



**LANnet Core Service
Definition**

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inTechnology

LANnet Service Definition

Service Overview

Advances in IP and optical networking such as LAN Extension Services (LES), Dense Wave Division Multiplexing (DWDM) and Multi Protocol Label Switching (MPLS) have enabled InTechnology to build a networking platform that can deliver cost effective high value services to its clients. The connectivity options and the portfolio of services which is delivered on this network is called LANnet.

InTechnology developed LANnet to provide connectivity for a variety of services and solutions:

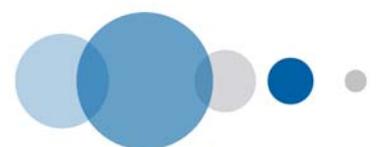
- The IP-VPN service provides IP connectivity between company locations, suppliers, 'extranets' and closed user groups including for example the NHS N3 and the Janet academic network.
- The Point-to-point Ethernet emulation service provides L2 connectivity between company locations.
- Internet connectivity service delivers high availability Internet access to one or more company locations.
- Voice VPN offers Prioritised bandwidth for converged IP telephony services including InTechnology's Unity IP voice service.
- Access to InTechnology's Data backup and replication services VPN.

Using innovative technologies means that customers can move away from older traditional telecommunication deliveries. These methods of delivery can be expensive and inflexible and are typically transported on networks that were not designed to support 'converged' environments.

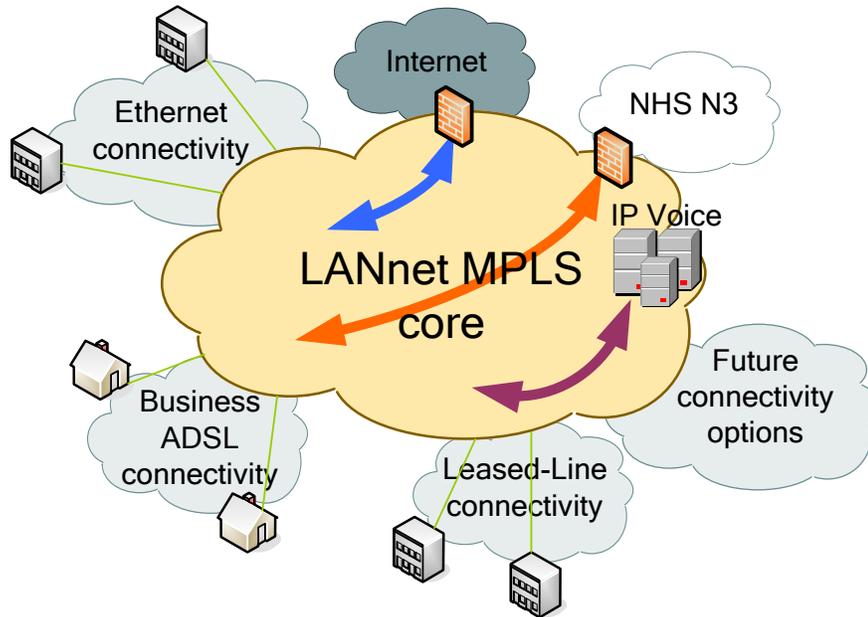
The LANnet Service portfolio gives organisations the flexibility to link sites, people, information and customers together using a secure efficient shared infrastructure.

LANnet uses a resilient high performance network that has been built by InTechnology to enable the delivery of network services, data centre services, voice services and managed data services and which can link sites across England, Scotland and Wales.

Various connectivity options are available and can be combined to offer a comprehensive single network solution meeting complex communication requirements. Each of the connectivity options have their own characteristics; some offer higher bandwidths than others, some have greater geographic availability than others and the service level changes from one option to another. The various connectivity options are detailed in their respective Service Descriptions. In addition to the circuits that connect customer sites to the core network, InTechnology offers Data Centre Ports within its co-location and private suite areas. This allows customers to re-locate their hardware and applications 'in the network core' for greater availability.



The diagram below depicts the InTechnology MPLS core with various customer sites connected to it using a number of the connectivity options. As well as each site being able to communicate directly with one another using the IP-VPN functionality, certain of the sites have access to other 'core' services including Internet access and Centralised IP telephony.

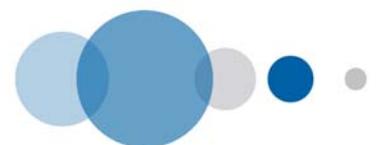


Features

- Most connectivity options are fully managed; InTechnology takes responsibility for network design plus the supply and configuration of a terminating device (CPE / router) on the customer site that acts as the demarcation for the managed bandwidth services. Ongoing CPE configuration support and fault management are also included.
- Most connectivity options can support multiple services (e.g. Internet, VPN etc.) and therefore the service is flexible and scalable.
- Managed InTechnology secure MPLS core network for maximum control.
- Online service portal offering almost real time access to statistical and reporting information.
- Multiple circuit options allow services to be more widely available.

Benefits

- Managed service allows customers to concentrate on their core business
- Service designed for scalability and flexibility
- Designed to support and enhance the entire InTechnology portfolio of services



Options

- Differentiated quality of service model
- InTechnology recommends the provision of multiple circuits to sites that require enhanced resilience and availability. The idea is that, should the 'primary' circuit fail, customer data traffic will be routed over the back-up circuit instead. A member of the InTechnology Professional Services team will be happy to discuss the options available. Most commonly, InTechnology uses a layer 3 routing protocol to automatically route traffic down the 'back-up' link. For the majority of circuit combinations, an outage of around five minutes would be experienced as the network detects failure and routes traffic via the alternative connection. For certain circuit combinations, (currently only when both primary and back-up links are delivered using 21CN Ethernet) this can be as low as 30 seconds.

Limitations

- IP-VPN service does not include encapsulation of non-IP packets (L2 Ethernet supports non-IP packets)
- LANnet does not currently support IP v6

Service Definition

The InTechnology LANnet portfolio comprises of essentially two service types, a layer 2, point-to-Point Ethernet leased line service based on the *Martini draft specification* and an IP VPN Network that complies with RFC2547bis, more information on these standards can be found on <ftp://ftp.ripe.net/>

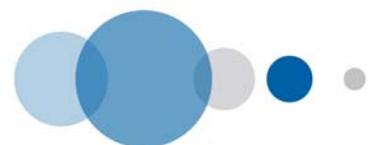
The majority of the LANnet Services e.g. Internet and corporate VPN use an IP VPN as the 'enabler'. Please see the technical description below for details.

LANnet enables the creation of VPN services based on the very latest Multi Protocol Label Switching (MPLS) technology, which makes it fast, flexible and secure.

InTechnology's core network has been designed with high-availability in mind. The LANnet backbone currently consists of a STM16 (2.45 Gigabit per second) DWDM ring using SRP protocol to allow reconstruction (wrap) of the ring in event of failure, this recovery will typically take place within 50ms without data loss. InTechnology strives to improve the quality of services it provides and the exact design is subject to change.

LANnet VPN services are linked directly to InTechnology's UK data centres and network infrastructure and therefore able to support the cost effective 'central' or 'hosted' InTechnology services such as:

- Managed Back-up Service
- Managed Archiving service
- IP Unity Voice



- Virtual Hosting Service
- Internet Connectivity

IP-VPN Service

InTechnology's IP-VPN Service allows Customers to connect their sites, people and resources together using a wide range and scale of connectivity options. A wide range of bandwidth connection sizes from ADSL through to Gigabit Ethernet can be used to link together corporate resources to form an any-to-any Wide Area Network (WAN).

Technical Description

The IP VPN feature for MPLS enables the deployment of scalable IP layer 3 VPN services. MPLS is utilised for the deployment of large-scale IP networks and as such is the natural choice for virtual private networks.

The IETF have developed an RFC, RFC-2547, which describes a VPN model that has been adopted by service providers. The 2547 model uses MPLS to forward packets over the backbone and BGP is used to distribute routes over the backbone. Each 2547 VPN is an individual IP network, with modified private IP addressing for the provider edge (PE) routers that are used to connect customer sites. The route to each of the sites on the VPN is distributed using BGP routing protocol.

The relationship between the PE router and the customer edge (CE) router is the distinctive aspect of 2547 VPNs. The CE router becomes a peer of the PE router, not a peer of other CE routers. The CE router provides the PE router with route information for the VPN. The PE router, in turn, stores multiple VPN routing tables - one for each connection.

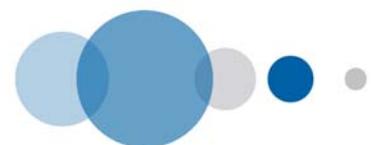
MPLS handles the forwarding between the nodes in the VPN. MPLS forwarding means the routers in the core network, the provider (P) routers, need not know about the routes connecting the VPN. The VPN uses a two-level label stack - the ingress PE router pushes both 'next hop' BGP header (for the VPN) and a 'next hop' Interior Gateway Protocol (IGP) header (for the shared infrastructure) onto the packet. After reaching the egress PE router via one or more MPLS Label Switched Paths (LSP's), the PE router removes the MPLS header and delivers a normal IP packet to the customer site.

Point-to-Point Ethernet Service

InTechnology's point-to-point Ethernet service allows customers to connect their sites, people and resources together using a range and scale of connectivity options. Various bandwidth connection sizes can be used to link together corporate resources in a point-to-point configuration. Using a 'layer-2 data transport' eliminates the need for encapsulation of non-IP packets. This offers immediate support for 'legacy' protocols such as DECnet and IPX etc. The Layer-2 data transport service is not available on all access circuit options.

Technical Description

With point-to-point Ethernet services the goal is to extend traditional Layer 2 services and transport them via a tunnel across the MPLS network backbone. In Layer 2 VPN's the PE router is not a peer to the CE router and as such does not maintain separate routing



tables. The PE routers simply map incoming Layer 2 traffic onto the appropriate point-to-point tunnel.

IP Addressing

MPLS VPNs allow customers with RFC1918 private address space to continue to utilise their present addressing.

LANnet supports existing customer network IP addressing schemes. Most connectivity options support basic IP routing to the CPE subnet(s) as standard. Additional customer specific routing requirements can sometimes be accommodated. InTechnology's technical pre-sales consultants can advise on specific requirements.

Service Implementation and Support

During installation of the LANnet Service, InTechnology's service delivery consultants will provision and install the hardware and software components of the LANnet Services. There are a number of elements to the installation:

- (a) Connection installation
- (b) Installation, configuration and testing of the router on the customer site.
- (c) Service hand-over.

InTechnology will plan and co-ordinate all aspects of ordering, implementation and testing of the last mile circuit. Where appropriate, InTechnology will arrange, just prior to the final delivery of the connection circuit, a convenient time to install and configure the router. This will be scheduled between 9am and 5:30pm, Monday to Friday excluding Bank holidays. When the circuit has been delivered, the router installed and the service tested, the customer is issued a 'hand over certificate' which marks the commencement of the service.

Service Support

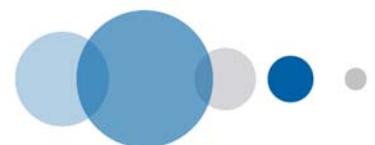
InTechnology will manage the LANnet Service to the SLA specified in the individual connectivity service descriptions. As part of the service, InTechnology provides remote monitoring from the InTechnology network operations centre.

Infrastructure Support, Monitoring & Management

The LANnet Service is supported by a comprehensive support, monitoring and management package which enables 24 hour monitoring of all hardware, software and network elements which comprise the service including:

- o Event reporting and analysis
- o Response to systems alerts
- o Customer notification of system alert

For monitored and managed connectivity options, the InTechnology systems poll the CPE every 5 minutes to confirm that the circuit and CPE is available, according to industry



standard network management best practices. If the CPE does not respond to a poll, an automatic alert is forwarded to our Network Fault Management System. The Network Fault Management System automatically raises an incident and the incident is placed in our Technical Support Queue which is managed 24x7. Customers occasionally become aware of network outages very quickly and InTechnology provides additional channels for customers to raise faults; namely via telephone, email and the web portal. Experience shows that fault resolution times are largely independent of the fault identification and reporting method.

InTechnology Inform portal

One of the major features of the LANnet service is the on-line portal that provides easy access to performance and usage information. InTechnology has built state of the art management tools through which customers and internal staff manage the service platforms that business relies upon on.

The InForm portal provides web based access to manage the InTechnology services portfolio anywhere in the world.

Features include;

- o Customer self-service - management of contact database for planned and emergency works, fault logging etc
- o View of the current status of open tickets, the ability to log new calls and update existing
- o Storage utilisation and trending information
- o On-line access to billing data
- o Access to project manager and latest status and date information for projects in service delivery.
- o Access to industry leading reporting and management suite – Info Vista

Info Vista: -

Info Vista is the industry leading enterprise class reporting system giving customer access to detailed information on Network & Data services.

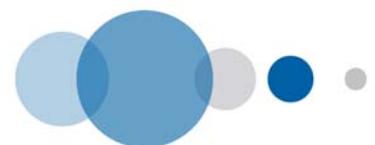
Access to:

- o Reports covering Services / Devices / Sites with the ability to summarize at each level.
- o Detailed network statistics on availability, performance and utilization
- o Analyze packet loss, latency and inbound/outbound traffic over specified time periods
- o Instant reports give a “real time” view activity.

Delivery Timescales

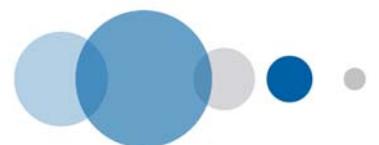
This is subject to the timescales for delivery of the specific connection to which the Customer has subscribed. The typical delivery will be 5 working days from the circuit provider’s vendor’s Ready For Use (RFU) certificate.

Provision of most DSL connections have a typical lead-time of 12-17 working days to RFU. In the interest of keeping installation charges low, for single line DSL services, InTechnology ships the customer premise equipment (CPE / router) to site for installation



by the customer. This is a very straightforward task and a support telephone number is provided for any required assistance. Further details are provided in the Service Description for the DSL access options.

Provision of the connectivity for most other circuits has a typical lead-time of 35-65 working days to RFU, therefore the circuit should be ordered at the earliest possible time. This will typically be on signing of the service agreement. Further details are provided in the various access option Service Descriptions.



LANnet Service Level Agreement

The Service Level Agreement (SLA) defines the terms on which InTechnology shall provide the Service to the Customer. This SLA is subject to and shall be interpreted in accordance with the other terms of the Agreement.

The purpose of this SLA is to set out the agreed supply, operation and management of the LANnet Service by InTechnology, as well as specific network service measurements or commitments. Please refer to the LANnet service description for further details of the SLA for each connectivity option.

No changes may be made to this Service Level Agreement, except by written agreement dated and signed by both parties.

Service Level Agreement Description

The LANnet SLA is comprised from two specific components: -

a) InTechnology Core Network Infrastructure.

This component consists of the network infrastructure InTechnology has installed to deliver all LANnet services. The SLA covers the core network infrastructure including the circuits that connect the core nodes and the hardware in these nodes. Please see the sections titled 'Service Quality Parameters' and 'service availability' below for details.

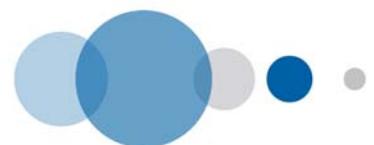
b) Access Links.

The second component is the access links that inTechnology use to connect customer sites to the core infrastructure; many different services are provided by several vendors. The SLA commitments vary according to the service and supplier; InTechnology manages these supplier SLAs and the LANnet SLA reflects the underlying SLA provided by the circuit provider.

InTechnology offers a LANnet SLA to cover either a minimum monthly service availability or a maximum time for service restoration (TSR) should a link fail. Details of the SLA for each link type are provided in the connectivity option's service definition.

Service Quality Parameters

InTechnology has identified a set of qualitative parameters which characterise the health of the core network. These measurements help InTechnology identify network anomalies and emerging problems in the core and therefore form part of the commitment to provide customers with a high quality service. The LANnet Service quality parameters (average Round trip Time, average packet loss rate and jitter) are continually measured between several points on the InTechnology core network. Whilst the figures detailed below are ordinarily comfortably exceeded, they do not constitute a contractual commitment on the part of InTechnology and accordingly InTechnology will not be liable on any ground for a failure to meet the targets.



Average Round Trip Time

The average round trip time (RTT) is defined as two-way delay time of an IP packet. It describes the quality of the InTechnology IP/MPLS network and therefore the quality in respect of the delay times. For the measurement of the RTT InTechnology uses the results from the time between transmission and reception of an IPv4 ICMP ping message (64 byte packet size) to a valid unicast-address within the InTechnology IP/MPLS network.

Average Packet Loss Rate

The average packet loss rate describes the quality of the InTechnology LANnet Service regarding the loss rate along the way. The packet loss rate is defined as a proportion between the differences of transmitted and received IP packets to the total number of transmitted IP packets belonging to the same data stream.

Jitter

Jitter is defined as the deviation in or displacement of some aspect of the digital signal or the variance on the average round Trip Time.

Quantitative Metrics

InTechnology target will be to meet the following LANnet Service quantitative metrics.

Average Round Trip delay	Average Packet Loss Rate	Jitter
less than 35 ms	less than 0.1%	less than 0.1% outside ± 5 ms

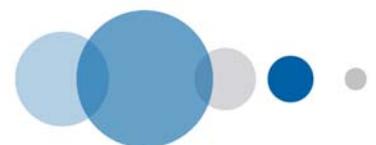
Service Availability

The InTechnology LANnet Service SLA is being offered to cover a minimum Service Availability of the core network. Furthermore, the SLA covers a minimum Service Availability for Data centre Ports. The LANnet Service Availability will be calculated over a period of time of one calendar month (30 days).

The Availability is defined as the proportion of the total time the core network is available and one calendar month (30 days).

The Equivalent Downtime per month is defined as the difference between the number of minutes in a month and the number of minutes the core network is Available in that month. The Availability and Equivalent Downtime per month figures are shown in the following table.

Service Element	Availability	Equivalent Downtime per month
Core Infrastructure	99.95 %	22 mins
Data Centre Ports	99.95 %	22 mins



Service Availability Limitations

InTechnology shall not be liable for a failure to meet the service levels outlined above in the event that any failure or suspension of the Services arising as a result of a failure of the Customer Equipment, any act or omission of the Customer, its employees, agents, sub-contractors or invitees or for any failure of the Customer to comply with its obligations under the Contract.

In calculating Service availability the following circumstances are excluded:

- Service unavailable as a result of Service suspension pursuant to the Service Agreement.
- Service unavailable due to faults on the Customer's side of the service.
- Service unavailable due to circumstances created by the Customer.
- Service unavailable due to planned maintenance.
- Service unavailable due to emergency maintenance.
- Service unavailable due to Force Majeure.

Planned maintenance can involve a temporary suspension of parts of 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 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 to have minimum impact on the Customer's operation.

Service Credits

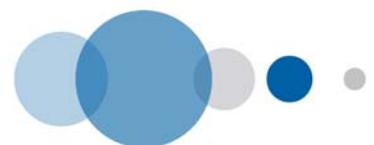
InTechnology shall pay the Customer by way of Service Credits, a sum equal to one hour's Service Charge (exclusive of VAT) for each full-completed hour in excess of the Equivalent Downtime detailed above based on the following calculation.

Service Credit = (Monthly Service Charge) x Full completed hr(s) in excess of Equivalent Downtime / Number of hours in a month

Service Credit Note

Any reduced charges under this Service Level Agreement will be confirmed by credit note issued by InTechnology to Customer, confirming the adjustment to be made to the following monthly charge.

InTechnology shall not be liable to pay any more to the Customer by way of service credits in any one month than a sum that is equal to (the VAT exclusive amount of) one-month service charge regardless of the number of network outages in that particular month.



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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