CHORUS

Chorus UFB Services Agreement
Bitstream Services: Service Description for
Enhanced Bitstream 4

Reference Offer

May 2022

We're currently re-assessing our layer 2 point-to-point products. This means the changes to enhanced Bitstream 4 planned for October 2022 are on hold .

Document Version History

Version	Date	Author	Description of Change
1.0	?	Alan Mitford-Taylor	Initial version
2.0	June 2021	Alan Boniface	Addition of glass only option
3.0	May 2022	Alan Boniface	Addition of 2, 4 & 10G options plus October 2022 and May 2023 offer changes

TABLE OF CONTENTS

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 Enhanced Bitstream 4 Service

2.1   The Enhanced Bitstream 4 Service is a high speed multi-class Bitstream Service suitable for complex business grade applications delivered over point-to-point fibre access. Enhanced Bitstream 4 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
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 Enhanced Bitstream 4 Service is set out in Appendix A. The Enhanced Bitstream 4 Service provides an Ethernet Private Line (EPL) bitstream service supporting a single Access-EPL service per UNI at the End User Premises, Service Provider Premises or NBAP (as applicable) to the UFB Handover Connection Service located at the POI that enables a Service Provider to access and interconnect with the LFC Network

2.3   The Enhanced Bitstream 4 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 provide fibre based telecommunications services to End Users.

2.4 The Enhanced Bitstream 4 Service has the following key characteristics:

2.4.1 Support for NID[1] or glass-only end-customer access termination types.

2.4.2 It is available in three Access Rate configurations:

a) 100/100[2] Mbps;

b) 1000/1000 Mbps;

c) 10/10 Gbps (10000/10000 Mbps)

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

2.4.3 It includes a single Ethernet Access-EPL[3] Operator Virtual Circuit (OVC) service delivered over Active Optical Network (P2P) fibre access. An Access-EPL allows up to 4093 VLANS to be passed transparently between the UNI at the End User Premises, Service Provider Premises, NBAP or the Service Provider's co-location space (as applicable) and the E-NNI at the POI.

2.4.4 Support for two classes of traffic, High and Low for 100Mbps and 1Gbps options; where:

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

10Gbps options only support high traffic class.

2.4.5 Appendix C provides an overview of the Service Templates and bandwidth profiles that are offered, with the option until May 2023 to create modified or new Service Templates and bandwidth profiles using 'core building blocks' and the Product Development Process. Public Service Templates and bandwidth profiles will published on the LFC website.

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

2.4.7 Can be delivered to a valid UFB Handover Connection located at a local POI or, using the NGA Tail Extension service, a national POI.[4]

2.4.8 For NID based services, supports 1000/100 Base-T or SFP UNI that is located at the End User site.

2.4.9 For Glass-only services supports a connectorised fibre tail UNI that plugs into a compatible SFP in the end-customer CPE

2.4.10 Supports the following optional features:

a) Single (MEF-33 HIGH Priority) or Multiclass, depending on the service selected;

b) OAM Connectivity Fault Management (CFM) (NID only);

c) Birth Certificate (NID only);

d) Access Diversity;

e) Tail Extension;

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[1] NID grandfathering ends on 21 April 2022 so no new NID connections can be requested after that date. Existing Feasibilites and Orders can proceed.

[2] The Glass-ony variant may be ordered as 100Mbps Access rate, but is delivered over fibre as 1000Mbps. The maximum bandwidth for this option is enforced as a 100Mbps sub-rate using a bandwidth policy.

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

[4] 10Gbps delivery to a national POI is not available currently.

2.4.11   For NID based services supports:

a)   1000/100 Base-T or 1000Base-X (SFP) UNIs located at the End User site.

b)   Single (MEF-33 HIGH Priority) or Multiclass;

c)   OAM Connectivity Fault Management (CFM);

d)   Birth Certificate;

e)   Access Diversity;

f)   Tail Extension;

2.4.12   For Glass-only services supports

a)   a connectorised fibre tail UNI that plugs into a compatible SFP/SFP+ in the end-customer CPE

b)   1Gbps access rate (1000Base-X) with High and Low Priority CoS (Multiclass)

c)   10Gbps access rate (10GBase-X) with High Priority CoS (MEF-33)

d)   OAM Connectivity Fault Management (CFM);

e)   Access Diversity;

f)   Tail Extension;

2.4.13   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*.

3   Enhanced Bitstream 4 Service and Implementation Activities

Installation Services

3.1   The Enhanced Bitstream 4 Service includes a Standard Install as set out in the Operations Manual.[5] The LFC will provide Non-Standard Installs as an ancillary service.

Termination Point

3.2   The Enhanced Bitstream 4 termination points are for;

3.2.1   The Layer 1 termination point at the End User Premises, Service Provider Premises, NBAP or the Service Provider's co-location space (as applicable) is either:

a)   the LCA connector or splice on the OFDF; or

b)   an SCA connector at an Internal Termination Point (ITP); and

3.2.2   The Layer 2 termination point is either:

a)   the SFP Socket (UNI-N) on the NID; or

b)   the End User facing port on the Access Node (UNI-N) in the Central Office.

Testing

3.3   The LFC will test the Fibre Lead-in from the termination point at the Premises, as referred to in the Operations Manual, 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.

3.4   If a NID-based service is requested, the LFC will complete a functional test of the Enhanced Bitstream 4 Service at the Layer 2 termination point at the Premises referred to in the Operations Manual using the diagnostic tools and record a birth certificate.

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[5] Standard Install parameters may differ between LFCs

Additional Services

3.5   If the Service Provider requires additional services such as:

3.5.1   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; or

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

c)   installation of Fibre-Lead-in diversity at an End User Premises, Service Provider Premises or NBAP (as applicable) (from the FAP to the ETP or OFDF as applicable);

3.5.2   Provision of diversity to End User Premises, Service Provider Premises or NBAP (as applicable) (when the second or subsequent instance of the Enhanced Bitstream 4 Service is purchased);

3.5.3   Any Premises' wiring services; or

3.5.4   Installation and testing of Service Provider equipment and services,

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

Core Enhanced Bitstream 4 Service

3.6   The core bitstream services provided as part of the Enhanced Bitstream 4 Service are as follows:

3.6.1   One Access-EPL service that supports transparent pass-through of 802.3 and 802.1Q frames on the UNI delivered to the End User Premises, Service Provider Premises, or NBAP (as applicable);

3.6.2   Delivery over a single 802.1ad SVLAN on the E-NNI at the local or regional POI;

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

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

a)   Select the Access Rate. The Enhanced Bitstream 4 Bitstream Service has three Access Rates available which define the maximum downstream and upstream Layer 2 bandwidth allowed for that Access Rate:

- 100/100 Mbps[6];

- 1000/1000 Mbps;

- 10000/10000 Mbps (10/10Gbps)

Note the transmission of Ethernet frames includes additional overheads such as Ethernet preamble, frame delimiters and inter-frame gaps. This limits the maximum throughput to ~ 90% of the physical medium speed depending on frame size.

b)   Depending on the product offer, select the High Traffic Class and Low Traffic Class Bandwidth Profiles as follows:

(i)   Only bandwidth profiles less than or equal to the Access Rate can be selected. However the sum of High and Low Traffic Class bandwidth profiles can exceed the Access Rate, noting that the physical medium speed defines the maximum bandwidth that can be utilised at any time.

(ii)   It is recommended that aggregate CIR service bandwidth does not exceed 70% of UNI or E-NNI physical speed.

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[6] The Glass-ony variant may be ordered as 100Mbps Access rate, but is delivered over fibre as 1000Mbps. The maximum bandwidth for this option is enforced as a 100Mbps sub-rate using a bandwidth policy.

(iii) These bandwidth profiles can be modified or combined with other services until May 2023 using the Product Development Process as described in clause 3.7.

(iv) The list of bandwidth templates is defined in Appendix C.

(v) Enable MEF 33 Compliance as follows

- Off – Frame Traffic Class will be classified based on the individual frames priority markings and colour-awareness setting as set out below

CoS	UNI CE-tag PCP	E-NNI S-tag PCP	DEI Green	DEI Yellow
High	1,2, 3, 4, 5, 6, 7,	5	0	-
Low	0, untagged	0	0	1

- High – all frames will be classified as High Traffic Class including untagged frames at the UNI and single-tagged frames at the E-NNI;

c) Enable the required level of Access Diversity as described in the Operations Manual; Specify the following attributes per Access-EPL:

(i) The Access-EPL E-NNI;

(ii) The E-NNI SVLAN Identifier.

d) Tail Extension ON or OFF, as per NGA Tail Extension Service Service Description.[7]

3.6.5 For NID-based services, the following additional options, exercised by Service Request, to:

a) Enable OAM as follows

(i) On - UNI Maintenance and E-NNI Maintenance Association Intermediate Points (MIP) are available to the Service Provider for the NID variant, and can be integrated with Service Provider 802.1ag OAM solutions; or

(ii) Off – no UNI or E-NNI MIP are available to the Service Provider and OAM frames will be passed transparently through the Access-EPL service.

b) Request a subsequent Birth Certificate to be created, either as part of a modify service request or during an assure event. The Birth Certificate runs a Y.1564 out-of-service test across the Access-EPL and all customer traffic is discarded for the duration of the test.

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[7] 10Gbps TES is not available currently.

3.6.6 Frames are managed as follows:

a) Upstream:

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

    (ii) 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:

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

    (ii) 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.

3.6.7 Frames will be treated based on the individual frames Traffic Class classification:

3.6.8 Frames are policed at ingress based on the subscribed CIR/CBS/EIR/EBS values for the frame's Traffic Class classification;

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

Type	Ingress	Transport
Low Traffic Class	CIR ≥ 0 EIR ≥ 0	Queued and Weighted fairly under congestion conditions Frames classified as EIR dropped first
High Traffic Class	CIR ≥ 0 EIR = 0	Strictly prioritised

b) In-profile Frame drop preference is:

    (i) Low Traffic Class EIR;

    (ii) Low Traffic Class CIR;

    (iii) High Traffic Class (CIR);

CIR frames will be delivered according to performance metrics..

c) Traffic can burst up to line rate as per policer settings (CBS/EBS);

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

3.6.9   The Enhanced Bitstream 4 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	Bitstream 4 (HSNS Premium)	Enhanced Bitstream 4
Bitstream	E-AVPL	E-APL	E-APL	E-APL	Access-EPL
High Priority	Yes	Yes	Yes	Yes	Yes
Low Priority	Yes	No	Yes	No	Yes
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	From 100 Mbps up to 10 GigE	For current 1G multiclass plans Low up to 1000 Mbps withHigh from 10/10 Mbps to 1000/1000** Mbps Offers launching October 2022 will only have High Traffic Class 500Mbps, 1, 2, 4 and 10Gbps
OAM CFM	No	No	No	No	Yes (NID only)
Birth Certificate	No	No	No	No	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	1 with a second UNI available on request	NID: 2 1000/100 Base-T + 2 SFP Sockets standard Glass: 1 with a second UNI available on request
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	Available to Priority Users in selected areas

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

*** 1 G version has either 500Mbps or 1Gbps high priority and 2, 4 and 10Gbps versions are high priority.*

NID characteristics

3.6.10   The standard NID includes at least two 1000/100 Base-T and two SFP Socket UNIs.

Glass-only characteristics

3.6.11   The standard connector type on the ITP is SCA.

3.6.12   A customer-supplied 1GE SFP or 10GE SFP+ optics module will be required to provide the UNI-C.

UNI – NNI characteristics

3.6.13   The sum of High and Low Traffic Class bandwidth profiles of all services delivered downstream to a UNI can exceed the UNI line rate. If there is insufficient UNI line rate to deliver demanded traffic then frames will be randomly discarded, based on their drop precedence, 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.

3.6.14   The sum of High and Low 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 drop precedence, 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.

New Template Options (only available until May 2023)

3.7   A Service Provider may request that the LFC creates additional Bandwidth profiles using the process in the Operations Manual and the following standard building blocks:

3.7.1   CIR in increments of 10 Mbps upstream and downstream;

3.7.2   EIR in increments of 100 Mbps upstream and downstream;

Noting that:

a)   CIR and EIR are specified independently;

b)   If CIR = 10Mbps and EIR = 100Mbps then CIR+EIR = 110Mbps;

c)   If CIR = 20Mbps and EIR = 100Mbps then CIR+EIR = 120Mbps;

d)   For Low Traffic Class the initial 100 Mbps may optionally comprise 10Mbps CIR and 90 Mbps EIR.

These bandwidth profiles are available to all Service Providers and will be published on the LFC website.

3.8   In addition to the Access Rate, as set out in 3.7 above, Service Templates have the following options:

3.8.1   One Access-EPL service with one or more bandwidth profiles, each as defined in 3.7:

3.8.2   Alternative CBS/EBS values, where the LFC determines that these new values do not impact the SLAs;

3.8.3   MEF 33 compliance (single class) (depending on the product offer)

3.8.4   OAM configuration options, such as maintenance levels (depending on the product offer);

3.8.5   Other services or attributes requested by the Service Provider and agreed by the LFC.

where a Service Template is a pre-set combination of building blocks and service attributes, i.e. would contain limited per-service-request attributes

3.9   Service Templates can be primary or secondary, as defined in the Operations Manual.

3.10   Service Templates can be added as public or private Service Templates, as defined in the Operations Manual:

3.11   Requests for additional Service Templates will be implemented and delivered through the Product Development Process, as described in the Operations Manual.

3.12   Operations, Administration and Maintenance (OAM) and Diagnostic tools.

3.12.1   The Glass-based Enhanced Bitstream 4 Bitstream service OAM capability will be limited to providing a Level 3 MIP both at the UNI and at the ENNI (Handover) for 10Gbps access-based (2Gbps, 4Gbps and 10Gbps) plans. For 1Gbps access-based (100Mbps, 500Mbps and 1Gbps) plans it will be limited to just an ENNI level 3 MIP. This MIP allows customers to perform basic connectivity checks to the test points.

3.12.2   The NID-based Enhanced Bitstream 4 Bitstream service includes a repeatable birth certificate function that verifies the as-provisioned service is performing to bandwidth and QoS performance specifications.

3.13   The NID-based and 10G glass-only variants of Enhanced Bitstream 4 Bitstream service will support 802.1ag and optionally include the following two Maintenance Associations that are available for the Service Provider's OAM system:

3.13.1   UNI Service Provider-facing MIP; and

3.13.2   E-NNI MIP.

The following maintenance levels will apply:

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

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

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

3.14   The Glass-based Enhanced Bitstream 4 Bitstream service will support 802.1ag and include an E-NNI MIP (for 1Gbps access-based services), and both an ENNI MIP and a UNI MIP (for 10Gbps access-based services).

Service Requirements

3.15   To use the Enhanced Bitstream 4 Service the Service Provider must have the capability to access and interconnect with it, by one of the following:

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

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

3.15.3   Connecting to a backhaul service at the local or regional POI; or

3.15.4   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 regional POI Central Office area.

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

Additional Service Characteristics

3.16   The technical specification of the Enhanced Bitstream 4 Service is set out in Appendix B.

3.17   The LFC will provide certain support and other assistance as part of the Enhanced Bitstream 4 Service including:

3.17.1   An automated facility for Service Requests;

3.17.2   An automated facility for fault notifications;

3.17.3   A tool to assist the Service Provider in determining the location and availability of the Enhanced Bitstream 4 Service (pre-qualification); and

3.17.4   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.

3.18   The Enhanced Bitstream 4 Service specifically excludes:

    3.18.1   The UFB Handover Connection Service;

    3.18.2   Provision or maintenance of any cabling or connection or active device:

        a)   beyond the Service Demarcation Points;

        b)   between the jack terminating the LFC provided Fibre Lead-in and the NID/UNI where that cabling or connection is not provided by the LFC and the LFC has not agreed to take responsibility for that cabling or connection;

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

    3.18.4   Supply of AC mains & UPS power, accommodation space, heating, ventilating, and air conditioning at the POI or End User Premises or Service Provider Premises or NBAP (as applicable).

4   Service Demarcation Point at End User Premises or Service Provider Premises or NBAP (as applicable)

4.1   For NID-based services, the Service Demarcation Point at the End User Premises, Service Provider Premises or NBAP (as applicable) is the 1000/100 Base-T or SFP Socket UNI on the NID.

4.2   For glass-only services, the Service Demarcation Point at the End User Premises, Service Provider Premises or NBAP (as applicable) is:

    4.2.1   Physically, the SCA connector on the ITP; and

    4.2.2   Logically, the transparent VLAN (802.1q) of the Access-EPL on the Enhanced Bitstream 4 Bitstream Access service.

4.3   The Enhanced Bitstream 4 Service excludes the End User Premises', Service Provider Premises' or NBAP's (as applicable) wiring. If a fault reported by the Service Provider is found to be caused by the End User Premises', Service Provider Premises' or NBAP's (as applicable) equipment (CPE) or the wiring at the End User Premises, Service Provider Premises or NBAP (as applicable) beyond the Service Demarcation Point, then the Service Provider may be charged the "No fault found" Ancillary Charge in the Price List. Note the wiring should comply with the industry standard Premises wiring requirements which are available at www.tcf.org.nz.

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 National 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 National POI.

    5.2.3   The logical demarcation between the Enhanced Bitstream 4 Bitstream 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 Enhanced Bitstream 4 Service i.e. the Service Provider must first purchase and then continue to maintain a local or regional UFB Handover Connection Service at all times while taking the Enhanced Bitstream 4 Service.

7   LFC and Service Provider Responsibilities

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

8   Fibre Diversity

8.1   Enhanced Bitstream 4 supports Access Diversity options, where diversity is relative to another Enhanced Bitstream 4 Bitstream product instance in the same the End User Premises, Service Provider Premises or NBAP. Diversity is subject to the options, availability and limitations set out in Part 9 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   Enhanced Bitstream 4 Service Levels

9.1   Service Levels for both the Layer 1 and Layer 2 components of the Enhanced Bitstream 4 Service are set out in the Service Level Terms for the Bitstream Services.

Appendix A – Diagrams
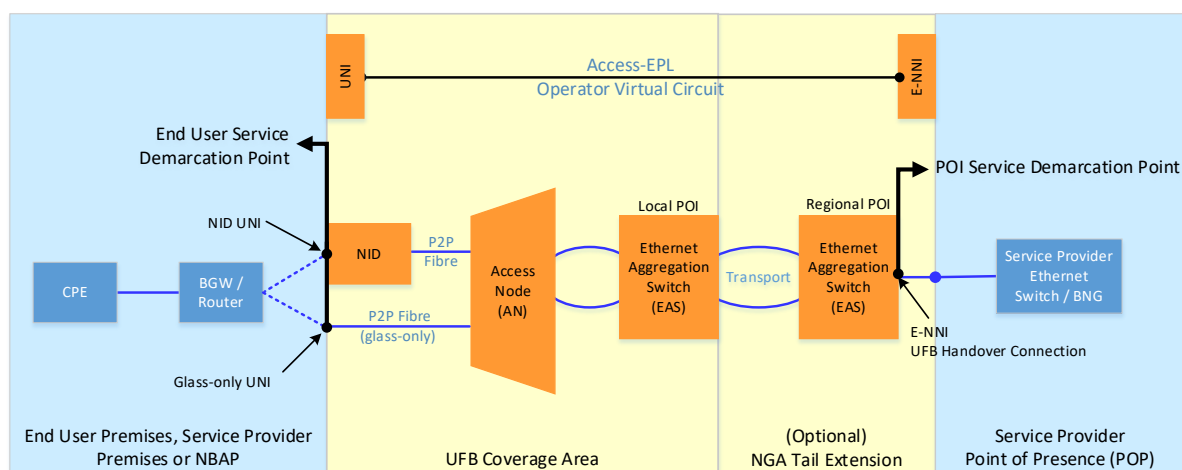
Enhanced Bitstream 4 service, with and without Tail Extension. It is not intended to represent every situation or detailed physical architecture. The following points should be noted:

- The Enhanced Bitstream 4 Service, Service Levels and pricing applies from the UNI to the local POI.

- The Enhanced Bitstream 4 UNI is either:

  o NID-based: The Ethernet port or SFP cage on the NID located in the End User Premises, Service Provider Premises or NBAP; or

  o Glass-only: The connectorised fibre tail terminated on the ITP in the End User Premises, Service Provider Premises or NBAP.

- The Enhanced Bitstream 4 Service tail extension service, Service Levels and pricing applies from the local POI to the E-NNI at the regional POI.

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

- If selected as an option by the Service Provider, OAM MIPs are configured on the NID UNI and E-NNI at Service Provider MEG Level 3.

Appendix B – Technical Specification

Technical Specification

Ethernet (UNI)	• IEEE 802.3 – 2005 • Single tagged 802.1ad supporting 4093 VLANs

UNI	• RJ45 1000/100 Mbps = 1000/100BaseT (NID only electrical option)
	• SFP Cage (1000/1000 Mbps) (NID only SFP option)
	• Glass-only Connectorised Fibre Tail (SCA)
	    o 1000Base-X
	    o 10GBase-X

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 CIR/EIR Multicast Frame Delivery = passed within service CIR/EIR Broadcast Frame Delivery = passed within service CIR/EIR 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 SC/APC type connectors (complying with the IEC 61754-4 standard) or alternatively LC/APC also known as LCA type connectors (complying with the IEC 61754-20 standard) as appropriate.
Optic 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 –Enhanced Bitstream 4 Service Templates and Bandwidth Profiles

This section provides a view of the Enhanced Bitstream 4 Service Templates and Bandwidth Profiles. These, and any future public Service Templates and Bandwidth Profiles, will be published on the LFC website. CBS/EBS values are based on the *TCF Ethernet Access Service Description v33, 11 May 2017.*

<u>Offers currently available that will be grandfathered May 2023</u>

There are two NGA Business Premium offers available based on the access rate:

Offer	Access Rate	Segment	Primary	Geographic Zones	Type	Headline Rate		Other Options		
						Low Symmetric	High Symmetric	Colour Awareness	MEF 33 Compliance	OAM
Business Premium 100	100/100 Mbps	Business	Primary	UFB, RBI, Other	eBS4	Select (0, 100 Mbps)	Select (≤ 100 Mbps)	Off	Off/High	On/Off
Business Premium 1G	1000/1000 Mbps	Business	Primary	UFB, RBI, Other	eBS4	Select (≤ 1000 Mbps)	Select (≤ 1000 Mbps)	Off	Off/High	On/Off

Low Traffic Class bandwidth selection

The following Low Traffic Class bandwidth profiles can be selected per service request:

Selection	Headline Rate DS/US	PIR (CIR+EIR) Mbps	CIR Mbps	CBS kB	EIR Mbps	EBS kB
0	0/0 Mbps	0	0	0	0	0
100	100/100 Mbps	100	10	32	90	180
200	200/200 Mbps	200	10	32	190	180
500	500/500 Mbps	500	10	32	490	180
1000	1000/1000Mbps	1000	10	32	990	250

Where:

- Low Traffic Class bandwidth = 0 Mbps is only applicable if MEF 33 Compliance is set to on

- Low Traffic Class bandwidth > 0 Mbps is only applicable if MEF 33 Compliance is set to off

- All bandwidth profiles are symmetric, i.e. upstream bandwidth profile = downstream bandwidth profile;

- Business Premium 100 supports a maximum of 100Mbps Low Traffic Class bandwidth;

- Low Traffic Class Bandwidth does not include any bandwidth overhead for higher layer protocols. This is different to NGA Evolve or NGA Business.

High Traffic Class Bandwidth Selection

High Traffic Class Bandwidth can be selected per service request as follows:

Selection	Headline Rate DS/US	PIR (CIR+EIR) Mbps	CIR Mbps	CBS kB	EIR Mbps	EBS kB
20	20/20 Mbps	20	20	32	0	0
30	30/30 Mbps	30	30	32	0	0
50	50/50 Mbps	50	50	32	0	0
70	70/70 Mbps	70	70	44	0	0
100	100/100 Mbps	100	100	63	0	0
150	150/150 Mbps	150	150	150	0	0
200	200/200 Mbps	200	200	243	0	0
300	300/300 Mbps	300	300	372	0	0
500	500/500 Mbps	500	500	624	0	0
700	700/700 Mbps	700	700	874	0	0
1000	1000/1000Mbps	1000	1000	1248	0	0

Where:

- Business Premium 100 with MEF 33 Compliance = High supports a maximum of 100Mbps High Traffic Class bandwidth;

- Business Premium 100 with MEF Compliance = Off supports a maximum of 10 Mbps High Traffic Class bandwidth, i.e. 100 Mbps Low and 10 Mbps High.;

High Traffic Class-only offers launching on October 2022

Two new offers will be available on 1Gbps access, and three offers on 10Gbps access:

Offer	Access Rate Mbps	Headline Rate DS/US Mbps	PIR (CIR + EIR) Mbps	CIR Mbps	CBS KB	EIR Mbps / EBS kB
Business Premium 500	1000	500/500	500	500	624	0/0
Business Premium 1000	1000	1000/1000	1000	1000	1248	0/0
Business Premium 2000	10000	2000/2000	2000	2000	1248	0/0
Business Premium 4000	10000	4000/4000	4000	4000	1248	0/0
Business Premium 4000	10000	10000/10000	10000	10000	1248	0/0

Where:

- MEF 33 Compliance is set to on (single HIGH class traffic only)

- All bandwidth profiles are symmetric, i.e. upstream bandwidth profile = downstream bandwidth profile