Chorus UFB Services Agreement
Bitstream Services: Service description for
Mobile Access

Reference Offer

May 2022

Document Version History

Version	Date	Author	Description of Change
1.0	December 2020	Sergiy Kozakevych	Initial version
2.0	May 2022	Sergiy Kozakevych	Addition of 4 & 10G option

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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 applies to this Service Description unless expressly
        provided otherwise.

1.2   References to the Operations Manual are references to the Operations Manual for the
        Bitstream Services.

1.3   Access Point means an NBAP where Chorus fibre terminates and which houses
        equipment used by a Service Provider to provide wireless access services.

2   The Mobile Access Service

2.1   The Mobile Access Service is a high speed high traffic class Bitstream Service suitable
        for complex business grade applications delivered over point-to-point fibre to a mobile
        NBAP. Mobile Access is part of the UFB family of Bitstream Services:

Bitstream 2	Based on the TCF Mass Market service.
Bitstream 2 Accelerate	Based on the TCF Mass Market service with enhanced low priority options.
Small Business Fibre	Based on the TCF Mass Market service with enhanced low priority options and Enterprise assure service level.
Bitstream 3	Based on the TCF Business service.
Bitstream 3 Accelerate	Based on the TCF Business service.
Bitstream 3a	Based on the TCF Business service.
Bitstream 3a Accelerate	Based on the TCF Business service with enhanced low priority options
Bitstream 3a P2P	Based on the TCF Business service.
Bitstream 3a SFP	Based on the TCF Business service with an SFP ONT
Enhanced Bitstream 4	Based on the TCF Business Premium service.
Mobile Access	Based on customer requirements.
UFB Handover Connection	Based on the TCF E-NNI specification.
Multicast	Based on the TCF Ethernet Multicast Access (EMA) service.
ATA Voice	An analogue telephone access service.
UNI Voice (128/128)	Low speed Bitstream service for telephony access service.

2.2 A diagram of the configuration for the Mobile Access Service is set out in Appendix A. The Mobile Access Service provides an Ethernet Private Line (EPL) bitstream service supporting a single Access-EPL service at the Access Point to the UFB Handover Connection Service located at the local POI or, when using the NGA Tail Extension service, remote POI that enables a Service Provider to access and interconnect with the LFC Network.

2.3 The Mobile Access Service is an input service which a Service Provider can combine with other LFC services (or with the Service Provider's own network or wholesale services provided by other service providers) to support the delivery of wireless telecommunications services to End Users.

2.4 The Mobile Access Service has the following key characteristics:

2.4.1 It is available in the following glass-only Access Rate configurations:

(a) 1/1 Gbps;

(b) 10/10 Gbps

where the Access Rate defines the maximum bandwidth that can be consumed on the access.

2.4.2 It includes a single Access-EPL[1] Operator Virtual Connection (OVC) service delivered over Active Optical Network (P2P) fibre access. An Access-EPL allows up to 4093 VLANS to be passed transparently between the LCA connector at the Access Point and the E-NNI at the POI.

2.4.3 Support for one class of traffic, High Priority;

where:

Traffic Class	CIR	EIR
Low Priority	= 0	= 0
High Priority	≥ 0	= 0

2.4.4 The UNI all-to-one bundling attribute is enabled, supporting both tagged and untagged frames at the UNI.

2.4.5 Note that the UNI functions are split between two points, with the physical interface (demarcation point) being the connectorised fibre tail at the Access Point and the UNI-N functions delivered by the LFC Access Node.

2.4.6 Can be delivered to a valid UFB Handover Connection located at a local POI or, using the NGA Tail Extension service, a remote POI.

2.4.7 It is only a glass only service that uses a single core fibre terminated at an LCA connector on the Internal Termination Point (ITP) in the Access Point agreed demarcation point. Bi-directional SFP/SFP+ 10Km optics (1000Base-BX10-U and 10GBase-BX10-U) are used by default. Alternative SFP/SFP+ types may be used by agreement on a case by case basis for longer fibre access tails.

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[1] This document uses *Access-EPL* (Ethernet Private Line) instead of *E-APL* to align with MEF 33, MEF 51 and TCF Ethernet Access Service Description v33 standards.

2.4.9   Supports the following features:

(a)   Service Commissioning testing: layer 1 optical test of the fibre between the customer site and the LFC access node;

(b)   Tail Extension (up to 1Gbps);

(c)   Service Availability reporting;

(d)   Service Utilisation reporting.

2.4.10   Complies with the Access-EPL service described in *MEF Technical Specification MEF 51: OVC Services Definition August 2015, MEF Technical Specification MEF 33 Ethernet Access Services 2012* and the Business Premium service described in the *TCF Ethernet Access Service Description v33, 11 May 2017*. Where a term is not defined in this Service Description, the General Terms or the Operations Manual, the definition of that term from the *MEF Technical Specification MEF 33 Ethernet Access Services Definition dated January 2012* will apply to this Service Description.

3   Mobile Access Service and Implementation Activities

Installation Services

3.1   The Mobile Access Service includes a Standard Install as set out in the Operations Manual.

3.2   The LFC will provide Non-Standard Installs as an ancillary service.

Termination Point

3.3   The Mobile Access termination points at the Access Point are:

3.3.1   The Layer 1 termination point is the SCA connector on the ITP which is installed at the Service Demarcation Point at the Access Point; and

3.3.2   The Layer 2 termination point (UNI-N) is the SFP Socket (optical) on the LFC Access Node.

Testing

3.4   The LFC will test the Fibre Lead-in from the termination point at the Access Point to the Central Office where the access node is located to ensure the fibre is within the technical specification for fibre set out in Appendix B.

3.5   The LFC will complete an optical test of the Mobile Access Service at the Layer 1 termination point at the Access Point.

Additional Services

3.6   If the Service Provider requires additional services such as:

3.6.1   a Non-Standard Install which includes (where required):

(a)   the installation of the Fibre Lead-in where there is no existing fibre cabling and the installation is outside the parameters set out in the operations manual noting only the incremental work represents the non-standard; or

(b)   installation of specialised termination equipment in an NBAP; or

(c)   installation of Fibre-Lead-in diversity at an NBAP (from the FAP to the ETP or OFDF as applicable);

3.6.3   provision of diversity to an NBAP (when the second or subsequent instance of a Primary Business Premium Bitstream Service is purchased);

3.6.4   any premises wiring services; or

3.6.5   installation and testing of Service Provider equipment and services,

then items 3.6.1 (a) and (b) are available on the terms as set out in this Agreement. The LFC may be able to provide the remaining items on request subject to terms to be agreed between the LFC and the Service Provider.

Core Mobile Access Service

3.7   The core bitstream services provided as part of the Mobile Access Service are as follows:

3.7.1   One Access-EPL service that supports transparent pass-through of 802.3 and 802.1Q frames on a designated UNI on the SCA connector at the Access Point (Layer 1) and LFC Access Node interface (Layer 2);

3.7.2   Delivery over a single 802.1ad SVLAN on the E-NNI at the local or remote POI.

3.7.3   A QOS bandwidth profile that describes how traffic is carried between these points.

3.7.4   The following options, exercised by Service Request, to:

(a)   Select the Service Bandwidth. The Mobile Access Service has three service bandwidth options available which define the maximum downstream and upstream Layer 2 bandwidth allowed for that Access:

- 1/1 Gbps,
- 4/4 Gbps,
- 10/10 Gbps

where

- All frames will be classified as High Priority Single Class including untagged frames at the UNI and single-tagged frames at the E-NNI.
- The transmission of Ethernet frames includes additional overheads such as Ethernet preamble, frame delimiters and inter-frame gaps. This limits the maximum user data throughput to ~ 95% of the physical medium speed depending on frame size.

(b)   Enable OAM as follows;

- On - E-NNI Maintenance Association Intermediate Point (MIP) and UNI-N MIP is available to the Service Provider and can be integrated with Service Provider 802.1ag OAM solutions; or
- Off – no test points are available to the Service Provider and OAM frames will be passed transparently through the Access-EPL service.

(c)   Specify the following attributes per Access-EPL:

- The Access-EPL E-NNI;
- The E-NNI SVLAN Identifier.

(d)   Tail Extension ON or OFF depending on the Handover Point Location, as per Tail Extension Service Description.

(e)   Service Availability reporting, which reports on individual and aggregate service availability. This is always ON.

(f)   Service Utilisation reporting, which reports on per-service utilisation measured over 15 minutes and identifies services exceeding 75% utilisation. This is always ON.

3.7.5   Frames are managed as follows:

(a)   Upstream:

- Untagged frames are delivered as single tagged frames at the E-NNI (S-tag only).

- Tagged frames are delivered as double tagged frames at the E-NNI. CE-VLAN and PCP values are preserved in the E-NNI C-tag.

(b)   Downstream:

- Single-tagged frames are delivered as untagged frames at the UNI.

- Double tagged frames are delivered as single tagged frames at the UNI. C-tag 802.1Q VLAN and PCP values are preserved as in the single-tagged 802.1Q frame at the UNI.

3.7.6   Frames are classified as High Priority Traffic Class and are strictly prioritised between the E-NNI and UNI;

3.7.7   Frames are policed at ingress based on the subscribed High Priority Traffic Class CIR/CBS values;

(a)   Frames are transported between the E-NNI and UNI as follows:

Type	Ingress	Transport
Low Priority Traffic Class	CIR = 0 EIR = 0	Not supported
High Priority Traffic Class	CIR ≥ 0 EIR = 0	Strictly prioritised

(b)   Mobile access uses a shared network with other single and multi-class bitstream services. In-profile Frame drop preference is:

- Low Priority Traffic Class EIR;

- Low Priority Traffic Class CIR;

- High Priority Traffic Class CIR;

CIR frames will be delivered according to performance metrics..

(c)   The headline rate = CIR+EIR.
There will be no bandwidth overhead to compensate for higher protocol encapsulation overheads;

3.7.8   The Mobile Access Service has similar characteristics to the other services within the UFB family of Bitstream services as identified below:

Attribute	Bitstream 2	Bitstream 3	Bitstream 3a	Enhanced Bitstream 4	Mobile Access
Bitstream	E-AVPL	E-APL	E-APL	Access-EPL	Access-EPL
High Priority	Yes	Yes	Yes	Yes	Yes
Low Priority	Yes	No	Yes	Yes	No
Service Bandwidths*	From 30/10 Mbps up to 1000/500 Mbps	From 2.5Mbps up to 100/100 Mbps	200/200 Mbps with High Priority from 2.5Mbps	For current 1G multiclass plans Low up to 1000 Mbps withHigh from 10/10 Mbps to 1000/1000** Mbps For new plans High Traffic Class only 500Mbps, 1, 2, 4 and 10Gbps	1, 4, 10 Gbps
OAM CFM	No	No	No	Yes (UNI MIP on NID option only)	Yes
Birth Certificate	No	No	No	Yes (on NID option only)	No**
MTU (at E-NNI)	2000 Bytes	2000 Bytes	2000 Bytes	9100 Bytes	9100 Bytes
MAC addresses	16	64	64	Unlimited	Unlimited
Number of available UNIs	4 standard	4 standard	4 standard	2 1000/100 Base-T + 2 SFP Sockets standard	1 LC/A
L2CP support	No	No	No	Limited	Limited
Diversity	On request with limited availability	On request with limited availability	On request with limited availability	Available to Priority Users in selected areas	No

Bandwidth options for each Bitstream Service are detailed in each Bitstream Service Description and further options can be developed using the Product Development Process.

** *layer 1 optical test of the fibre between a site and the LFC access node.*

UNI – E-NNI characteristics

3.7.9   The sum of High Priority Traffic Class and Low Priority Traffic Class bandwidth profiles of all services delivered upstream to a UFB Handover Connection Service can exceed the UFB Handover Connection Service line rate. If there is insufficient UFB Handover Connection line rate to deliver the submitted traffic then frames will be randomly discarded, based on their Traffic Class classification, and Service Levels for that Class of Service do not apply. It is therefore the Service Provider's responsibility to shape and queue traffic appropriately.

Operations, Administration and Maintenance (OAM) and Diagnostic tools

3.8   The Mobile Access Service includes a layer 1 optical test of the fibre between a site and the LFC access node;

3.9   The Mobile Access Service will support 802.1ag and optionally include E-NNI and UNI MIP as Maintenance Associations for the Service Provider's OAM system.

3.10   The following maintenance levels will apply:

3.10.1   Maintenance Domain levels 0-2 are reserved for use by the LFC.

3.10.2   Maintenance Domain level 3 is used for the UNI MIP/E-NNI MIP;

3.10.3   A Service Provider may request specific OAM attributes, including custom Maintenance Domain levels, via the Product Development Process.

Service Requirements

3.11   To use the Mobile Access Service the Service Provider must have the capability to access and interconnect with it, by one of the following:

3.11.1   co-locating Service Provider equipment at the local or remote POI using the UFB Handover Connection Service and Central Office and POI Co-location Service;

3.11.2   connecting to third party co-location space at the local or remote POI using the UFB Handover Connection Service, and with the third party taking the Central Office and POI Co-location Service;

3.11.3   connecting to a backhaul service at the local or remote POI; or

3.11.4   by using the Direct Fibre Access Service to connect the UFB Handover Connection Service to Service Provider equipment at a remote location within the local or remote POI Central Office area.

The location of the POIs is detailed in the Operations Manual appendices. Note use of a connection to a remote POI may also require the use of the Tail Extension Service to extend traffic from Local POI.

Additional Service Characteristics

3.12   The technical specification of the Mobile Access Service is set out in Appendix B.

3.13   The LFC will on request provide certain support and other assistance as part of the Mobile Access Service including:

3.13.1   an automated facility for Service Requests;

3.13.2   an automated facility for fault notifications;

3.13.3   a tool to assist the Service Provider in determining the location and availability of the Mobile Access Service (pre-qualification) and

3.13.4   an online application that tracks and manages the progress and status of an installation request,

each as more particularly set out in the Operations Manual.

3.14   The Mobile Access Service specifically excludes:

3.14.1   the UFB Handover Connection Service;

3.14.2   provision or maintenance of any cabling or connection or active device beyond the Service Demarcation Points;

3.14.3   configuration, monitoring, operation, on-going support or maintenance of Service Providers' or End Users' applications, equipment or networks; and

3.14.4   supply of AC mains & UPS power, accommodation space, heating, ventilating, and air conditioning at the POI or Access Point.

4   Service Demarcation Point at Access Point

4.1   The Service Demarcation Point at the Access Point is the SCA connector that terminates the lead-in fibre.

5   Service Demarcation Point at POI

5.1   Where no Tail Extension Service is supplied, the POI Service Demarcation Point is:

5.1.1   The physical service demarcation point is the MOFDF in the local POI which is part of the UFB Handover Connection Service; and

5.1.2   Logically, the single S-VLAN per Access-EPL on the UFB Handover Connection located at the local POI.

5.2   Where Tail Extension is used, the POI Service Demarcation Point is:

5.2.1   Physically, the MOFDF in the remote POI, which is part of the UFB Handover Connection Service; and

5.2.2   Logically, the single S-VLAN per Access-EPL on the UFB Handover Connection located at the remote POI.

5.2.3   The logical demarcation between the Mobile Access Service and the Tail Extension Service is the middle of the Ethernet Aggregation Switch at the local POI. There is no physical demarcation point and the Access-EPL is provisioned as a single entity.

6   Service Prerequisites

6.1   The UFB Handover Connection Service is a separate service and is a prerequisite to the supply of the Mobile Access Service (i.e. the Service Provider must first purchase and then continue to maintain a local or remote UFB Handover Connection Service at all times while taking the Mobile Access Service).

7   Roles and Responsibilities

7.1   Other LFC roles and responsibilities in respect of the Mobile Access Service are detailed in the General Terms and the Operations Manual.

7.2   Clauses 24.2 and 24.6 of the Bitstream Services Service Operations Manual do not apply and the following new clause 24.2 applies to Voluntary MAS instead:

*24.2 Where practical the LFC will provide diversity on request if available as a Non Standard Install.*

8   Fibre Diversity

8.1   Mobile Access supports Access Diversity options, where diversity is relative to another Mobile Access product instance in the same NBAP. Diversity is subject to the options, availability and limitations set on in clause 7 of the Operations Manual.

8.2   There may be practical limitations to providing full physical diversity to some sites. The provision of a separate entry to a LFC Central Office will have unique site specific engineering considerations and may attract additional costs.

9   Mobile Access Service Levels

9.1   Service Levels for both the Layer 1 and Layer 2 components of the Mobile Access
           Service are set out in the Agreement Service Level Terms.

Appendix A – Diagram
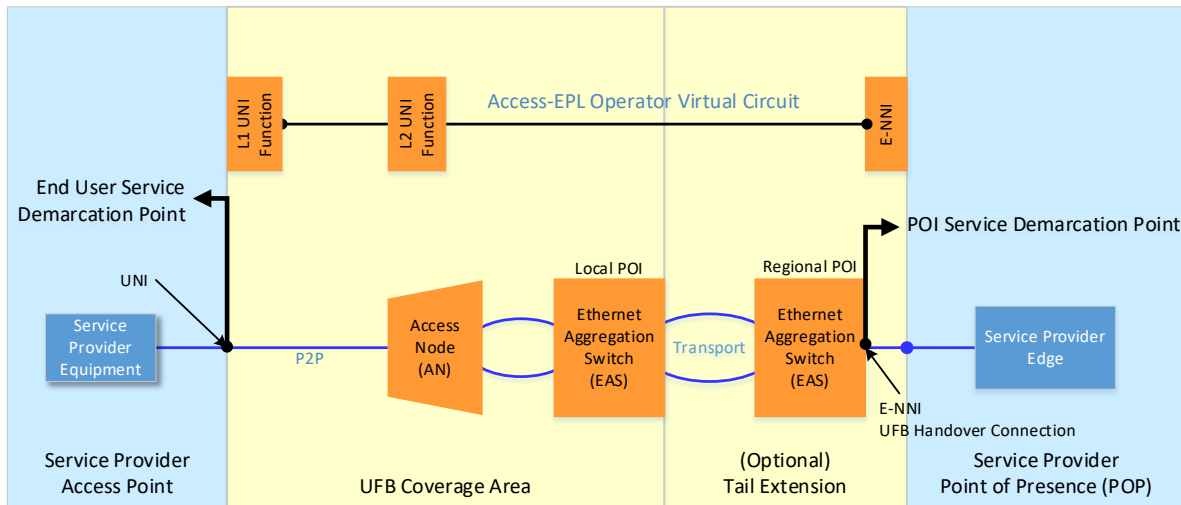
This is a generic diagram showing the standard configuration and Service Demarcation Points for a Mobile Access Service, with and without Tail Extension. It is not intended to represent every situation or detailed physical architecture. The following points should be noted:
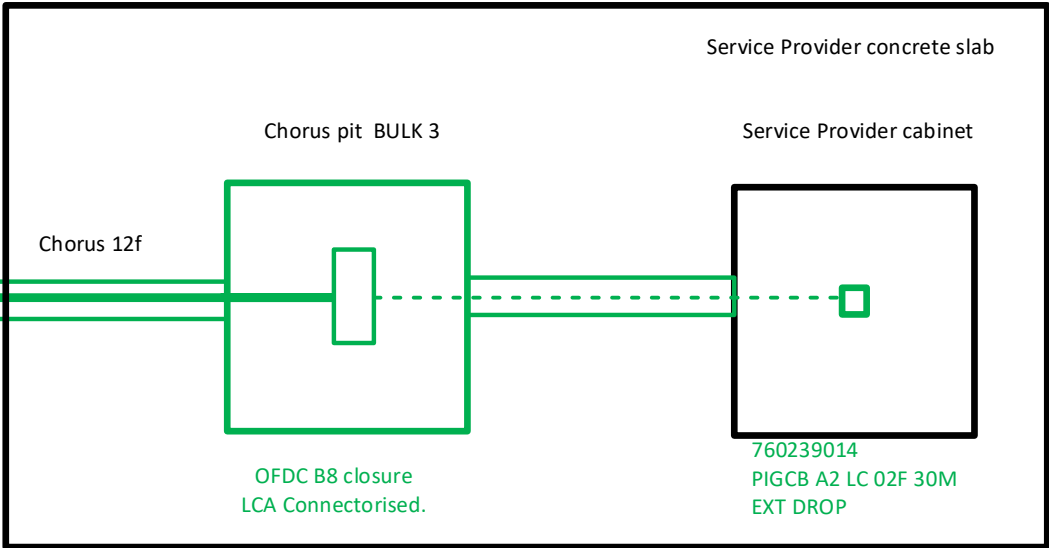
- The Mobile Access Service, Service Levels and pricing applies to the agreed E-NNI at the local POI, including any tail extension service required to reach that Nominated POI (where Tail Extension service is available).

- Access node and aggregation interconnection will use redundant links to meet Service Level requirements.

- OAM MIPs are optionally configured on the UNI-N and E-NNI.

- The connectivity is to a single UFB Handover Connection.

Appendix B – Technical Specification
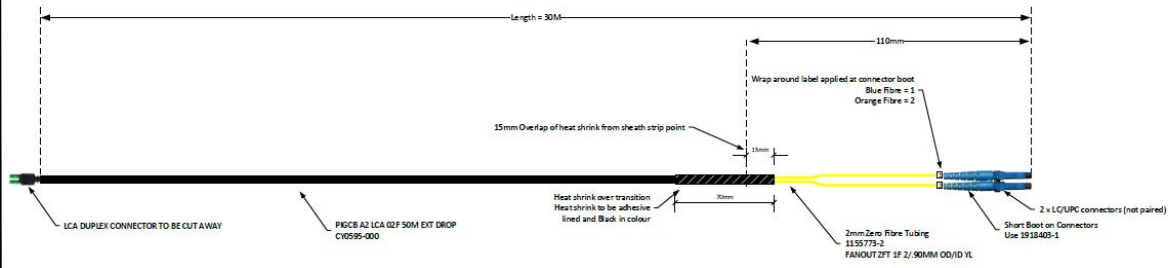
Technical Specification

Ethernet (UNI)	• IEEE 802.3 – 2005 • Single tagged 802.1Q/802.1P supporting 4093 customer VLANs
UNI	• 1 GigE Single fibre working 1000BASE-BX10-U or BX40-U (Alternative SFPs may be used by on a case by case basis) depending on distance ○ TX 1310 nm ○ RX 1490 nm • 10 GigE Single fibre working: ○ 10Km SFW 10GBase-BX10-U SFP+ (1270nm / 1330nm); or ○ 40Km SFW 10GBase-BX40-U SFP+ (1270nm / 1330nm) 10GBase-X Optics for distances greater than 40Km may be available on demand.
UFB Handover Connection (E-NNI)	Ethernet: • 802.1ad VLAN (SVID, CVID); or • Double tagged QnQ. Other Ethertypes on request
VLAN	Point-to-Point (Access-EPL) MTU • 9096 Bytes at the UNI; • 9100 Bytes at the E-NNI. Unicast Frame Delivery = passed within service BW Multicast Frame Delivery = passed within service BW Broadcast Frame Delivery = passed within service BW Layer 2 Control Protocols Processing = Limited (but may be amended by the LFC from time to time)
Fibre	External fibre must comply with ITU-T specification G.652D or 657A. Internal building fibres cables must meet appropriate fire regulations i.e. be Flame-Retardant, Non Corrosive, Low Smoke, Zero Halogen (FRNC/LSZH). Testing for power loss will be at either 1310 or 1550 nm 1625 nm reserved for network maintenance testing purposes compliant with ITU-T L.41.
Connector Type	Fibre terminations must be LC/APC (also known as LCA) type connectors (complying with the IEC 61754-20 standard).
Optic Types	Laser types and path characteristics expected to be designed to a minimum standard which are contained in either IEEE 802.3 Section 5 standard or ITU-T G.984 standards.

Appendix C – Installation standards

Generic Chorus handover to Service Provider cabinets.
Chorus pit installed in Service Provider concrete slab, with a OFDC B8 closure and a 30m LC-LCA ruggerdised pigtail from CommScope into the Service Provider cabinet.

Service Provider concrete slab

Chorus pit BULK 3

Service Provider cabinet

Chorus 12f

760239014
PIGCB A2 LC 02F 30M
EXT DROP

OFDC B8 closure
LCA Connectorised.

| Bulk 3 | Humes:
80085173

Channell:
BULK324707110

Microduct Flash 9 incl:
Humes P/N 80095999
Aerial Flash 9 incl:
Humes P/N 80096000 | Width: 432mm
Length: 762mm
Depth: 610mm
Also known as 1730

Pit only, no Flash 9 inside | |

Length = 30M

110mm

Wrap around label applied at connector boot
Blue Fibre = 1
Orange Fibre = 2

15mm Overlap of heat shrink from sheath strip point

15mm

LCA DUPLEX CONNECTOR TO BE CUT AWAY

PIGCB A2 LCA 02F 50M EXT DROP
CY0595-000

Heat shrink over transition
Heat shrink to be adhesive
lined and Black in colour

30mm

2mm Zero Fibre Tubing
1155773-2
FANOUT 2FT 1F 2/.90MM OD/ID YL

2 x LC/UPC connectors (not paired)
Short Boot on Connectors
Use 1918403-1

	Reference:	Reference:	Exchange/CSA:
C H O R U S	Job Title: Address:	Plan Type: Generic Chorus handover to Service Provider Cabinets	Designer: Andy.Carnihan Date:16/5/2019