



eircom **wholesale**

Product Description

Wholesale NGA Bitstream Plus Products

Version 2.2



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Acronyms

AF	Assured Forwarding
AN	Access Node
BE	Best Effort
BP	Bitstream Plus
BTV	Broadcast Television
CoS	Class of Service
CPE	Customer Premises Equipment
CSID	Calling Station ID
EF	Expedited Forwarding
FTTC	Fibre to the Cabinet
FTTH	Fibre to the Home
GPON	Gigabit-capable Passive Optical Network
GLUMP	Geographic Local Unbundled Metallic Path
IGMP	Internet Group Management Protocol
M-VPN	Multicast – Virtual Private Network
MPLS	Multi-Protocol Label Switching
NGA	Next Generation Access
NGA-AN	Next Generation Access – Access Node
NGN	Next Generation Network
NTP	Network Termination Point
NTU	Network Terminating Unit
OLT	Optical Line Terminal
ONT	Optical Network Terminal
PB	POTS Based
PoH	Point of Handover
PON	Passive Optical network
POTS	Plain Old Telephone Service
QoS	Quality of Service
RG	Residential Gateway
SA	Standalone
SAB	Service Access Bandwidth
SB-WLR	Single Billing - Wholesale Line Rental
STB	Set-top Box
UG	Unified Gateway
ULMP	Unbundled Local Metallic Path
VLAN	Virtual Local Area Network
VLL	Virtual Leased Line
VPLS	Virtual Private LAN Service
VAS	Value Added Service
VoIP	Voice over Internet Protocol
VOD	Video on Demand
VDSL	Very high bit-rate Digital Subscriber Line
WEIL	Wholesale Ethernet Interconnect Link



1. Introduction

This document provides the product description for the eircom Wholesale NGA Bitstream Plus product set. The NGA Bitstream Plus product set is a subset of the overall Bitstream Plus product set, which also includes current generation access products. The table below outlines the individual products covered by this product description.

<i>Access Medium</i>	<i>POTS¹ Support</i>	<i>Product</i>
Fibre to the Home (FTTH)	No	FTTH Bitstream Plus SA (Standalone.)
	Yes	FTTH Bitstream Plus PB (POTS-based.)
Fibre to the Cabinet (FTTC).	No	FTTC Bitstream Plus SA (Standalone.)
	Yes	FTTC Bitstream Plus PB (POTS-based.)

Figure 1: Wholesale NGA Bitstream Plus Access Products

All Bitstream Plus products provide generic Ethernet access between an end-customer's premises and an Operator's own network and are intended to support a mix of time sensitive and high volume applications. These include voice, general entertainment (including Broadcast TV), and high speed Internet.

Bitstream Plus products are differentiated in terms of the physical medium used to connect the end-customer to the eircom network. This document covers the eircom Wholesale Next Generation Access, products. These Wholesale NGA Bitstream Plus products are delivered over Fibre to the Home (FTTH) or Fibre to the Cabinet (FTTC). Two distinct products, Standalone (SA) or POTS-Based (PB), are available over each access medium, as shown in Figure 1, above.

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. All such changes will be communicated in accordance with agreed industry practices.

The document should be read in conjunction with the associated documents, listed on page 2. Any specific technology mentioned in this document is current as at date of issue and is for guidance purposes only. Eircom Wholesale reserves the right to adapt the technology used to deliver the NGA Bitstream Plus Product, at any time.

¹POTS is an acronym for 'plain old telephone service', and refers to the analogue telephone service provided over a copper twisted pair landline. It is used to distinguish that service from other voice services, such as a Voice over Internet Protocol (VoIP) service provided over an all-digital network.

2. Products Overview

The Wholesale NGA Bitstream Plus product range consists of Layer 2 Ethernet-only access products, giving the Operator full control of network protocols. Each NGA Bitstream Plus product provides an enhanced broadband access service, between the service termination / demarcation point at an end-customer premises and a WEIL², at an Operator’s nominated handover point³, within the NGN Aggregation Node. All Bitstream Plus products support traffic-based Class of Service to allow time-critical applications, such as Voice over IP, be prioritised. Further flexibility is provided by including Multicast Support, for cost-effective distribution of TV and other broadcast services.

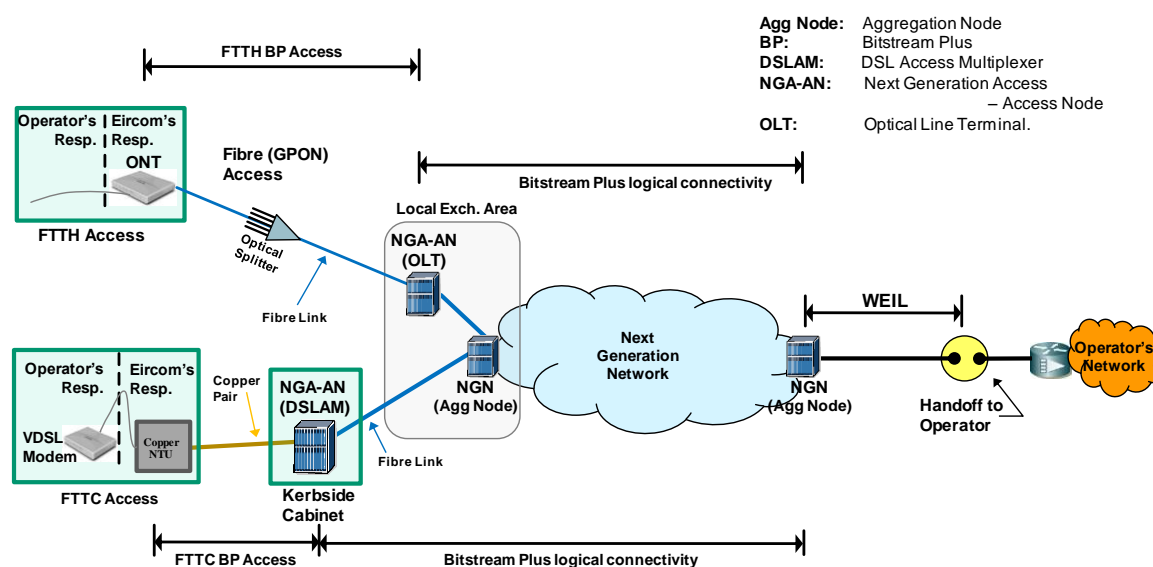


Figure 2: Wholesale NGA Bitstream Plus

Bitstream Plus products are designed to use either copper or fibre as the physical access medium, as shown in Figure 2. FTTH⁴ Bitstream Plus products are used where fibre is the access medium and FTTC⁵ Bitstream Plus where copper is the access medium. Two variants of each, Standalone (SA) or POTS⁶-based (PB), are available.

The demarcation point varies, depending on the access medium used. Where services are delivered over fibre the demarcation point is the interface on an Optical Network Terminal. Where Services is delivered over copper, the demarcation point is the copper Network Terminating Unit.

² Wholesale Ethernet Interconnect Link

³ Generally known as the Point of Handover (POH)

⁴ Fibre to the Home

⁵ Fibre to the Cabinet

⁶ POTS is an acronym for 'Plain Old Telephone Service'..



2.1 Bitstream Plus Access Components

Bitstream Plus Access products comprise a number of distinct components that can be divided into two categories:

- Connectivity components, common to all end-customers.
- Access mechanisms, ordered individually for each end-customer.

In addition, provision of any element of the product is dependent on the presence of a Wholesale Ethernet Interconnect Link (WEIL) connection to the Operator network upon which capacity is nominated specifically for Bitstream Plus traffic.

There are two types of connectivity services available, namely Unicast and Multicast. The basic Bitstream Plus service is based on Unicast⁷, which is mandatory for all Bitstream Plus products. This supports an individual connection between the Operator's network and each active session for an end-customer, or Application. Unicast is ideal for applications such as Internet browsing and Video on Demand.

Bitstream plus products also support Multicast⁸, which is available as an additional Bitstream Plus service. Multicast allows multiple end-customers to access a single broadcast stream, such as a TV program and makes more efficient use of the Operator's network for this type of material. Multicast connectivity also requires Unicast connectivity to be in place.

Once the WEIL is in place, an Operator can order Unicast and Multicast logical connectivity for each of its resellers⁹, to individual NGN Aggregation Nodes within the eircom network. The existence of a Unicast logical connection to an NGN Aggregation Node is a pre-requisite to providing service to individual end-customers. In addition, if an Operator wishes to provide Multicast services, they must have Multicast logical connectivity in place before service can be provided to an individual end-customer.¹⁰

⁷**Unicast** transmission is the sending of messages to a single network destination identified by a unique address.

⁸**Multicast** is the delivery of a message or information to a group of destination computers simultaneously in a single transmission from the source.

⁹ An Egress Group is required for each of an Operator's Bitstream Plus resellers

¹⁰ Multicast connectivity (per Egress Group) is not standalone and is only provided in conjunction with associated Unicast connectivity per Egress Group.



3. Product Features

All Bitstream Plus products share the following feature set:

- Layer 2 Ethernet-only access - allowing Operators to differentiate their services at the Internet Protocol (IP) Layer and above.
- Support for traffic-based Class of Service (CoS).
- Support for Multicast Injection and Replication.¹¹
- Handover of Ethernet Traffic to Operator using a WEIL.^{12,13}
- Connectivity is extended automatically as the available footprint, within a Local Exchange Area, expands.
- Usage-based Unicast Billing based on 95th Percentile bandwidth measurement.
- Multicast Billing based on reserved NGN Core Bandwidth.
- Supports multiple, geographically dispersed, handovers, for traffic management and resilience.
- Core services based on Virtual Private LAN Service (VPLS), for maximum flexibility and scalability.
- The support of multiple-VPLS, to enable an Operator to resell service to multiple operators
- NGN Infrastructure will be managed by eircom to ensure that there is no network congestion.^{14,15}

3.1 Fibre Product Features

The following additional features apply to Bitstream Plus products delivered to the end customer over fibre:

- Guaranteed Unicast Bandwidth, downstream and upstream.
- Additional bandwidth available for Multicast.

3.2 Copper Product Features

The following additional features apply to Bitstream Plus products delivered to the end customer over copper:

- Products are 'Up To' – i.e. the maximum attainable bandwidth, for a typical access line, are specified.¹⁶
- Individual installations can be configured for High Speed Internet¹⁷ or with a Stable Profile.¹⁸
- Service terminates on a Copper NTU in a "Wires Only" solution.
- Operator provides own DSL Modem.¹⁹

¹¹ Multicast Solution supports IGMPv2 and IGMPv3.

¹² A Wholesale Ethernet Interconnect Link (WEIL) is a separate product with its own product description, and supporting collateral.

¹³ The full range of available WEIL handoffs, e.g. in-building, in-span and customer-sited, are supported.

¹⁴ Ongoing capacity management of the handoff WEIL, to ensure sufficient Unicast and Multicast bandwidth, is the responsibility of the Operator.

¹⁵ Under normal network conditions

¹⁶ The actual attainable bandwidth depends on the characteristics of the individual copper line, and associated DSL equipment.

¹⁷ High Speed Internet is 'Rate Adaptive' in both directions. It gives maximum bandwidth, with minimum latency.

¹⁸ The Stable profile is designed primarily for IPTV and is non Rate Adaptive in the downstream direction.



- Multicast Traffic shares available bandwidth with Unicast.
- The DSL Line Profile can be changed by the Operator, up to the maximum bandwidth supported by the copper line.

3.3 Key Benefits

The foregoing features provide the following key benefits, for Operators:

- Operators can add ultra high speed Broadband, and multi-play options, to their product portfolio.
- Operators can choose their own AAA (Authentication, Authorisation & Accounting) solution.
- Operators can design individual Multicast Solutions, independent of other Operators implementation.²⁰
- Operators can prioritise individual customer services, in terms of the Quality of Service required.
- Operators can provide their own VoIP Solution, or use eircom-provided POTS.
- Operators can resell to multiple resellers

3.4 Unicast Redundancy

Bitstream Plus Unicast redundancy allows the Operator to order multiple BPU logical connections to multiple WEILs, in order to provide redundancy for the same BPU access traffic. The VPLS is local to the NGN node and there are separate services going to the different WEILs. This protects against failure of the BPU connection or the WEIL. Broadcast traffic (e.g. DHCP Discover messages) will be forwarded to both WEILs. Unicast traffic will be forwarded to one WEIL based on MAC learning in the VPLS. Split horizon is applied to the VPLS to prevent routing loops.

3.5 Multicast Redundancy

Bitstream Plus Multicast redundancy allows the Operator to order multiple BPM logical connections to multiple WEILs, in order to provide redundancy for the same BPM access traffic. The VPLS service on the NGN node is connected to two separate PE nodes within an NGN region. This protects against failure of the BPM connection or the WEIL. If both WEILs are advertising the RP in BGP, then IGMP joins will be forwarded based upon BGP best path selection. The Operator can influence this using the MED. Split horizon is applied to the VPLS to prevent routing loops.

¹⁹ Choice of equipment is a matter for the Operator. The DSL Modem could be a standalone item or the functionality could be incorporated into more complex Customer Premises Equipment, such as a Residential Gateway. In any case the DSL functionality must comply with the Copper Loop Frequency Management Plan, and any other criteria that might be specified by eircom from time-to-time.

²⁰ An Operator can use any valid Multicast Address Range, regardless of what addressers other Operators use.



3.6 VLAN Management

End-user CPE: The Operator is required to tag traffic with a VLAN (VLAN ID 10).

3.7 Vectoring Standard (FTTC)

Operators are obliged to ensure that all equipment connected to the network is compliant with Recommendation ITU-T G.993.5 for vectoring.

3.8 NTU Installation (FTTC)

Operators have the option to install the customer NTU on behalf of eircom on an exchange by exchange basis. Once an Operator has selected an exchange where they will install the NTU then all customers of that Operator in that exchange that do not have an existing NTU, must have the NTU installed by that Operator.

4. Bitstream Plus logical connectivity

Bitstream Plus products avail of the logical connectivity to configure the connection between the Operator's network and the NGN Aggregation Node. This logical connectivity links each access node (NGA-AN)²¹ and the Operator's nominated Wholesale Ethernet Interconnect Link (WEIL)²². The means of ordering and assuring this Bitstream Plus logical connectivity service is common, across all Bitstream Plus products. It must be ordered individually for each reseller, for each NGN Aggregation Node. Multiple handoffs, for resilience or load sharing, are supported with a separate logical connection required for each. As the eircom Wholesale NGA footprint expands, and additional NGA access nodes are added to a NGN Aggregation Node, the connectivity is automatically extended, without further Operator intervention.

4.1 Bitstream Plus Unicast

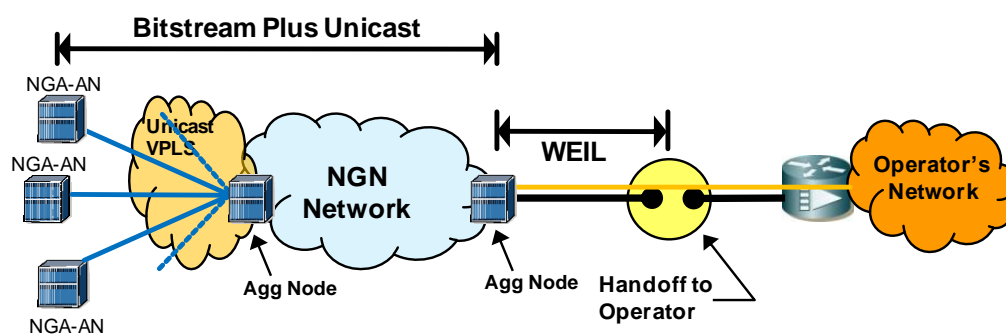


Figure 3: Bitstream Plus Unicast Service

The core Bitstream Plus connectivity is Unicast which supports an individual connection for each active session for an end-customer, or application. Unicast traffic, from each access node within an NGN Aggregation Node footprint, is assigned to a single Virtual Private LAN Service (VPLS)²³. Additional access nodes within that area will be joined to the VPLS by eircom, as the Bitstream Plus footprint expands. Traffic from individual end-customers is uniquely identified by means of the CSID (Calling Station Identifier) which is included in each information frame transmitted. Aggregated traffic, from all end-customers within that NGN Aggregation Node footprint is then presented in a single VLAN, at the Point of Handover. The Option82 Calling Station ID (CSID) format is as follows:

Fibre access:

```
<OLT Name>xpon<Frame>/<Slot>/<Port>:<ONT>.<GEM>.<VLAN>
e.g. SND99 xpon 0/1/0:6.1.10
```

VDSL2 access:

```
<MDF>_<Cabinet><Node> eth <Frame>/<Slot>/<Port>
e.g. DDM1_061A eth 0/2/0
```

²¹ Each end-customer is connected to the NGN network via an access node. The type of node varies, depending on the access medium. For fibre it is an Optical Line Terminal or OLT while for copper it is a Digital Subscriber Line Access Multiplexer or DSLAM.

²² A Wholesale Ethernet Interconnect Link (WEIL) is a separate product with its own Product Description.

²³ Multiple VPLS is supported for multiple resellers



The handoff to the Operator is over a Wholesale Ethernet Interconnect (WEIL), which may be at the same node', i.e. within the same Local Exchange Area, or in the same Region, or in a different Region. The Operator nominates a SAB²⁴ on the WEIL on which the VLAN carrying this traffic is to be presented.

4.2 Multicast Principles

Unicast is inefficient for Broadcast TV applications where multiple end-customers simultaneously consume the same information. Even if hundreds of consumers were watching the same TV Station, each would receive a unique stream from the Service Head-end.

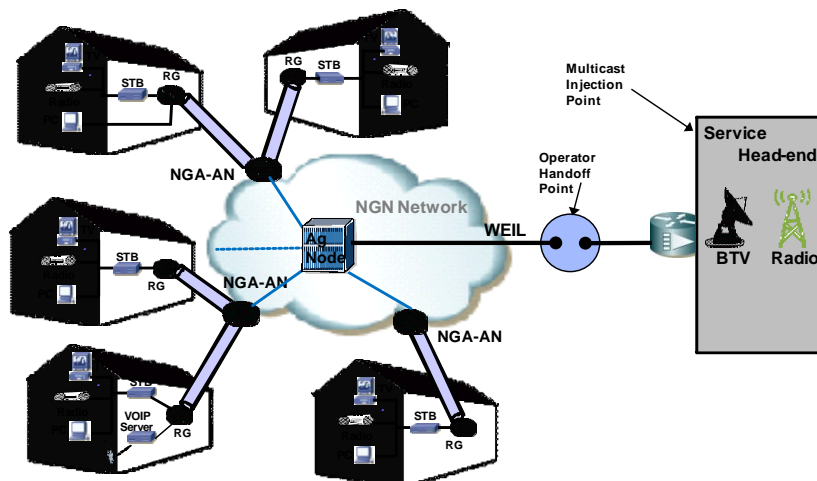


Figure 4: Multicast Principles

With Multicast, see Figure 4, a single copy of each stream, e.g. every TV Channel offered by an Operator, is carried from the Operator's hand-off point, through the core network, to the NGA-AN and through the access network. At no point in this path is the broadcast stream replicated unnecessarily.

The CPE (e.g. a Set-top Box) on the end-users premises uses the Internet Group Management Protocol (IGMP) for requests to "Join" or "Leave" a broadcast stream. The End-User's CPE sends an IGMP Join to multicast group 239.1.1.1 (IGMP v.2 is supported) to the ONT/DSLAM.

²⁴Service Access Bandwidth (SAB) is a logical partitioning of bandwidth in the WEIL.

4.3 Bitstream Plus Multicast

All Wholesale NGA Bitstream Plus products support Multicast²⁵, which is available as an additional service. Internet Group Management Protocol (IGMP) Version 2 and Version 3 are supported.

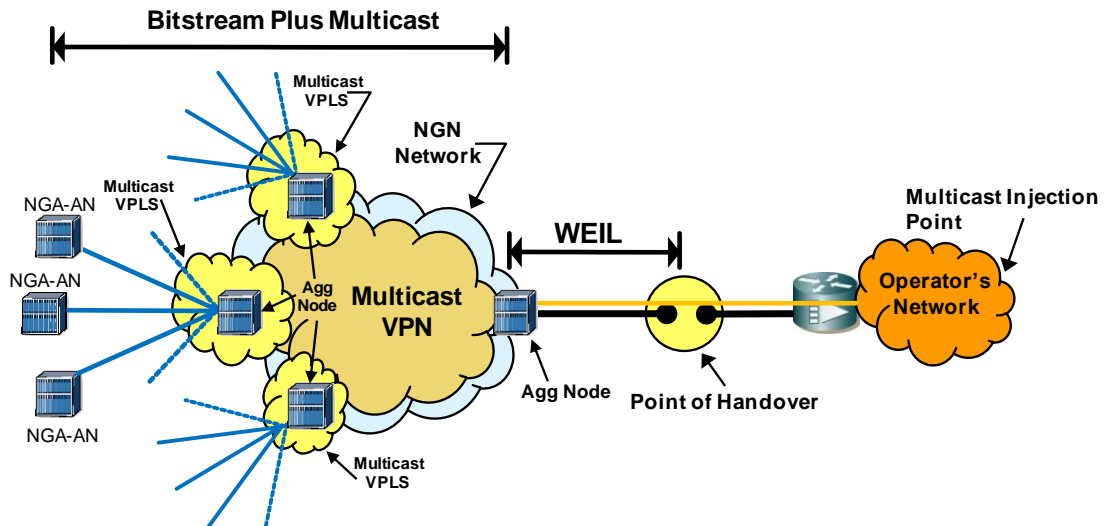


Figure 5: Bitstream Plus Multicast Service

Where Multicast is required for a single Egress Group, a dedicated VPLS, to handle all Multicast broadcasts within a NGN Aggregation Node is set up. All VPLS's for an Operator are joined to a single Multicast-VPN (M-VPN), as shown in Figure 5. Multicast traffic can be presented on a VLAN on the same SAB as the Unicast traffic, or on a dedicated SAB as shown in Figure 7.²⁶ Using a Multicast-VPN means that each Operator can use any valid Multicast Address Range - even where Multicast IP Addresses overlap between different Operators using the eircom Network. Further details are given in the Bitstream Plus & Virtual Unbundled Access Technical Handbook.

Where Multicast is required for multiple Egress Groups, a dedicated VPLS, to handle all Multicast broadcasts within a NGN Aggregation Node is set up for each Egress Group, as shown in Figure 6.

²⁵ Some current generation Bitstream Plus products do not support Multicast.

²⁶ It is the Operators responsibility to nominate the WEIL and SAB on which each VLAN is to be presented.

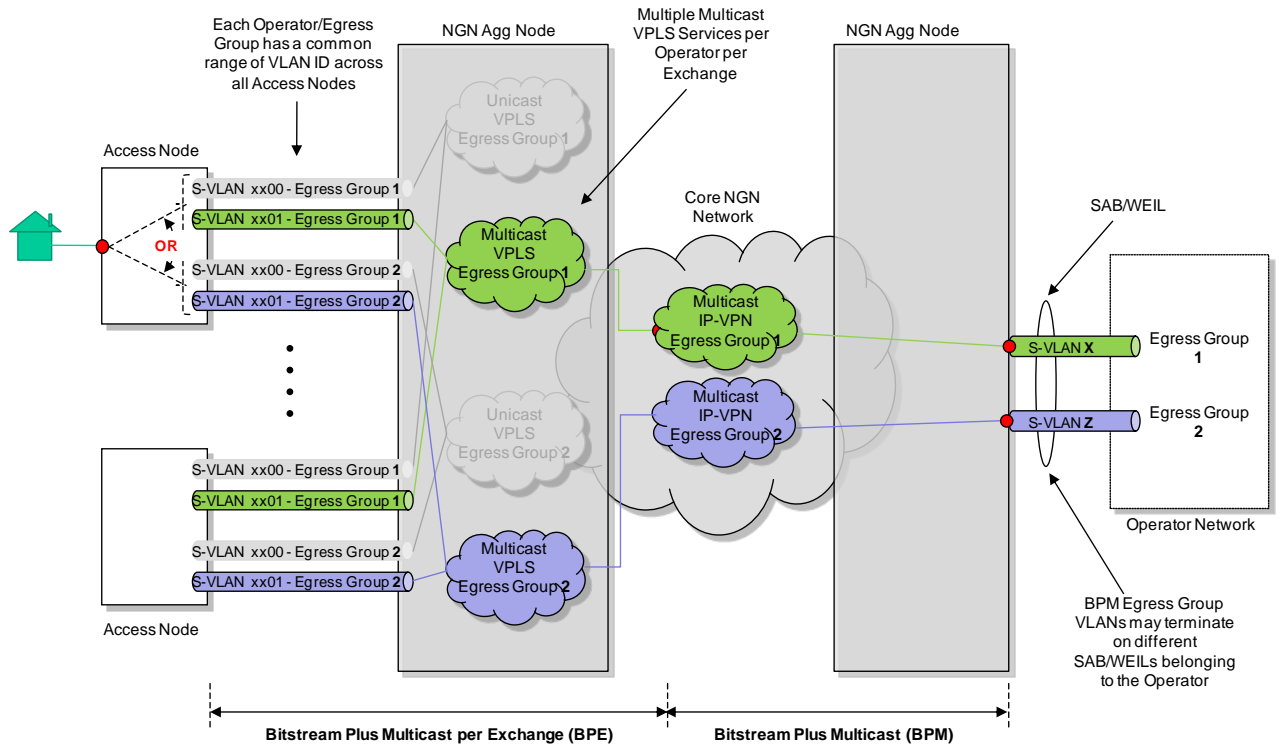


Figure 6: Bitstream Plus Multicast Service with multiple Egress Groups



4.4 Operators Handoff Point

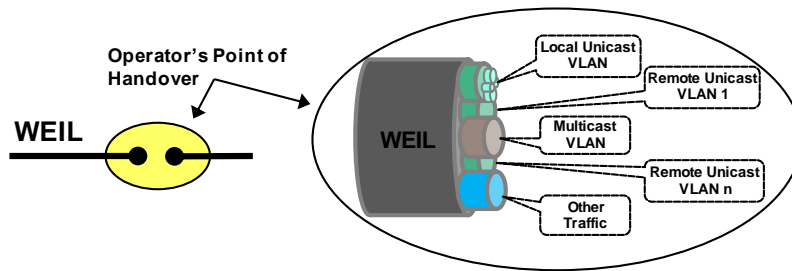


Figure 7: Operators Handoff Point

A standard WEIL product²⁷ is used to provide the interconnect link between eircom's and the Operator's networks. While the WEIL is a separate product, it is important to outline how the WEIL interacts with the NGA Bitstream Plus products. The Operator nominates the WEIL and SAB on which each VLAN is to be presented²⁸. This gives the Operator maximum flexibility, when configuring their solutions. A typical configuration, where a single WEIL is used for all for all Operator Traffic, is shown in Figure 7. Multicast traffic is injected on a single VLAN, and uses a dedicated SAB. Unicast traffic from multiple Local Exchange Areas is presented in a single SAB. Multiple Unicast SAB's to allow a level of geographic separation, are used. Other traffic²⁹ is presented on a separate SAB, as requested by the Operator.

Multiple Handoff WEILs

The Bitstream Plus service supports multiple handoff WEILs, which could be geographically dispersed within the NGN footprint. Multiple handoffs allow highly available solutions, with multi-site resilience, be built. Traffic can also be managed on a geographic basis, as Operator needs dictate. Multiple 'Multicast Injection Points', allow broadcast feed diversity or more efficient handling of regional content. Where multiple WEIL's are provided, the Operator nominates the WEIL and SAB on which each individual VLAN is to be presented.

²⁷ As described in the Wholesale Ethernet Interconnect Link (WEIL) Product Description.

²⁸ Note that this is per Egress Group

²⁹ Traffic that is not Bitstream Plus related.



4.5 Traffic-based Class of Service

All traffic carried in Access Network will be assigned to one of three Class of Service (CoS) queues:

- Expedited Forwarding (EF)
- Assured Forwarding (AF)
- Standard or Best Effort (BE)

The Operator can dynamically map their end-user traffic, to any one of these three categories. This provides an Operator with the ability to manage and prioritise their upstream and downstream traffic.

Upstream and downstream traffic should be marked using 802.1p marking.³⁰ The marking scheme is as follows:

C-VLAN 802.1p Marking	Forwarding Class
4	EF
2	AF
0	BE

Figure 8: Mapping of C-VLAN p-bits to Forwarding Classes

This marking will be honoured in the Access Network and the Wholesale Ethernet Interconnect Link (WEIL) at the Operators Handoff point. Traffic with other 802.1p markings, not specified above, will be mapped to the STD (Best Effort) queue.

4.6 CPE Management

Operators can implement their own device management platform for their Residential Gateway (RG) and other CPE³¹, e.g. using a protocol for communication with the RG over the eircom network. (TR69 Remote Device Protocol is one such protocol.)

³⁰For Multicast, an EF CoS will be automatically applied.

³¹In this context CPE (Customers Premises Equipment) refers to Operator's equipment, subsequent to the Service Termination Point.



4.7 Ordering the Bitstream Plus Logical Connectivity Service

Orders for the Bitstream Plus Logical Connectivity Service (Bitstream Plus Unicast and Bitstream Plus Multicast) use the Unified Gateway Infrastructure Orders.³²The Bitstream Plus logical connectivity service consists of a number of individual components, each of which must be ordered separately³³.

Bitstream Plus Unicast

BPU – Bitstream Plus Unicast, is the set-up of the Unicast VPLS and the connectivity between the NGN Aggregation Node and the Operator’s WEIL. This connectivity need only be ordered once per NGN Aggregation Node per Egress Group. Additional Access Nodes will be joined to each VPLS, by eircom, as the Bitstream Plus footprint expands.

Bitstream Plus Multicast –

This is the set-up of the Multicast VPLS and the connectivity between the NGN Aggregation Node and the Operator’s WEIL. There are two distinct elements, as shown in Figure 9.

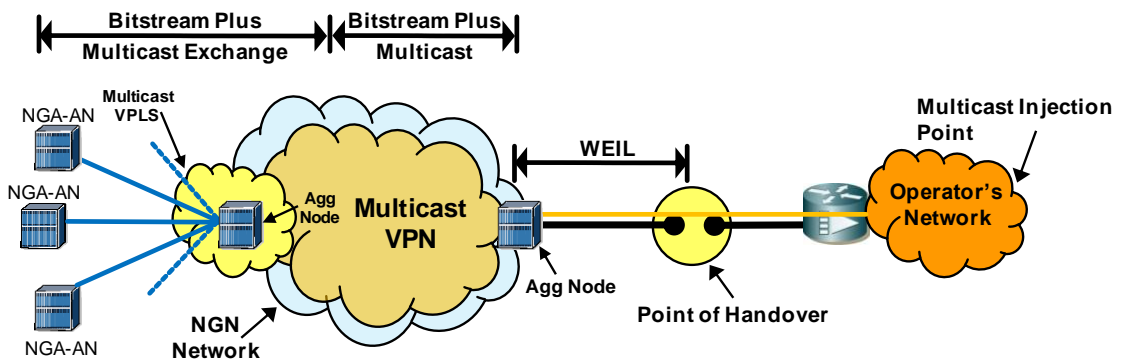


Figure 9: Bitstream Plus Multicast Orders

- **BPM – Bitstream Plus Multicast** –is the configuration of the Multicast service, for an individual Operator’s Egress Group. This capability need only be ordered once.
- **BPE – Bitstream Plus Exchange** –is configuration of the Multicast service per Egress Group, for an individual Local Exchange Area, and the connectivity to the WEIL. This connectivity must be ordered individually, for each Local Exchange Area.

³²There will be no Change Orders available to move a Unicast (or Multicast) VLAN to a different SAB/WEIL. Operators should place an order for the new VLAN to be delivered on the specified SAB/WEIL. When the new VLAN has been delivered the Operator can then place a Cease Order for the original VLAN.

³³An Operator must first order a Wholesale Ethernet Interconnect Link, before they can order any Bitstream Plus service.

5. FTTH Bitstream Plus

FTTH Bitstream Plus Access provides high speed broadband over a Fibre-based Gigabit-capable Passive Optical Network (GPON) network, which uses 1:32 optical splitters in the cabinets.

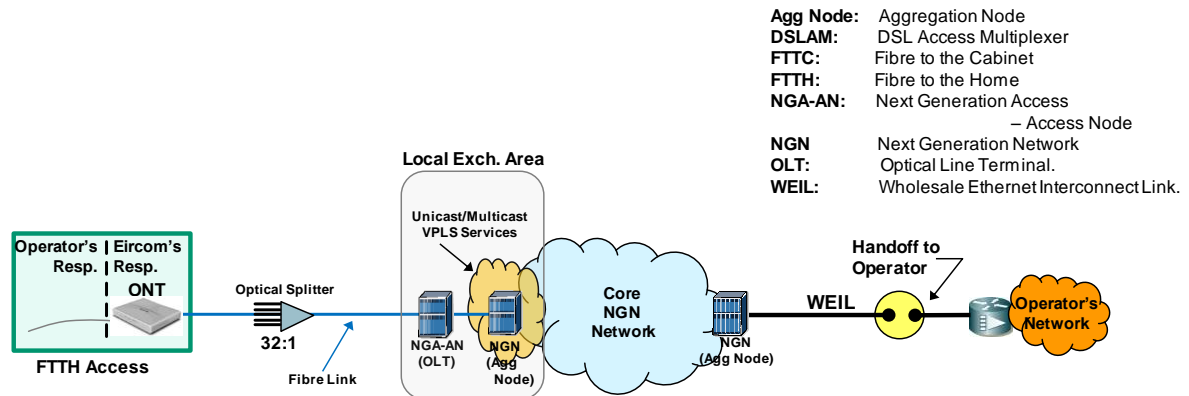


Figure 10: FTTH Bitstream Plus Standalone

A single customer port speed, 150Mb/s Downstream and 30Mb/s Upstream, is supported.

5.1 FTTH Bitstream Plus POTS-Based

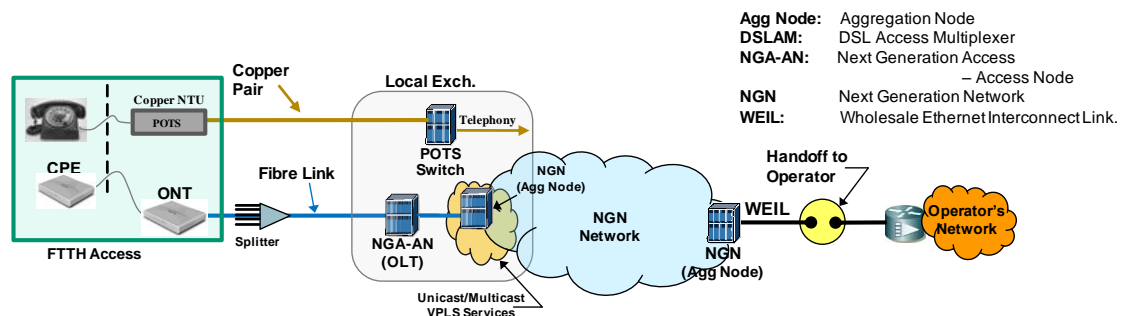


Figure 11: FTTH Bitstream Plus POTS-Based

FTTH Bitstream Plus POTS-Based supports a PSTN voice telephony service, as well as all the features of FTTH Bitstream Plus Standalone. The PSTN service is supplied on a copper access pair, in parallel with the fibre Gigabit Ethernet port of the ONT³⁴, at the end-customers' premises, is the demarcation point for Broadband. A Copper NTU³⁵ is the demarcation point for PSTN.

³⁴ Optical Network Terminal.

³⁵ The technical specification for the Copper NTU is given in the Technical Manual.



5.2 FTTH Bitstream Plus Service Presentation

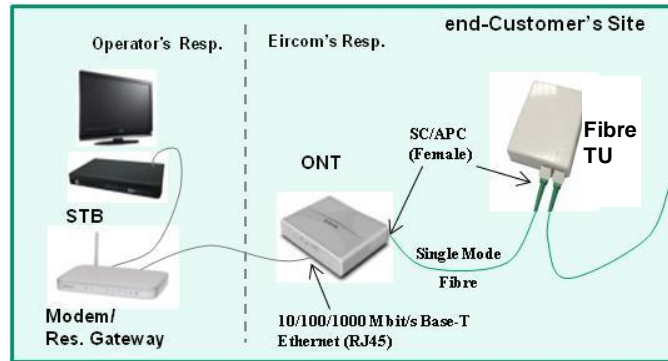


Figure 12: Fibre STP for FTTH

The end-customer Service Termination Point (STP), for all services delivered over fibre, is a Gigabit Ethernet Port on the Optical Network Terminal (ONT). This is an auto-sensing 10/100/1000Base-T Ethernet port (suitable for the insertion of a RJ-45 connector). A single mode fibre patch cord will be used to connect the female (adapter) SC/APC connector of the Fibre Terminating Unit to the female (adapter) single mode SC/APC connector of the ONT.

Where POTS is provided, it is delivered over a separate copper pair and has a separate demarcation point on a copper Network Terminating Unit (NTU). Further information on the service presentation, including the technical specification for the Copper NTU, can be found in the Bitstream Plus & Virtual Unbundled Access Technical Handbook.

The End-User traffic presented at the ONT will be VLAN tagged (VLAN 10). The End-User CPE will generate the 802.1p VLAN ID=10 frames.

ONT Specification:

Power adapter input: 100–240 VAC, 50–60 Hz

End-User Facing Port: Auto-sensing 10/100/1000M Base-T Ethernet port (RJ-45)

6. FTTC Bitstream Plus

FTTC Bitstream Plus Access provides high speed broadband over a dedicated copper pair using VDSL2 technologies from a kerbside cabinet. The kerbside cabinet is connected direct to the exchange via fibre. The bandwidth available to an individual end-customer depends on the characteristics of their copper line.³⁶

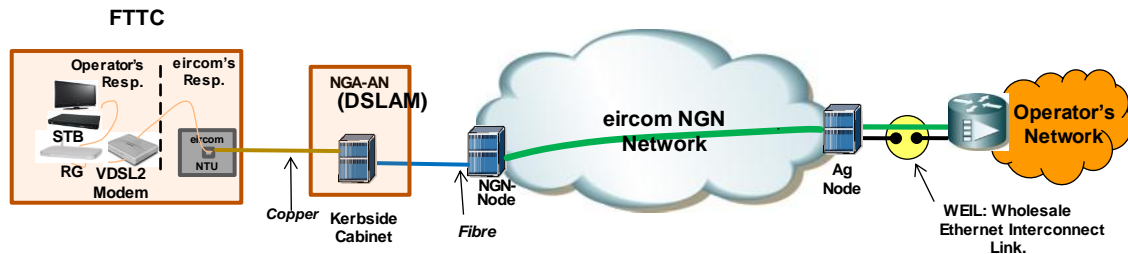


Figure 13: FTTC Standalone Bitstream Plus

The customer port speed depends on the characteristics of the individual sub-loop up to a maximum speed of 70Mb/s Downstream, 20Mb/s Upstream.

6.1 FTTC Bitstream Plus POTS-Based

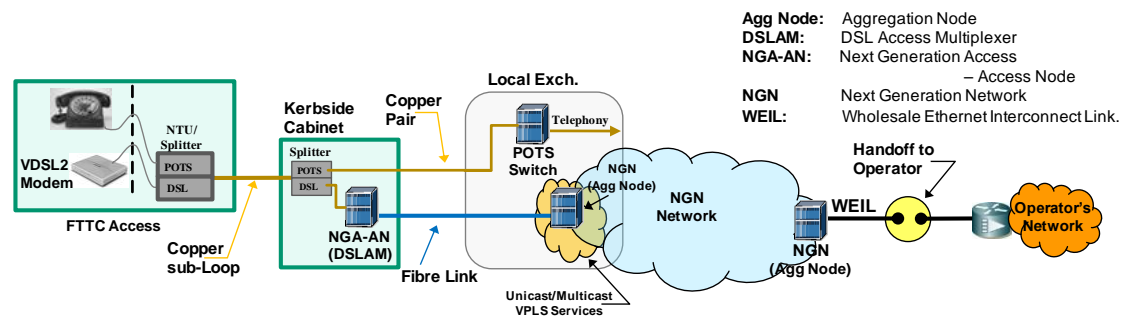


Figure 14: FTTC Bitstream Plus POTS-Based

FTTC Bitstream Plus POTS-based supports a PSTN voice telephony service, as well as all the features of standalone FTTC Bitstream Plus, on a single copper pair. All existing SB-WLR functionality and associated Ancillary Services are available. The dual NTU/Splitter, at the end-customer's premises, is the service termination point. The demarcation point is the copper NTU at the end-user premises; an RJ11 interface is provided for POTS and an RJ45 is provided for VDSL.

The End-User traffic presented at the NTU will be VLAN tagged (VLAN 10). The End-User CPE will generate the 802.1p VLAN ID=10 frames

³⁶ In this instance the 'copper line' is the copper twisted pair linking the customer's premises to the kerbside cabinet. This is often referred to as the 'copper sub-loop'.



6.2 FTTC Line Profiles

A 'Profile' is a set of configuration parameters that govern how a DSL line operates. The FTTC Line Profile determines the maximum downstream and upstream speed for that end-customer and whether that speed is fixed or adapts to varying line conditions. The Bitstream Plus FTTC Access Product supports two profile ranges – one for 'High Speed Internet' and one 'Stable or Non Rate-adaptive' range, intended primarily for Broadcast TV.

Stable/Multicast		High Speed Internet	
Downstream	Upstream	Downstream	Upstream
50	16	70	20
43	16	60	20
40	16	50	20
34	16	50	15
28	15	40	10
20	10	30	8
20	8	25	7
18	7	18	5
12	1	15	3
10	1	12	1
4	1	7	1

Figure 15: FTTC Profiles

The High Speed Internet (HSI) range is 'Rate Adaptive' in both directions – this means that the line speed in each direction varies, depending on local line conditions, up to the maximum value specified by the profile currently set on that line. The 'Stable' range is 'Rate Adaptive' upstream and 'Fixed' downstream. This means that the downstream speed is set by the applied profile and does not vary. High Speed Internet or Stable/ Non-rate adaptive is selected at Order Submission, but can be changed subsequently.



7. Bitstream Plus Access – Ordering and Assurance

The Unified Gateway (UG) should be used for all orders in relation to the provisioning or assurance of the Bitstream Plus Access products. The products will be available within a defined footprint which will be published on the eircom Wholesale website. The product may be ordered for new end-customer connections and a suite of both inter-Operator and intra-Operator order types are available. The Multicast element may be ordered as part of the initial transaction, or may be added at a later date. In addition to the normal ordering activity, Operators have the ability to amend the end-customer line profile, for the FTTC delivery mechanism. The UG will process and validate the relevant orders and will provide appropriate notifications for Acceptance and Delivery.

More detailed information can be found in the NGA Bitstream Plus and Virtual Unbundled Access Industry Process Manual.

8. Billing

There are connection, usage, and rental charges associated with the Bitstream Plus NGA Product. Once an order is completed billing shall commence in the next billing cycle.

In the event that an Operator has a query regarding the bill, they should contact their Wholesale Customer Relationship Manager.

9. Commercial

9.1 Pricing

Prices for the Wholesale NGA, Bitstream Plus Product will be published in the relevant eircom Price List.

9.2 Terms and Conditions

Terms and conditions will be published in the relevant eircom Wholesale Agreement.