a confirmation notice from Telstra that the Customer's Order has been accepted;
- (c) the SPTs end on completion of handover in accordance with Table 2;

3.3.2 the Customer must provide Telstra with safe and reasonable access to Customer Premises as reasonably required to enable Telstra to install, test, inspect, Repair, modify, operate and maintain the Telstra equipment at the Customer Premises required for provision of the Service. If the Customer fails to provide any such assistance and Telstra is unable to lawfully access the Customer Premises then, without limiting any other remedies available to Telstra under the Agreement or otherwise, the SPTs will be deemed to be extended by the amount of time which lapses before the Customer is able to lawfully access the Customer Premises and provide the necessary assistance or access.

3.3.3 The SPTs for the Service are set out in the table below and are dependent on the category of each Order. The categories are as follows:

- 1. On-Net;
- 2. Near Net ;
- 3. Off-Net

*each as defined in Table 1 below. These categories also cover the location where the Service is to be installed.

3.3.4 Following receipt of an Order from Customer, Telstra will reply to the Customer within five Business Days for Wideband Metro Orders or eight Business Days for Wideband Non-Metro Orders, to confirm acceptance or rejection of the Order (excluding Wideband Extensive Orders). In the event that Telstra does not reply to the Customer that an Order is rejected within the timeframes outlined in this clause, then the Order will be deemed to be accepted.

Table 1 – Provisioning Categories

CATEGORY	STANDARD PROVISIONING TIMES	
	METRO	NON-METRO
On-Net	20 Business Days	26 Business Days
Near Net	29 Business Days	> 49
Off-Net	> 39	> 49

3.3.5 Delivery dates can be adjusted depending on customer requirements.

3.4 Telstra Committed Date (TCD)

3.4.1 As part of the general service provisioning procedures, Telstra will supply a TCD. Telstra will notify Customer if Telstra considers that the TCD is unlikely to be met.

3.4.2 Telstra will use reasonable endeavours to meet the TCD but does not guarantee that it will meet the TCD.

Table 2 - Delivery procedures

ACTIVITY	RESPONSIBILITY
Installation Telstra will install the fibre and the Customer will arrange the required facilities and access to Customer Premises or Non-Premises.	Telstra and Customer
Testing Telstra will test against its performance standards (including, without limitation, any testing prescribed by a Service Schedule) and, when complete, provide a statement to the Customer that the performance standards were met.	Telstra
Revised TCD If it becomes clear that the new TCD is unlikely to be met, Telstra is to advise the Customer promptly of the probable delay and negotiate a new TCD with the Customer.	Telstra
Handover After testing is complete, Telstra will notify the Customer of completion of delivery of the Service. A handover document will be provided for each Service	Telstra

3.5 Order variations

- 3.5.1 Moves, Adds or Changes are not applicable for Telstra Dark Fibre Service. The Customer is required to cancel an existing service and submit a new Order if any variation is required.
- 3.5.2 The Customer must follow the Quoting and Ordering process outlined above in Clause 3.1 to submit a new Order.

3.6 Access to Customer Premises

- 3.6.1 In addition to the requirements contained elsewhere in this Agreement, if a SDP of Service is located in Customer Premises, the Customer must:
 - (a) provide Telstra, at no cost to Telstra, with all necessary utility services (such as electricity and air conditioning) as reasonably required by Telstra for the provision of the Service and the proper operation of equipment necessary to provide the Service; and
 - (b) provide Telstra, at no cost to Telstra, all assistance and take all safety precautions as may be reasonably necessary to ensure the safe and proper performance by Telstra of all work at the premises.
- 3.6.2 Telstra will connect existing Customer building cabling to the Service provided that:
 - (a) the cabling has been installed by a registered cabling service provider; and
 - (b) the cabling has been installed to and continues to meet minimum technical requirements determined by the ACMA.

3.7 Handover documentation

Upon completion of the delivery process Telstra will provide the customer with a handover document. The customer has 30 days upon receipt of the handover document to accept or reject the handover of the service. If the customer has not contacted Telstra to advise us of any service

issues Telstra will deem the service handed over to the customer after the 30 days has elapsed.

3.7.1 The Handover document provided to the customer by Telstra will include the following information:

- (a) order details
- (b) site addresses
- (c) SDP interfaces
- (d) Optical Measurements of each fibre, of both A-B and B-A direction
- (e) Service Delivery Point details and Photos where permissible

See Attachment 2 for the Handover Document template.

3.8 Termination of an order

3.8.1 If the Customer cannot ensure that a third party will give effect to Telstra's access requirements under this OPM and the remainder of the Agreement, any Order for the Service which is affected and which has not been commissioned and delivered, will be deemed to have been terminated by the Customer and, subject to Table 1808.3 Early Termination Charges of the Dark Fibre TWA.

3.8.2 Telstra will have no obligation to provide that Service and Charges may apply in accordance with the Pricing Profile.

3.8.3 No Charges will be payable by the Customer in accordance with Pricing Profile to the extent that any third party's refusal to give effect to Telstra's access requirements arises from an act or omission of Telstra or its People.

3.9 Operational escalation pathway

3.9.1 Each party will prepare and provide to the other party, a contact list in the form specified in Attachment 1, which includes:

- (a) the party's nominated ordering and provisioning contact personnel; and
- (b) contacts for escalation of issues under this OM. This list shall be updated by each party (and an updated version provided to the other party) from time to time

3.10 Cancellation of a Dark Fibre Service

3.10.1 If the customer wishes to Cancel a service, the customer will contact their Telstra representative in writing requesting the cancellation of the service. Telstra will respond with a request for information and agreement to cancel the service.

3.10.2 Once the service is cancelled, a request for the same service cannot be made. The customer will need to submit an entirely new order. Telstra cannot guarantee the same link will be available. The Dark Fibre service must not be used after the cancellation date. The customer must ensure there is no light travelling through the fibre and all customer permitted equipment has been removed before the cancellation date. Fee's will apply for early termination as per the terms of the contract.

3.10.3 In order to cancel the service Telstra needs the following information:

- (a) Customer Legal Name
- (b) Service FNN
- (c) Date of Cancellation
- (d) Customer Signature

3.11 Relocation of a Dark Fibre Service

3.11.1 Dark Fibre services cannot be relocated from one site to another, however they can be moved or relocated internally within a building e.g. moving the service from one floor to another floor in the same building. If a Dark Fibre service requires a relocation to another site, the customer request a new service quote for the intended relocation site. The customer must then Cancel the original service once the new service has been handed over to them. Early Termination Charges will apply as per the OCT.

Attachment 1 – Contacts list

Customer contacts list

	FIRST CONTACT	DETAILS	SECOND CONTACT	DETAILS
Billing		Ph: Fax: Email:		Ph: Fax: Email:
Operations		Ph: Fax: Email:		Ph: Fax: Email:

Telstra contacts list

Enquiry type	Role	Contact details
Billing		Raise a Billing ticket via Telstra Connect Ring the phone number listed on the invoice Alternatively, please contact your Telstra Client Executive / Telstra Account Manager for issues relating to Billing
Operations		For operational issues and service assurance, please raise a fault ticket via Telstra Connect portal or contact Telstra IP Service Centre IPSC on 1800 467 889

Attachment 2 – Handover document

Delivery Document



Dark Fibre Delivery Document

Dark Fibre Order Details

Click to select the Dark Fibre Service Type	Order Number	Dark Fibre Service ID (FNN)	Customer Reference	
	Add IDEAL POSO No.	NnnnnnnF	Add IDEAL Customer Reference No.	
A-End Address	Add A-End address from IDEAL order.		Installation Date	Version
B-End Address	Add B-End address from IDEAL order.			1

Dark Fibre Service Delivery Point Details

A-End SDP Details				B-End SDP Details			
Location	Hardware Type	Connector Type	OFDP Fibre Position/Number	Location	Hardware Type	Connector Type	OFDP Fibre Position/Number
Add SDP Location	Click to select SDP Hardware	Click to select Connector Type	Add Fibre Position / Fibre Number at SDP	Add SDP Location	Click to select SDP Hardware	Click to select Connector Type	Add Fibre Position / Fibre Number at SDP

Dark Fibre Commissioning Details

Click to select Wavelength and Number of Fibres				Click to select Commissioning Testing			
Wavelengths	Fibre	One-Way Insertion Loss (dB) ^{Note}		2-Way Ave Insertion Loss (dB)	Value	Result	
		A -> B	B -> A		Reference Optical IL @ 1550 nm	0.00	dB
1310 nm	Fibre 1	0.00	0.00	0.00	DF Link Path Length Calculated (km)	0.000	km
	Fibre 2	0.00	0.00	0.00	DF Link Path Loss Calculated @ 1550 nm (dB)	0.00	dB
1550 nm	Fibre 1	0.00	0.00	0.00	DF Link Length OTDR Measured @ 1550 nm (km)	0.000	km
	Fibre 2	0.00	0.00	0.00	DF Link Loss OTDR Measured @ 1550 nm (dB) Fibre 1	0.00	dB
1625 nm	Fibre 1	0.00	0.00	0.00	DF Link Loss OTDR Measured @ 1550 nm (dB) Fibre 2	0.00	dB
	Fibre 2	0.00	0.00	0.00			

Note: Where the Service Delivery Points at one or both ends of a Dark Fibre link are inaccessible, include a default value additional loss of 0.80 dB (A-B, B-A) per optical fibre tie. Example being; Data Centre ties between a Carrier Room and Meet Me Room where the Meet Me Room is inaccessible.

Dark Fibre Delivery Document



Dark Fibre Cabling Past the SDP

Note: Following section to be completed when cabling is performed past the agreed Dark Fibre Service Delivery Point. Examples being; Non-Premises Drop cabling or Internal patching to customers equipment.

End	Additional Cabling Scope	Additional Cabling Material	Length (m)	Additional Cabling Installation	Customer End Cabling Location Details
A-End	Click to select Additional Cabling Scope Details	Click to select the additional material details	0.00	Click to select installation location	Add details of the customer end Non-Prem: GPS, Customer Pit Type or Equip Loc/description Prem, Exchange: Tx Node Code, F/S/R/SR/POS/s, Fibre/s DC: MMR/IR/Location, DC Numbering (Delete comment on completion)
B-End	Click to select Additional Cabling Scope Details	Click to select the additional material details	0.00	Click to select installation location	Add details of the customer end Non-Prem: GPS, Customer Pit Type or Equip Loc/description Prem, Exchange: Tx Node Code, F/S/R/SR/POS/s, Fibre/s DC: MMR/IR/Location, DC Numbering (Delete comment on completion)

Dark Fibre Attachments

Commissioning attachments	A-End Photos		B-End Photos	
Attach Commissioning results zip file/s only File Name: FNN_OTDR.zip File Name: FNN_PMD.zip (if required) File Name: FNN_CD.zip (if required) (Delete comment on completion)	Attach Photos zip file/s only. File Names: FNN_SDP-A.zip and/or FNN_Additional Cabling-A.zip (Delete comment on completion)	Comments: Any additional comments. Where Photos are not allowed, add detail. (Delete comment on completion)	Attach Photos zip file/s only. File Names: FNN_SDP-B.zip and/or FNN_Additional Cabling-B.zip (Delete comment on completion)	Comments: Any additional comments. Where Photos are not allowed, add detail. (Delete comment on completion)

Please note: Photos will be provided where it is permissible to take them. Certain sites do not allow photos to be taken.

Chapter 4

Part B: Operations and Maintenance (OMM)

4 Procedures for Network Fault Management

4.1 Overview

Each Telstra Dark Fibre Fault is categorised as a transmission Fault, where service is no longer providing the expected performance.

A Planned Outage is described in section 5.1 of this OMM and does not constitute a Fault.

4.1 Customer responsibilities

Before reporting a service difficulty via Telstra Connect or via the Telstra IP Service Centre IPSC, the Customer must ensure that:

- (a) there are no faults in their own Network, or in any CPE (including the Customer Premises' wiring) relating to the Service that may be causing the service difficulty;
- (b) All other applicable pre-reporting testing activities have been carried out.

4.2 Fault reporting procedure

- (a) After conducting isolation testing to confirm that a Fault exists within the Fibre Network in accordance with section 4.1 Customer must promptly report the Fault via Telstra Connect or by calling the Telstra IP Service Centre on 1800 467 889 (or such other number that Telstra may advise from time to time). You must provide us with evidence from your testing including at a minimum the Fault location, distance from a site and the optical loss.
- (b) When reporting a Single Service Fault, Customer must report the Fault on the Service's Full National Number FNN.
- (c) When reporting a Fault, Customer must provide any information Telstra may reasonably require to resolve the suspected Fault, including all information available regarding the nature and scope of any Customer impact. This information may be provided to the Telstra work groups which will be involved in the service assurance process

- (a) Customer should include information on

ITEM	DESCRIPTION
Service record number	Telstra Service record number for the Section under suspicion (as advised by Telstra to customer in accordance with paragraph below**
Customer reference number	Customer Fault Notification reference number.
Symptoms	Description of the symptoms that prompted the Fault Notification, including the current (at time of notification) end to end optical insertion loss at 1310 and 1550nm on the Section in question, as measured by Customer immediately prior to the submission of the relevant Fault Notification.

ITEM	DESCRIPTION
Time of the notification	The date and time at which the suspected Fault occurred (and the relevant time zone).
Customer contact point	<p>Contact details for an available technical/engineering resource from the Customer who has the authority to take steps to assist investigation and Restoration work on the reported Service (including breaking the fibre path of the Service for testing).</p> <p>Also, Site Details (Site Access Contact Name, Phone Number and Access Availability Details, including site access hours);</p>
Diagnostic information	<p>Results of any supporting diagnostic tests (including any Delivery Testing) performed by the Customer during the isolation of suspected Fault that confirm that the Fault is in Telstra's Network. This includes:</p> <ul style="list-style-type: none"> • Optical Losses measured by you; • Telstra Initial Optical Loss;(as provided at handover) • Delta Value (difference between initial and current reading); • details of the testing performed to sectionalise the errors into the Telstra Network including who performed the testing and where the testing was performed *. • distance to fault or Loss (Km) from Site A or Site B * • an OTDR or Trace Reading * ; <p>* this data will vastly improve the timing of any restoration</p>
History	Any available information relating to Fault history, loss trends or similar on the reported Service that may aid diagnosis.
Laser safety status	The current laser safety status (active / inactive / isolated) of any optical line systems (such as transmission equipment or dense wave division multiplexing equipment) on the reported Section of the Service.

**On delivery of the relevant Service, Telstra will assign a service record number for each Service and notify the customer of that number at delivery of the relevant Service; deliver to the customer a delivery pack that confirms the Order details, SDPs and interfaces and Delivery Testing results (including Initial Loss Measurement results for the Service); and record the Initial Loss Measurement Results in its systems as the Initial Loss Measurement Results for the Service.

- (b) Failure to provide the required information outlined in Section 4.2 may result in delays to restoring a Dark Fibre Service and Fault Ticket/s will be on hold until the mandatory information is provided by the Customer.

4.3 Dead On Arrival

If a Customer has ordered a Dark Fibre Service and has received a handover pack however the Service has never worked, a Customer should follow the trouble shooting steps below.

1. Perform the Dark Fibre Service checks usually undertaken by the Customer on their end.

2. Check that the on-site communications equipment is powered on and operating normally.
3. Check the Laser Operational Status (Active Status) of the Customer equipment (i.e. equipment is configured correctly).
 - a) Check that the correct optics for link budget are installed. Ensure that the power receive level does not exceed and/or meets the specified limit of the interface. Try a software and/or hardware reset of the Customer equipment.
 - b) Check connectors and fibre cords at and between the Service Delivery Point and your equipment interface.
4. Connectors inspected for any contamination or damage e.g. scratches, fingerprints, dust, or dirt etc.
 - a) Clean and reinspect as required while observing laser safety procedures.
 - b) Fibre cords inspected for any physical damage e.g. indentations, pinch points
5. Check the fibre connections are fully plugged in at both ends; try disconnecting wait 30 seconds and reconnect
6. Check if there has been any customer planned works on site e.g. construction or repair work done in the building
7. Check if anyone has disconnected or made changes to your network
8. If the service or hardware resides in a data centre, ensure that the data centre has performed testing to sectionalise the error/fault into the Telstra network
9. Check that the fibres have not been transposed – Infracore standard delivery is no transpositions (as per s5.4 in the Telstra Dark Fibre TSIS below)

Fibres for the Dark Fibre Services shall not be transposed at any point between and including at the A-end and Z-End. The Customer will be responsible to implement fibre transpositions as necessary beyond the SDP at either end.

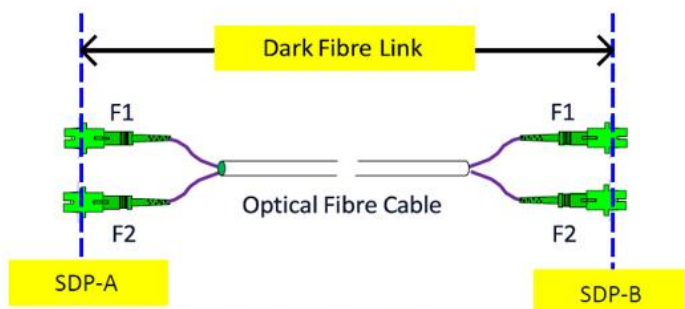


Figure 2 - Fibre Path End to End (no transpositions)

10. Advanced troubleshooting: undertake optical testing using the appropriate equipment i.e. Light Source, Power Meter and/or OTDR

4.3.1 Reporting Dead on Arrival Issues to Telstra

Log a Ticket: If issues persist, log an incident ticket via **Telstra Connect** or call the **Telstra IP Service Centre on 1800 467 889**. Please follow the prompts and provide the requested information including all testing information.

Email Option: Alternatively, email TEDarkFibre@team.telstra.com with "DOA" and your FNN number in the subject line. Include all testing information and CC your Telstra Enterprise client partner. If information is

missing, a Telstra consultant will be in contact to capture all required information.

If the commissioning (dead on arrival) issue was brought about by a party other than Telstra Infracore, Telstra Infracore may issue Fee For Service (FFS) charges as stated in the quote form.

4.4 Initiating a fault report via Telstra Connect or Telstra IP Service Centre (IPSC)

Telstra Connect will only accept Fault reports in relation to the Service from Customer.

- I. Telstra Connect is an online self serve tool available to receive a Fault report from Customer on a 24-hour basis, 7 days per week.
- II. Customer may report a single fault or check fault history
- III. Customer must provide all relevant information required when raising a Fault via Telstra Connect
 - i. verify that the Fault is associated with the Service; and
 - ii. Obtain details of Customer's Service parameters and the symptoms and description of the Fault.
- IV. Once details of a Fault from Customer has been captured on Telstra Connect, the details will be logged in the Telstra Fault reporting system, and Telstra Connect will issue Customer a unique Fault Sequence Number. This Fault Sequence Number is to be used by Customer for any future enquiry in relation to the Fault. Ticket updates will be available via Telstra Connect.

The IP Service Centre (IPSC) will only accept Fault reports in relation to the Service from Customer. Customer to report faults by calling 1800 467 889 (for new faults Option 2, for existing fault Option 1).

- (a) The IPSC is available to receive a Fault report from Customer on a 24-hour basis, 7 days per week.
- (b) Customer may call the IPSC to:
 - i. report a Single Service Fault
 - ii. Enquire about reported Faults.
- (c) When Customer reports a Fault, the IPSC consultant will ask a series of questions to:
 - i. verify that the Fault is associated with the Service; and
 - ii. Obtain details of Customer's Service parameters and the symptoms and description of the Fault.
- (d) After the IPSC has taken details of a Fault from Customer, the details will be logged in the Telstra Fault reporting system, and the IPSC will issue Customer a unique Fault Sequence Number. This Fault Sequence Number is to be used by Customer for any future enquiry in relation to the Fault.

4.5 Fault Management procedure

Unless expressly provided otherwise under the Agreement, Telstra will prioritise Faults in the Service as follows:

- (a) Faults that present danger to persons; and
- (b) Thereafter, according to Target Response Times and Target Restore Times for the relevant Service.
- (c) All Service Faults will be transferred to the Customer Transmission Group for investigation and restoration.
- (d) Initially the Customer Transmission Group will investigate to determine if there is a known Network related issue which may be impacting the Service. If there is a known Network related event, Customer will be advised, and the Fault will be linked to the restoration activities associated with that Network event. If the Fault is not Network related or no fault is found, the Customer Transmission Group will advise the Customer that an Incorrect Callout Fee will apply, as per the Customer's Agreement.
- (e) If the Customer Transmission Group investigates the Fault and confirms that the issue is Network related, it will advise Customer of the result of its investigation and it will transfer the Fault to the appropriate technical group for further analysis and service restoration.
- (f) If the Customer Transmission Group transfers the Fault to further technical groups, then field staff may be required to attend the appropriate location. If access to a building which is not managed by Telstra is required, access will be arranged via the Customer contact provided in the Fault docket. The time frame associated with the Fault restoration process will stop until access is provided.
- (g) Telstra workgroups will use best endeavours to undertake a Repair on the Service based on the Target Repair Times and the conditions in section 4.6(e). The Customer acknowledges that some Faults may require escalation to external vendors to assist with identification of the Fault condition and in these cases the Target Repair Time may be exceeded, however Telstra shall use best endeavours to mitigate the effects of such delays.
- (h) Telstra may ask Customer for additional information and request Customer to undertake co-operative testing in relation to the reported Fault. Customer is required to answer any questions from Telstra in good faith and to undertake the cooperative testing as required
- (i) The Customer is required to perform checks of their network including their power, cabling, equipment, hardware and the polarity of the fibre pair to prove the Fault is located within the Telstra Network.

4.6 Fault Management update

- (a) Telstra IP Service Centre IPSC shall provide updates via email/phone to the nominated contact.
- (b) The Telstra IP Service Centre IPSC staff will be able to provide an update based on the information in the “open” Fault record in the Fault system used by the Telstra FRC staff. However, Customer acknowledges that the updates provided by the Telstra FRC staff are dependent on the information inserted in the Fault docket by the relevant workgroups involved in managing the Fault to resolution. If there is insufficient information, where it is possible, the Telstra FRC will voice switch Customer through to the Customer Transmission Group to be given a Fault update.
- (c) For Faults raised via Telstra Connect, all updates shall be provided via the portal. Section 4.6.b applies.

4.7 Arrangements for truck roll

- (a) If Telstra testing determines there is a requirement for a Truck Roll to the Customer Premises, or a third party location (e.g. colocation space), Telstra shall undertake a Truck Roll and the Customer must arrange safe and sufficient access for Telstra to the premises in accordance with the following procedure:
 - (i) the Telstra testing officer will contact the Customer via the contact name and number shown on the initial Fault report;
 - (ii) when Telstra contacts the Customer to advise that access to attend the required premises is required, the Customer is requested to pass this information on to the third party promptly. The Customer must also inform the third party that the technician that will attend the premises is a Telstra representative and arrange access as required; and
 - (iii) if an appointment is required to access the Customer Premises, an appointment window not exceeding 4 hours may be selected.
 - (b) A Telstra technician who attends the Customer Premises or a third-party location under section 4.7(a) will not remedy a service difficulty that is on the Customer side of the SDP.
- (c) If the Customer is not able to procure Telstra access to the required premises:
 - (i) Telstra and the Customer will endeavour to arrange a re-scheduled appointment time at which Telstra’s technicians can get access to the required premises; and
 - (ii) The Response and Repair Times will not include the time between the original scheduled time and when Telstra is admitted to the required premises in accordance with a re-scheduled appointment time.
 - (d) The Customer will be charged for an incorrect callout set out in the Agreement if a Telstra technician attends the required premises and no fault is found to exist in the Fibre Network
 - (i) beyond the Network Boundary point;
 - (ii) due to CPE; or
 - (iii) due to a failure of the Customer supplied power at the SDP, (“Incorrect Call Out Fee”).

4.8 Fault clearance process

- (a) The Repair Time for a Fault ends when Telstra has Repaired the Service on a permanent or temporary basis, notwithstanding that the Fault report may be left “open” at the request of the Customer.
- (b) The Fault will be cleared, or, if requested by the Customer, left “open” for a maximum of 24 hours or until the close of business the next Business Day.
- (c) Following Repair of a Service, Telstra must notify the Customer that the Fault is Repaired. The

Customer will be contacted in relation to the Fault closure details via the contact name and number shown on the initial Fault report or by contacting the Telstra IPSC.

4.9 Target response times and target repair times for the service

- (a) If a Service has the 'A' end in a different area to the 'B' end then, subject to paragraph 4.10(d):
 - (i) the applicable Target Response Time will be the longer Target Response Time set out in Table 1; and
 - (ii) the applicable Target Repair Time will be the longer Target Repair Time set out in Table 1.
- (b) Telstra will use its reasonable endeavours to meet the applicable Target Response Times and Target Repair Times set out in Table 1 below

Table 1 - Target response times and target repair times

SERVICE ASSURANCE OPTION	AREA	TARGET RESPONSE TIME	TARGET REPAIR TIME	HOURS OF BUSINESS
STANDARD	Metro Area	60 minutes	8 hours	24 Hours/Day, 7 Days/Week
	Regional	On Application	On Application	24 Hours/Day, 7 Days/Week
	Rural	On Application	On Application	24 Hours/Day, 7 Days/Week

- (c) "Repair" occurs when:
 - (i) Telstra has corrected the Fault; or
 - (ii) the end to end fibre path is in the technical expert's opinion of Telstra back to the agreed performance levels agreed in the Agreement, whether this is achieved by way of temporary workarounds, Repairs, and service deviations or otherwise.
- (d) Target Response Times and Target Repair Times include only time accrued during the hours of business shown in Table 1 above.
- (e) Telstra's service assurance obligations under this OMM, including using reasonable endeavours to meet the Target Response Times and Target Repair Times, do not extend to service difficulties caused as a result of:
 - (i) a fault in the Customer's equipment or cabling, or other equipment or software on the Customer's side of the network demarcation boundary that does not form part of the Service;
 - (ii) damage due to third party causes external to Telstra which impact the Service; or
 - (iii) and rectified during Planned Outages.
- (f) In addition to the circumstances set out elsewhere in the Agreement, the Target Repair Time may be extended if (and to the extent any delays are directly caused by):

- (i) there is a Force Majeure event, in which case the Target Repair Time will be extended by the delay caused by the Force Majeure event;
 - (ii) the Customer fails to provide all necessary assistance required by Telstra or its People to Repair the Fault within the Target Repair Time, in which case the Target Repair Time will be extended by the amount of time that elapses between the time Telstra or its people requested the assistance and the time that assistance was provided; or
 - (iii) Telstra is required to obtain and utilise special transport (e.g. helicopter or boat) to access the site to rectify the Fault, in which case the Target Repair Time may be extended by four Business Days.
- (g) The Customer must comply with all operational procedures and methods that are determined by Telstra to be reasonably necessary for Telstra to meet the relevant Target Response Times and Target Repair Times set out in Table 1.

4.10 Procedures for escalation

The Customer may only escalate a Fault if the Customer believes the treatment of the Fault is not satisfactory for one or more of the following reasons, and the issue cannot be resolved by the Telstra IPSC:

- (a) missed Target Times or Target Repair Time; or
- (b) The Customer believes that a Service is still exhibiting a Fault although the system indicates that the Fault was restored within the last seven days; or
- (c) where a fault exhibits Significant Business Impact, then notwithstanding that a service location may be Rural Area or Remote Area, the Customer may escalate the Fault notwithstanding that the Target Repair Time under Table 1 has not been missed

Chapter 5

Procedures for Network Maintenance

5.1 Planned outages

- (a) The Customer agrees that Telstra may from time to time close down any Service to perform planned maintenance work on its Network.
- (b) Telstra will endeavour to give the Customer at least 10 Business Days' notice of a Planned Outage, by way of a "Planned Outages notification".
- (c) Telstra will use reasonable endeavours to minimise the duration of any outages and to undertake any maintenance work that may result in outages between 11 pm and 6 am.
- (d) On receipt of a Planned Outages notification, Customer may advise Telstra that one or more of its Services will be affected by a Planned Outage and Customer does not wish the Planned Outage to occur at the time and date specified in the Planned Outages notification for a particular Service. Where the Customer advises Telstra (by notifying the relevant contact specified in the Planned Outages notification) at least 5 Business Days before a Planned Outage under this section, Telstra and Customer will discuss new times and dates for one or more Services up until the later of:
 - (i) 2 Business Days before the Planned Outage; and
 - (ii) a time and date advised by Telstra.
- (e) While Telstra is prepared to discuss alternative times for a Planned Outage:
 - (i) Customer acknowledges that Services are provided over network infrastructure which is used by Telstra's customers generally;
 - (ii) Customer acknowledges that it may not be possible to reschedule Planned Outages and that Telstra is under no obligation to reschedule a Planned Outage; and
 - (iii) Customer agrees that failure to reach agreement on the rescheduling of, or to reschedule, Planned Outages is not a breach of the Agreement by Telstra.
- (f) Where Telstra and the Customer cannot agree on a new time and date for a Planned Outage under section 5.1(d), the Planned Outage will proceed on the time and date specified in the original Planned Outages notification issued under section 5.1(b).

5.2 Late change

- (a) This OM does not cover, and section 5.1 does not apply to, unplanned maintenance work associated with a Fault or Emergency which may require Telstra to suspend the Service without advance notice. However, under these circumstances Telstra will provide as much advance notice as is reasonably practicable and if no advance notice is provided, Telstra will notify the Customer (which may be via an update on the Customer portal) as soon as practicable following the Service suspension.
- (b) For a Late Change, Telstra will, where practicable, use its reasonable endeavours to follow the Planned Outages notification process. However, due to the urgent nature of the work required, Telstra may not always be able to give as much notice as for a Planned Outage.

This publication has been prepared and written by Telstra Corporation Limited (ACN 051 775 556, ABN 33 051 775 556), and is copyright. Other than for the purposes of and subject to the conditions prescribed under the Copyright Act, no part of it may in any form or by any means (electronic, mechanical, microcopying, photocopying, recording or otherwise) be reproduced, stored in a retrieval system or transmitted without prior written permission from the document controller. Product or company names are trademarks or registered trademarks of their respective holders.

Chapter 6

Telstra Dark Fibre Technical Specifications

6.1 Purpose

The purpose of this Telstra Dark Fibre Tech Spec Manual is to provide a customer-facing technical and operations description of the Telstra Dark Fibre product.

6.2 Scope

This document describes technical interface requirements and handoff point environment considerations for the Telstra Dark Fibre product. It is intended to provide the relevant technical information that a Customer will need in order to interface their private equipment to, and to use, the Telstra Dark Fibre.

The document does not explain ordering, provisioning, operations, or maintenance aspects of the Telstra Dark Fibre product. The rights, obligations, and processes relating to these aspects are described in the preceding Operations section of this document.

6.3 Audience

This technical specifications document is intended for Customers who are considering purchasing, and/or who have already purchased Telstra Dark Fibre. It is anticipated that readers will have a working knowledge of Optical Fibre technology.

6.4 Service Description

The Telstra Dark Fibre service provided by Telstra to the Customer are as described in the Telstra Dark Fibre Our Customer Term (OCT).

The service is an unlit single-mode optical fibre pair between two Fibre Termination Points located at two sites - an A-End and a B-End.

The maximum distance will be dependent on Customer A-End to B-End link loss and equipment capability e.g. but not limited to LX 10km, EX 40km and ZX 80 km optical transceiver types.

The service has no electrical devices attached by Telstra, and therefore does not carry any traffic until connected to **Customer-supplied** active optical transmission equipment.

The Telstra Dark Fibre is a **non-diverse** service. To achieve path diversity, two separate services may be ordered, with a request that they be designed over diverse geographic paths. In such cases Telstra will endeavour to comply with the path diversity request but cannot guarantee that full end-to-end path diversity will be achievable at time of initial service delivery, or (as a result of maintenance activities) maintainable over time.

6.5 Fibre Characteristics

The optical fibre used for the Telstra Dark Fibre is a single-mode, non-dispersion shifted, terrestrial optical fibre pair, which was designed at the time of original deployment to meet the relevant technical characteristics for single-mode optical fibre cable current at the time of that deployment.

The optical fibre used by Telstra to deliver the Telstra Infracore Dark Fibre complies with ITU-T **G.652.D** as of August 2006 (and prior to that time **G.652.B**) and ITU-T **G.657.A2**

The light transmission characteristics of optical fibre can change over time, either as a result of natural fibre age degradation, or as a result of geological disturbance creating physical distortions in the fibre. The fibre in Telstra's network has been progressively deployed over time and thus the individual fibre sections utilised in making the end-to-end path of any Telstra Dark Fibre may vary in age. It should be assumed that a Telstra Dark Fibre will consist of a distribution of different aged fibre sections.

Except where noted, the characteristics provided in this section reflect Telstra's current specifications for newly deployed fibre. Fibre in Telstra's network is designed for a service life of up to 40 years.

6.5.1 Optical Attenuation

Maximum Fibre Loss @ 1310nm (initial fibre deployment)	≤ 0.35 dB per kilometer (fibre path)
Maximum Fibre Loss @ 1310nm (end of fibre life)	≤ 0.40 dB per kilometer (fibre path)
Maximum Fibre Loss @ 1490nm (initial fibre deployment)	≤ 0.23 dB per kilometer (fibre path)
Maximum Fibre Loss @ 1490nm (end of fibre life)	≤ 0.25 dB per kilometer (fibre path)
Maximum Fibre Loss @ 1550nm (initial fibre deployment)	≤ 0.20 dB per kilometer (fibre path)
Maximum Fibre Loss @ 1550nm (end of fibre life)	≤ 0.25 dB per kilometer (fibre path)
Maximum Fibre Loss @ 1625nm (initial fibre deployment)	≤ 0.23 dB per kilometer (fibre path)
Maximum Fibre Loss @ 1625nm (end of fibre life)	≤ 0.25 dB per kilometer (fibre path)
Maximum Connector Loss: <i>(eg end terminations and in-path patching connectors)</i>	≤ 0.20 dB per connector
Maximum Splice Loss <i>(e.g. midpoint exchange splices and in-ground path splices)</i>	≤ 0.10 dB per splice
Cable Cut-off Wavelength λ_{cc}	≤ 1260 nm
Typical Polarisation Mode Dispersion (PMD)	≤ 0.1 ps/ $\sqrt{\text{km}}$

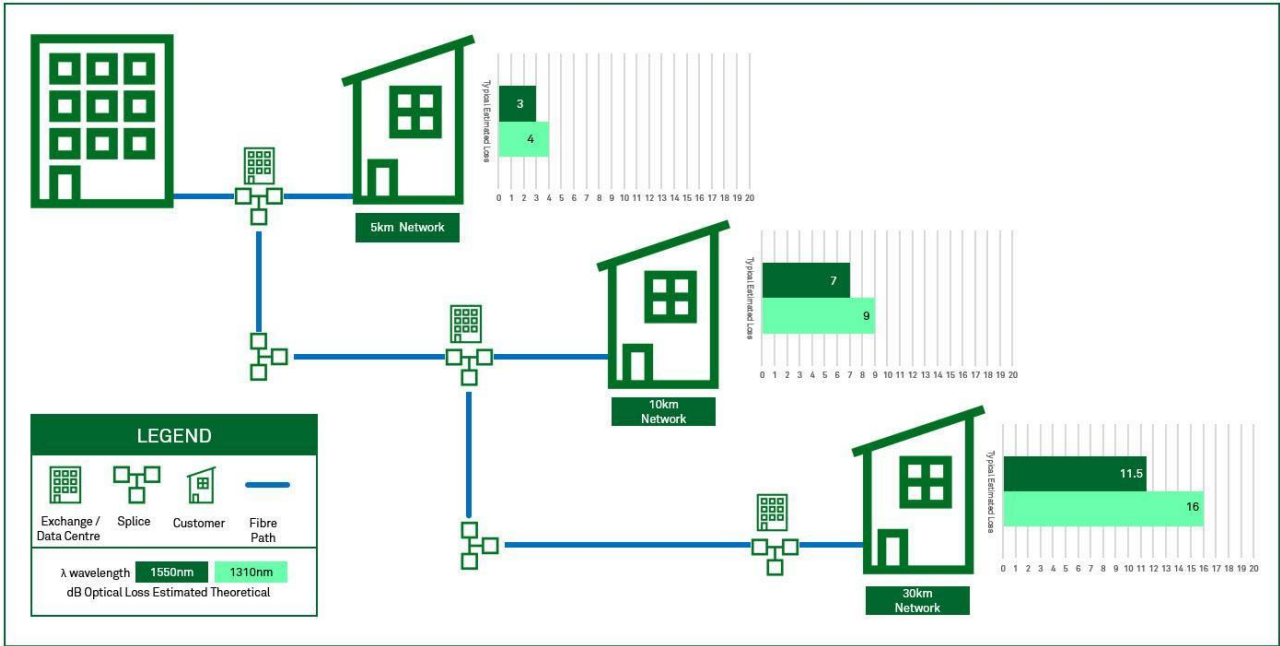


Figure 1. Typical estimated optical loss (dB) examples for Dark Fibre Links between sites in a metropolitan area.

6.5.2 Chromatic Dispersion

G.652

Zero Dispersion Wavelength λ_0	1302 nm (min) to 1322 nm (max)
Zero Dispersion Slope (S_0) at λ_0	≤ 0.092 ps/nm ² .km
Chromatic Dispersion Coefficient between 1285 & 1330nm	≤ 3.5 ps/nm.km
Chromatic Dispersion Coefficient at 1550nm	≤ 18 ps/nm.km
Chromatic Dispersion Coefficient at 1625nm	≤ 22 ps/nm.km

G.657.A2

Zero Dispersion Wavelength λ_0	1300 nm (min) to 1324 nm (max)
Zero Dispersion Slope (S_0) at λ_0	≤ 0.092 ps/nm ² .km
Chromatic Dispersion Coefficient between 1285 & 1330nm	≤ 3.7 ps/nm.km
Chromatic Dispersion Coefficient at 1550nm	≤ 18.5 ps/nm.km
Chromatic Dispersion Coefficient at 1625nm	≤ 23 ps/nm.km

6.5.3 Physical Fibre Characteristics (New Fibre)

Item	G.652	G657.A2
Core Material	Ge doped silica glass	
Core Mode Field Diameter @ 1310nm	9.2/9.1/9.0* \pm 0.4 μ m	8.8 \pm 0.4 μ m
Core Mode Field Diameter @ 1550nm	10.4/10.1* \pm 0.5 μ m (characterised)	9.8 \pm 0.5 μ m (characterised)
Cladding Material	Silica glass	
Cladding Diameter	125 \pm 0.7 μ m	

*The specification for Telstra Fibre Cable Core Mode Field Diameter has varied over time to align with fibre manufacturer's performance adjustments required to improve cable design, e.g. Prysmian Flextube.

6.5.4 Fibre Path End-to-End

Fibres for the Dark Fibre Services shall not be transposed at any point between and including at the A-End and B-End. The customer shall be responsible to implement fibre transposition as necessary beyond the SDP at either end.

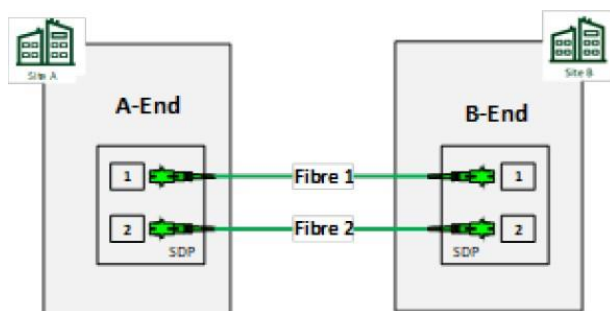


Figure 2 – Fibre Path End-to-End with No Transpositions

6.6 Service Delivery Points

A Telstra Dark Fibre is provided as an end-to-end optical fibre link between two Fibre Termination Points at the nominated **Service Delivery Points**.

The Service Delivery Points are the only points at which Customer supplied optical line terminal equipment may be connected to the service.

The Service Delivery Points at the A-End and the B-End of the service are physically located at Optical Connectors provided by Telstra. Service Delivery Points may at Telstra's discretion be provided at the following site types:

- | | |
|--------|--|
| Nodes | <ul style="list-style-type: none"> • Data Centres • Telstra Exchanges (Colo) • Other Customer aggregation sites |
| Points | <ul style="list-style-type: none"> • Business Premises • Other customer sites |

(unless otherwise agreed by the parties in accordance with the Telstra Dark Fibre Agreement).

6.6.1 Optical Connectors

The physical interface provided by Telstra at each Service Delivery Point will use Telstra's standard optical connector unless Telstra notifies Customer in writing otherwise.

The standard optical connector currently used by Telstra is the "**SC type Angled Physical Contact**" (SCAPC) also commonly known as "**Angled SC**" or "**A/SC**" connector, as described in IEC 61754-4 (Fibre Optic Connector Interfaces – Part 4: Type SC Connector Family).

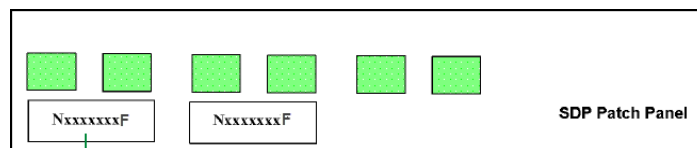
Telstra may at its discretion use different optical connectors in special circumstances.

Customer is responsible for ensuring that any Customer supplied optical transmission equipment used in conjunction with a Telstra Dark Fibre is technically compatible with the Telstra Dark Fibre.

Telstra may use a variety of mounting arrangements for the optical connector at the Service Delivery Point. The **preferred** delivery mounting will be a rack mounted optical SDP tray with SC/ACP connectors as shown below.



Labelling of services in the SDP tray will typically be as per the following diagram.

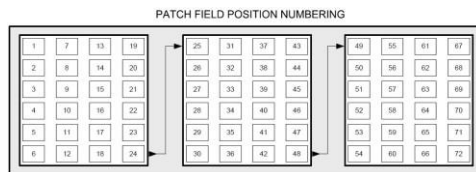


Full National Number FNN

Alternative physical presentations which may be used in some locations include 24 fibre and 72 fibre OFTU panels:



24 fibre COFTU panel



72 fibre COFTU panel

In limited circumstances where Telstra's standard delivery arrangements are not available, the optical connector may at Telstra's discretion be presented in a "Customer Terminating Unit"



Where the Service Delivery Point is located in a third party **Data Centre**, the optical connector will be typically located in an data centre supplied demarcation frame - detailed handoff arrangements for these locations will vary depending the specific data centre rules. Final delivery of the optical service from the SDP to the customer rack in data centres will typically be implemented by the data centre support staff using a DC supplied "cross-connect" optical patch – in these cases the handoff at the customer rack may be ASC or LC type connector.

6.6.2 Service Delivery Point Diagrams

Service Delivery Point will vary at each location. Common examples are explained to improve general understanding.

Telstra InfraCo Data Centres

The Telstra Data Centre (DC) SDP will typically be located within the DC SMF (Sub Main Frame).

Connection of the Dark Fibre Service to the customer rack will be via an optical cross-connect from the SDP within the SMF (Sub Main Frame) to the DC Campus Fibre Frame (CFF). This will be implemented and recorded by the InfraCo ExchangeCo DC staff.

Interconnections (Patching) traversing the DC e.g., OMF lead-in to OMF lead-in can be run by InfraCo Fibre staff.

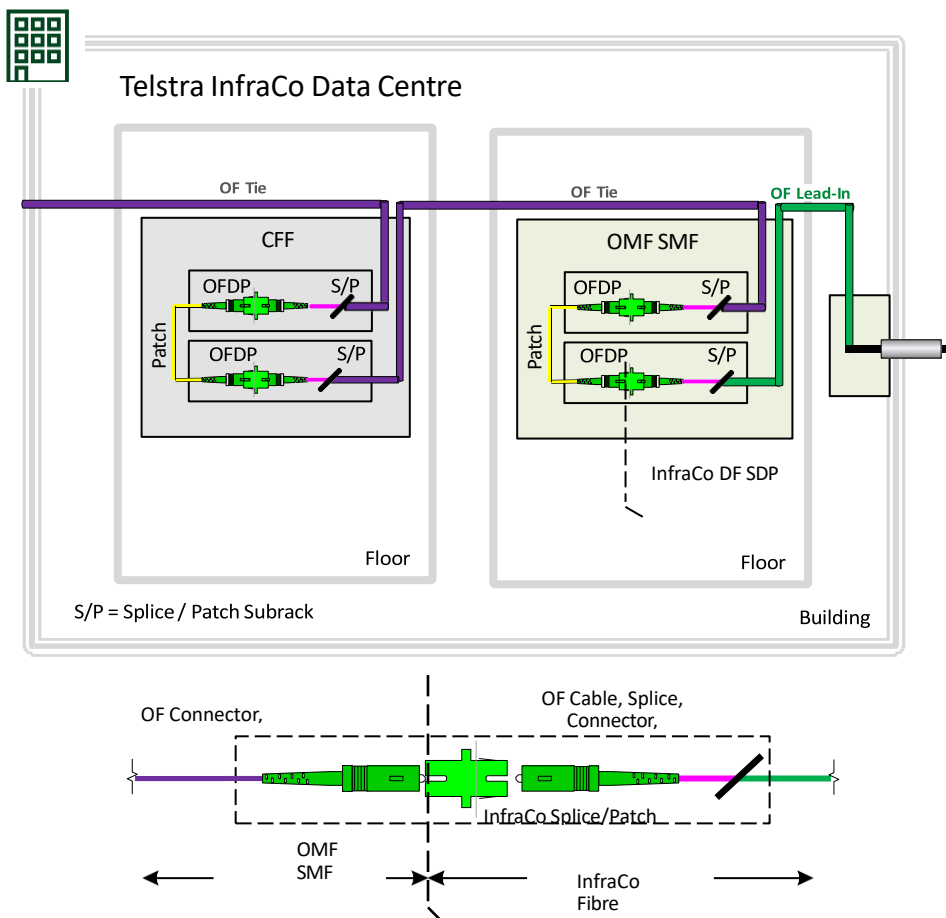


Figure 3 – DF SDP Telstra InfraCo DC site

3rd Part Commercial DC

Within 3rd party Commercial Data Centres (DC) detailed handoff arrangements for these locations will vary depending on the specific data centre rules.

Where the DF SDP is delivered to the MMR (Meet Me Room) / IR (Interconnect Room) ODF the connection of the Dark Fibre service to the customer rack ODF in data centres will typically be implemented by the data centre support staff using a DC supplied optical cross-connect.

To reduce the delay from the time of completion of Dark Fibre services the final SDP location should be confirmed with the customer as soon as possible. The customer can then place the cabling order with the Data Centre.

Figure below summarises the typical DC optical infrastructure and SDP locations to support Dark Fibres.

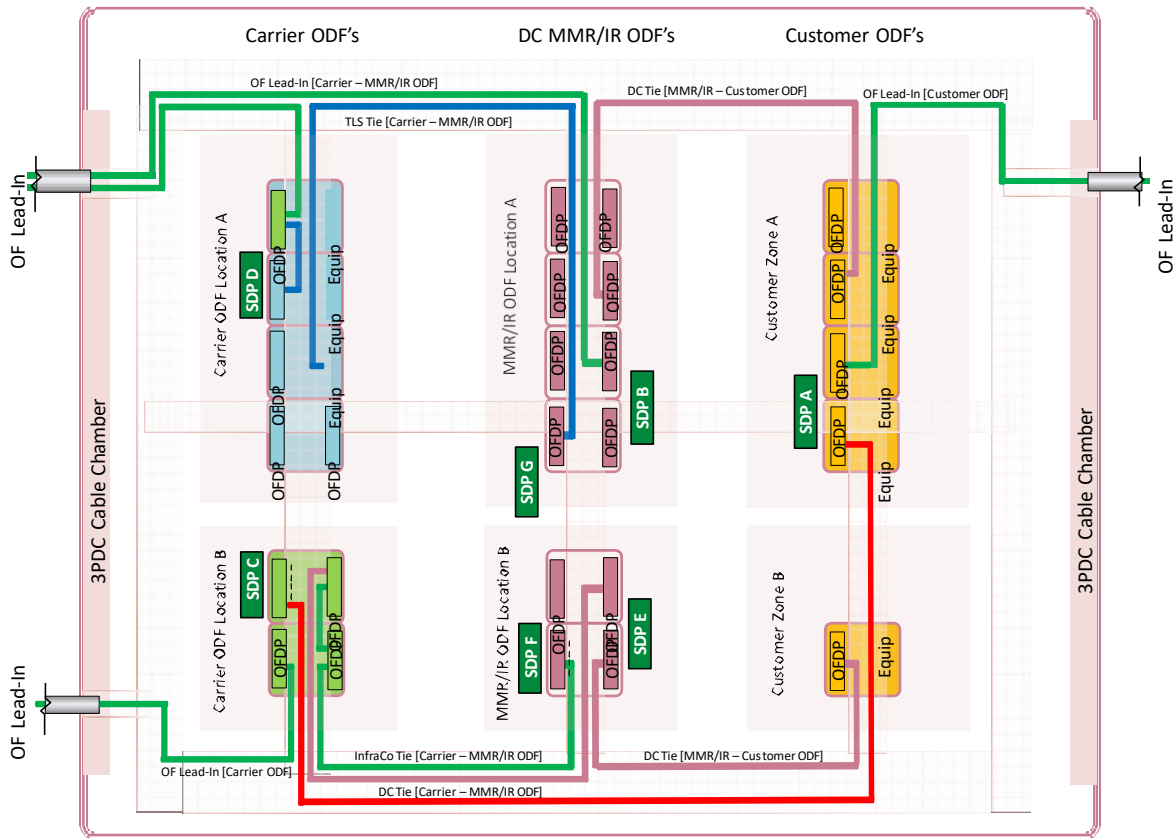


Figure 4 – 3PDC Cabling, OFDP and SDP's example.

SDP	Lead-In Location	Tie Location A	Tie Location B	Tie Ownership	SDP Location	Notes
SDP A	Customer OFDP	Nil	Nil	Nil	Customer OFDP	Lead-In direct to Customer OFDP. ^{Note 1,2}
SDP B	MMR OFDP	Nil	Nil	Nil	MMR OFDP	Lead-In direct to DC MMR/IR OFDP. ^{Note 1,2}
SDP C	Carrier OFDP	Carrier OFDP	Customer OFDP	Customer	Carrier ODF	Structured Cabling. ^{Note 1,2,3}
SDP D	Carrier OFDP	Carrier OFDP ^{Note 4}	TLS OFDP ^{Note 4}	TLS	TLS OFDP	Dark Fibre to TLS (Telstra Limited) OFDP. ^{Note 2}
SDP E	Carrier OFDP	Carrier OFDP	MMR OFDP	DC	MMR OFDP	Dark Fibre to MMR using DC Tie. ^{Note 2}
SDP F	Carrier OFDP	Carrier OFDP	MMR OFDP	InfraCo	MMR OFDP	Dark Fibre to MMR using InfraCo Tie. ^{Note 2}
SDP G	Carrier OFDP	Carrier OFDP	MMR OFDP	TLS	MMR OFDP	Dark Fibre to MMR using DC Tie. ^{Note 2}

Table 1 – 3PDC cabling and SDP scenarios.

Note 1 : Solution is by exception and could be subject to commercial terms. This solution will be made available via a Fibre ISA or will be captured in the Feasibility Solution brief.

Note 2 : DC and Carrier infrastructure (Racks, Cables, OFDP) may be existing or newly installed.

Note 3 : Structured Cabling - The DF SDP will be presented in the Carrier ODF at the end of the simplex patch cords (SCAPC) interconnecting the InfraCo cable and customer's cable.

Customer is responsible (or InfraCo can arrange on the customers behalf) for the tie between the Carrier ODF and Customer ODF. The OFDP terminating the customers optical fibre cable at the Carrier ODF may be either an InfraCo supplied W&B 72F Splice/Patch subrack or Codecom supplied 72 or 144F CXD Chassis.

Customer shall advise customer tie on the order, InfraCo design will select the next available fibre/port. InfraCo patch, test and advise details in Delivery Document.

The OFDP terminating the customer tie will be modelled in MITS, MM & TPD, but the customer cable will not.

Note 4 : InfraCo OFDP to TLS Active Equip may be a Simplex or Ruggedised Patch cord.

Exchange Building

The physical interface provided by InfraCo at each SDP inside exchange buildings will depend on what optical connector type is the standard for the OFDF where the SDP is presented.

The standard optical connector currently used in OFDFs deployed by InfraCo in exchange buildings is SCAPC.

NBC – Network Building Co-location

The SDP is presented within the NBC rack using SCAPC connectors on a 72F Splice/Patch OFDF. Where requested the SDP SCAPC connector may be replaced by splicing on an applicable Pigtail for connection to the customers equipment.

Exchange NBC racks are designed for ISPs and resellers who offer services in specific geographic areas. ISPs and resellers can install their equipment within NBC racks located in selected network sites.

NBC racks are available in 600mm W x 600mm D and 600mm W x 1000mm D footprints with the choice of half height or full height. Usable space, half rack is 14 rack units, or 34 rack units for a full rack.

Each rack will be configured with fibre connectivity to an NBC OFDF. Half height racks have separate optical fibre ties back to the NBC OFDF and full height racks have one (1x) optical fibre tie back to the NBC OFDF.

All NBC racks are secured (locked), access to an individual NBC rack will use the Telstra One Card. Access is managed in Service Now (SNOW), a “One Card Access Request” application will be required for requesting new or changes to existing access.



Front – Half Height NBC Racks



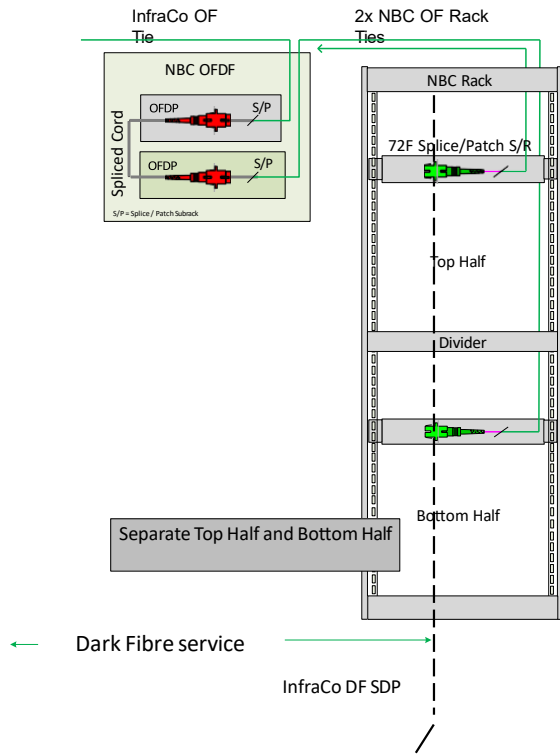
Rear – Half Height NBC Racks



Internal – NBC Half Height Rack

Figure 5 – NBC half height rack Photos

Single Sided NBC Half Height Rack



Single Sided NBC Full Height Rack

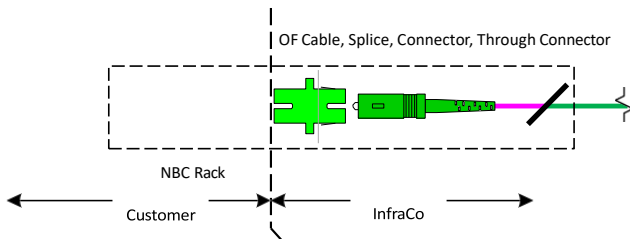
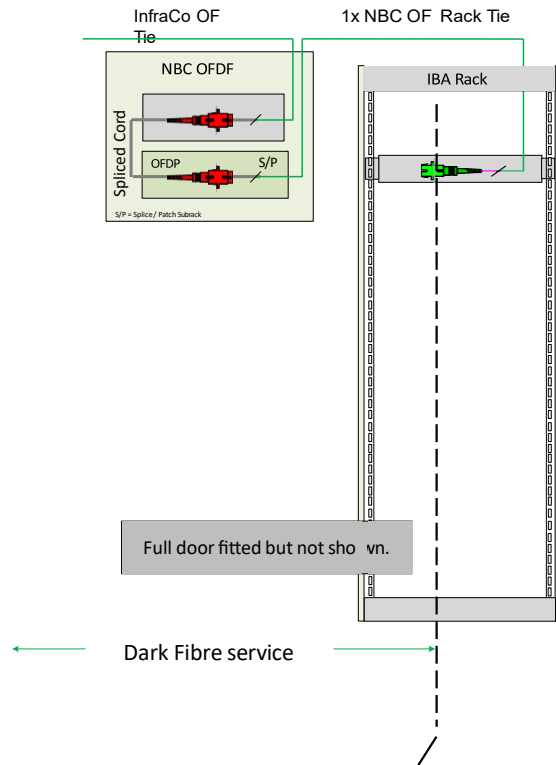


Figure 6 – NBC half and Full Height racks, SDP SCAPC.

Single Sided NBC Half Height Rack

Single Sided NBC Full Height Rack

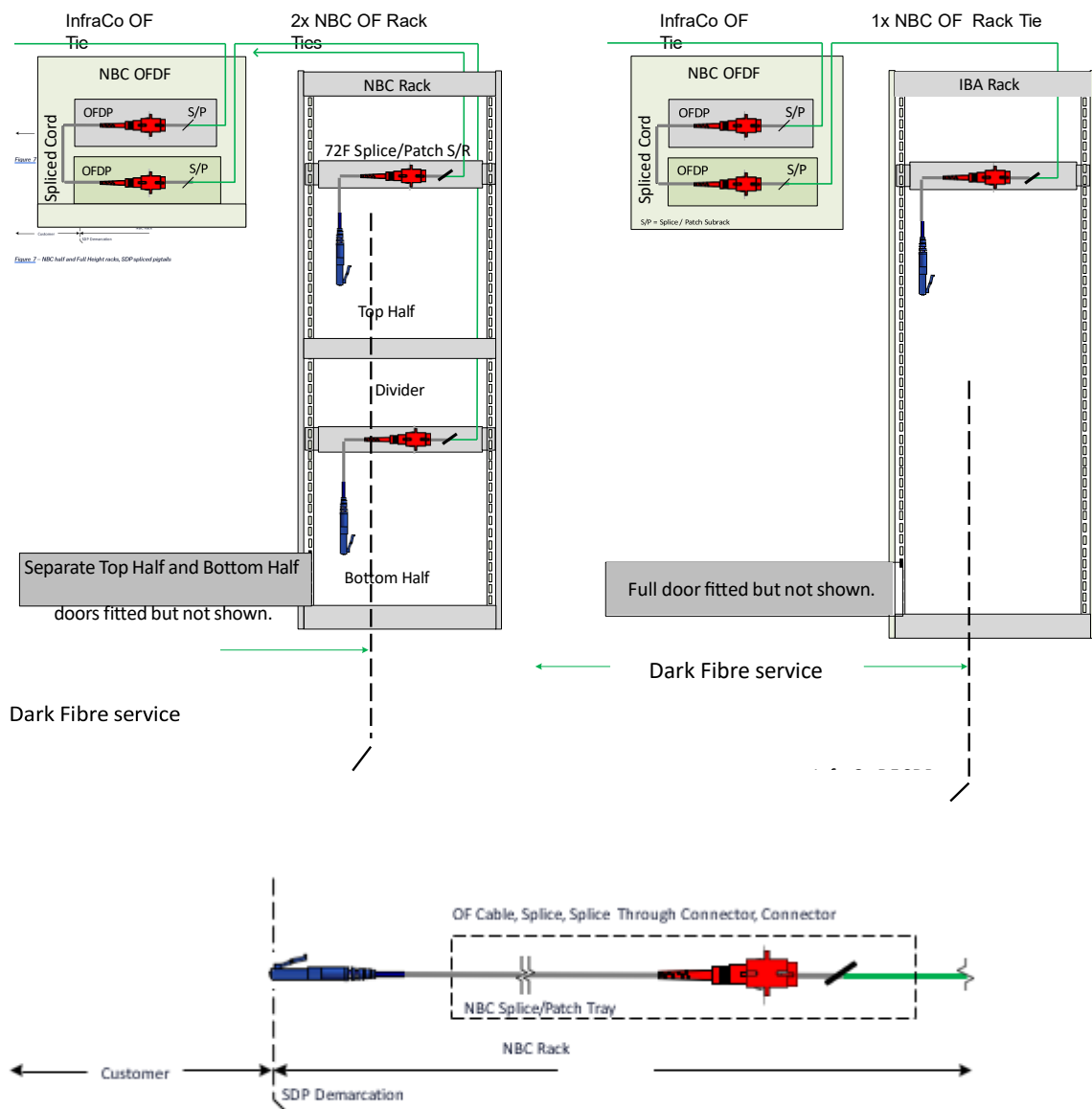
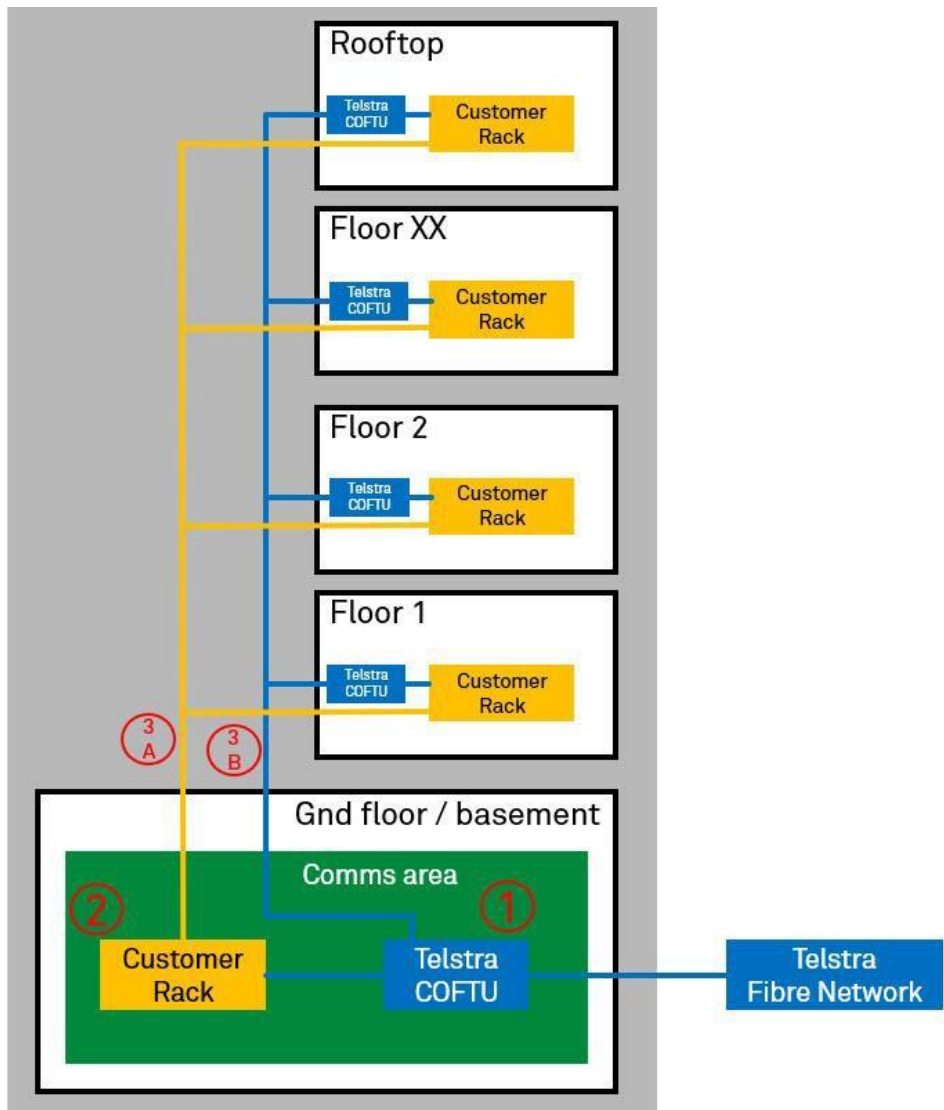
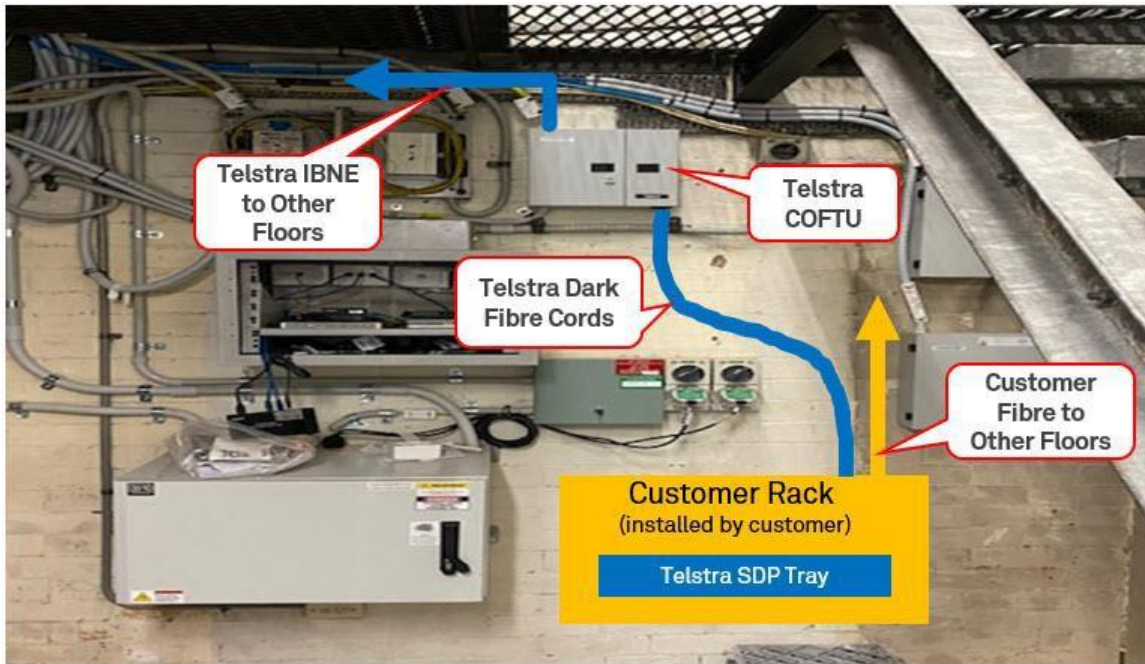


Figure 7 – NBC half and Full Height racks, SDP spliced pigtails

Service Delivery Points – Business Premise

Business Premise include single and multiple level buildings.





Common Area

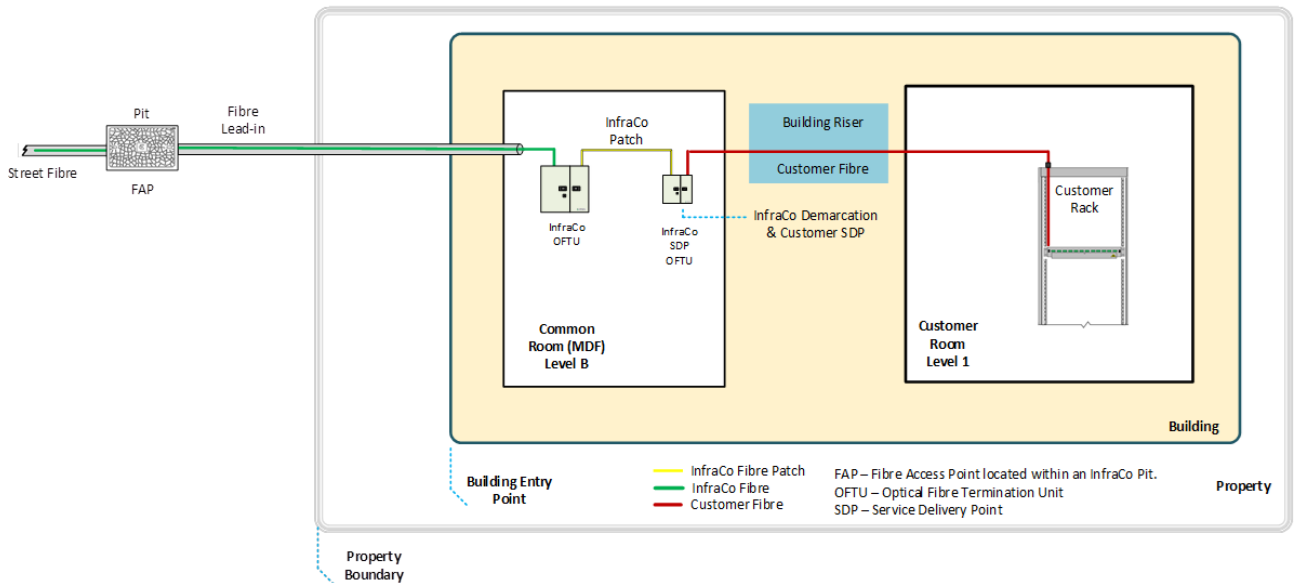
1. Network Boundary / Service Delivery Point is in the common area / main distribution frame (MDF) normally located in the basement or ground floor .
2. The fibre service would typically be presented in a SDP tray installed in a customer equipment rack within the common area.
3. The fibre service may also transit through an OFTU on a wall or a High Density Optical Distribution Frame (HDODF) inside a rack for a larger fibre count

To access the upper floor or rooftop COFTU two options can apply:

- A. The customer can organise and deliver fibre from the common area / MDF to their rack.
- B. Telstra can provide for a charge the In-Building Network Extension (IBNE). Once the field visit has been completed and the height, length and path calculations have been completed, a quote for building cable extension will be emailed to you for approval prior to work commencing.

Telstra Dark Fibre (Telstra InfraCo) Demarcation Diagrams – Business Premises

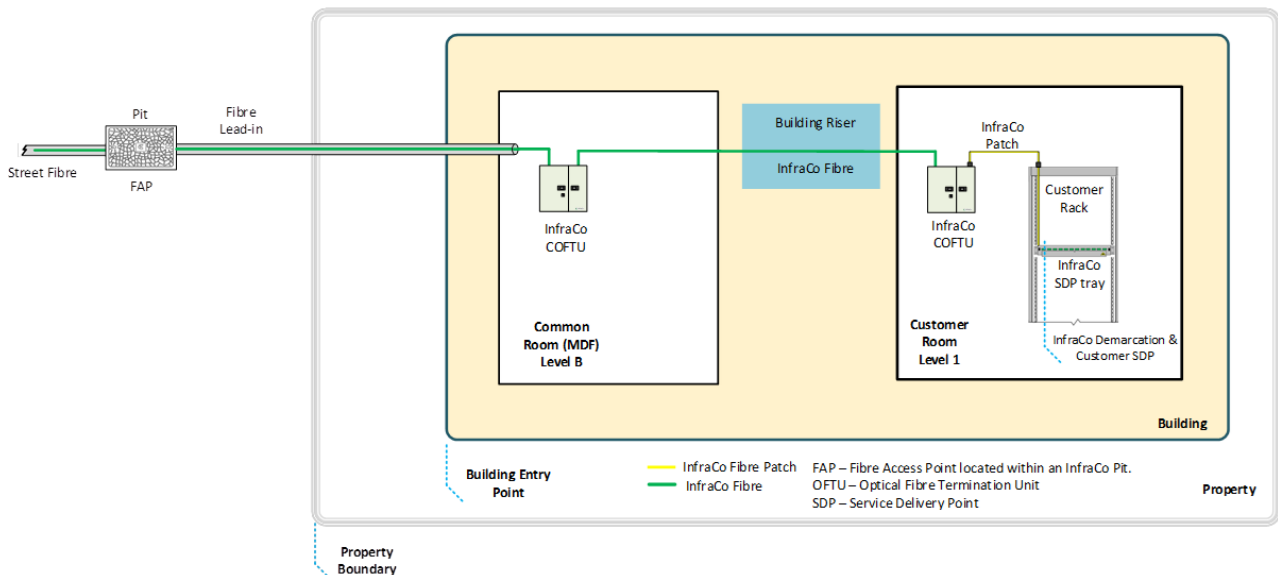
InfraCo demarcation and SDP in Common area.



Use Case 1 : Telstra Dark Fibre delivered to the Building (MDF) Common Room. Customer connects via their own fibre (shown in red) to the Telstra InfraCo SDP OFTU.

Note: if additional work is required to deliver the Dark Fibre service to the Customer Premise, additional charges may apply including, but not limited to, In-Building Network Extension or Special Linkage charges, Fee-for-Service and/or Commercial Work charges.

InfraCo demarcation and SDP in Customers area.



Use Case 2 : Telstra Dark Fibre delivered to Customer Communications Room via a Telstra InfraCo fibre (shown in green). The Dark Fibre service will terminate on an SDP Tray located in the customer's rack.

Note: if additional work is required to deliver the Dark Fibre service to the Customer Premise, additional charges may apply including, but not limited to, In-Building Network Extension or Special Linkage charges, Fee-for-Service and/or Commercial Work charges.

6.7 Laser Safety and Power Limits of Customer Equipment

Customer **must** ensure that any Customer Equipment connected to a Telstra Dark Fibre:

1. complies with the **laser safety** requirements specified in:

ITU-T Specification G.664	<i>Optical safety procedures and requirements for Optical transport systems;</i>
IEC 60825-1	<i>“Safety of Laser Products - Equipment Classification and Requirements”. (Australian Standards - AS/NZS 2211.1:2004);</i>
IEC 60825-2	<i>“Safety of Optical Fibre Communication Systems”. (Australian Standards - AS/NZS 2211.2:2006);</i>
AS/NZS 60950	<i>(Safety of Information Technology Equipment); and</i>
AS/NZS 2967:2010	<i>“Optical fibre communication cabling systems safety”;</i>

2. is fitted with an **automatic power reduction** system which will, **in the event of a break** in the optical path of the Telstra Dark Fibre, automatically turn off or reduce the power of the emitting lasers in the system in such a way as to ensure that the accessible emission level of laser radiation at any stage of operation on or with a Telstra Dark Fibre at any point (including commissioning and maintenance situations) **does not exceed Class 1M levels** (as defined in IEC 60825-1). [See also Section 9 – Optical Fibre Safety Procedures]; and
3. does not at **any time** exceed a maximum transmitted optical power level of **500mW**, and
4. Does not exceed the location Hazard level of Class 1M (as defined in IEC 60825-2) at any point in the fibre link, under normal or fault conditions (even when a fibre break occurs).

6.8 Patch Cords

Customer or their Data Centre operator is responsible for providing and maintaining any optical patch cords required to connect from the Telstra Dark Fibre termination point (the Optical Connector at the Service Delivery Point) to the Customer’s private optical transmission equipment.

Patch cords must be designed to connect with Telstra’s Optical Connector at the Service Delivery Point. Simplex patchcord cables conforming to IEC 60794-2-50 are generally suitable for this purpose.

6.9 Optical Fibre Safety Procedures

Telstra expects the customer or their suppliers to enforce appropriate fibre safety handling procedures.

6.9.1 Live Working

“Live working” on fibres for maintenance should only be performed when the radiation level from the live fibre end is Class 1 or Class 1M at the point of live work. Customer must ensure that the laser radiation at the point of work falls within this classification.

Co-ordination between Telstra fibre repair teams and Customer personnel may be necessary to ensure safe power levels within Class 1M is achieved during the maintenance work (when necessary)

It is preferable to work with **no** power propagating in the fibre where this is possible.

6.9.2 Use of Optical Fibre Viewing Devices

Commercially available **video fibre scopes** (e.g. JDSU P5 or similar) may be used by Customer personnel for viewing fibre connector endfaces at equipment optic ports, optical patch panels, connectorised cable tails or anywhere there is a possibility of laser radiation being present. Inspecting fibre endfaces via a video scope is considered safe because the image is viewed indirectly on a PC/Laptop screen or LCD display. Thus a video fibre scopes is the preferred method of inspection of all connector ends irrespective of whether any laser radiation is present or not.

6.10 References

Document	Title
AS/NZS 60950	Safety of Information Technology Equipment
CISPR22	Information technology equipment - radio disturbance characteristics - limits and methods of measurement
IEC 61754-4	Fibre Optic Connector Interfaces – Part 4: Type SC Connector Family
IEC 60825-1	Safety of Laser Products - Equipment Classification and Requirements (Australian Standards - AS/NZS 2211.1:2004)
IEC 60825-2	Safety of Optical Fibre Communication Systems (Australian Standards - AS/NZS 2211.2:2006)
IEC 60794-2-50	Optical fibre cables - Part 2-50: Indoor cables - Family specification for simplex and duplex cables for use in terminated cable assemblies
IEC 61300-3-35	IEC standard for failure thresholds that define defects limits for each zone on fibre connector endfaces for single-mode and multimode connectors
IEC 61754-4	Fibre Optic Connector Interfaces – Part 4: Type SC Connector Family
ITU-T Rec G.652	Characteristics of a single-mode optical fibre and cable
ITU-T Rec G.654	Characteristics of a cut-off shifted, single-mode optical fibre and cable
ITU-T Rec G.655	Characteristics of a non-zero dispersion-shifted single-mode optical fibre and cable
IEC/TR 60825-14	Safety of Laser Products – Part 14: A user’s guide Issue 2011 and future updates

6.11 Definitions

In the event of an inconsistency between this Technical Specifications document and the Agreement, the Agreement will prevail to the extent of these inconsistencies.

In this Tech Spec, unless the contrary intention appears:

1. terms not defined in this Tech Spec but which are defined in the Agreement have the same meaning in this Tech Spec; and
2. the following words have the meanings set out below.

Agreement means the Telstra Enterprise Agreement entered into by Telstra and the Customer.

Business Premise includes single- and multi-level buildings

Carrier has the meaning given by section 7 of the Telecommunications Act.

Customer means the legal entity that acquires the Service from Telstra under the Agreement.

Exchange means a building housing telephone switching equipment of Telstra.

IBNE In-Building Network Extension means extension of the Telstra Network that is beyond the existing Telstra Network Boundary and/or existing common room area

IEC means International Electrotechnical Commission

Metro means the classification given to each ESA in the ESA List for the purposes of determining some of the Charges for the Service.

Network, means a system, or series of systems, that carries, or is capable of carrying communications by means of guided or unguided electromagnetic or optical energy.

SC means standard connector

SCAPC means SC type angled physical contact.

Service Delivery Point means the location at which the Service terminates and is available for interconnection with Customer private equipment.

Telstra means Telstra Corporation Limited

Telstra Enterprise Account Manager means the person identified as such by Telstra in the Agreement.

Tech Specs means this Telstra Service Interface Specification.

Un-lit means a passive fibre bearer i.e. one which does not intrinsically include and is not at the time of delivery attached to, any form of optical light source.

6.12 Enquiries

If you have any questions regarding this Telstra Dark Fibre Tech Spec document, or would like to suggest an improvement, please contact your Telstra Enterprise Account Manager or Solutions Engineer

This publication has been prepared and written by Telstra Corporation Limited (ABN 33 051 775 556), and is copyright. Other than for the purposes of and subject to the conditions prescribed under the Copyright Act, no part of it may in any form or by any means (electronic, mechanical, microcopying, photocopying, recording or otherwise) be reproduced, stored in a retrieval system or transmitted without prior written permission from the document controller. Product or company names are trademarks or registered trademarks of their respective holders.

Note for non-Telstra readers: The contents of this publication are subject to change without notice. Telstra has made every effort to ensure the accuracy and completeness of the information in this Telstra Service Interface Specification, but Telstra does not make any warranties