

Chorus UFB Services Agreement
Bitstream Services: Service Description for
UFB Handover Connection

Reference Offer

July 2021

Document Version History

Version	Date	Author	Description of Change
1.0	November 2011	Alan Mitford-Taylor	Original UFB contract document
2.0	June 2017	Alan Mitford-Taylor	Added single fibre working for 1Gbps.
3.0	July 2021	Karmen Mai	Added single fibre working for 10Gbps. Added additional information on LAG.

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

2 The UFB Handover Connection Service

- 2.1 The UFB Handover Connection Service is a linking service that provides the inter-network connectivity between the other Bitstream Services and the Service Provider networks. The UFB Handover Connection Service is part of the family of Bitstream Services set out below:

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 3P2P	Based on the TCF Business service.
Bitstream 3a	Based on the TCF Business service with Low Priority options.
Bitstream 3aP2P	Based on the TCF Business service with Low Priority options.
Bitstream 3a Accelerate	Based on the TCF Business service with Low Priority options.
Bitstream 2/3/3a SFP	Based on the TCF Business service with an SFP ONT
Bitstream 4	Based on the TCF Business Premium service.
Enhanced Bitstream 4	Based on the TCF Business Premium service.
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 UFB Handover Connection Service is set out in Appendix A. The UFB Handover Connection Service provides the bitstream ENNI functions at the POI that enables a Service Provider to access and interconnect with the LFC Network.
- 2.3 The UFB Handover Connection Service is an input service which a Service Provider can combine with other Bitstream Services (and the Service Provider's own network or wholesale services provided by other providers) to provide fibre based telecommunications services to End Users.

- 2.4 The UFB Handover Connection Service has the following key characteristics:
- 2.4.1 Provides the inter-network connectivity for the following Bitstream Services:
 - (a) Bitstream 2 (all variants);
 - (b) Bitstream 3 (all variants);
 - (c) Bitstream 3a (all variants);
 - (d) Bitstream 4 (all variants);
 - (e) ATA and UNI Voice; and
 - (f) Multicast.
 - 2.4.2 Operates as an Ethernet bitstream linking service that allows up to 4093 Service VLANs, each with 4093 End User VLANs, to be passed to the Service Provider.
 - 2.4.3 Supports multiple physical links of up to 4 ports for redundancy and capacity using Link Aggregation Grouping (LAG) in the following configurations:
 - (a) 1+0: one active link
 - (b) 1+1: one active and one standby link;
 - (c) 2+0: two active links;
 - (d) 2+2: two active and two standby links; or
 - (e) 4+0: four active links

Where

 - (a) Standby links must be in the same POI as the active link¹.
 - (b) All active links are provisioned on one card and all standby links are provisioned on a different card in the same Chorus EAN chassis and have same port speed. (Except during speed upgrades where dissimilar speeds are permitted).
 - (c) The active/standby status of links is controlled by Service Provider equipment using Link Aggregation Control Protocol (LACP).
 - 2.4.4 Complies with the E-NNI services specified in the TCF Ethernet Access Service Description v32a, March 2017.

¹ The ability to have the standby links in a different POI, but within the same Coverage Area, is planned as a future development.

3 UFB Handover Connection Service and implementation activities

Installation Services

- 3.1 The UFB Handover Connection Service includes a Standard Install (in each case to the extent that the relevant provisioning works are not already complete for the relevant Service Order). A Standard Install for the UFB Handover Connection Service includes:

- 3.1.1 One, two or four GigE or 10 GigE physical ports at the POI;
- 3.1.2 one or two standby GigE or 10 GigE physical ports at the same POI as the active links; and
- 3.1.3 a fibre cable from each physical port to the POI MOFDF.

Core UFB Handover Connection Service

- 3.2 The UFB Handover Connection Service is comprised of:

- 3.2.1 A GigE or 10 GigE Ethernet E-NNI Service that supports the pass-through of other Bitstream Services to an MOFDF at the POI.
- 3.2.2 Uses double-tagged 802.1ad frames on the E-NNI at the POI. VLAN allocation is based on the bitstream access services mapped to that E-NNI:
 - (a) Outer tag (Service) VLAN Identifiers (SVID) will be allocated serially commencing with SVID = 2;
 - (b) Inner tag (Customer) VLAN identifiers (CVID) will be allocated or carried according to the Bitstream service;
 - (c) Bitstream VLAN Identifier allocation rules are as follows:

Bitstream service	VLAN ID allocation rules
Bitstream 2 (all variants)	SVID, CVID per service instance
Bitstream 3/3a (all variants)	SVID per service instance. CVID = transparent
Bitstream 4 (all variants)	SVID per service instance. CVID = transparent
ATA and UNI Voice	SVID, CVID per service instance
Multicast 2	SVID per service instance Noting that as Multicast is delivered through the Product Development Process final VLAN allocation rules will be defined per Service Template

- 3.2.3 Tagged traffic is treated according to the individual Bitstream Service traffic management rules as set out in the relevant service description.
- 3.2.4 The UFB Handover Connection Service supports two speed options:
 - (a) 1 GigE; and
 - (b) 10 GigE;

This speed represents the maximum bandwidth available to all other Bitstream Services delivered through the UFB Handover Connection Service.
- 3.2.5 LAG allows multiple physical ports to be combined into a single UFB Handover Connection Service. In the event of the failure of one physical link, the traffic management rules apply. Only same speed links may be combined into a LAG group.

Traffic Management Rules

- 3.2.6 On ingress (downstream), bitstream traffic policies are applied, as described in the relevant bitstream service description.
- 3.2.7 On egress (upstream) High Priority traffic is strictly prioritised over Low Priority traffic.
- 3.2.8 The sum of High and Low Priority traffic profiles of all services delivered at a UFB Handover Connection can exceed the UFB Handover Connection line rate. If there is insufficient line rate to deliver the traffic then frames will be randomly discarded, based on their Class of Service precedence, and performance characteristics for that Class of Service do not apply. It is therefore the Service Provider's responsibility to shape and queue traffic appropriately.

Support for multiple bitstream access services

- 3.3 One instance of the UFB Handover Connection Service can support any combination of other Bitstream Services up to the available VLAN ID allocation space and subject to the maximum bandwidth of the UFB Handover Connection Service selected by the Service Provider under clause 3.2.4.

Operations, Administration and Maintenance

- 3.4 The UFB Handover Connection Service will support Ethernet Service Operations and Maintenance (OAM) for service integrity testing, fault diagnostics and performance measurement using ITU Y.1731. OAM capability will be phased in as the functionality is developed and deployed in scale.

Service Requirements

- 3.5 To use the UFB Handover Connection Service the Service Provider must have the capability to access and interconnect with it, by one of the following:
 - 3.5.1 co-locating Service Provider equipment at the POI using the Central Office and POI Co-location Service or a commercial Co-location Service;
 - 3.5.2 connecting to third party co-location space at the POI with the third party taking the Central Office and POI Co-location Service or a commercial Co-location Service;
 - 3.5.3 connecting to a backhaul service that connects to the MOFDF at the POI; or
 - 3.5.4 by using a Direct Fibre Access Service to connect to Service Provider equipment at a location remote to the Central Office area.

The location of the POIs is detailed in the Operations Manual appendices.

Additional Service Characteristics

- 3.6 The technical specification of the UFB Handover Connection Service is set out in Appendix B.
- 3.7 The LFC will provide certain support and other assistance as part of the UFB Handover Connection Service including:
 - 3.7.1 an automated facility for Service Requests; and
 - 3.7.2 an automated facility for fault notifications,
 each as more particularly set out in the Operations Manual.
- 3.8 The UFB Handover Connection Service specifically excludes:
 - 3.8.1 any other Bitstream Service;
 - 3.8.2 provision or maintenance of any cabling or connection or active device beyond the Service Demarcation Points described in clauses 4.1 and 5.1;
 - 3.8.3 configuration, monitoring, operation, on-going support or maintenance of Service Providers' or End User's applications, equipment or networks; and
 - 3.8.4 supply of AC Mains & UPS Power, accommodation space, heating, ventilating, air conditioning and other similar services and facilities at the POI.

4 End User facing Service Demarcation Point

- 4.1 The End User facing Service Demarcation Point is a nominal point located on the trunk side of the handover EAS. There is no physical demarcation point and no ability to directly connect to this nominal point.

5 Service Demarcation Points at POI

- 5.1 The Service Demarcation Point for the UFB Handover Connection Service at the POI is the MOFDF in the POI.

6 LFC and Service Provider Responsibilities

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

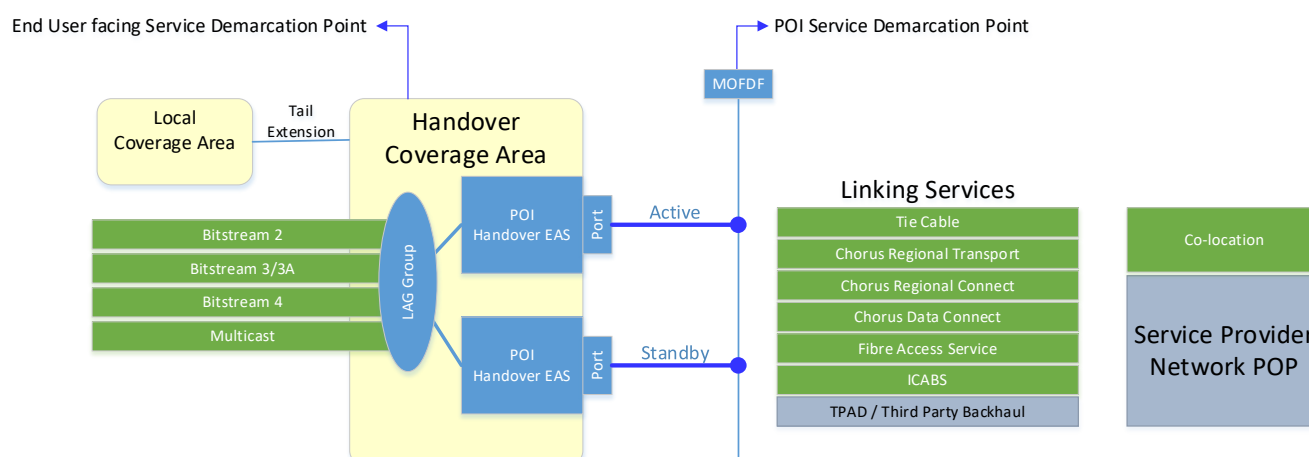
7 UFB Handover Connection Service Levels

- 7.1 Service Levels for the UFB Handover Connection Service are set out in the Service Level Terms for the Bitstream Services.

8 UFB Handover Connection Diversity

- 8.1 The UFB Handover Connection Service provides a single interface between the other Bitstream Services and the Service Provider's network.
- 8.2 Where a second or subsequent instance of the UFB Handover Connection Service is required to pick up the other Bitstream Services within a Candidate Area, LFC may be able to engineer the second or subsequent UFB Handover Connection Service to provide a level of diversity to the first or previous instances of the UFB Handover Connection Service.
- 8.3 If the Service Provider requires diversity of the UFB Handover Connection to the Service Provider Premises, their options are either:
- 8.3.1 a second or subsequent instance of the UFB Handover Connection Service at the same Central office with diversity between the Central Office and the Service Provider Premises; or
 - 8.3.2 a second or subsequent instance of the UFB Handover Connection Service at a different Central office in same Candidate Area with diversity between the Central Offices and the Service Provider Premises.
- 8.4 Where available the diverse optical paths will be in separate fibre cable sheaths, and if requested in separate cable routes. The diverse cable routes will be a minimum of the width of a street apart, and should not share any manholes or access points. Separate entries into the Central Office will also be used where available.
- 8.5 There may be practical limitations to providing full physical diversity to some sites. The provision of a separate entry to an LFC Central Office will have unique site specific engineering considerations and will attract additional costs.

Appendix A – Diagram



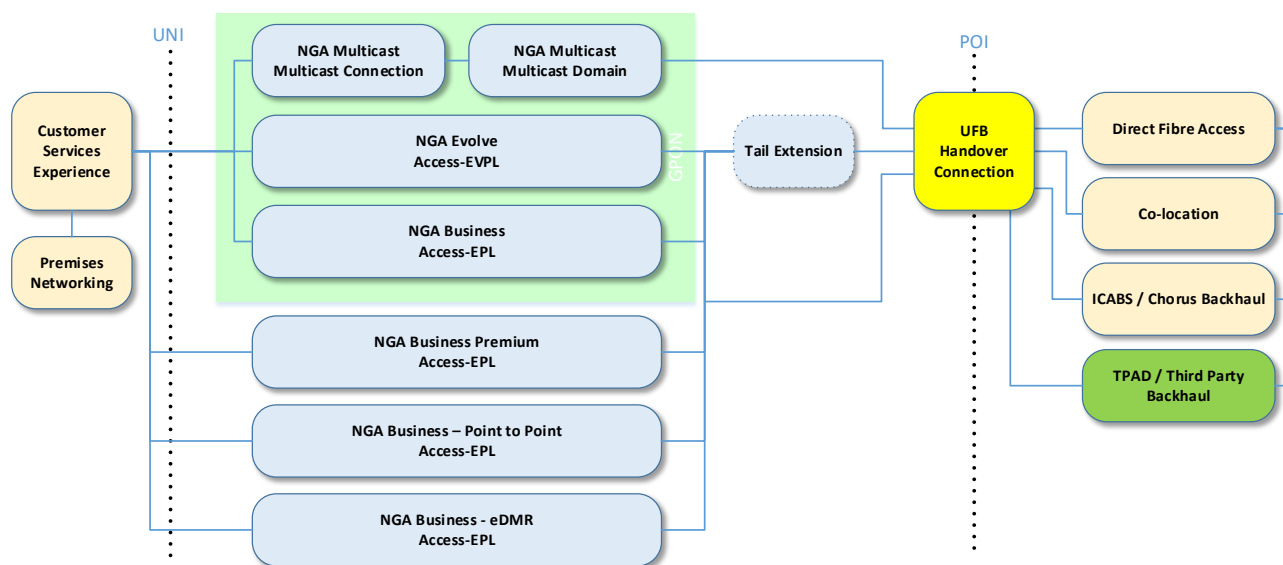
This is a generic diagram showing the standard configuration and service demarcation points. It is not intended to represent every situation or detailed physical architecture. The following point should be noted:

- Link Aggregation Grouping (LAG) supports N x 1 GigE or N x 10 GigE physical handovers, supporting the following four configurations
 - 1+0 - One active GigE or 10 GigE physical link
 - 1+1 – One active and one standby GigE or 10 GigE physical links
 - 2+0 - Two active GigE or 10 GigE physical link
 - 2+2 – Two active and two standby GigE or 10 GigE physical links.
 - 4+0 - Four active GigE or 10 GigE physical link

Where:

- Each link is the same speed;
- Each link comprises either 1 fibre connection (SFW) or 2 x fibre connections (Rx/Tx).
- Each link comes from the same handover EAS. The ability to deliver these links from different handover EAS is planned as a future development..

- The 1Gbps / 10Gbps UFB Handover Connection Service is a linking function that enables Service Providers to interconnect with and consume other UFB services as follows:



- The UFB Handover Connection Service provides the E-NNI function for the other Bitstream Services. The specific E-NNI attributes are defined in the service descriptions for the other Bitstream Services.
- The linking services connect the UFB Handover Connection Service to the Service Provider Network Point of Presence as follows:
 - Direct Fibre Access Service can be used to connect to Service Provider equipment at a remote location within the POI Central Office area.
 - Tie Cables can connect the UFB Handover Connection Service from the MOFDF to Co-location Footprints at the POI. The Footprints can be the Service Provider's Footprint or third party Footprints. Tie Cables to third party Footprints require agreement between the LFC, the Service Provider and the third party.
 - Backhaul is a service that can be provided by LFC, the Service Provider or a third party.
 - Third party backhaul may require the use of the TPAD service.

Appendix B – Technical Specification

Technical Specification																			
Ethernet	802.1ad VLAN (SVID, CVID); or - Double tagged QnQ.																		
UFB Handover Connection (E-NNI)	E-NNI 1 GigE - Single fibre working RSP end 1000BASE-BX10-U or BX40-U depending on distance (default) <table border="1"><tr><td>LFC E-NNI</td><td></td><td>Service Provider E-NNI</td></tr><tr><td>RX 1310 nm</td><td>←</td><td>TX 1310 nm</td></tr><tr><td>TX 1490 nm</td><td>→</td><td>RX 1490 nm</td></tr></table> - Dual fibre working 1000BASE-LX 1310 nm 10 GigE 10GBase-LW/LR - Single fibre working RSP end 10GBASE-BX10-U (default). BX40-U not supported <table border="1"><tr><td>LFC E-NNI</td><td></td><td>Service Provider E-NNI</td></tr><tr><td>RX 1270 nm</td><td>←</td><td>TX 1270 nm</td></tr><tr><td>TX 1330 nm</td><td>→</td><td>RX 1330 nm</td></tr></table> - Dual fibre working 1310 nm 10 GigE 10GBase-EW/ER - Dual fibre working 1550 nm	LFC E-NNI		Service Provider E-NNI	RX 1310 nm	←	TX 1310 nm	TX 1490 nm	→	RX 1490 nm	LFC E-NNI		Service Provider E-NNI	RX 1270 nm	←	TX 1270 nm	TX 1330 nm	→	RX 1330 nm
LFC E-NNI		Service Provider E-NNI																	
RX 1310 nm	←	TX 1310 nm																	
TX 1490 nm	→	RX 1490 nm																	
LFC E-NNI		Service Provider E-NNI																	
RX 1270 nm	←	TX 1270 nm																	
TX 1330 nm	→	RX 1330 nm																	
Fibre	External fibre must comply with ITU-T specification G.652D or 657A. Internal building fibre 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. The wavelengths of 1625 nm and 1650nm are reserved for network maintenance testing purposes, compliant with ITU-T L.41.																		
Connector Type	In the Access Network Fibre terminations must be SC/APC type connectors (complying with the IEC 61754-4 standard) or as an alternative LC/APC also known as LCA type connectors (complying with the IEC 61754-20 standard) as appropriate. Fibre Terminations within Chorus sites may use LC/UPC type connectors (complying with the IEC 61754-20 standard) as appropriate.																		
Optic Path	Laser types and path characteristics are expected to be designed to a minimum standard which are contained in either IEEE 802.3 Section 5 standard or ITU-T G.984 (GPON) standards.																		