



# SERVICE DESCRIPTION

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**SiteConnect  
Services**

# Executive Summary

## Service Overview

Thrive's SiteConnect service enables the provision of data services to suit the requirements of the most demanding private data networks on a national and international basis. Connectivity can include integration with third party services such as Cloud based services, data centre connectivity and other service provider networks. Thrive's SiteConnect services are delivered using a combination of standard products which are used as building blocks to create customisable solutions to meet the individual customer requirements.

The service components to build a solution comprise of:

- Full range of access types (including resilience options)
- Cloud based centralised internet breakout
- Hosted firewall services
- Cloud based SIP breakout
- Remote Access
- Fully managed CPE
- Network monitoring
- Quality of Service (QoS)
- Project management
- Migration Support
- Professional Services

SiteConnect is delivered as a fully managed service providing full end to end support from initial technical consultation and design in co-operation with Thrive's CAPS team, ordering and management through our Project Management Office (PMO) and in life support and change management through Thrive's Technical Assistance Centre (TAC).

Thrive's SiteConnect solution offers:

### Maximum Choice

Thrive's provides a carrier agnostic route to market meaning that its customers have freedom of choice rather than being constrained by a single carrier's network and technology. Thrive's customers have the ability to have a solution that can take the best mix of the different carriers' infrastructures and can also readily adapt and change over time.

### Optimal Network Design



Thrive are a carrier integrator rather than an operator; utilising a core infrastructure that integrates the carriers' networks rather than creating a network of our own. In doing so it allows Thrive to produce the optimal network design for our customers using the best, most appropriate technology available.

## Custom Design

Thrive's solutions are delivered using a combination of standard access products which are used as building blocks to create a customisable solution to meet each customer's individual needs.

## On Site Connect Services

### Flexible Connectivity Options

Thrive SiteConnect can be provisioned as either Layer 2, Layer 3 or a combination, providing a flexible scalable solution for each individual customer. Thrive SiteConnect is configured with traffic separation ensuring that it is secure and unique to each customer. Flexible connectivity between sites can be configured as:

- Hub and Spoke (branch sites communicating only with the central site).
- Any to any (all sites able to communicate with all other sites)
- Point to Point Services
- Or a combination of the above

Multi VLAN capability on dedicated Ethernet Access gives the options for providing multiple services across one connection using multiple VLAN's. For example, providing connectivity for MPLS traffic across one VLAN and dedicated internet access across the second VLAN, both on the same physical circuit. This can also be provided for other services such as direct SIP provider connectivity and to Cloud service providers. In doing so customers are able to utilise both networks across one link reducing cost and utilising available bandwidth.

### Virtual Route Forwarding (VRF)

Thrive use Virtual Routing & Forwarding (VRF) to separate each customers traffic within the network. The customer VRF is created on each network device that customer network resides on to ensure traffic separation. A standard naming convention (customer name, core) will be used for each VRF and Route Distinguishers (RD) are used to distinguish the distinct Virtual Private Network (VPN) routes for each separate customer. Route Targets (RT) are used to maintain uniqueness among identical routes in different VRFs, route targets can also be used to share routes among customer specific VRFs. We can apply route targets to a VRF to control the import and export of routes among it and other VRFs.

Provider based VPNs (MPLS based) are provided to customers connecting directly to an MPLS enabled PE (Provider Edge) Network devices using industry standard access methods based on VPNs that support both Private and public IP address assignment. eBGP routing protocol is used between the CPE and PE routers.

## Access Type

SiteConnect offers national & international coverage for many different connections types. Below table shows these options and available bandwidths.

Circuit Type	Bandwidth	Bandwidth Options	QoS Availability
Fibre Ethernet	Up to 10Gb (symmetrical)	2-10Mb (2Mb increments) 10-100Mb (10Mb increments) 100Mb+ (100Mb increments)	4 Classes
Ethernet EFM	Up to 35Mb (symmetrical)	2-10Mb (1Mb increments) 10-35Mb (5Mb increments)	4 Classes
FTTC Ethernet (GEA)	Up to 20Mb (symmetrical)	1-10Mbps (1Mbps increments), 10, 15 and 20 Up to max available.	4 Classes
FTTC	Up to 80Mb (non-symmetrical)	80:20Mb or 40:10Mb up to max available	EF Voice 220Kb
ADSL2+	Up to 24Mb (non-symmetrical)	24Mb/1.3Mb	EF Voice 220Kb
ADSL2+ AnnexM	Up to 24Mb (non-symmetrical)	24Mb/2.5Mb	EF Voice 220Kb

The various access types are described in the sections below. The services to be provided under the Contract will be specified in the Scope of Works.

## ADSL2+/ADSL2+ Annex M

ADSL services require a PSTN line over which it connects to the site.

ADSL is a shared service – and, although private, traffic across the national networks flows over paths that are used by many other ADSL users. As a result, the service may be slower at busy times and cannot be guaranteed. ADSL is asymmetrical; the downstream speed is greater than the upstream speed to suit the typical profile of users. The asymmetry needs to be taken into consideration if a site must upload large files or has other requirements for upstream bandwidth.

The performance of an ADSL connection will depend upon the sites location – in particular the length/quality of the PSTN line. In most areas, the local exchanges now provide ADSL2+ services which achieve up-to 24Mbps on some short lines, with typical speeds for most users being in the 10-15Mbps range on good quality lines.

ADSL2+ AnnexM delivers upload speeds more than twice as fast as ADSL 2+ where it is available, improving performance for file transfers, data uploads and real-time communications. As with ADSL2+ it is a rate-adaptive service, providing the best possible speeds your telephone line will support. Incident Definitions

Each ticket raised will be classified in advance of fault being assigned to the appropriate resource.

The following table provides details of how Thrive defines incident priority, as well as receipt confirmation, engineer response and mean time to resolution target times.

## **FTTC**

Fibre to the Cabinet (FTTC) service requires a PSTN line over which it connects to the site.

FTTC uses Very High Speed ADSL technology between the site and the street cabinet. The cabinet is connected to high capacity fibre linking it, thorough the local exchange, onward to the national network. The much shorter copper line not only has much higher performance but should also be more reliable. As with ADSL2+ this is a shared service and therefore actual speeds cannot be guaranteed.

## **EFM - Ethernet in the First Mile**

EFM also uses the same local copper cable infrastructure as PSTN phone lines and so is widely available. It combines multiple, dedicated copper pairs into a single data service delivering a higher capacity copper data connection than Broadband. EFM does not need, nor does it provide, a PSTN phone service.

The EFM service gives a dedicated connection of between 2Mb to 35Mb depending upon line length and has the strong service level agreement needed to suit those medium sized locations where fibre isn't available and it is useful as backup for sites with a fibre leased line.

Although the headline speed of an EFM service is less than headline speed of FTTC, its throughput of sustained data transfer is higher because it is a dedicated, rather than shared, connection.

## **FTTC-GEA – General Ethernet Access**

Generic Ethernet Access, or GEA for short, is an entry-level form of Ethernet connectivity that uses copper technology between the premises and the cabinet and then fibre to the exchange, before handing data over to the Ethernet network. By utilising copper and fibre as the initial transit technology, costs and installation times are much lower than other Ethernet-based connectivity technologies, but can still achieve symmetrical speeds of up to 20Mbps. GEA services will require a PSTN line to site.

## Fibre Ethernet leased lines

Fibre Ethernet services are delivered to customer's premises via dedicated high-capacity and highly reliable fibre. New installations will be provided on 100Mb, 1Gb or 10Gb bearer circuits and will be provisioned at the initial bandwidth agreed. The service is then scalable with bandwidth upgrades in increments available on short lead-times.

Thrive's agnostic carrier relationships also offer the opportunity to provide resilience at key sites such as server rooms & data centres by using diverse circuits from two different carriers – see the Resilience options section for more details.

## Resilience Options

### Overview

By combining two links from the options available in the Connection Types section; one as Primary and the other as Backup a resilient service can be achieved, by using separate routers for each connection - to avoid any single points of failure - a very high-availability resilient service can be achieved.

The site routers can be configured with a standby router protocol which together with dynamic routing across the dual WAN links & core can provide an automatic backup for the site connectivity.

The dynamic protocols allow fail-over in the event of any single failure of a communications link or router to be 'transparent' so that incoming and outgoing traffic are diverted over backup link with only a short interruption to service.

Note that if the backup link has a lesser capacity – for example a 10M EFM service backing up a 100Mbps fibre service – then during fail-over the service will have reduced throughput capacity.

The pairing of connection types can be chosen to match the sites technical and budgetary requirement from the combinations listed below-

### Fibre and Copper

Since copper is ubiquitous and reasonable level of throughput can be achieved at many sites either with EFM or FTTC services, a cost-effective combination fibre primary & copper backup services are well suited to many sites' needs for connectivity resilience.

The preferred combinations are Fibre + EFM or Fibre + FTTC/GEA. A combination of Fibre + ADSL is technically possible, but unless the fibre service is being used at low service bandwidths, ADSL will be inadequate as a fail-over service.

Ideally fibre from an alternative carrier will be used for the primary connection in conjunction with an Openreach copper connection for the backup. For sites where no alternative carrier fibre is available, Openreach fibre copper should be used.

Depending upon local circumstances the Openreach fibre and copper cables may have separate routing – for example the fibre may be in underground duct and the copper on poles overhead - which achieves some separation and helps to improve resilience.

## Dual Fibre Ethernet – using different Carriers fibre

For Data Centres, larger sites and customer Server Rooms that are in locations where dual carrier fibre is available it's possible to achieve separation of the links over two different physical paths all the way from the customer's site to the core network:

- Carrier A fibre through their local point-presence, across their national network to one NNI
- Carrier B via the local exchange across a different national network to a different NNI

## Dual Fibre Ethernet – using Openreach ‘tails’

For some sites, only Openreach fibre is available, in this case there are two options to achieve the most feasible level of resilience –

### Common Tail routes

Thrive provides a carrier agnostic route to market meaning that its customers have freedom of choice rather than being constrained by a single carrier's network and technology. Thrive's customers have the ability to have a solution that can take the best mix of the different carriers' infrastructures and can also readily adapt and change over time.

A high degree of resilience can still be achieved by two different carriers for most of the link, but both should use parallel Openreach tails between the exchange and the site.

However, it's important that all parties are aware that a common physical route will be used for the 'last mile' of the Primary and the Backup services. This means that physical damage to those ducts or cables – for example being cut by street works – could affect both services.

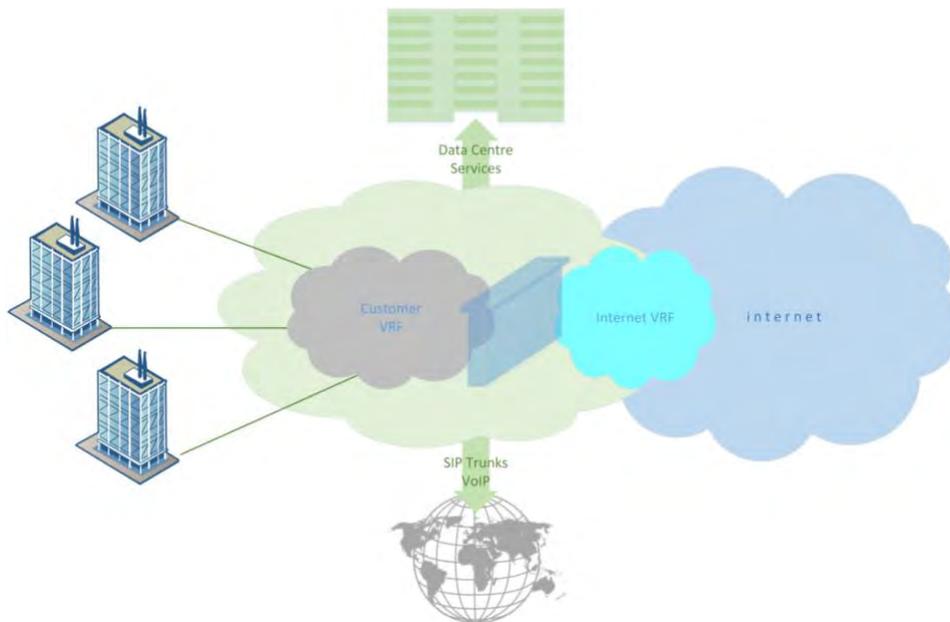
## Openreach Resilience

Alternatively, Openreach can provide the backup circuit via a different route. This will often require a new dig as well as additional cabling. The customer should be made aware that “Excess Construction Charges” for new dig /ducts can be very high and the lead-times long depending upon the location of the civil engineering dig as permissions may be required from landlords, highway authorities, councils, etc.

## Additional Services

The individual sites, each with their various connection types, which make up the wide area network are connected within the core network to an MPLS VRF (Virtual Routing & Forwarding domain) which is created for and specific to each customer. This industry-standard architecture built on the carrier grade MPLS features provided by Cisco ASR9000 series core routers enables us to logically and securely separate our customer's traffic across our networks. This technology also allows us, where required, to enable customer's private WAN to communicate with other network services such as: -

- Internet – via hosted firewalls
- Data Centre & Cloud Service providers
- SIP Trunk Voice over IP services



## QoS – Quality of Service

Thrive's SiteConnect MPLS WAN service provides a private network which supports 4 Classes of Service to enable Priority to be given business critical WAN traffic such as Voice, Video or line-of-business applications.

These IP Quality of Service features are available on all Fibre Ethernet leased line and EFM/GEA 'leased line equivalent' connections. Voice QoS (EF) can also be provided on ADSL & FTTC services up to a maximum of 220k.

QoS can be configured for all or any of the sites with suitable connections; each site can be configured for QoS priorities as required – for example to support -

- appropriate numbers of Concurrent Voice over IP call at each site.
- SIP Trunk traffic from an IP PBX at one of the sites to a SIP Trunk service.

The core network will be configured to honour classified traffic from the router according to the industry standard Data Packet Markings.

There are four Priority classes are available in addition to standard default Best Efforts traffic.

Priority Class	Max % of Service Bandwidth	DSCP Packet Marking
Voice	20%	EF
Gold	25%	CS4
Silver	30%	CS3
Bronze	20%	CS2
Best Efforts	Balance remaining after priority classes (i.e. min 5%)	--

For the basic "Wires-Only" service where the customer is providing the Service Monitoring platform, Thrive will not normally be performing detailed service monitoring & therefore not have visibility of QoS performance.

## Internet Breakout

Thrive can provide cloud internet breakout from the core network providing fully resilient and flexible access to multiple internet service providers. Managed hosted firewalls can also be provided or traffic can be routed to on premise firewalls if required. Please refer to the firewall section below for further details.

For customers taking Internet breakout, Thrive will provide an allocation of fixed public IP addresses. These can be purchased in blocks of 8 IP addresses, 3 of which will not be retained for the service and therefore not

useable. Multiple blocks can be purchased; however, these are provided in accordance with RIPE guidelines and justification will therefore be required to be submitted.

## Internet Breakout

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## Firewall Services

Thrive offer a range of firewall options to support our Internet services, below is an overview of our solutions:

- Centralised Firewall - Scalable 'virtual' internet breakout from the MPLS cloud, or dedicated internet service via high availability managed firewalls in our own or carrier data centres.
- On-premise Firewall- Dedicated managed firewalls provided on site.

The centralised firewall service provides customers with a turnkey solution without the need to implement and manage the service. Thrive will install, configure, monitor and maintain the system in collaboration with our customers to meet individual security policies.

Thrive can also offer hosting within our own or our carriers Data Centres for those customers who wish to accommodate owned dedicated firewalls.

## Centralised SIP

For session initiation protocol (SIP) MPLS WAN can provide a direct VLAN to Gamma via our resilient Network to Network Interface (NNI) ensuring call quality and guaranteed bandwidth for voice services. Thrive partner with Gamma and can provide SIP services directly or just connectivity if Gamma SIP services are already used. Thrive will provision a VLAN sized on the bandwidth required for the number of voice calls from all sites. This can be amended through Thrive's MACD process whenever required.

## Hosting & Cloud Services

Thrive offers hosting within our Data Centres for customers who wish to co-locate existing equipment or can provide access any of Thrive's Cloud services through the SiteConnect service. A dedicated VLAN will be provided to resiliently connect customers to any of Thrive's Data Centres removing the need for additional connectivity circuits and longer lead times. Dedicated links to other cloud providers such as AWS & Microsoft Azure through SiteConnect can also be provided.



## Service Deployment

### Single WAN Connection (Port Based)

The default deployment for a Thrive MPLS WAN service is delivered as a single WAN connection with all LAN ports on the CPE device forming part of the Customer MPLS WAN.

### Trunk option

This option supports more complex LAN requirements including multiple services, customer VLAN's and multiple IP sub-nets. The service is presented as an 802.1Q VLAN Trunk at the customer premises. The Trunk option supports up to a maximum of 5 VLAN's or IP sub-nets as part of the standard solution. Additional VLAN's and sub-nets can be provided should these be required and should be discussed with Thrive's technical support team.

### Two LAN port option

For customers who wish to purchase additional services such as Internet service or SIP connectivity in addition to their MPLS WAN service the "Two LAN Port option is used. This option allows for multiple services to be delivered on the same physical bearer circuit however for simplicity & security each service is provisioned on separate physical ports on the CPE device. Where a wire only service is being provided, it is important to ensure that the chosen CPE device provides multiple ports.

## Customer Premises Equipment (CPE)

### Managed MPLS WAN - CPE

A managed MPLS WAN service is delivered at a customer site via a managed CPE that connects to the customer local area network. The LAN port on the CPE device is deemed to be the network demarcation point between the Thrive MPLS WAN service and the customers site LAN or border network.

In addition to Thrive's CPE device the Telco carrier will also install their own network terminating equipment (NTE) which is the handoff point for their service and a relevant test point. (see Customer Site Requirements section below) Thrive will provide the cable connectivity from the NTE to the router whereas cabling from the router to the customer's network is the customers responsibility. 2 x 13A sockets are required for the Site CPE device and the Telco Carrier NTE. Also, space in a suitable rack will be required to house both the NTE and the CPE devices. The CPE devices supplied by Thrive as part of the Managed MPLS WAN service will typically be Cisco business class models selected to suit the profile of the service provided and will be defined in the Scope of Works.

### Managed MPLS WAN - LAN IP Addressing

For customers purchasing a Private WAN connection, the customer will need confirm the details of the LAN IP range(s) to Thrive to enable the site router to be configured. For sites having a single (non-resilient) connection a single LAN IP address will be needed. This can either be a free address in the current range or, if a migration from an existing WAN is being planned, it could be the same address as the current router provided that the migration plan ensures that the old router is disconnected or shutdown prior to the connection of the new router so that addresses are not duplicated.

Thrive uses the following management IP address ranges: Private ranges used internally are. 10.96.x.x through 10.107.x.x plus 10.254

Any conflicts with these IP ranges must be highlighted immediately. Any re-work due to IP clashes following installation will be chargeable.

## Wires Only MPLS WAN – CPE

The design of the core network places requirements on the customer routers used to terminate MPLS WAN connections. These requirements are summarised below. Please refer to “Wires Only Service Design” section for full details:

- Support BGP routing protocol
- Support SNMP Read-Only access for Thrive basic availability monitoring
- Adhere to the maximum MTU size of 1500 bytes
- Use agreed RFC1918 ‘private’ IP ranges for the WAN
- Avoid specific Thrive Network Management Address ranges
- Optional QoS – used agreed industry-standard Packet marking for QoS priorities

## Wires Only Service Design

### Routing Protocol:

The routing protocol of choice for the Thrive MPLS WAN network is the Border Gateway Protocol (BGP). Our preference is to assign each customer an individual private BGP Autonomous System (AS) number to ease with both the provisioning of the Core network for new sites and to ease troubleshooting of the network should issues arise. On the Edge nodes in the Core, we use the BGP AS number 64900. We usually assign customers an AS number in the 649XX range.

The maximum number of prefixes that we will accept from a single site is limited to 5. Should this need to increase additional prefixes can be included as an optional service and costs will be supplied.

### Recommended Cisco BGP Settings

With a wires only service, the following BGP settings are recommended when connecting to the Core network:

router bgp 649XX

bgp router-id ##WAN Address of Router##

neighbor 1.2.3.4 remote-as 64900

neighbor 1.2.3.4 description Convergence Group Core

neighbor 1.2.3.4 soft-reconfiguration inbound

neighbor 1.2.3.4 allowas-in 1

neighbor 1.2.3.4 password

The following is an explanation of the recommended settings:

Setting	Description
router bgp 649XX	This line of code will start the BGP process on the router. It is strongly recommended that the Thrive assigned AS number is used.
bgp router-id ##WAN Address of Router##	The WAN address of the router will be supplied by Thrive and should be used for the routers BGP id. This greatly eases troubleshooting within the Core network.
neighbour 1.2.3.4 remote-as 64900	This line of code will tell the router where the Thrive peer is. The vast majority of the time, the BGP AS of the peer will be 64900, where this is not the case, the handover document will depict the relevant AS number to use.
neighbor 1.2.3.4 description Convergence Group Core	It is a recommended good practice to place a description on the BGP neighbour that connects to the Thrive network.
neighbor 1.2.3.4 soft-reconfiguration inbound	There may be times during troubleshooting when we need to reset the BGP connection to the Customer Premise Equipment (CPE), to speed up this process, we recommend configuring the soft-reconfiguration option.
neighbor 1.2.3.4 allowas-in 1	As you will be using the same BGP AS number on all sites, there is a need to configure the allowas-in option to ensure that BGP routes are not dropped when entering the router.
neighbor 1.2.3.4 password	To ensure security in the Core network, a password will be assigned. This will be issued to you by Thrive.

## Maximum Transmission Unit (MTU)

We recommend that customers set the MTU on their routers to be 1450 and clear the “Do not Fragment” (DF) bit.

## Recommended Cisco MTU Settings

- Interface FastEthernet 0/0.VLAN
- Description WAN INTERFACE
- ip mtu 1490
- ip tcp adjust-mss 1450
- Interface FastEthernet 0/1
- Description LAN INTERFACE
- ip policy route-map set-df-0
- ip access-list extended match-tcp
- Permit tcp any
- Route-map set-df-0 permit 10
- Match ip address match-tcp
- Set ip df 0
- Route-map set-df-0 permit 999

Note: MTU settings will need to be lowered when using IP Sec tunnels, etc.

## IP Addressing

Within the Core network several private IP ranges are used for link connectivity. It is highly recommended that customers refrain from using any of these IP addresses on their Local Area Network (LAN) equipment. Please do not be alarmed if you see these addresses when performing trace-route operations.

Private ranges used internally are. 10.96.x.x through 10.107.x.x plus 10.254

Other things of note:

10.100.x.x and 10.101.x.x addresses are assigned as a /31 (255.255.255.254) address

10.102.x.x and 10.103.x.x addresses are assigned as a /32 (255.255.255.255) address

10.105.x.x addresses will be assigned depending on the size of the network

10.106.x.x, 10.107.x.x and 10.254.x.x addressing will not usually be assigned, as they are used internally on the Core network

Note: Any conflicts with these IP ranges must be highlighted immediately. Any re-work due to IP clashes following installation will be chargeable.

## VLANs

When supplier WAN circuits are ordered by Thrive, we order the supplier links as an 802.1q trunk with the circuit delivered as a VLAN down the circuit. This is done for two reasons. Firstly, if a second VLAN is ever required down to the site to deliver an additional circuit, then the risk of downtime during reconfiguration is greatly reduced and secondly, it assists with troubleshooting on the Core network.

We have a list of available VLANs that we use on WAN circuits and these are specified by Thrive so that we ensure that no VLAN number clashes occur on the Core Edge equipment.

## Customer Site Requirements

As part of the circuit installation the Telco carrier will install some equipment (NTE: Network Terminating Equipment) at the customers site to terminate their cable.

The detail of the NTE will vary depending upon the carrier and type of connection. The carrier termination point, the router location, suitable power sockets and the connection to the customer's LAN or border network must all be adjacent to each other at each of the WAN sites.

This NTE is maintained by the Telco carrier via Thrive.

The customer should ensure that their site(s) provide the necessary physical and network environment to accommodate the WAN service equipment. The Customers site must provide: -

Customer Site Environmental Requirements		
Environment	Suitable for IT equipment:  Secure, office or comms/server room or equipment rack/cabinet  Dry, Dust free & temperature controlled	
Accommodation	Sufficient space to install & have access for maintenance to  the Network Terminating Equipment (NTE)	
Power for NTE		
	Single circuit	Primary & Backup circuits

13A sockets	1	2
Consumption	between 25W & 75W (approx.)	between 50W & 150W (approx.)

The carriers' circuit termination location, NTE location and Power sockets must all be adjacent to one another and within a standard 1.5m cables length.

Cabling from the NTE to the customer's router or other equipment is not included; this is the customers' responsibility.

## Circuit Presentation

### ADSL, FTTC & GEA

The copper PSTN line is terminated on a standard telephone socket wall box. New line installations may have socket with separate PSTN phone and RJ-11 Broadband connections; existing installations will need a Micro-Filter to provide the RJ-11 Broadband connection. No mains power is required by the PSTN line.

Telco NTE	
Space	standard telephone socket
Power	None

### EFM - Ethernet in the First Mile

Multiple copper pairs are used for EFM – between 2 & 8 lines depending on the service – they are terminated on standard telephone socket wall boxes. NB: these lines do not provide nor do they require a PSTN phone service – they are dedicated to EFM.

Special cables connect the multiple telephone sockets to the carriers NTE device which requires mains power – one 13A socket.

The site router will also require a 13A power socket; therefore, an EFM service will require 2 x 13A sockets in total.

Telco NTE	
Space	standard telephone socket + NTE below
Size (HxWxD approx.)	40mm x 250mm x 250mm plus small external power unit
Mounting	Free-standing / place on a rack shelf (not supplied)
Power	1 x 13A socket – 15W (approx.) <i>plus a second socket for the site router</i>

## Fibre Ethernet leased lines

Fibre cables will normally terminate in a passive unit where the individual fibres are split out. This may be located in an area of the building dedicated to carrier's equipment with a fibre 'tail' entering the customer's office or the customer may have to accommodate the passive fibre unit. The fibre tail will terminate on a carrier optical NTE device which will require mains power – one 13A socket.

The site router will also require a 13A power socket; therefore, a Fibre service will require 2 x 13A sockets in total.

Telco NTE	
Space	standard telephone socket + NTE below
Size (HxWxD approx.)	40mm x 250mm x 250mm plus small external power unit
Mounting	Rack mounting supplied
Power	1 x 13A socket – 15W (approx.) plus a second socket for the site router

## Service Management

The following table highlights the key elements of how Thrive will manage the SiteConnect service.

<b>Service Delivery</b>	Installation lead times are subject to access type and carrier lead times. General lead times are as follows for circuits. Additional lead
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	<p>time will be required for core configuration and router installation where a managed service is provided.</p> <ul style="list-style-type: none"> <li>• PSTN – up to 20 working days</li> <li>• Broadband ADSL/ADSL2+ – 10 working days*</li> <li>• Fibre Broadband FTTC – 20 working days*</li> <li>• Ethernet over Fibre** – as per quote from supplier: 40-90 working days typical</li> <li>• Ethernet EFM** – up to 50 working days</li> <li>• FTTC-GEA** – up to 20 working days</li> </ul> <p>Carrier lead times start once an order has been accepted by the carrier. For acceptance, all sites details need to be provided including on site contacts and site termination details. A completed customer requirement form (crf) will be provided to customers to capture this detail. Provisioning cannot be commenced without the completed detail.</p> <p>Once orders have been accepted the carrier will undertake a survey to confirm the work needed to install the new service. This survey should identify if the standard lead-time can be met or if any additional work is required that adds cost and/or extends the lead-time. If wayleaves are required, the lead-time can be open ended. When delays cause an unacceptable impact to the solution Thrive will work with the customer and our supplier partners to escalate where possible and/or facilitate alternatives.</p> <p><i>*Lead time depends on availability and presence of PSTN line (ADSL/ADSL2+, FTTC &amp; GEA)</i></p> <p><i>**Subject to site survey</i></p>
<b>Service Monitoring</b>	<p>Proactive monitoring ensures our support engineers are alerted as soon as an incident occurs. They can then deal with this in a responsive manner, coordinated by Thrive’s TAC and supporting systems.</p>
<b>Configuration Management</b>	

	<p>Thrive's skilled engineers will update the configuration of the SiteConnect service from the Service Desk subject to a request from an authorised customer representative.</p> <p>These changes will be tracked within Thrive's service management system.</p> <p><i>Note: These configuration changes may be chargeable.</i></p>
<b>CPE Maintenance</b>	<p>Up to 24x7 with 4-hour on-site fix including software support and Vendor TAC</p>
<b>Fault Management</b>	<p>Thrive provides 24x7x365 technical support for troubleshooting and problem resolution from a UK based Technical Assistance Centre.</p> <p>The fault management process will be managed and tracked in Thrive's service management system</p>
<b>Service Level Agreement (SLA)</b>	<p>A comprehensive Service Level Agreement (SLA) with service level guarantees and service credits is provided for each Service offering</p> <p>Class of Service guarantees are also provided based on round trip delay, jitter, and packet delivery</p> <p>All DSL access tails are available with Standard or Enhanced Levels for Repair</p>

## Service Level Targets

Thrive will work to the following targets in relation to incidents and service requests.

## Incidents

Unplanned interruptions to a service, reductions in the quality of a service, or failures that have not yet impacted a service, will have one of the following priority levels assigned.

Where possible, the priority selected should be agreed between the TAC and customer representatives, based on the available understanding of the incident's impact and priority.

Priority & Description	Receipt Confirmation	Engineering Response
<b>Priority 1.</b> A node, system, or cluster is down, is unable to serve data, is in a state of frequent or repeating panic or hang, or is in a state of degraded performance sufficient to prevent normal business operations.	30 Minutes	15 Minutes
<b>Priority 2.</b> A node, system, or cluster is experiencing an infrequent, isolated, or intermittent panic or hang or is in a state of degraded performance that allows business operations to continue, but at an inconsistent or less than optimal rate.	30 Minutes	15 Minutes
<b>Priority 3.</b> A node, system, or cluster is experiencing an issue, anomaly, or cosmetic defect that has little or no business impact	30 Minutes	2 Hours

The priority assigned to each incident may change throughout its lifecycle, in order to accurately reflect the situation as it evolves. Any changes will be with customer agreement.

## Service Requests

Requests for information, advice, and standard changes, will be assigned the following priority and targets:

Priority	Receipt Confirmation	Engineering Response
4	60 Minutes	8 Hours

## Network Performance

Thrive aim to deliver high performance for the MPLS WAN service. The service offers service levels for the parameters of Latency, Jitter and Packet Loss. For the “Wires-Only” service the performance of these parameters must be measured by the customers monitoring systems as Thrive will not normally be performing their own detailed service monitoring.

## Availability & Repair

The target availability for a service depends upon the type of connection and its resilience options and is calculated on a monthly period from the service start date, which is reported to date at each Service Review.

The target fix time also depends upon on the type of connection.

Connection Type	Target Availability per Month	Target Time to Restore
Dual Fibre Ethernet Dual Diverse Fibre	99.99%	6 Hours
Dual Fibre Ethernet One Carrier Fibre Primary & Backup	99.95%	6 Hours
Single Fibre Ethernet	99.5%	6 Hours
Fibre Ethernet Primary EFM / FTTC Backup	99.5%	6 Hours
EFM (Cooper)	98%	8 Hours
FTTC/GEA	97%	40 Hours 20 Hours Enhanced
ADSL	95%	40 Hours 20 Hours Enhanced

For dual connection resilient services, availability is measured with respect to the service as a whole – i.e. a failure of the primary connection where service continued via the backup connection does not constitute unavailability.

Where Thrive have provided a resilient service, this will typically fail over within no more than 5 minutes. This is dependent on the protocol used within the network and will be discussed as part of the low-level design.

## Latency

The MPLS WAN service guarantees the average delay (latency) for IP packets to traverse the network between the Routers at any two of the customer’s sites. Latency varies by connection type, being greater for Broadband shared services than for dedicated services such as Fibre Ethernet leased lines. Lower levels of latency are guaranteed for prioritised Class of Service traffic.

Latency is measured between the interfaces of the site routers and includes their access circuits and the core network. It is for UK mainland sites only and does include any latency arising from applications or customer networks.

Type of Service	Average Latency – ms
Fibre Ethernet leased line – default	<b>50ms</b>
Broadband	85ms
Voice - EF service class	40ms
Gold, Silver Bronze – AF service classes	45ms

## Jitter

Jitter is the variation in transit time of successive packets and too high a level of jitter is disruptive to real-time service such as Voice over IP.

The MPLS WAN service has a guarantee for the maximum level of jitter for traffic in the Voice EF service class. The variation is measured between the Routers at any two of the customer’s sites. It is measured between the interfaces of the site routers and includes their access circuits and the core network. It is for UK mainland sites only and does include; any latency arising from applications or customer networks and does not include traffic traversing the public Internet.

Type of Service	Average Jitter- ms
Voice - EF service class	3.5ms

## Packet Loss

The MPLS WAN service guarantees the average success rate for IP packets traversing the network from the Router at a customer's site. This is measured by ICMP PING between the interface of the site router and a core network router. The level of guarantee varies according to the service class of the prioritised Class of Service traffic. It is for UK mainland sites only and does not include any loss arising from applications or customer networks.

Type of Service	Average Success Rate
Voice - EF service class	99.95%
Gold, Silver Bronze – AF service classes	99.9%
Best Efforts – default	99.8%

## Planned Outages

On occasion, it may be necessary to interrupt the service to a particular site in order to re-arrange the Network. These Planned Outages will be agreed with the Customer and their duration will not count towards time when the Service is unavailable for measurement purposes. These Planned Outages will be undertaken according to any Change Control Process agreed between Thrive and the Customer.

## Timing

Except in an emergency, such work will only be undertaken with the prior agreement and at a time agreed with the Customer, if the Customer is the only affected Party. Thrive shall give the Customer notice in line with the table below, except for where the situation is an emergency where Thrive shall give as much notice as possible. Where there are multiple affected Parties, Thrive shall use reasonable efforts to schedule the Planned Outage at a suitable time for all affected so to minimise any disruption caused.

All necessary equipment maintenance or network upgrade will, wherever possible, be planned to avoid any interruption to the provided Service. In general, such work would be scheduled at low traffic periods to minimise any risk. Thrive scheduled maintenance will be highlighted in the appropriate service reports.

## Customer requested Planned Outage

Interruptions to the Service necessary to make changes at the Customer's request will be planned as part of the change management process and will not be treated as a Planned Outage for the Customer requesting the work.

Only the over run time will be included in the Availability calculation i.e. the time taken to complete the task outside the approv

Type of Maintenance	Notice to be provided
Standard – planned outage scheduled by Thrive or carrier	Up to 10 days' notice, no less than 24 hours
Emergency – where emergency work is required to be carried out to resolve a high priority incident	Up to 24 hours' notice

## Service Credits

In the event of service unavailability, Thrive will credit the customer in accordance with the table(s) below.

### Fibre Ethernet

Service Restoration Time	Service credit as a % of 1 month's rental charge for the affected Service
6 Hours or less	0%
Greater than 6 – less than 10 Hours	3%
10 Hours or greater	8%

### EFM Copper

Service Restoration Time	Service credit as a % of 1 month's rental charge for the affected Service
8 Hours or less	0%
Greater than 8 – less than 30 Hours	3%
30 Hours or greater	8%



In the event of service unavailability, Thrive will credit the customer in accordance with the table(s) below.

Discounts will be applied on a per fault basis and will be capped at 10% of monthly rental per circuit

As a condition of entitlement to SLA credits, the customer shall cooperate with Thrive in addressing any reported service problems. SLA credits are applied only upon customer's written request, which must be submitted within 10 working days of a valid support call reporting the incident and backed up by a reference number to support that claim. This can be submitted to the relevant Thrive staff by 1st class recorded mail, or by email. All approved SLA credits claimed by a customer for a given month will be totalled and applied to that customer's next invoice for the Service, or as promptly thereafter as is practical in the event of a dispute.

No SLAs apply to newly installed services or to service reconfigurations requested by customer, until five business days after:

- The service activation date or
- Completion of the Service reconfiguration, as applicable

The SLAs above apply only in respect of service that is provisioned on Thrive's network and, where applicable, to local access circuits provided by Thrive (via third party providers). Service credits will not be approved for network faults or fibre issues outside of our control.

Exclusions: no SLA credit shall apply to the failure of the service to comply with an SLA, or to any period of service unavailability, caused, in whole or part, by any of the following:

- A failure of customer's own premises equipment or equipment of a customer's vendor.
- A failure in local access facilities connecting the customer to Thrive's network which are not provided by Thrive.
- Force majeure events as defined within the contract for services.
- Any act or omission of customer or any third party (including but not limited to, Customer's agents, contractors or vendors).
- Failing to provide Thrive adequate access to facilities for testing.
- Failing to provide access to customer premises as reasonably required by Thrive (or its agents) to enable Thrive to comply with its obligations regarding the service.
- Failing to take any remedial action in relation to a service as recommended by Thrive, or otherwise preventing Thrive from doing so, or
- Any act or omission which causes Thrive to be unable to meet any of the SLAs.
- Customer's negligence or wilful misconduct, which may include customer's failure to follow agreed upon procedures.
- Any scheduled maintenance periods when customer has been informed of such maintenance, and emergency maintenance.



## Site Connection Upgrades

### Copper services

New installations of Broadband services will either be ADSL2+ or, where available & if required, FTTC. Currently FTTC is the highest Broadband speed service available. If FTTC becomes available to a site using ADSL, it can be upgraded to FTTC. EFM services use multiple copper pairs and connect to dedicated equipment in the Exchange, the upgrade path is more complex and costlier, but in many cases a speed upgrade will be possible, however there is a fixed maximum speed for an EFM service which depends upon sites location.