

LANnet - Next Generation Ethernet

Service Definition

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inTechnology

LANnet Ethernet Service Definition

Service Description

The InTechnology LANnet Ethernet service represents one of the connectivity options within the InTechnology LANnet Service portfolio. It is a high quality, uncontended service aimed at businesses wishing to connect small, medium and large offices, data centres, DR sites etc. to the rest of the corporate network. The Service includes a high specification terminating router that acts as the service demarcation point.

The InTechnology Ethernet Service delivers as many 'bandwidth services' as capacity will allow on the circuit. The bandwidth services include Internet access, private VPN, any of InTechnology's managed data services and Unity IP voice etc. For sites that require extremely high levels of availability, a second ethernet, broadband or 3G connection can be provided to 'back up' the primary circuit should a failure occur.

Several connectivity options exist depending on the bandwidth required to a site and the site location. Ethernet over Fibre services running at 10, 100 & 1000 Mbps can be used to connect premises to the InTechnology core. Ethernet over Copper service is provided using up to eight copper pairs which are bonded together to provide the required bandwidth. Bandwidths from 1Mbps up to 8 Mbps can be provided to connect premises to the InTechnology core. The available maximum bandwidth at a particular site and the number of pairs required to achieve a chosen bandwidth depends on the distance from the exchange.

Ethernet connectivity provides a cost effective and scalable solution for higher bandwidth requirements. It is not necessary to use all of the capacity on the circuit initially. It is possible to order, for example, a 100Mbps circuit and initially only use (and pay for) 10Mbps of VPN traffic. Clearly there is capacity in future to increase the amount of VPN connectivity delivered to the site or to add one or more other services, e.g. an Internet feed.

Service Design

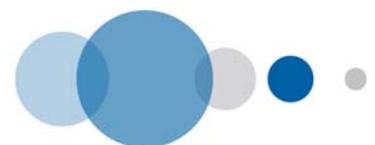
A short-haul Ethernet service is used to connect the customer premises to the InTechnology core via the BT 21CN backbone. InTechnology installs a router or switch on the customer premises and this terminates the circuit. This so called Customer Premises Equipment (CPE) is polled by InTechnology so that failures are identified quickly. Typically the various bandwidth services are delivered to different ports on the CPE for straight-forward deployment. Software on the CPE allows the various bandwidth services to have overlapping IP address space. The end of the circuit that is delivered to the PoP is connected into the core infrastructure. The various layer-two virtual LANs are delivered to the appropriate VPN at the edge of the core network. MPLS is used in the core to offer secure and efficient data transfer to all sites on the network.

Typically short-haul optical fibre Ethernet Services operate at distances of up to 25Km from the nearest PoP. Ethernet over Copper services can only operate up to about 4.5Km from the local exchange. UK coverage for these services is extensive at over 800 local exchanges, but there are parts of the UK that cannot be covered.

Quality of Service

InTechnology can deliver multiple services on a single Ethernet WAN link including Internet connectivity, Private VPN, IP Telephony and SIP trunks. InTechnology applies Quality of Service (QoS) configuration as necessary to support some of these services; most notably QoS is required to deliver the InTechnology voice services.

InTechnology can also apply the QoS model to customer data that is travelling between their sites i.e. within their private VPN. InTechnology offers 4 Classes of Service (CoS)



using the Differentiated Service (Diff-Serve) QOS model. QOS is used to ensure that certain customer traffic is treated differently to other traffic. For example customers may wish to identify and 'prioritise' their business critical application traffic (eg. CRM or Citrix) to ensure that it gets a better level of service than, say, email or Internet traffic. The most common requirement for QOS is to ensure that 'real time' traffic (e.g. interactive voice and video) is given the highest possible class of service.

InTechnology offers four QOS classes as this satisfies the vast majority of customer requirements and can be implemented on cost effective CPE.

When required, InTechnology technical consultants will work with a customer to gather QOS requirements then design and document a policy which will be implemented on the InTechnology network components.

The InTechnology CPE can be configured to identify the various traffic types based on IP addresses, protocol numbers, customer DSCP packet markings etc. The CPE will 'classify' each packet by marking, remarking or trusting any existing customer markings as required. InTechnology treats individual packets according to its classification at various places in the network.

For maximum efficiency, the volume of traffic in the 'Real Time' class is specified in terms of the bandwidth required, the volume of traffic in the 'Priority' and 'Standard' classes is specified in terms of the percentage of bandwidth remaining and the volume of traffic in the 'best Effort' class is that remaining.

Note: Hardware constraints can dictate certain 'steps' for the bandwidths above.

E.g. if a customer wanted 10Mbps 'VPN' bandwidth; of which 2Mbps would be used as an inter-site voice trunk and approximately 2Mbps was required for voice signalling and Citrix, bandwidths could be defined like this:

Traffic Class	Traffic assigned	Bandwidth
Real Time	Inter office voice	2Mbps
Priority	Voice signal + 'Citrix'	25% remaining (i.e. 2Mbps is 25% of 8Mbps)
Standard		
Best Effort	All other traffic	(This will be the remainder i.e. 6Mbps)

Good design practice dictates that limits should be placed on the percentage of traffic allocated to the various classes. InTechnology consultants will provide best practice advice and document these percentages in the QOS policy. The table below shows typical traffic allocation along with default QOS actions.

Traffic Class	Typical traffic assigned	Default action on traffic exceeding the allocation
Real Time	Real Time Voice/Video payload	Drop
Priority	Business Critical	Re-mark – place in Standard queue
Standard	Normal Business	Re-mark – place in Best Effort queue
Best Effort	All other traffic	Drop

The various InTechnology access options (e.g. ADSL, leased Line, Ethernet etc.) have different QOS capabilities as dictated by the underlying infrastructure. Traffic requires end-to-end QOS support. Therefore traffic travelling between two locations effectively has the QOS capability equal to the lower of the links. I.e. traffic travelling from an ADSL connected site to a Next Generation Ethernet connected site (and vice versa) will have end-to-end QOS capability of the ADSL line.

InTechnology's standard set-up and monthly recurring charges include the design, implementation and support of 'QOS'. InTechnology currently deploys two CPE devices, one for lower throughput requirements and one for higher requirements. InTechnology will help determine which device is most suitable for deployment taking into account initial and potential future requirements. If the lower specification device is installed initially and at



some future point the higher specification device is required (most likely due to upgrading Service bandwidths), a CPE upgrade charge will be applied.

No QOS performance reporting information is available at present. QOS performance reporting may be available at some future point and the service may be chargeable.

Lead times

The typical lead time to provide the Ethernet over Fibre Service is 65 working days. If the majority of infrastructure is in-place, this figure can drop to as low as 35 working days. If additional construction work is required to deliver the service; lead times can be in excess of 65 days.

The standard lead time to provide the Ethernet over Copper Service is 30 working days. If the majority of infrastructure is in-place, this figure can drop to as low as 20 working days. If additional construction work is required to deliver the service, lead times can be in excess of 30 days.

Repair Service Levels

The target time for repair of a fault is the time period between fault detection and service restoration. The time starts with pro-active fault detection by the InTechnology service management centre (SMC) or when InTechnology acknowledges the Customer's reported fault.

Service Element	Target Time for Service Restoration
Ethernet over Fibre Access	5 hrs
Ethernet over Copper Access	20 hrs

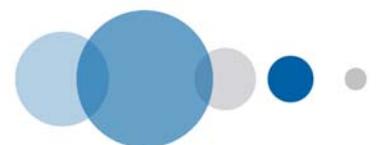
Charging

Charging for these services is based on a connection fee and then on a monthly rental basis and is billed monthly in advance. Installation quotes assume that BT fibre is present at the customer site or sufficient BT PSTN capacity is present in the local vicinity and that the number of pairs required are in line with the nominal distance of the postcode from the exchange, so that no 'excess construction charges' will be levied by BT. If, as a result of a site survey, excess construction charges are identified, InTechnology will re-calculate and submit the revised installation price and monthly charges. If the revised price is unacceptable, the customer has the option to cancel the order.

LANnet Ethernet Service Level Agreement

Service Availability

Service Availability is measured at the on-site router as the percentage up-time seen by the InTechnology network management system. This percentage availability is reported on a monthly and last twelve months basis. The Service Level Agreement offered by InTechnology is that over a twelve month period the percentage up-time will be at least 99.8% for Ethernet over Fibre and 99.5% for Ethernet over Copper.



Service Element	Percentage Up-Time over 12 Months
Ethernet over Fibre Access	99.8%
Ethernet over Copper Access	99.5%

Service Credits

After the access circuit has been in service for 12 months, the customer may claim any service credits due. A service credit will be due if the availability has fallen below the specified minimum availability percentage averaged over the last twelve months, as reported by the InTechnology network management system, adjusted for the following incidents:

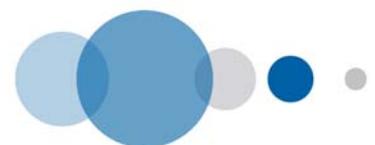
- Service unavailable due to planned or emergency maintenance or during the maintenance window specified in the Customer Service Plan
- Loss of power to the InTechnology equipment at the customer site
- Unauthorised interference with the cabling to the on-site InTechnology equipment
- Faults traced to the Customer or to faults on the Customer's side of the service termination point including local power or local area network failure
- Service unavailable due contractual service suspension or to Force Majeure

Planned maintenance can involve a temporary suspension of parts or all of the services in order to enable InTechnology to undertake vital remedial, maintenance or upgrade work. Controlled outages will always be notified to the Customer at least 7 days in advance and be planned in such a way as to have minimum impact on the Customer's operations.

Emergency maintenance required as a result of identifying a problem through ongoing monitoring and management, that could potentially cause an outage or failure of the Service, will be notified to the Customer at the earliest possible time and be managed in such a way as to have minimum impact on the Customer's operations.

Any service credits due are calculated as follows:

If the availability of a site, measured over 12 months, is lower than the committed figure, a proportionate amount of the annual charge will be refunded by way of a service credit. The proportion will be the committed availability percentage minus the achieved availability percentage. For example, if the committed availability is 99.8% and the achieved availability is 99.5%, the service credit is 0.3% of the annual charge.



InTechnology designs and supports the best IP solutions for business with a range of applications seamlessly integrating clients' communications needs through the delivery of secure voice, data and mobile solutions.

InTechnology employs 200 people and has data centres in Harrogate, London and Reading.

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