



Bitstream Ethernet Access (BEA) Product Description

Version Control

| Version | Status | Update | Effective Date |
|---------|--------|--|----------------|
| 2.0 | | Draft | 16/04/2014 |
| V3.0 | Final | This document is based on V2.0 Implementation of Standardised Change Control. | 13/06/2017 |

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For information:

- Historical Document History Table located at end of Document.
- Publish means the action of uploading a document to the website regardless of status or location.
- **If there are changes to the document between 'Proposed' and 'Final', change control operates.**

Acronyms

| | |
|--------|--|
| ADSL | Asymmetric Digital Subscriber Line |
| ADSL2+ | More advanced ADSL technology offering speeds up to 24Mbps |
| AF | Assured Forwarding |
| ATM | Asynchronous Transfer Mode |
| BEA | Bitstream Ethernet Access |
| CIR | Committed Information Rate |
| CoS | Class of Service |
| CPE | Customer Premises Equipment |
| DSL | Digital Subscriber Line |
| EF | Expedited Forwarding |
| ISAM | Integrated Services Access Manager |
| MDF | Main Distribution Frame |
| NGN | Next Generation Network |
| NTU | Network Terminating Unit |
| PIR | Peak Information Rate |
| PoH | Point of Handover |
| QoS | Quality of Service |
| SAB | Service Access Bandwidth |
| SLA | Service Level Agreement |
| STD | Standard |
| UG | Unified Gateway |
| UNI | User Network Interface |
| VC | Virtual Circuit |
| VLAN | Virtual Local Area Network |
| WEIL | Wholesale Ethernet Interconnect Link |
| WES | Wholesale Ethernet Service |



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1 Introduction

This document provides the product description for the open eir Bitstream Ethernet Access (BEA) Product. This product is a subset of the overall Bitstream product set and will **harness the potential offered by the Ethernet over eir's Next Generation Network (NGN)**.

The product offers a highly secure asymmetrical access product suitable for the business market as it does not touch the public internet at any point. The development will focus on the replication of the Bitstream VC products currently supported on the ATM (Asynchronous Transfer Mode) network but provide superior functionality for this market segment. In addition, it will allow Bitstream Operators greater flexibility over their product definition

This product description is subject to review and may be re-issued to reflect changes, as new products are added to the range, or enhancements to existing products are made.

This document is without prejudice to any future position that eir may adopt in respect of **eir's provision of the BEA Product. It should be read in conjunction** with the associated documents listed on page 2 of this product description. Any specific technology mentioned in this document is current as at date of issue and is for guidance purposes only.

open eir reserves the right to adapt the technology to deliver the Bitstream Ethernet Access product at any time.

2 Product Overview

Bitstream Ethernet Access utilises the copper access network to connect to the NGN network. The product will be available in NGN enabled exchanges only and line suitability will be determined by the Prequalification result

The product provides a QoS (Quality of Service) enabled secure connection from the customer premises to the Bitstream Operator interconnection point. An individual S-VLAN will be built for each customer connection through the eir core network to the hand-off point. This connection will be available at a number of bandwidth speeds and at varying QoS levels. It is proposed that the Traffic Based QoS capability developed for the Ethernet product portfolio will be utilised for this product.

The existing Wholesale Ethernet Interconnect Link (WEIL) product will be utilised for the hand-off of Bitstream Ethernet Access service to the Bitstream Operator. A single Service

Access Bandwidth (SAB) on the WEIL will be allocated to this service. Product Features and Availability

3 Product Features and Availability

The Bitstream Ethernet Access product is designed to utilise the copper access network as the physical access medium and it is envisaged the network topology will consist of the end customer NTU linking to the ISAM as per the normal Bitstream setup before aggregating into the NGN cloud. The NGN transit leg will then pass onto the eir NTU handoff to the Operator via an Ethernet Interconnect Link.

Figure 1 below provides a visual representation of the proposed product:

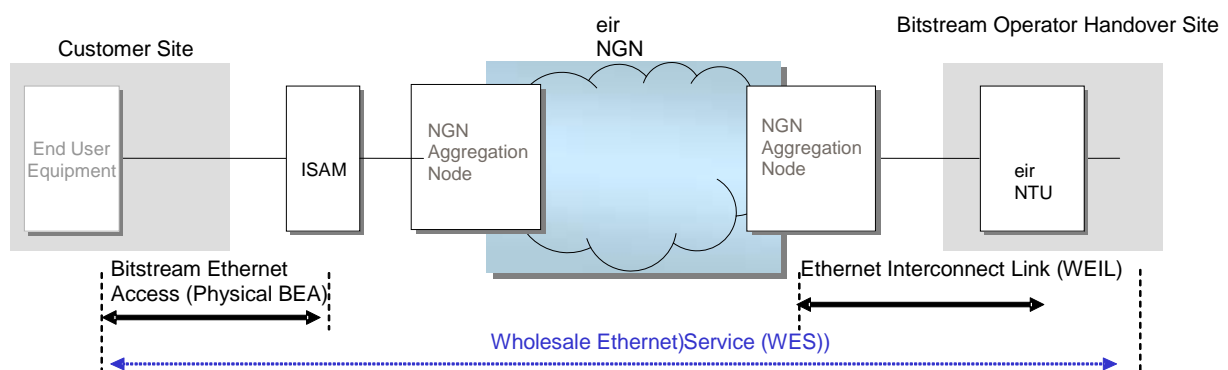


Figure 1: Bitstream Ethernet Access

The open eir Bitstream Ethernet Access (BEA) service consists of a number of components:

1. Bitstream Ethernet Access (BEA) provides physical connectivity from an End User site to the 7302ISAM.
 - Wholesale Ethernet Service logical connection (WES) provides a logical E-line service between an Operator's End User site and the Operators handover site.
2. Wholesale Ethernet Interconnect Link (WEIL) provides physical connectivity from an Operator's handover site to the NGN Aggregation Node.

Multiple WES connections may be aggregated within the eir NGN network and handed-over to an Operator on an EIL. Only one logical WES connection can be supported on an individual physical BEA.

The Bitstream Ethernet Access service will be available within the NGN footprint only and is supported on Flexible Density 7302 ISAMs which are either:

1. Co-located with an 7450ESS node
2. Connected to a 7450ESS node via APT
3. Connected to a 7450ESS node via fibre

It should also be noted that there will be no eir managed NTU deployed at the end user site for the Bitstream Ethernet Access service

4 Product Components

The product consists of the following components:

4.1 Bandwidths

Bitstream Ethernet Access is defined as a non rate-adaptive product.

The BEA bandwidth profile (i.e DSL profile) will be applied on the customer facing port on the 7302ISAM. The actual service bandwidth (WES bandwidth) available to the End User will be approximately 85% of the ADSL synchronisation speed. The WES bandwidth profile will be applied on the SAP on the 7450ESS (NGN Aggregation Node) associated with the BEA connection as well as on the SAP on the 7450ESS associated with the EIL connection

4.1.1 Non Rate-Adaptive Bandwidths

The table below specifies the proposed range of non-rate adaptive bandwidth profiles supported on the Bitstream Ethernet Access service.

| Downstream Speed (Kbps) | Upstream Speed (Kbps) | Interleaving (Downstream) | Interleaving (Upstream) |
|-------------------------|-----------------------|---------------------------|-------------------------|
| 16348 | 1216* | High | Low |
| 12288 | 2048* | High | Low |
| 10240 | 1536* | High | Low |
| 8192 | 2048* | High | Low |
| 8192 | 1024 | High | Low |
| 6144 | 672 | High | High |
| 4096 | 512 | High | High |
| 2048 | 384 | High | Low |
| 1024 | 256 | High | High |

Table 1: Non Rate Adaptive BEA Bandwidth Options (kbps)

* Requires ITU G.992.5 Annex M support

The following table shows the proposed WES bandwidths associated with the different BEA Non Rate Adaptive Bandwidth profiles:

| BEA Downstream (Kbps) | (ADSL) Speed | BEA (ADSL) Upstream Speed (Kbps) | WES Downstream Speed (Kbps) | WES Upstream Speed (Kbps) |
|-----------------------|--------------|----------------------------------|-----------------------------|---------------------------|
| 16348 | | 1216* | 13600 | 1030 |
| 12288 | | 2048* | 10400 | 1740 |
| 10240 | | 1536* | 8700 | 1300 |
| 8192 | | 2048* | 6900 | 1740 |
| 8192 | | 1024 | 6900 | 870 |
| 6144 | | 672 | 5200 | 570 |
| 4096 | | 512 | 3400 | 430 |
| 2048 | | 384 | 1700 | 320 |
| 1024 | | 256 | 870 | 210 |

Table 2: WES Bandwidth

4.2 QoS - Quality of Service

There are three network service classes used within the eir Core NGN network for the open eir Wholesale NGN Ethernet products: the Expedited Forwarding (EF) class, the Assured Forwarding (AF) class, and standard/best effort (STD) class. Traffic Based QoS will be utilised for Bitstream Ethernet Access.

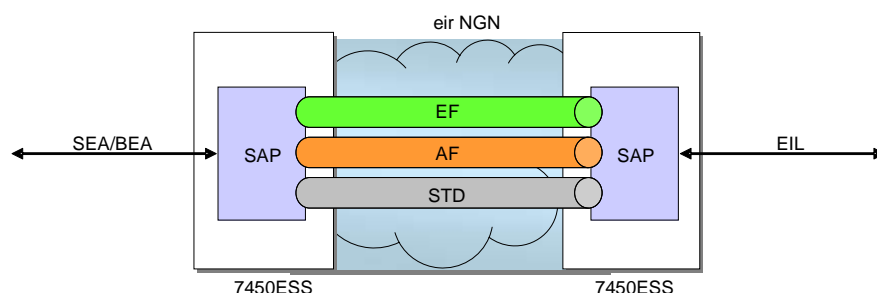


Figure 2: Network Forwarding Classes / Queues

The Expedited Forwarding Class is serviced before the Assured Forwarding class and is intended to be used for real-time delay-sensitive traffic. There is a committed information rate (CIR) associated with the Expedited Forwarding class. Customer traffic which exceeds the configured CIR will be dropped on ingress to the eir Core NGN network.

The Assured Forwarding Class is serviced before the Standard Forwarding class and is intended for business applications which require priority access to available bandwidth over standard applications. There is a committed information rate (CIR) and peak information rate (PIR) associated with the Assured Forwarding class. The Assured Forwarding class provides the ability to classify ingress traffic as either in-profile or out-of-profile based upon the traffic arrival rate. A queue is considered in the in-profile state if the rate at which the queue is being serviced is less than its configured CIR. A queue is considered out-of-profile if the rate at which the queue is being serviced is greater than its CIR, but less than its PIR. After the profile state of the packet is determined at network ingress, the profile state of the packet influences the packets queuing priority and drop preference.

The Standard Forwarding Class is used for carrying all remaining traffic. This remaining traffic generally uses protocols that are capable of maintaining some form of connectivity during congestion.

For the open eir NGN services the customer traffic is mapped to the appropriate forwarding class on ingress to the eir Core NGN network.

4.2.1 Traffic Based QoS

With traffic-based QoS the customer marks the 802.1p bits in their Ethernet frame headers on network ingress. Customer traffic is mapped to a forwarding class on ingress to the eir Core NGN network based on the 802.1p markings.

The following range of Traffic Based QoS options have been defined for Bitstream Ethernet Access:

| | EF | AF | Queuing |
|----------------|-----|----|--------------------------------------|
| Option 1 | 0% | 0% | All traffic mapped to Standard Queue |
| Option 2 | 5% | 0% | 5%l traffic mapped to EF queue |
| Standard Class | 10% | 0% | 10% traffic mapped to EF queue |

Table 3: BEA QoS Options

4.3 Service Level Agreement (SLA)

There are 2 repair SLAs proposed for the Bitstream Ethernet Access product.

Table 4 below outlines the features of each SLA and the associated response time.

| SLA | Fault Reporting | SLA Hours | Response time* | Repair Time | Costs |
|-------------|---------------------|---------------------|----------------|-------------|-------------------|
| Standard | 09:00-17:00 Mon-Fri | 09:00-17:00 Mon-Fri | T+3 hours | N/A | In Tariff |
| Master Plan | 24x7x365 | 24x7x365 | T+3 hours | N/A | Fixed Price (TBC) |

Table 4: SLA Parameters

Response can be defined as the following:

- The fault has been correctly logged and acknowledged
- Preliminary testing and fault localisation has occurred
- Fault Clearance has been instigated
- Results of preliminary eir testing and fault localisation provided to OAO

5 Service Management

5.1 Order Handling and Provisioning

The Unified Gateway (UG) should be used for all orders in relation to the provision of the Bitstream Ethernet Access product. It will be made available on the Unified Gateway via new Product IDs.

The product will be available in all ADSL2+ NGN enabled exchanges, on eligible lines. The rollout of NGN locations is currently taking place on a phased basis. Line eligibility will be determined by the prequalification result.

An up to date deployment plan of NGN enabled exchanges is sent out on a weekly basis from open eir Bitstream, please refer to latest iteration of plan for latest information.

More detailed information on the processes for order handling and provisioning will be set out in the Order section of the Bitstream IPM published on www.openeir.ie

5.2 Fault Handling and Repair

The Unified Gateway should be used for logging faults on the Wholesale Bitstream Ethernet Access product. Faults for the BEA product will be logged as Data Product Faults using the FDC order type. More detail on the process for fault handling and repair will be set out in the Fault section of the Bitstream IPM published on www.openeir.ie

5.3 Billing

It is proposed that a flat connection and rental charge will be applied in the same manner as the existing “Bitstream per VC” and “Bitstream Legacy IP” product range. Quality of Service parameters and Service Level Agreements (SLAs) will be separately charged.

Once an order is completed, billing commences in the next billing cycle. In the event that an Operator has a query regarding the bill they should contact their eir Wholesale Customer Relations Service Manager.

6 Price

Prices for the Bitstream Ethernet Access product will be published on the Bitstream price list.

7 Terms and Conditions

Terms and conditions are published on the eir website at www.openeir.ie in the Wholesale Bitstream Access Reference Offer.

8 Appendix 1: BEA Interface Specifications

This section describes how services will be delivered using a copper based access mechanism between the End User site and the 7302ISAM using ADSL2+ technology. The services will be delivered to the End User site over copper pairs and terminated on a CPE device which will not be managed by eir (the End User/Operator is responsible for providing the ADSL modem/router). The access circuit will be terminated on the MDF in the eir exchange and will be jumpered to a port on the 7302ISAM.

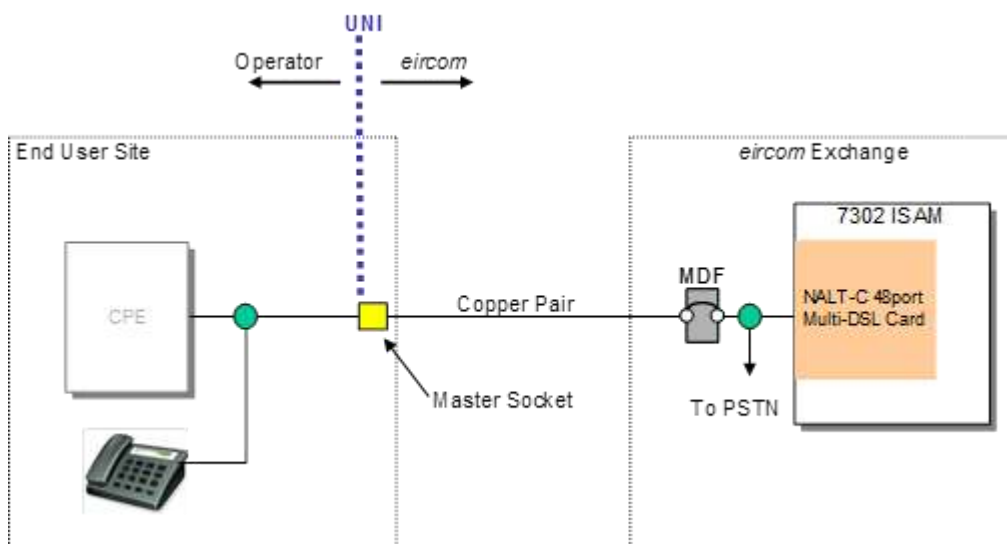


Figure 3: Bitstream Ethernet Access

The eir service demarcation point will be a master socket installed in the End User site.

The ADSL modem/router maps the End User traffic presented on the customer-facing port onto the up-link port facing the 7302ISAM. End User traffic may be tagged or untagged. The Ethernet frames from the End User are encapsulated into ATM/AAL5 on the DSL line using RFC2684 Bridged encapsulation. There is only one ATM PVC provisioned on the ADSL connection. **In order to support service multiplexing (if required) the End User's ADSL modem/router must have the capability to map multiple C-VLANs onto a single ATM PVC.**

| | |
|-------------------------|-----------------------------------|
| ADSL Annex A Standard | ITU G.992.1 |
| ADSL2+ Annex A Standard | ITU G.992.5 Annex A |
| ADSL2+ Annex M Standard | ITU G.992.5 Annex M |
| Encapsulation | ATM RFC2684 bridged encapsulation |
| VPI | 8 |
| VCI | 35 |

Table 5: BEA UNI Interface Specification

Version Control History

| Version | Status | Update | Effective Date |
|---------|--------|--|----------------|
| 0.1 | | Draft | 14/10/2011 |
| 1.0 | | For Industry Review | 23/04/2012 |
| 2.0 | | Draft | 16/04/2014 |
| V3.0 | Final | This document is based on V2.0 Implementation of Standardised Change Control. | 13/06/2017 |