BT WHOLESALE

BT Wholesale Ethernet

Direct Internet Access (DIA)

Product Handbook, Annex C

In strictest confidence

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Change control

Version	Date	Author	Changes
1.0	March 2022	John Parsons	Etherflow Internet Direct Internet Access
2.0	5 June 2023	Simon Baker	Re-structuring and updates. Addition of Ethernet over FTTP access option

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1 About Direct Internet Access (DIA)

1.1 Direct Internet Access (DIA) Service Overview

Direct Internet Access (DIA) is our main name for this service, but it is also known as 'Wholesale Ethernet Internet' on some of our ordering systems and documentation since it is part of our wider Wholesale Ethernet portfolio.

Direct Internet Access (DIA) is our Wholesale leased line internet access service, offering your customers speeds, performance, and reliability beyond Broadband. DIA offers dedicated and uncontended internet bandwidth, with matching upload and download speeds, available up to 10 Gbps. It offers a direct connection into our BT network which offers low latency and ultra-reliability for data, voice, video, and cloud applications.

1.2 BT Wholesale Ethernet Portfolio Overview

BT Wholesale Ethernet is a national layer 2 Ethernet service available across the UK and Northern Ireland (including Hull but with the exception of Isle of Man, and the Channel Isles) providing high quality connectivity services to UK communication providers for short, medium, and long-distance data applications.

The network services provided have received government CESG (Communications & Electronics Security Group) authorisation through CAS-T certification.

All services were verified and successful against the full Telecommunication Service Requirement version 1.1. For more details on our current CAS-T accreditation, please see the following: https://www.ncsc.gov.uk/commodity-service/network-services

DIA is a capability within our wider Wholesale Ethernet portfolio, utilising an access component (an "Etherway") and virtual connection (an "EVC" or "Etherflow"). For layer 2 point to point, or point-to-multi-point Wholesale Ethernet services the Etherflow is typically known as an "Etherflow Connected" or "Etherflow Dynamic" depending on the type and design of layer 2 connectivity required.

For the DIA product the Etherflow is called an "Etherflow Internet" which is a point-to-point connection, from one of BT's core internet peering sites across the Wholesale Ethernet platform onto an Etherway fibre access. Note: these Etherflow Internet virtual connections will have an "EHTI" reference on our systems.

As it is part of our Ethernet portfolio, you can do the following:

- Order an "Etherflow Internet" virtual connection over an existing Etherway access circuit, without the need to wait for provision of a new access.
- Migrate quickly and easily between layer 2 Ethernet services, and layer 3 DIA services without needing to re-provision the access circuit
- Create hybrid connections across a single Etherway access (e.g. one Etherflow Connected for layer 2 connectivity, and another Etherflow Internet for DIA connectivity, but over a single Etherway fibre access circuit.
- Create resilient and diverse services using a combination of layer 2 and layer 3 Ethernet services

1.3 Key Features and Availability

- Dedicated leased line internet access delivered from BT's internet platform
- Symmetrical, matching upload and download speeds available up to 10Gbps
- A range of access technologies, primarily Ethernet Fibre (100Mbps, 1Gbps and 10Gbps options) but also utilising Ethernet over FTTP (Fibre to the Premises) where coverage exists and where suitable for the required service.
- Range of flexible and scalable bandwidth port speeds within the main circuit capacity

- Uncontended bandwidth
- Wires Only service to enable you, the service provider, to provision and manage your own hardware of choice and offer further value to your customers.
- Simple pricing and ordering via our intuitive online portals and API interfaces
- Target service availability of 99.977% (single circuit delivery), going up to 99.9996% for the most resilient and diverse services (covered in more detail below)
- 24/7 support with 5 hour target fix time (7 hours for Ethernet over FTTP)
- Resilience options available including R02 diverse routing and network level separation. Diverse delivery between layer 2 and layer 3 Ethernet services is also available via our dual-diverse access options.

1.4 Contract

BT DIA (aka Wholesale Ethernet Internet) is part of the Wholesale Ethernet product portfolio and as such can only be ordered by existing Wholesale Ethernet service customers, or those being onboarded as new customers.

If you wish to consume the service as a point to point internet-based service, you will have to sign up to the Wholesale Ethernet Terms and Conditions so please contact your Account Manager for more details.

2 Connectivity Details

For detailed information on the BT Wholesale Ethernet product, please refer to main product handbook, or also SIN 476 (Suppliers Information Notes - https://www.btplc.com/sinet/), which provides detailed technical information on our Ethernet services, including Layer 2 protocols.

This product handbook annex will concentrate specifically on the Direct Internet Access (DIA) service and its EVC variant “Etherflow Internet”

2.1 Etherway Fibre Access

The Direct Internet Access service follows the standard Etherway Fibre access criteria which are:

- Etherway Fibre are provided using an Openreach EAD input product for 100Mbps, 1Gbps & 10Gbps. Please note that 10Gbps access it not available in Hull.
- A maximum radial distance from end user site to an access node for the Etherway fibre access is 25km, extending to 45Km for Extended Reach (ER) fibre options.
- A maximum total network routing distance of 40km, extending to 86km for Extended Reach fibre options.

2.1.1 Etherway Fibre, Etherflow Bandwidth

Ethernet Fibre access ‘Etherflow’ bandwidths are limited to the rate purchased. The ‘Etherflow Internet’ EVC used for the DIA service is no different and is available at bandwidths between 30Mbps and 10Gbps. Available bandwidth or “port speed”) will depend on the size of the Etherway access circuit selected.

Access circuit	Available bandwidth "port speed" options
100Mbps Etherway Fibre access	30 Mbps 50 Mbps 100 Mbps
1Gbps Etherway Fibre access	30, 50 and 100Mbps 150Mbps to 1Gbps in increments of 50Mbps
10Gbps Etherway Fibre access	1Gbps to 10Gbps in increments of 500Mbps

All Etherflow Internet connections will be 'Premium' class of service so are optimised to support delay-sensitive business voice and data applications where low end-to-end delay with minimal packet loss is a requirement.

2.2 Ethernet over FTTP Access

In certain enabled locations, 'Ethernet over FTTP' (FTTP = Fibre to the Premises) connectivity is available. With the infrastructure already in place, delivery should be quicker and easier than providing new Ethernet Fibre. A DIA service using Ethernet over FTTP will be connected to our Ethernet platform, which is separate to the platform used for FTTP Broadband services (Wholesale Broadband Connect). As a result, the DIA Ethernet over FTTP delivery can be considered a different solution to FTTP Broadband, carrying different platform performance, management, support and service levels.

To be able to use Ethernet over FTTP access a customer end site must have Openreach FTTP installed for this service to be available, but we must also have a "GEA Cablelink" to connect back to our 21C Ethernet platform. This Cablelink is provided by BT but may impact delivery lead times if it is not already in place.

Ethernet over FTTP offers a range of Etherway access options, which is based on Openreach GEA component structure. There is a specific Supplier Information Note produced for this access option: *SIN 506: Fibre to the Premises (FTTP) Generic Ethernet Access Service and Interface Description*

FTTP infrastructure is pre-built to selected areas and we have identified two different scenarios.

i) Some premises already have copper product availability, so the GEA Ethernet over FTTP network is pre-built to a Connectorised Block Terminal (CBT) in the street.

ii) For brand new sites (where there is no existing copper network / products) and with the permission of the construction developer, the FTTP network is provided all the way into each premises on site with pre-installation of the Optical Network Termination (ONT) box. As some premises will have an ONT and some will not, there are two different provision lead-times dependant on whether a new ONT is required or an existing ONT can be used (this impacts on provision lead times – see below for more details)

In order to establish whether the GEA Ethernet over FTTP access option is available at your required location we recommend using the BT Wholesale Ethernet Pricing Tool which provides you with a quotation for all bandwidth options and availability, and also identifies whether a new GEA Cablelink is needed. Multiple site quotations can also be processed.

While a top level indication of availability can be obtained from the pricing tool using only a postcode (amber status will be shown if the postcode area has some FTTP coverage), you must select an exact and accurate address to check availability for a given site (which will then return a green status if confirmed availability). Please note that not all addresses in a postcode area may have FTTP installed and available.

2.2.1 Ethernet over FTTP Access Speeds

Ethernet over FTTP service is available in a range of FTTP access options, as outlined in the table below. The availability of each access option, and their supporting speeds may vary by location. All access options are asymmetrical, offering capacity for a higher download rate than upload in theory, but actual service bandwidth will depend on the accompanying Etherflow Internet bandwidth ordered for the service. See the following section for information about the Etherflow bandwidth.

The access options are configured with various parameters, comprising 'Peak Rate' and 'Prioritised Rate' for both downstream and upstream traffic management capability.

The '**Peak Rate'** sets the upper limit of the line transmission capability (between the Headend L2S and the end customer's ONT). This is a maximum "up to" speed, and it is important to be aware that any 'Peak Rate' data packets can be dropped in high usage periods by end customers on the same shared FTTP PON architecture (i.e. all of the end customers served from the same CBT and / or Splitter). i.e. you will not necessarily always experience the Peak Rate depending on contention and other network traffic.

The '**Prioritised Rate'** within the access capacity sets a bandwidth allocation which is lower than the Peak Rate, but importantly it is categorised as traffic that should not be dropped in peak usage periods. The Prioritised Rate therefore can always be relied upon and is suitable for data packets for quality critical services such as 'Linear TV' (IPTV), Voice over IP (VoIP), Telemetry services for Alarms and any other monitoring applications.

Available DIA Ethernet over FTTP Access Circuit Speeds (may vary by location)

Openreach FTTP Access Option	Downstream Mbps ("up to" Peak Rate)	Downstream Mbps (Prioritised Rate)	Upstream Mbps ("up to" Peak Rate)	Upstream Mbps (Prioritised Rate)
40/10	40	15	10	10
80/20	80	30	20	20
220/30	220	110	30	30
330/50	330	110	50	50
500/165	500	220	165	110
550/75	550	110	75	50
1000/115	1000	110	115	50
1000/220	1000	330	220	110

As an example an Ethernet over FTTP access using the 1000/220 access option would offer up to 1000Mbps download peak rate, with 330Mbps of that as a "prioritised rate". For upload it would offer up to 220Mbps maximum peak rate, of which 110Mbps is prioritised. The speeds available from the DIA service will depend on the Etherflow Internet EVC selected though, this is just the potential capacity of the access circuit being used.

2.2.2 Ethernet over FTTP, Etherflow Bandwidth

The Etherflow (bandwidth) running over the Ethernet over FTTP access can be configured either as symmetrical (matching upload and download speeds), or as asymmetrical (faster download than upload). Available port speeds may vary slightly from the underlying access speed option to align with currently available DIA port speeds.

- The BT Wholesale Pricing Tool will allow you to select available port speeds for the underlying access you have chosen as appropriate.

- Available port speeds for the DIA Ethernet over FTTP service are – 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 200, 300, 400, 500 and 1000 Mbps.

2.2.2.1 Ethernet over FTTP, Asymmetrical Bandwidth

To take advantage of the asymmetrical nature of the access, where download capacity is higher than the upload capacity you can choose a port speed equal to the peak download rate. Since the upload capacity will be restricted by the access being used, this port speed will only be available up to the maximum peak rate of the downstream capacity and a lower rate will be experienced on the upload.

- As an example selecting the 1000/220 Ethernet over FTTP access option would allow you to choose an Etherflow Internet bandwidth of 1Gbps. This would allow you to use up to the full download capacity of 1000Mbps (1Gbps) in theory, although keep in mind that only a portion of this (330Mbps in this example) would be "prioritised rate". The service will be able to "burst" in to the additional capacity up to a 1Gbps download maximum.
- Since the upload capacity is limited to 220 on the access, you will be able to use up to 220Mbps peak rate on the upload – even though the Etherflow Internet is selected as 1Gbps. Again, this would include a lower prioritised rate here of 110Mbps and bursting room up to the max 220 Mbps.

In some situations, the available port speeds may not exactly align with the FTTP access option, since the port speeds are standardised across the DIA product, with common port speed options. For instance, a 550/75 access option would only allow you to choose a maximum 500 Mbps port speed for asymmetrical access, since a 550Mbps port speed option is not available on the DIA service. The Pricing Tool will allow you to configure and choose only what is available.

2.2.2.2 Ethernet over FTTP, Symmetrical Bandwidth

It is possible to select a port speed that would provide a symmetrical Ethernet over FTTP service with matching upload and download speeds. This will be limited by the available upload capacity of the access chosen as the smaller of the two.

- If you want to take advantage of the full upstream *peak rate*, a port speed could be chosen aligning to the access speed. e.g. a 1000/115 access would allow you to select a 100Mbps symmetrical service. (Note that 115Mbps is not available as a port speed on DIA). An 80/20 access would allow you to choose a 20Mbps port speed.
- If you want to align the port speed only with the *prioritised rate*, in order to be able to offer more promises around speeds, an appropriate port speed should be selected based on the prioritised rate for the access. E.g. a 1000/115 access has a prioritised rate of 110/50, so a symmetrical port speed of 50Mbps would fit within this limit. The 80/20 access has prioritised rates of 30/20 so a 20Mbps symmetrical port speed could be chosen.

2.2.3 Ethernet over FTTP Access Details

- Physical NTE presentation is by copper RJ45
- At least two power sockets are needed within 1 metre of the main Customer Splice Point (CSP) for FTTP, or within 30m of that point if making use of the 30m extension cable which can be provided upon request on order placement.

- Access Connections should be ordered as VLAN aware so that the subsequent Virtual connections can be fully supported as Class based. You can then mark traffic that is higher priority, and that traffic is given preference in the access connection network.
- As part of the delivery KCIs we will advise you of the upstream speed so that your end user can set their router up to shape the traffic within the parameters of the delivered service.
- If during delivery you want to change the speed of the Etherflow, an amendment can be made to the order or it can be modified subsequent to delivery.
- There may be on occasion Excess Construction Charges (ECCs) which will be charged to you. These are identified during the survey and delivery journey, and you have the option to cancel the order if you do not wish to proceed with the order having been notified of these ECCs.

2.3 Service Connection Options

Service type	Description
Point-to-Point service	This service uses VLAN mapping on the Ethernet switch; you will need to apply VLAN tags.
IP allocation	As a layer 3 internet-based service - IPv4 or IPv6 markers will be allocated as standard with all new Etherflow Internet orders.

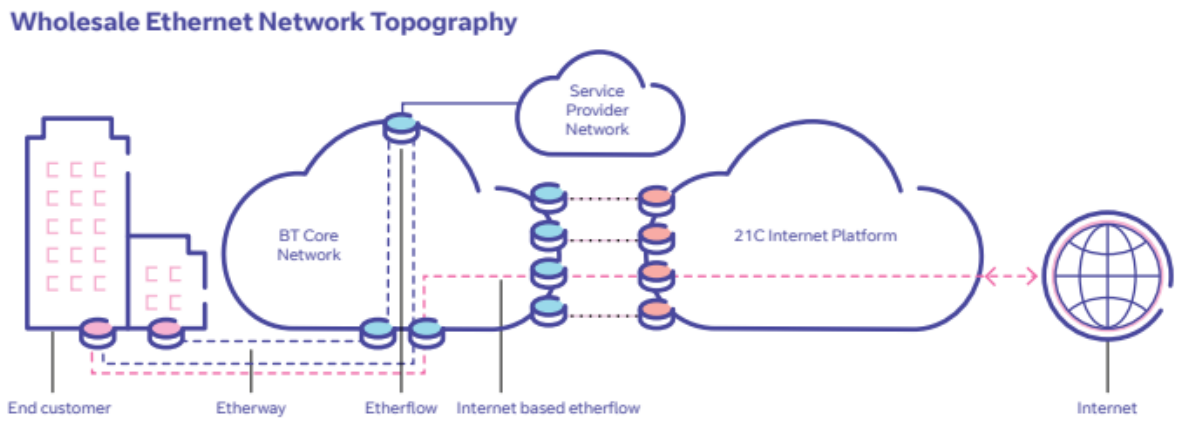
The DIA service delivers a layer 3 internet access based service. This essentially allows you to deliver a direct bandwidth connection directly out to the internet, utilising BT's high-grade peering service, and therefore removing the need to connect and manage additional bandwidth and hardware in your network core. This allows you to offload capacity from your network, or to utilise our internet network and platform should you not have a platform of your own.

The Direct Internet Access service differs from the existing Wholesale Ethernet product as it will only operate as a point to point service. The Etherflow Internet service offers a VLAN interface; from the BT peering network through our core network delivered to a physical connection, typically an Etherway Fibre service, or other delivery technology where available.

The service can be delivered to either an existing Etherway Fibre (with ETHA reference) or to a new Etherway Fibre ordered as part of a bundle via the existing customer order portal. Unlike some Wholesale Ethernet product options, the Etherflow Internet used for the DIA services is always delivered as a "Premium" Etherflow service. There are currently not any plans to offer a "Standard" Etherflow Internet EVC on the Etherway Fibre access like may be available on other Ethernet products.

Note: Etherway Overbooking is not supported as the service is delivered direct from the BT network to the end customer's access.

Phase 1 will not support the service being delivered to or via a hub site or customers data centre.



2.4 Termination Connections and Equipment

The access options ("Etherway Fibre" or "Ethernet over FTTP") are available with several physical interfaces on the NTE:

Access Delivery method	Access option
Etherway Fibre (exc. Hull) 100Mbps	• 100BaseT
Etherway Fibre (exc. Hull) 1Gbps	• 1000BaseT • 1000Base-SX • 1000Base-LX
Etherway Fibre (exc. Hull) 10Gbps	• 10000Base-LR • 10000Base-SR*
Etherway Hull Access 10Mbps **Etherway Hull Access** 1Gbps **Etherway Hull Access** 10Gbps	• 10BaseT • 100BaseT • 1000Base-SX • 1000Base-LX
Ethernet over FTTP (aka GEA: FTTP)	• 1000BaseT

The service provider or end user will need to provide the suitable connecting cables between the NTE and their own equipment.

* For multimode fibre cabling used on the 10000 Base-SR interfaces, this is limited to a maximum cable length based on the bandwidth specification of the multimode cable:

Multimode cable bandwidth (MHz•km)	Operating Distance (m)
160	26
200	33
400	66
500	82
2000	300

Power Supply

Etherway NTEs are provided with mains power only. Stand-by power (battery back-up) is not available from BT; however customers may use their own UPS if desired.

AC power supplies

You can install NTEs using permanent or temporary AC power supplies. You will need a minimum of four 13A, 240V power sockets for each slim line and modular unit. However, you'll be responsible for arranging alternative supplies if a temporary supply fails for any reason and may have to pay wasted visit charges if an Openreach engineer visits because of a failure in a temporary power supply.

For more information, see Distribution of AC/DC power in the Customer Premises Guide at:

https://www.openreach.co.uk/eadsupplementary).

Please note that if an Openreach engineer believes that a trailing lead feeding the NTE isn't installed correctly, they won't continue working on the installation until the issue has been rectified.

2.5 Access Resilience and Diversity

Our Wholesale Ethernet product portfolio now offers 5 resilience and diversity options, offering various configurations for dual access circuit provision. The same options are available on the DIA product, given it is built from Wholesale Ethernet components. Diversity and resilience is only available with Ethernet Fibre access, and is not available with Ethernet over FTTP.

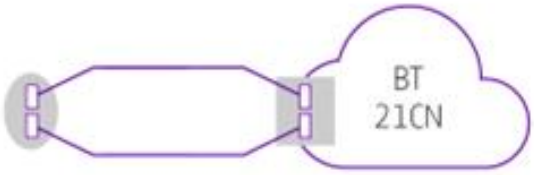
A short summary of these resilience and diversity options is provided here, but full details can be found in the BT Wholesale Ethernet Product handbook available on the Ethernet webpage:

https://www.btwholesale.com/products-and-services/data/ethernet.html

Resilience and Diversity options (diagrams below):

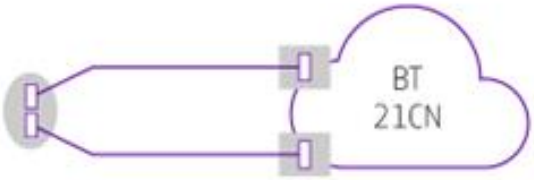
1. **Diverse** – two discrete and separated Etherway access circuits delivered to the same customer site but with diversity with the local routing. Both are connected to the *same* BT access node meaning a shared pinch point to access our network. Routing within our core network will be as diverse and separate as possible beyond the access node.
2. **Diverse Plus -** two discrete and separated Etherway access circuits delivered to the same customer site but with diversity with the local routing. Each is connected to a *different* BT access nodes also giving you network level diversity. Routing within our core network will also diverse and separate beyond the access node.
3. **Diverse Split-site –** the same as Diverse above, but the two access circuits are delivered to two different customer locations and not the same site. This provides access and routing diversity. Both are connected to the same BT access node meaning a shared pinch point in our network. Routing within our core network will be as diverse and separate as possible beyond the access node.
4. **Diverse Plus Split-site –** the same as Diverse Plus above, but the two access circuits are delivered to two different customer locations and not the same site. This provides access and routing diversity. Each is connected to a *different* BT access nodes also giving you network level diversity. Routing within our core network will also diverse and separate beyond the access node.

Etherway Diverse



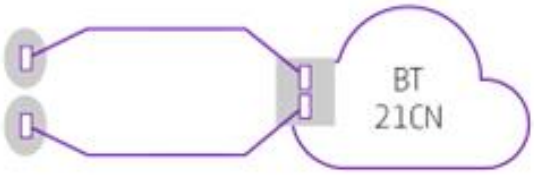
- 2 Discrete Access circuits to a single Node
- Diversity between the 2 accesses is provided between customer and Node
- Both accesses can be used at the same time

Etherway Diverse Plus



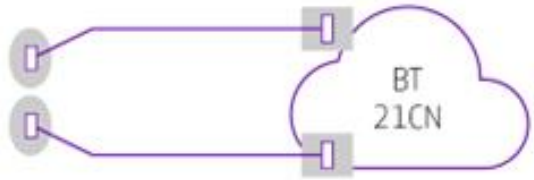
- 2 Discrete Access circuits to separate Nodes
- Diversity between the 2 accesses is provided between customer and Nodes
- Both accesses can be used at the same time

Etherway Diverse – Split Site



- 2 Discrete Access circuits to a single Node
- Diversity between the 2 accesses is provided between split customer site and the Node
- Both accesses can be used at the same time

Etherway Diverse Plus–Split Site



- 2 Discrete Access circuits to separate Nodes
- Diversity between the 2 accesses is provided between split customer site and Nodes
- Both accesses can be used at the same time

2.6 Traffic Class

Class of service	Description
Premium (Etherflow -Internet)	This is an un-contended end to end service, suitable for time critical applications. Bandwidth offered will be in terms of Etherflow bandwidth, where Committed Data Rate (CDR) = Peak Data Rate (PDR). Customer traffic above the Etherflow bandwidth will be policed out and discarded.

The premium traffic class offered on the Etherflow Internet is an un-contended service and is configured so that the Committed Information Rate (CIR) is equal to the Peak Data Rate (PDR). All the traffic within the Service has equal priority and the full bandwidth rate can be utilised. Premium CoS is only guaranteed across the BT network. On reaching the network egress point the service is no longer subject to BTs guarantees.

3 Creating Networks

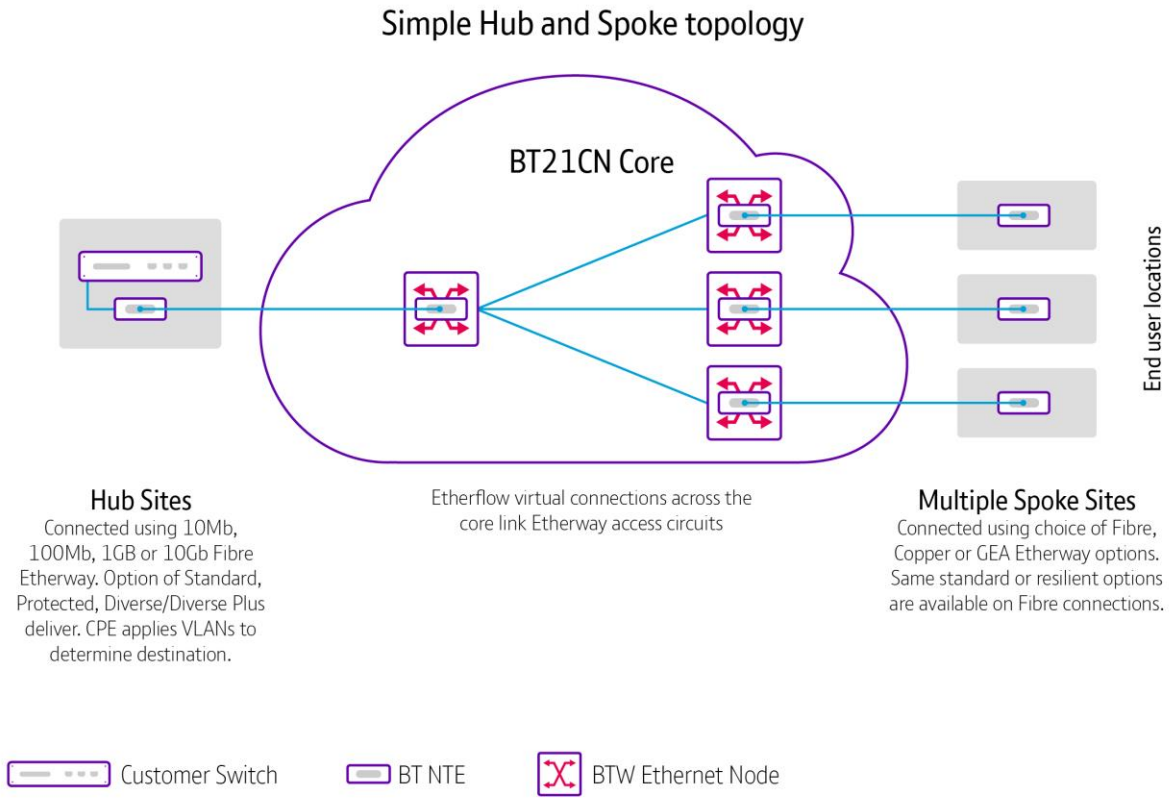
3.1 Point-to-Point Connections

On the DIA service, the 'Etherflow Internet' EVC connections are treated as point to point. The connection is created from one access Etherway to an internet port in BT Wholesale's network.

3.2 Point-to-Multipoint Connections

Etherflow Internet connections are only offered as point to point connections as explained above. However, an Etherflow Internet can be presented on an end user Etherway Fibre access *alongside* a point to multipoint (layer 2) connection that originates from a customer's data centre or hub site.

With the Etherflow Internet service no traffic needs to be forwarded to or through your Hub site. This reduces the complexity of the CPE required at the spoke end.



For creating networks using Wholesale Ethernet alongside DIA, additional VLAN configuration may be required. Please see the Wholesale Ethernet service description and handbook for more detail.

4 Commercial Details

BT Wholesale Direct Internet Access (DIA) is available to Wholesale customers only. Customers wishing to consume the DIA service must sign up to the contract terms and conditions for BT Wholesale Ethernet first. Wholesale customers should address any queries regarding the Wholesale Ethernet terms and conditions, in the first instance, to their nominated BT Account Manager.

Access to the Wholesale pricing tool is provided for quoting purposes. Access is only provided after customers have signed the BT Wholesale Ethernet terms and conditions for service, along with other pre-requisites such as credit checks. Access to the Wholesale pricing tool is via https://www.btwholesale.com/pages/static/home.htm

4.1 Pricing

The pricing model for DIA as stated, consists of two components, an access service (Etherway) connected to BT Wholesale Ethernet core network and an Ethernet Virtual Connection (Etherflow Internet) connecting through the BT core network from the Etherway Fibre into the BT peering point.

The Etherway can be ordered independently from, or as part of a bundle with the Etherway Internet. If pricing an access, as part of your order, you will need to specify the access speed and interface type required at the end customers site and the Etherflow bandwidth required between the site and the BT peering point.

Pricing will depend on the access circuit size, bandwidth selected and the end customer's geographical location, and proximity to a BT Ethernet access node.

4.1.1 Etherway Access

Etherway (fibre) pricing is dependent on access speed required and distance from the BT Wholesale Ethernet access node.

- A distance related charge (main link) from the serving exchange of your site to the Wholesale Ethernet node, if the connection point is outside of the local exchange area. Otherwise, the site would be deemed "local access" and a 0km distance would be listed. Note: main link charges are calculated on a per km (rounded up) rental charge.
- Each local end (Etherway) will incur Connection and Annual Rental charges depending on the term of contract selected.
- All BT Wholesale Ethernet Etherway orders are subject to a minimum of 12-month term period from the date the service is delivered.
- Installation is subject to survey. Excess Construction Charges (ECC) for installation work may at times be applicable to support provision of service and would be identified at the point of site survey.

4.1.2 Etherflow Internet

An Etherflow Internet EVC can be provided on a new access as a bundled order or can be connected onto an existing Etherway Fibre access, subject to the access having enough spare bandwidth available for the connection.

Pricing for an Etherflow Internet (EI) is based upon an annual rental charge aligned to bandwidth required. The connection charges are currently waived for this component.

4.1.3 Wholesale Etherway Hull Access

BT Wholesale Ethernet Etherway Hull Access connections have a fixed connection and annual rental charge. Only a 1-year term option is available for these locations.

4.2 Bandwidth Upgrades ("Flexes")

Etherflow Internet will support bandwidth upgrades, or "flexes", subject to capacity existing on the Etherway access circuit. Modification orders to change the bandwidth on the service can be raised via the ordering tool.

4.3 Pricing Tool

The current BT Wholesale Ethernet pricing tool has been updated to enable the additional pricing of the Direct Internet Access (DIA) service. The pricing tool will enable both single and bulk quotes to be undertaken. Access to the pricing tool in the first instance should be requested via your account manager and is subject to acceptance of the BT Wholesale Ethernet terms and conditions and onboarding process.

5 Ordering and Provision

5.1 Placing an Order

The preferred mode of submitting orders will be through the BT Wholesale online customer portal. For Wholesale to accept and progress the order, you must provide all the relevant information including customer details, fibre access and Ethernet Internet connection bandwidth requirements (including existing connection IDs where applicable), to enable successful order placement and progression.

You are responsible for ensuring accuracy of the details input on your order submission, errors in input could result in delay in the provision of the service. As the service provider you are responsible for keeping your end customer informed of order progress and arranging access and having obtained the end customers consent for any engineering access or installation work required in the delivery of the service. We recommend that you include in a secondary contact point on any order submitted to wholesale to ensure smooth delivery.

As this is a layer 3 internet-based service, BT will be providing IP addressing for the access service (discussed later).

5.2 Order Types Supported

The following order types are supported:

- Provide
- Amend
- Cancel
- Cease
- Modify

Provide orders

Once submitted these order types can be amended or cancelled. Please note that on partial cancels e.g. cancelling the diverse leg of a resilient Diverse or Diverse Plus pair (perhaps owing to high Excess Construction Charges) can only be achieved if ALL components are still undelivered i.e. one Etherway leg has not yet been completed.

Cease orders

Cancellation of Cease orders cannot be requested or cancelled less than 2 working days prior to the Customer Required Date (CRD). If an Etherway (ETHA service) cease order is be cancelled within 2 working days of the CRD then an email request "MUST" be submitted to your respective Service Operations team. Please note that where there is a live service over an existing Etherway, the Etherflow MUST be ceased prior to ceasing the Etherway.

Cease orders which have reached their CRD CANNOT be cancelled, any request to restore service must be via a new circuit (ETHA) order, the standard lead time will be as per the product offering– (33 Working Days subject to survey), no DSO or escalation will be accepted against such orders until the lead time for delivery has been met.

5.3 Order Progress

Order progress can be tracked via the online customer portal. When placing an order, you can choose your preferred medium of communication from a pick list. Information will be provided to you via the requested method at key milestone points known as Keep Customer Informed (KCI) points and at other times during the order journey, as and when relevant.

5.4 KCI Timeline

The Contractual Standard Lead Time (SLT) for an Etherway Fibre access and an Etherflow Internet bundled services is 35 working days subject to survey. The Contractual SLT for an Etherflow Internet is 2 additional working day.

Note: Further details on the ordering process and the KCI's are available in the main Wholesale Ethernet Product handbook

5.5 Excess Construction Charges (ECC)

Excess Construction Charges (ECC) may apply to Wholesale Ethernet and DIA orders where additional infrastructure is required to provide service to the end customer's site. ECC will be identified at the site survey stage and upon notification to you of any applicable ECCs, the circuit order will be suspended as follows:

- If the ECCs are £2,800 or greater, the order will be suspended until your acceptance of the ECCs is received by us
- If the ECCs are less than £2,800, the circuit will progress for a short period of time, but will be suspended if your acceptance has not been received by us within 5 working days of notification

A quotation for ECCs is valid for 30 working days. Following receipt of your agreement to accept the ECCs, the Contractual Delivery Date (CDD) of the order will be re-calculated to consider any suspension period and the nature of the additional work required. If you have not confirmed acceptance of any ECCs within 30 working days of notification, then the circuit order may be cancelled by BT Wholesale.

For larger customers and to improve the delivery process, it is possible to pre-authorise ECC limits, these can provide at time of order entry. See Best Practice Guide on how to provision.

5.6 Cancellation Charges

All DIA orders that are cancelled may incur cancellation charges as set out below depending on how far they have progressed through the provision stage and how much work has already been completed. Cancellation charges will be aligned to the prevailing 1-year connection charge price, even where this charge may have been waived on a 3 or 5 yr term contract.

All days will be calculated as Working Days, i.e. ignoring weekends and public holidays. The full cost of any additional work like ECC (e.g. ducting and cabling) which has been specifically incurred for the order by the time of the cancellation, will be recovered in addition to the cancellation charge.

Ethernet Fibre access (per circuit if providing dual-circuit diverse service)

Fibre Cancellation Policy	**(% of Connection Charge) (Fibre)**			
New Fibre Cancellation Policy	Day 1 to KCI1 + 1WD	KCI1 + 2WD to KCI1.1 + 1WD	KCI1.1+2WD to KCI1.2	Any time after (KCI2 + 5WD)
	Zero charge	Zero charge	50% of Connection charge (Excluding those cancelled due to ECC's)	100% of Connection charge (Excluding those can-celled due to ECC's)

Ethernet over FTTP access

Working days before Contractual Delivery Date	**% of Connection Charge**
3 or less	90%
4-5	75%
6 to 7	30%
8 or more	0%

5.7 Suspended Orders

Wholesale and/or its suppliers may cancel an order when the order has been suspended for a period of more than 90 cumulative calendar days. If Wholesale cancels the order, you must pay the cancellation fees as specified in the tables in the 'Cancellation Charges' section, based on the product that was being ordered.

5.8 Provision Service Level Guarantee (SLG)

Full details of the Provision Service Level Guarantee (SLG) can be found in Section 16 of the 'Schedule to the General terms' of the Contract, which remains the authoritative document in all service level matters. This document can be found in the 'Pricing and Contracts' section of the BTWholesale.com Ethernet product page:

https://www.btwholesale.com/products-and-services/data/ethernet.html

NOTE: Although we offer SLGs on provision order types. SLGs are not paid out on Modify orders.

5.9 Provision Support

Any unresolved technical queries and other reports of provisioning difficulties should be directed in the first instance to the 21CN Data Services Team. Please refer to the Wholesale Ethernet Customer Service Plan for contact and further details.

6 Maintenance

A maintenance package applies to all Wholesale Ethernet services as standard and provides the description and terms and conditions of the repair service offering fault repair work carried out during 24 hours per day, 7 days per week including public/bank holidays.

Self-Diagnostics

You are required as with the other Wholesale Ethernet services obliged to carry out a self-diagnostic test prior to raising a fault with BT Wholesale. A self-diagnostic capability is available via BT's online customer portal from where you enter the Service Reference of the Etherflow Internet virtual circuit (the ETHI reference) and this will return a message to say if Wholesale is aware of a network fault. It will also initiate a check for any alarms occurring at the time.

Loop Tool

This allows your authorised users to apply remote loops to the End User NTE of your Etherway Fibre access (those based on EAD) so that faults can be simply identified to be within, or beyond the BT domain. Test traffic can be generated within your own network and measured returning via the distant loop at the end user location. Loops can be applied to the Etherway at either end of a service; however care is required to ensure you do not apply a loop to a hub Etherway where multiple services are in operation as all will experience a break in service if looped. Whilst the BT portal provides guidance and warning to avoid looping an active hub Etherway the responsibility is on you to correctly apply the loop.

The loops can be applied for various time periods to allow short duration intrusive tests through to longer periods whereby soak tests for potential intermittent faults can be run. The BT fault diagnostics portal provides reports on who and when loops were applied and removed on a circuit by circuit basis.

6.1 Raising a Fault

Your primary method of contacting the Data Services Team will be via the online portal. If the online portal is unavailable, you may contact the Data Services Team by calling **0800 032 3888, option 2**. The online portal (and if it is unavailable your nominated contacts) will be the only point of contact with BT Wholesale for the notification of all faults with the Service and fault resolution. Wholesale will not accept fault reports in respect of the Service directly from an End User. If an End User mistakenly contacts BT Wholesale, the End User will be advised to contact you as their service provider. You agree to advise all End Users that all faults in the Service must be reported to yourselves and not to BT Wholesale.

- The 21CN Data Services Team will receive faults proven to Wholesale network from you
- The 21CN Data Services Team will be responsible for logging the fault details and handling of faults on the Wholesale network and will be responsible for fault clearance notification.

6.2 Repair Portal

The online portal should be used to raise faults into BT Wholesale, raise issues and view and track any reports on the system. The online portal is available via https://www.btwholesale.com

The DIA service has had the repair journey enhanced to support the identification and acknowledgement of its fault process. With the introduction of the internet peering and IP addressing the fault process will look to ensure early identification and the correct response to all faults reported on the repair portal.

6.3 Fault Handling Timescales

On the receipt of a fault, BT Wholesale issues a unique reference number to acknowledge the fault. Fault support is available 24/7, and our target fix times for the Etherway access are detailed below:

Etherway Access Option	**Target fix Time** (and applicable Wholesale Maintenance category)
Etherway Fibre access	5 hours (Cat 3)
Ethernet over FTTP access	7 hours

6.4 Repair Service Level Guarantee (SLG)

Full details of the Repair Service Level Guarantee (SLG) can be found in Section 16 of the 'Schedule to General Terms' of the Ethernet Contract, which remains the authoritative document in all service level matters.

This document can be found in the 'Pricing and Contracts' section of the BTWholesale.com Ethernet product page:

https://www.btwholesale.com/products-and-services/data/ethernet.html

6.5 Planned Engineering Works (PEW)

Planned Engineering Works is a known programme of network engineering work within BT Wholesale's control. We will inform you of any planned and foreseen work we find necessary to carry out within our own network which may affect the DIA service or standards of performance as perceived by you. The request for deferment of a planned outage by you will be subject to negotiation and agreement with each case considered individually.

7 Performance

7.1 End-to-End Service Availability

We have calculated the availability targets based on the four basic configurations of access at both ends of a point-to-point service:

- Standard (single circuit delivery)
- R02 Diverse
- R02 Diverse Plus

Where a Resilience type can be provided with multiple access products, we calculate an overall blended availability, weighted by the numbers of each access type sold, EAD being the most popular type. The end-to-end target service availabilities for each service type are non-contractual (not covered by our SLG) and are listed below:

Ethernet Fibre

	Standard	**R02 Diverse**	**R02 Diverse Plus**
Target Service Availability (blended)	99.977%	99.998%	99.9996%

Ethernet over FTTP

	Standard	**R02 Diverse**	**R02 Diverse Plus**
Target Service Availability	99.977%	Not available	Not available

7.2 Service Performance Levels

Targets for service performance are also provide as outlined below for Packet Loss, Latency and Jitter are targets, although these are non-contractual metrics, not covered by our SLG.

7.2.1 Packet Loss performance target

The performance targets/ stats below are on the BT 21C core network and do not include the access component.

Service CoS	**Packet Loss**
Multiclass "High" & Premium Etherflow (the only option applicable on DIA)	<0.00001 (<0.01%)

7.2.2 Latency Performance Targets (Core)

BT 21C core network latency performance is shown below. For access component please see table further down:

Distance (Radial)	**Latency (Max) – one way**	**Latency (Max) - RTD**
<100km	8ms	16ms
100km-200km	10ms	20ms
200km-400km	12ms	24ms
>400km	15ms	30ms

7.2.3 Latency Performance Targets (Access)

Etherway	**Latency (Max) –one way**	**Latency (Max) – RTD**
Ethernet Fibre	<0.5ms	<1ms
Ethernet over FTTP	Not defined	<2ms

7.2.4 Network End to End Service Jitter

Target performance for the Premium service used for DIA is a maximum jitter of 3ms.

8 IP Addressing

IP routing is the basic principle of enabling traffic to flow to and from the Internet onwards to the customer's Internet facing devices. The IP addressing is an essential building block as public IP addresses (IPv4 and IPv6) are required to ensure unique addresses are identified for each customer, and to ensure traffic is sent and received correctly.

Customers will require public registered IP addresses for their DIA service. It is envisaged that most customer orders for DIA will take the IP addresses issued by BT. These are not transferable to another ISP; this is known as Provider Aggregatable (PA) addressing. It is also possible to use Provider Independent (PI) addressing on the service if you already have an existing PI range. See below for more details.

All new services ordered will automatically be provided with a dual stack service of IPv4 and IPv6. This will future proof your service by providing you with the capability to implement your own IPv6 plans in line with your customers own timeframes without any change to their Internet Access service.

Public IP addresses are controlled under Internet Registry (IR) rules. BT has a relationship with the RIPE Regional Internet Registry (RIR) and is recognised by RIPE as a Local Internet Registry (LIR). This means that BT can allocate public IP addresses on behalf of RIPE for use by BT's end customers.

The DIA service supports both IPv4 and IPv6 standards in a dual stack capability and both will be allocated to the service. A default /29 IPv4 LAN range will be added to the Etherflow Internet order as standard. Larger IPv4 LAN address ranges are available but are a chargeable option and are subject to approval. Pricing is available on the Wholesale Ethernet Pricing Tool for additional IPv4 addresses beyond the default /29 range. A /56 IPv6 LAN range will also be allocated as standard per DIA site.

8.1 WAN IP Addressing

As the DIA service is wires only, with no BT managed CPE provided, the WAN IP addresses need to be allocated on the DIA service to ensure the network access router and the customer CPE can connect to each other.

These IP addresses are not advertised out over the Internet like the LAN IP addresses and are allocated from BT's pool of IP addresses. Both IPv4 and IPv6 WAN addresses are allocated for customers deployed with an IPv6 enabled dual stack service.

Both IPv4 and IPv6 WAN addresses are allocated for customers deployed with an IPv6 enabled dual stack service

- /31 IPv4 WAN range is currently allocated as to the service as standard (2 addresses, one for each end of the link)
- /30 IPv4 WAN range is available via the ordering tool as an option (4 addresses, 2 used for service leaving 2 useable by the customer)
- /29 IPv4 WAN range is available via the ordering tool as an option (6 addresses, 2 used for service leaving 4 useable by the customer)
- /127 IPv6 WAN range is assigned as standard

8.2 LAN IP Addressing - Provider Aggregatable (PA)

For PA IP Address ordering BT use RIPE guidelines to ensure customers are allocated enough IP addresses for their needs, including the specification of exactly how many IP addresses are required and what equipment will be configured with these addresses. It is important to ensure the customers IP requirements are an integral part of the ordering journey.

Critical information that is mandatory on the DIA order is as follows:

- Technical contact details for the customer. The customer technical contact should be IP literate as they will be registered on the RIPE Database and used during the delivery process to interact with the DIA delivery teams.
- The nature of the customer's business e.g. ISP, Manufacturing, Retail, etc.
- The number of IP addresses required for the service. Do not ask for more IPv4 addresses than required and can justify for immediate use.
- An accurate description of what customer equipment the IP addresses will be configured on. E.G. like Firewall, Mail Server, Web Server are acceptable with added detail around the equipment manufacturer and model number required in the RIPE form. Descriptions such as 'general use' are not acceptable and will lead to delays in the delivery of the order.

8.2.1 LAN IPv4 Provider Aggregatable IP Addressing

The customer can request as many IPv4 addresses as they can justify for immediate use. BT will provide a 'standard allocation' of IP addresses for free as part of the service, which is a range suggested by RIPE to suit the needs of a wide range of customers. **The standard allocation of IPv4 addresses provided for free as part of the service is a /29 (Subnet Mask 255.255.255.248) which provides 6 usable IPv4 addresses from a block of 8 (two are needed for our access router and your CPE WAN interface).**

If a customer needs more than the standard allocation of IPv4 addresses, then additional rental charges will apply and will be provided at the time of quoting/ordering the service. For requirements beyond the standard allocation the customer will be expected to provide detailed usage rationale also in line with RIPE requirements. IP addressing information for your service will be communicated during the delivery journey via one of the KCI (Keep Customer Informed) order update emails.

8.2.2 LAN IPv6 Provider Aggregatable IP Addressing

BT use RIPE guidelines for assigning customer IPv6 PA addresses from BT's allocation. The RIPE regulations provide a set design for IPv6 address allocation that allows BT to assign IPv6 addresses on a customer and site basis without the need to capture any additional information than the IPv4 justification provided at point of order.

At a customer level, each customer would be allocated a /48 IPv6 range, with 256x /56 ranges within it. At an individual site level each DIA service would be allocated a standard /56 IPv6 address block from that range, providing support for up to 256 subnets (/64) each with 18,446,744,073,709,551,616 IPv6 Addresses.

	IPv6 Address Allocation	Details
Customer level	/48	A /48 address block is assigned to each customer. This supports each customer by allowing 256 /56 address blocks to be assigned per site. The customer level /48 address allocation is different to how IPv4 address allocation currently works. A customer will not be provided the /48 address allocation as a fully routable IPv6 address block as the service is ordered at a per site level, however if the customer has more than 1 site (FTIP) then the individual /56 address allocations for each site will be assigned from the customers larger /48 allocation.
	IPv6 Address Allocation	**Details**
Site level	/56	A /56 IP address block provides support for up to 256 subnets (/64) each with 18,446,744,073,709,551,616 IPv6 Addresses

A good source of reference for IPv6 is the RIPE site: http://www.ripe.net/internet-coordination/ipv6

8.3 LAN IP Addressing - Provider Independent (PI)

Customers who have their own public IP addresses known as Provider Independent (PI) addresses require a direct relationship with an official Internet Registry body and are wholly responsible for these IP addresses.

Customers can request their own IP address blocks from a Regional Internet Registry (RIR) directly, (if a recognised Local Internet Registry). In Europe the RIR is RIPE http://www.ripe.net/. There are qualification criteria to be met before the RIR will allocate a customer PI addresses. To enable better control of PI Resources (PIR), RIPE has put in place mechanisms which requires BT to include the following conditions in its contracts with Customers who take PI Resources: -

- None of the PI range may be sub-assigned to a third party
- The PI range will return by default to the RIPE Network Coordinating Centre if the customer cannot be contacted when required
- The use of PI range is subject to RIPE policies as published on the RIPE web site and which may be amended from time to time
- Please discuss this with your account manager or specialist if you would like to use a PI range

8.3.1 Provider Independent Address Ordering

For efficient ordering of DIA services with PI addressing the following mandatory information is required during the ordering process:

- Technical contact details for the customer. The customer technical contact should be IP literate as they will be registered on the RIPE Database and used during the delivery process to interact with the DIA delivery teams.
- The nature of the customer's business e.g. ISP, Manufacturing, Retail, etc.

- Either the existing PI address range required to be routed or the indication that the customer wishes BT to apply for PA address space on their behalf
- The Internet Registry body who provided the PI addresses
- The ISP that provided the LIR sponsorship for the PI addresses
- Immediate and forecasted 3-month usage of the IP addresses (as per PA IP address ordering)

Additional RIPE forms will be sent to the account team/customer to fill out during the delivery process. The customer will also need to sign a contractual clause indicating their acceptance of responsibility for the PI address space. Failure to complete and return these will result in delays to the delivery of the DIA service.

- **The minimum IPv4 PI address assignment is a /24 subnet** (Subnet mask of 255.255.255.0 with 256 IP addresses). This is the minimum routable PI address block for IPv4 to meet Internet routing rules.
- **The minimum IPv6 PI address assignment is a /48 subnet**. This is the minimum routable PI address block for IPv6 to meet Internet routing rules

8.4 BT Internet Peering and Backbone

DIA is delivered using BT's high speed, highly resilient, core IP platform, which is used to support a range of services, including DIA, Internet Connect and BT's broadband services. DIA has dedicated Access routers and DNS servers designed, implemented, and managed to provide business grade Internet connectivity. So, although the 21C IPP provides DIA and Broadband transit in the UK, the access into the 21C IPP is dedicated to DIA. Broadband services do not use the same platform as DIA.

Within 21C IPP DIA uses the core IP platform (AS2856), which is connected to multiple UK ISP peers and, via BT's European Internet backbone (AS5400), to tier 1 ISPs for onward global Internet connectivity. These highly resilient peering connections are carrying tens of Gigabits of traffic every second.

The 21C IPP utilises OSPF and iBGP routing protocols internally to provide a highly stable, scalable, and secure IP routing platform that supports BT's Internet Connectivity not only for DIA customers but also for Broadband customers. This provides customers with direct connectivity to the largest Internet customer base in the UK. The DIA service teams proactively monitor the core network infrastructure against DoS (Denial of Service) attacks. One of the main DoS mitigation tools used is Arbor Network's Peakflow SP which enables DIA to monitor traffic flowing into and out of the core network. The tool allows DIA to proactively detect most traffic anomalies and DoS attacks in our core. The attacks can then be managed by cleaning the traffic and blocking the source of the attacks using filters.

9 Billing

Monthly or quarterly billing is available; you may choose the preferred option when setting up your billing account.

Connection (Where applicable, depending on contract term), and any Excess Construction Charges (ECC) are charged in arrears. Service Rental is charged in advance. For Quarterly billing, BT's billing cycle is April/July/October/January.

10 Contact Information

Enquiries about Wholesale Ethernet and Direct Internet Access (DIA) should be addressed in the first instance to your Wholesale Account Team, or alternatively the client reception team

- Tel: 0800 671 045
- Email: clientreception@bt.com
- Information about Wholesale Ethernet, DIA and BT Wholesale products and services is available from the BT Wholesale website available at the following URL: https://www.btwholesale.com

11 Further support and documentation

Various support documents and other collateral can be found via the BTWholesale.com website on the DIA specific page: Direct Internet Access (DIA) - Products & services | BT Wholesale

For more detail about the underlying Wholesale Ethernet product, and the building blocks for the DIA service, see the Ethernet page on BTWholesale.com: Wholesale Ethernet - Products & services | BT Wholesale

You will need to be signed up for an account to be able to access the various documents listed there. Please speak to your account manager if you have any other questions.

12 Glossary of Terms

Abbreviation or term	Explanation
21CN	21st Century Network
BTW	BT Wholesale
CDD	Contractual Delivery Date
CDR	Committed Data Rate
Component	A single Ethernet Asset e.g. Etherway or Etherflow
CoS	Class of Service
CP	Communications Provider
CPD	Customer Promised Date
CPE	Customer Premises Equipment
CRD	Customer Required by Date. Used for notifying & managing the delivery date of component/s
CRF	Customer Requirement Form
CSP	Customer Service Plan

DIA	Direct Internet Access
DSO	Director Service Office
EI	Etherflow Internet
EMP	Equivalence Management Platform, a strategic Openreach system for managing order and fault transactions
ESB	Ethernet Service Bandwidth
Etherflow	A virtual connection (or EVC) running across an “Etherway” access circuit
Etherway	The physical access circuit providing the service
EVC	Ethernet Virtual Connection
FE	Fast Ethernet
FTTC	Fibre To The Cabinet – An asynchronous access option under the GEA umbrella based upon combined fibre and copper delivery utilising VDSL2 technology
FTTP	Fibre To The Premise –An asynchronous access option under the GEA umbrella based upon fibre direct from the exchange to end user site
GEA	Generic Ethernet Access. A term used to define Openreach FTTC & FTTP products
KCI	Keeping Customers Informed – Customer reporting process for provision and repair progression.
LAN	Local Area Networks
LIR	Local Internet Registry
MAC	Media Access Control
MI	Momentary Interruptions
MPLS	Multi-Protocol Label Switching
NTE	Network Termination Equipment
Online portal	BTW’s Portal –provides order placement, tracking, fault reporting & tracking directly with you
PDR	Peak Data Rate
PEW	Planned Engineering Works
PI	Provider Independent, as in “PI range” of IP addresses
PIA	Provider Independent Addressing
QoS	Quality of Service
RIR	Regional Internet Registry
RTD	Round Trip Delay
SLG	Service Level Guarantee
SM	Service Manager
SVLAN	Service Virtual Local Area Network
VLAN	Virtual Local Area Network
VPN	Virtual Private Network
WAN	Wide Area Networks