

Chorus UFB Services Agreement

Fibre Access Service: Service Description for  
Chorus Data Centre Connect (CDCC) Service

Reference Offer September 2024

## Document Version History

Version	Date	Author	Description of Change
1.0	November 2021	Karmen Mai	Initial version
2.0	June 2023	Mark West	New features options and price structure
3.0	September 2024	Alexandru Tudor	Addition of Auto-Switching Diversity

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## 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. Capitalised terms not defined in this Service Description are as defined in the General Terms or the Operations Manual.
- 1.2 References to the Operations Manual are references to the Operations Manual for Direct Fibre Access Services (layer 1) and references to the Service Level Terms are references to the Service Level Terms for Fibre Access Services (layer 1). Except as varied by this Service Description any references to Direct Fibre Access Service in the Operations Manual or to the Fibre Access Services in the Service Level Terms shall include the Chorus Data Centre Connect Service. References to Chorus in this Service Description should be read as references to the LFC in the General Terms, Operations Manual or Service Level Terms.
- 1.3 This Service Description covers the provision of the Chorus Data Centre Connect Service (“CDCC” or “the Service”).
- 1.4 The General Terms in Chorus UFB Services Agreement/Reference Offer apply to provision of the CDCC Service subject to any modifications, exclusions, and clarifications set out in clause 1.5 below.
- 1.5 The CDCC Service:
- 1.5.1 may be withdrawn by Chorus on 12 months’ notice. Clauses 5.2(a) and 5.2(b) of the General Terms do not apply to the withdrawal of the CDCC Service. Any instance of the CDCC Service that is subject to a Minimum Service Term that expires after the 12 months’ notice of withdrawal, shall continue to be provided by Chorus on the terms of the relevant Service Order until the expiry of that Minimum Service Term; and
- 1.5.2 may be subject to a Core Price Change or an Ancillary Price Change in accordance with clauses 24.4 (a) and 24.5(a) of the General Terms.
- 1.6 This CDCC Service Description may be changed by Chorus using the process for Agreement Changes set out in the General Terms except that:
- 1.6.1 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; and
- 1.6.2 the Service Provider may not propose any Agreement Change in relation to this Service Description in accordance with clause 24.1(b) of the General Terms.
- 1.7 For the purposes of this Service Description:
- 1.7.1 “Available Connector” means one of the connectors set out in the list in the section titled “Optical Connector Type” within the “Technical Specification” at Appendix B;
- 1.7.2 “Network OFDF” means one of a range of connection types as defined within the “Technical Specification” at Appendix B;

- 1.7.3 “UFB Area” means an area listed as an individual UFB Area in a table on the Products section of the Chorus Service Provider website:  
<https://sp.chorus.co.nz> <https://sp.chorus.co.nz/product/central-office-and-point-interconnect-poi/resources> and which aligns to the “UFB geographic area (POI Area)” in the Commerce Commission’s Notice of points of interconnection available at [www.comcom.govt.nz/\\_data/assets/pdf\\_file/0028/306937/Notice-of-Specified-Points-of-Interconnection-16-February-2023.pdf](http://www.comcom.govt.nz/_data/assets/pdf_file/0028/306937/Notice-of-Specified-Points-of-Interconnection-16-February-2023.pdf) .
- 1.7.4 Specified Central Office” means specified list of POIs and some Central Offices where the CDCC service can be terminated, The list of Specified Central Offices where the CDCC Service may be terminated will be published on the Chorus Service Provider website:  
<https://sp.chorus.co.nz/product/chorus-data-centre-connect/resources>

## 2. The Data Centre Connect Service

- 2.1 CDCC Service is a throughput managed DWDM (Dense Wavelength Division Multiplex) access service. It transports data between selected Data Centres available at the locations listed on the Service Provider website (<https://sp.chorus.co.nz/product/chorus-data-centre-connect/overview>, each a “Data Centre”) and the Specified Central Office where it can be interconnected with the Chorus transport network, Service Provider equipment, co-located equipment, or third-party services as part of a high-speed secure data transmission solution.
- 2.2 The selected Data Centres are those where Chorus has installed managed DWDM Nodes and are listed on website [sp.chorus.co.nz](https://sp.chorus.co.nz). This list will be updated as new sites become available.
- 2.3 Where possible, the CDCC Service at each Data Centre can offer the choice of either a primary route or a diverse route. The diverse route (a second instance of the CDCC Service between the Data Centre and a Specified Central Office is designed during the equipment deployment and network build process (refer to Appendix A diagram and clause 7 Fibre Diversity).
- 2.4 The CDCC Service provides dedicated, uncontended bandwidth at either 10Gbps and 100Gbps (additional bandwidth options may be added in the future).
- 2.5 At the Specified Central Office termination point, the 10Gbps service can be delivered as either dual fibre working (DFW) or single fibre working (SFW) while at the Data Centre end all service speeds can be only delivered as dual fibre working including the 100Gbps service. A diagram of the configuration for the CDCC Service is set out in Appendix A.
- 2.6 The CDCC Service consists of the provision of 10Gbps or 100Gbps transport service at the Data Centre to either:
- 2.6.1 the Network OFDF at the Specified Central Office;
  - 2.6.2 where the Service Provider is taking an interconnection service.
- 2.7 The CDCC Service is an input service which the Service Provider can use as a building block to combine with other Chorus services (or with the Service Providers own network or wholesale services provided by other providers) to provide fibre-based services to End Users.

- 2.8 The expected termination point is within a Specified Central Office, however the CDCC Service may be extended beyond this Central Office by using one of the following:
- 2.8.1 if the termination point is within a POI, using Chorus Relay Connect to a POI in a different UFB Area where available;
  - 2.8.2 Direct Fibre Access Services to a site within the Central Office service area where available;
  - 2.8.3 Handover Connection Service;
  - 2.8.4 Third party backhaul, either directly or via TPAD (Third Party Access Distribution);
  - 2.8.5 another CDCC Service terminating at the same Specified Central Office ;
  - 2.8.6 ICABS; or
  - 2.8.7 Another available Chorus backhaul service.
- 2.9 The inter-operability of the CDCC Service with a particular extension service will need to be confirmed before a Service Request becomes a Service Order.
- 2.10 A diagram of the configuration for the CDCC Service is set out in Appendix A.

### **3. Data Centre Connect Service and implementation activities**

- 3.1 Part 5 of the Operations Manual shall not apply to the CDCC Service and clause 3.2 to 3.15 of this Service Description shall apply instead.

#### ***Installation Services***

##### *Standard and Non-Standard Installation at Specified Central Office*

- 3.2 The Standard Installation of the CDCC Service at a Specified Central Office as listed on website [sp.chorus.co.nz](http://sp.chorus.co.nz) set out below (in each case to the extent that the relevant provisioning works are not already complete for the relevant Service Order). Chorus will provide Non-Standard Installation for the CDCC Service as an Ancillary Service. A Standard Installation includes connection of the CDCC Service to an Available Connector, on the OFDF installed in the Service Provider's Footprint, or an Available Connector on the Network OFDF at the Specified Central Office as listed on website [sp.chorus.co.nz](http://sp.chorus.co.nz).

##### *Provisioning at Specified Central Office – Network OFDF*

- 3.3 Chorus will provide the following as part of a Standard Installation:
- 3.3.1 Termination on an Available Connector on the Network OFDF;
  - 3.3.2 Connection of the CDCC Service to either:
    - (a) a Tie Cable from the Network OFDF to the Service Provider's Footprint at the Specified Central Office. The Tie Cable will be supplied pursuant to the terms of the appropriate co-location service; or
    - (b) an extension service listed in 2.8.

##### *Installation at a selected Data Centre*

- 3.4 The Standard Installation of the CDCC Service at the Data Centre varies according to individual Data Centre's interconnection facility and policy.

3.5 However, where possible Chorus sets out similar standards as per our Specified Central Office installation as described in 3.2 (in each case to the extent that the relevant provisioning works are not already complete for the relevant Service Order). Chorus will provide Non-Standard Installation for the CDCC Service as an Ancillary Service. A Standard Installation includes connection of the CDCC Service to an Available Connector, on the OFDF installed in the Service Provider Footprint, or an Available Connector on the Network OFDF at the Data Centre as listed on website [sp.chorus.co.nz](http://sp.chorus.co.nz).

3.6 Where agreed with the relevant Data Centre operator, Chorus may provide the tie cable between the Chorus Network OFDF in the Data Centre and the Data Centre OFDF.

*Provisioning at Data Centre – Network OFDF*

3.7 Chorus will provide the following as part of a Standard Installation:

3.7.1 Termination on an Available Connector on the Network OFDF;

3.7.2 Connection of the CDCC Service using a tie cable from the Network OFDF to the Service Provider's Footprint at the Data Centre. This tie cable will be supplied by the Data Centre operator.

**Service Demarcation Points**

*Termination Point at Originating Data Centre*

3.8 At the originating Data Centre, the termination point for the purposes of the CDCC Service and the "Service Demarcation Point" for the purposes of this Service Description is an Available Connector on the Network OFDF in the Data Centre. Any equipment in the Data Centre beyond that Network OFDF remains the responsibility of the relevant Data Centre and Service Provider, as applicable.

3.9 If Standard Installation as described in clause 3.7 is not available at the relevant Data Centre, then Chorus may provide and connect the cable between Chorus' footprint in the Data Centre and the Service Demarcation Point by agreement.

*Termination Point at Destination POI or Central Office*

3.10 At the destination POI or Central Office, the termination point for the purposes of the CDCC Service and "Service Demarcation Point" for the purposes of this Service Description is an Available Connector on the OFDF within the Service Provider's Footprint. If a Tie Cable is required, the Tie Cables connecting the Service Provider's Footprint to the Network OFDF at the destination Central Office will be supplied pursuant to the terms of the relevant co-location service agreement with Chorus.

*Testing*

3.11 Chorus will test the CDCC Service from the Service Demarcation Point at the Data Centre to the Service Demarcation Point at the Specified Central Office to ensure it is within the technical specification set out in Appendix B. End to end testing between Service Provider equipment may be available on request.

### *Additional Services*

3.12 If the Service Provider requires additional services such as:

3.12.1 provision of diversity between POIs or Central Offices (when the second or subsequent instance of the CDCC Service is purchased); and

3.12.2 installation and testing of the Service Provider's Equipment,

Chorus may be able to provide these on request on terms and conditions to be agreed with the Service Provider.

### *Additional Service Characteristics*

3.13 The technical specification of the CDCC Service is set out in Appendix B.

3.14 Chorus will provide certain support and other assistance as part of the CDCC Service including:

3.14.1 an electronic facility for Service Requests;

3.14.2 an electronic facility for fault notifications; and

3.14.3 a tool to assist the Service Provider in determining the location and availability of the CDCC Service.

3.15 The CDCC Service specifically excludes:

3.15.1 provision or maintenance of any cabling or connection or active device beyond the Service Demarcation Points described in clauses 3.8 and 3.10. If a fault reported by the Service Provider is found to be caused by the Data Centre's or Service Provider's equipment (CPE) or the wiring beyond the Service Demarcation Point, then the Service Provider may be charged the "No fault found" Ancillary Charge in the Price List;

3.15.2 configuration, monitoring, operation, on-going support or maintenance of Service Provider's or Data Centre's applications, equipment, or networks; and

3.15.3 supply of mains and backup power, accommodation in a suitable environment for electronic equipment, heating, ventilation, air conditioning and facilities at the Specified Central Office or the Service Provider's Footprint at the Data Centre.

## **4. Interconnection Requirements**

4.1 To use the CDCC Service the Service Provider must have the capability to access and interconnect with the CDCC Service, either by either by co-locating Service Provider Equipment using a Footprint in a Specified Central Office or by purchasing the additional services set out in 2.8.

4.2 Where the Service Provider does not take a co-location service at the Specified Central Office Service Provider may need to take a Jumpering Service to connect to Service Provider equipment elsewhere.

## **5. Capacity and geographic availability**

5.1 Chorus will supply the CDCC Service between specified Data Centres and a list of Specified Central Offices can be found published on [sp.chorus.co.nz](http://sp.chorus.co.nz).



## 6. Service Provider Responsibilities

- 6.1 Other Service Provider responsibilities are detailed in the General Terms and Operations Manual.
- 6.2 The Service Provider will be responsible for all the design, specification and commissioning of their equipment and plant (both active and passive) connected to the CDCC Service.

## 7. Fibre Diversity

- 7.1 Part 8 - Fibre Diversity of the Operations Manual does not apply, and the following clauses applies to the CDCC Service instead.
- 7.2 Where possible the CDCC Service will be offered to Service Providers with a primary route and a diverse route. The diverse route (a second instance of the CDCC Service between the Data Centre and a Specified Central Office is designed during the equipment deployment and network build process. Where diversity is available, the CDCC Service includes on-going management to ensure a diverse path (refer to diagram in Appendix A).
- 7.3 Both primary route and diverse route path information is made available to a Service Provider during the feasibility or ordering stage. The primary route is the default route in ordering system when a Service Provider orders a single CDCC Service.
- 7.4 Each instance of the CDCC Service, primary and diverse, will be treated as an individual line for the purpose of pricing and Service Levels for CDCC.
- 7.5 There may be practical limitations to providing full physical diversity between the Specified Central Office and the relevant Data Centre. The CDCC Service will, where possible, provide diverse cable routes a minimum of the width of a street apart, with no shared manholes or access points and separate entries into the Specified Central Office.
- 7.6 Specific diversity design outside the pre-defined primary and diverse routes is not available in the CDCC Service.
- 7.7 When ordering a second instance of the CDCC Service, to provide diverse routes, the Service Provider must indicate in the Service Request that the request is for a diverse circuit and which current CDCC Service instance it needs to be diverse to.

## 8. Auto-Switching Diversity

- 8.1 Auto-Switching Diversity is an optional add-on feature that provides simple geographically diverse path redundancy for a Layer 1 lit fibre service between the service end points, as further set out in this section.
- 8.2 Auto-Switching Diversity provides dedicated protection to each optical channel, reducing service interruptions, and enhancing network reliability.
- 8.3 Auto-Switching Diversity is only available on the 100Gbps product variant, subject to feasibility.

- 8.4 Auto-Switching Diversity has the following key features:
- 8.4.1 Uses Optical Channel (“OCH”) protection, which provides redundancy of an individual optical channel. Each optical channel, carrying specific wavelengths of light, provides the transparent lit fibre service.
  - 8.4.2 The diverse path is fully geographically diverse, i.e. different physical fibre paths, between the optical line board at the source end point and the optical line board at the destination end point.
- 8.5 Path redundancy is between the optical line board at one service end point and the optical line board at a second service end point. This provides a level of protection against fibre cuts and certain hardware failures, but not against a line board failure.
- 8.6 A diagram of Auto-Switching Diversity OCH protection is set out in Appendix C.
- 8.7 In the event of a primary path failure or disruption scenario, the LFC Network will automatically switch between the primary (or working) path and the diverse path.
- 8.7.1 The optical channel switching latency is expected to be under 50ms. Note that this may mean a higher observed latency at Layer 2, both during switching and for a short period afterwards.
  - 8.7.2 The LFC will notify the RSP of any incident causing auto-switching to occur within 2 hours of the incident, via the Service Events channel.
  - 8.7.3 The LFC will automatically switch back to the primary (or working) path, 20 minutes after service has been restored.
  - 8.7.4 As the diverse path is most likely to be longer than the primary path, the Service Provider may observe a slight increase in observed layer 2 latency while the service is running on the diverse path.

## 9. Service Levels

- 9.1 Service Levels for the Fibre Access Service in Chorus Reference Offer (as updated from time to time) shall apply to the provision of the CDCC Service subject to any modifications, exclusions, and clarifications as set out in this clause 9.
- 9.2 Clauses 1.1, 1.2 and 1.3 of Appendix 1 to the Fibre Access Service Level Terms do not apply and the following new clauses 1.1 and 1.2 will apply to CDCC instead:
- 1.1 *The LFC must complete each installation of a CDCC Service connection on the date accepted by the Service Provider via Chorus’ ordering and booking system.*
  - 1.2 *Further to clause 4.4, any time period:*
    - a. *during which any Force Majeure Event prevents installation of a CDCC instance or prevents restoration of CDCC instance which is subject to Downtime; or*
    - b. *during which LFC is, due to a Force Majeure Event, unable to safely access any location or premises where physical access is required to install a CDCC instance or restore a CDCC instance which is subject to Downtime; or*
    - c. *which reflects any minimum notice requirements or access constraints contained in any existing arrangements referred to in clause 12.2(b) of the General Terms and which contain the permissions or consents that are relied upon,**will be added to the periods specified in clause 1.1 as applicable.*

9.3 Clauses 2.1.to 2.4 of Appendix 1 to the Fibre Access Service Level Terms do not apply to the CDCC Service and the following new clauses 2.1, 2.2 and 2.3 will apply to the CDCC Service instead:

- 2.1 *Subject to clauses 2.2 and 2.3 the LFC must ensure that CDCC Services for which downtime is reported to the LFC in the OSS/BSS reporting system:*
- (i) Before midday are restored by 7pm on that day; and*
  - (ii) After midday are restored by midday on the following day.*
- 2.2 *Prior to reporting Downtime to the LFC, Service Provider must reasonably ascertain that that the fault lies within the LFC Network, If the Service Provider fails to do so and the fault is not found within the LFC Network, the Service Provider will be liable for a no fault found fee specified in the Price List.*
- 2.3 *For the purposes of clause 2.1:*
- (i) Downtime has the meaning set out at Appendix A to the Direct Fibre Access Service Operations Manual, except that Downtime in relation to availability of an instance of the CDCC Service will not be measured in relation to End Users but rather in relation to the length of time that the Service Provider is without service at any Service Provider site or sites connected to the CDCC Services;*
  - (ii) Service at a CDCC Service connection is restored when the service at the connection meets the service specification, either by way of a workaround or resolution of the fault.*

9.4 Appendix 2 to the Fibre Access Service Level Terms does not apply and the following new Appendix 2 will apply to the CDCC Service instead:

### **Appendix 2**

*The following table specifies the Service Rebates payable by the Chorus in relation to the CDCC Service.*

<b>Service Level (references are to clauses in Appendix 1)</b>	<b>Core Service Rebate</b>
<b>CDCC Provisioning Core Service Levels</b>	
<i>1.1 – installation of CDCC Service</i>	<i>A fixed fee of \$500.00 each time that the installation Service Level is not achieved.</i>
<b>Chorus Data Centre Connect Restoration Core Service Levels</b>	
<i>2.1 – CDCC Service fault restoration</i>	<i>A fixed fee of \$500.00 each time the fault restoration Service Level is not achieved.</i>

## 10. Operations Manual

- 10.1 The Operations Manual applies to provision of the CDCC Service subject to any modifications, exclusions, and clarifications:
- 10.1.1 As set out in clause 3; and
- 10.1.2 As set out in this section 10.
- 10.2 Forecasts for the CDCC Service are to be included in the forecast figures provided in accordance with Part 2 – FORECASTING of the Operations Manual.
- 10.3 Section 8.1 and 8.3 of the Operations Manual do not apply, and the following new section 8.1 and 8.3 applies to the CDCC Service instead:

### *Pre-qualification*

- 8.1 *Pre-qualification is a service that enables the Service Provider to:*
- 8.1.1 *determine if the Chorus Data Centre Connect Service is available between the requested Data Centre and the Specified Central Office exchange;*
- 8.1.2 *confirm primary and diversity path information; and*
- 8.1.3 *determine when the applicable Chorus Data Centre Connect will be available in the future for areas outside of the current availability list.*
- 8.3 *Automated Pre-qualification is available in OSS/BSS or by sending an email to Chorus Customer Solution team. If pre-qualification request is sent through by email channel, all responses will be provided by emails. The same applies to Special Manual Pre-qualification investigation if required.*

## 11. Price List

- 11.1 The Price List sets out the rental and installation Charges for the CDCC Service subject to the following modifications, exclusions, and clarifications as set out in this clause 11.
- 11.2 CDCC is priced based on a set price point for 10Gbps and 100Gbps per instance at each Data Centre location that the CDCC Service is available as listed on website [sp.chorus.co.nz](http://sp.chorus.co.nz).
- 11.3 The CDCC Service is offered on Open and 24-month Minimum Service Term pricing. The Standard Installation charge is waived for Service Orders with a 24-month term. The term applies to each individual instance of the CDCC Service and transferring the term to another service instance will require Chorus' prior approval.
- 11.4 At the expiry of any Minimum Service Term as specified in a signed Chorus Customer Solution (CCS) Agreement, the Service Provider's Charges will be adjusted to the then standard Open term pricing unless Service Provider renews the CDCC Service for a further Minimum Service Term.

## 12. Early Termination Charges

- 12.1 If the Service Provider takes or has taken the CDCC Service for a Minimum Service Term which includes a discount on the Open term pricing, the Service Provider will be liable to pay an Early Termination Charge (ETC) in relation to any instance of the CDCC Service which is terminated prior to the end of the relevant Minimum Service Term.

## 12.2 The ETC:

- 12.2.1 will be charged in a single lump sum on the final Chorus invoice relating to the terminated instance of the CDCC Service and the Service Provider will pay the lump sum ETC.
- 12.2.2 applies to each individual instance of the CDCC Service and transferring the term to another service instance will require Chorus' prior approval; and
- 12.2.3 the ETC is calculated as the difference between the amount paid by the Service Provider and the amount that would have been paid to the expiry of the Service Provider's Minimum Service Term and will be equivalent to the remainder of the minimum term monthly Charges which the Service Provider has taken under this Service Description for the relevant instance of the CDCC Service to the date of termination as follows:

ETC Formula:

Months into term x Minimum Service Term pricing = amount paid

Total Charges payable by Service Provider up to the end of the fixed term (monthly Charges x months in fixed term)

The difference in the above (fixed term Charges – amount paid) = ETC

## 12.3 Worked Example:

- 12.3.1 If a RSP took a CDCC service on a 24 month Minimum Service Term and cancelled after 18 months the ETC would be the difference between the amount paid of their 24 month fixed term and months left to pay in that term.

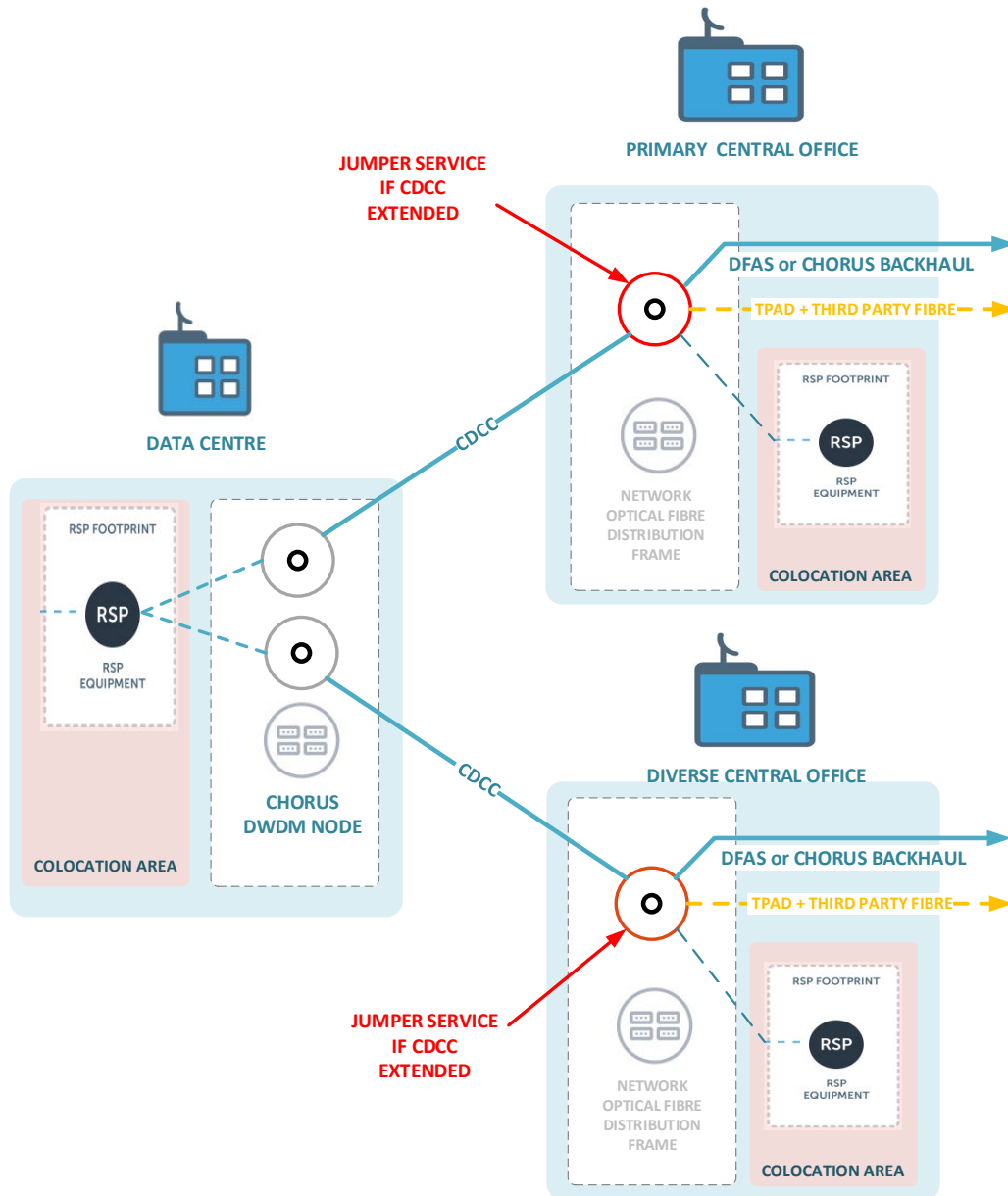
Expected Charges \$700 x 24 months = \$16,800

If terminated after 18 months, the RSP has paid \$700 x 18 = \$12,600

Therefore the difference between what the RSP committed to pay and the remainder of the term = (\$16,800 – \$12,600 = \$4,200 to pay)

Total paid for the 18 months including the ETC would be = \$16,800

## Appendix A – Diagram



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

- The CDCC Service may pass through several Central Offices between the Data Centre and the Specified Central Office depending on the location chosen.
- Some Data Centres will have a single equipment chassis with card redundancy while others will have two separate sets of equipment, each in a separate area.
- The path of a second instance of the CDCC Service from the Data Centre to a diverse Specified Central Office will be, on request, diverse to the first instance (diversity will not always be available due to geographical constraints).
- CDCC Demarcation Point: Refer to clause 3.8. It will be agreed between Chorus and the Service Provider based on the Data Centre’s interconnection policy.
- The diagram also indicates how the CDCC Service can be extended with other backhaul products utilising the optional Jumpering Service.
- A combination of engineering and interface requirements will determine equipment location in the Data Centre.

## Appendix B – Chorus Data Centre Connect Technical Specification

Single Mode Fibre	External fibre must comply with ITU-T specification G.652D or alternately ITU-T G.657A2. Internal building fibres comply with ITU-T G.657A2, and meet appropriate fire regulations i.e. be Flame-Retardant, Non Corrosive, Low Smoke, Zero Halogen (FRNC/LSZH).
Copper Connector Type	RJ45 An 8-position 8-contact (8P8C) Ethernet interface complying with TIA568 wiring standard.
Network OFDF	The first Optical Fibre Distribution Frame (OFDF) within a Chorus Central Office, providing a cross-connection facility between external cables entering the site, and all internal tie cables. The Network OFDF can contain a range of connection types as listed below.
Optical Connector Type	Connector optical performance complies with the IEC61300-4 (Grade B) for Insertion Loss and IEC61300-6 (Grade 1) for Return Loss. Multi-Push-On (MPO) connectors are Method B wire map and are defined as Ultra Low Loss (ULL), complying with IEC 61754-7 and TIA-604-5-D for intermateability.  Connector types (“Available Connectors”) and locations will be: <ul style="list-style-type: none"> <li>• LCAPC or a splice at Network OFDF locations</li> <li>• LCUPC or MPO 12F at Service Provider footprints</li> <li>• MPO 12F for tie cables originating from the Network OFDF</li> </ul>
Optic Path	Laser types and path characteristics expected to be designed to a minimum standard which are contained in the documents for 10G, Compliant with Telcordia GR-253/IEEE 802.3ae/G.959. Generally: MSA compliant pluggables are acceptable  10G variant is either 10G LAN PHY – 10GBase-R or 10G WAN PHY – 10Gbase-W 10G LAN PHY is predominant, 10G WAN PHY is an exception  The standard optic wave lengths are 1310nm and 1550nm for dual fibre working. Single fibre working pluggables use 1330nm client RX/ 1270nm client TX. More information on SFW pluggables made available under technical resources <a href="https://sp.chorus.co.nz/product/chorus-data-centre-connect/tech-specs">https://sp.chorus.co.nz/product/chorus-data-centre-connect/tech-specs</a>
Tie cables	Tie cables between Network OFDF and SP footprint can consist of the following connector types: LCAPC at Network OFDF and MPO and / or LCUPC at SP footprint.

### Appendix C – Auto-Switching Diversity

#### 1+1 OCH

