

# Networking Made Easy

IP Converge offers security and flexibility for your voice  
and data needs

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# 1. IP Converge

*BT's customers include 80% of the top FTSE 100 listing*

If your company is seeking to maximise its business opportunities you need more than a traditional method of accessing the corporate WAN. In the digital networked economy, BT's IP Virtual Private Networks (IP VPNs) – based on its Multi Protocol Label Switching (MPLS) platform can provide the flexibility, security and resiliency required.

With a BT IP VPN you can securely link your sites, both in the UK and abroad, through a wide range of access options, including Fixed, Flex (with flexible bandwidth), ADSL, and Dial options. Moreover, you have the option to include Local Area Network, IP Telephony and Unified communications packages to achieve a simple and completely integrated solution combining voice, video and data on a single platform from a single supplier on a single contract.

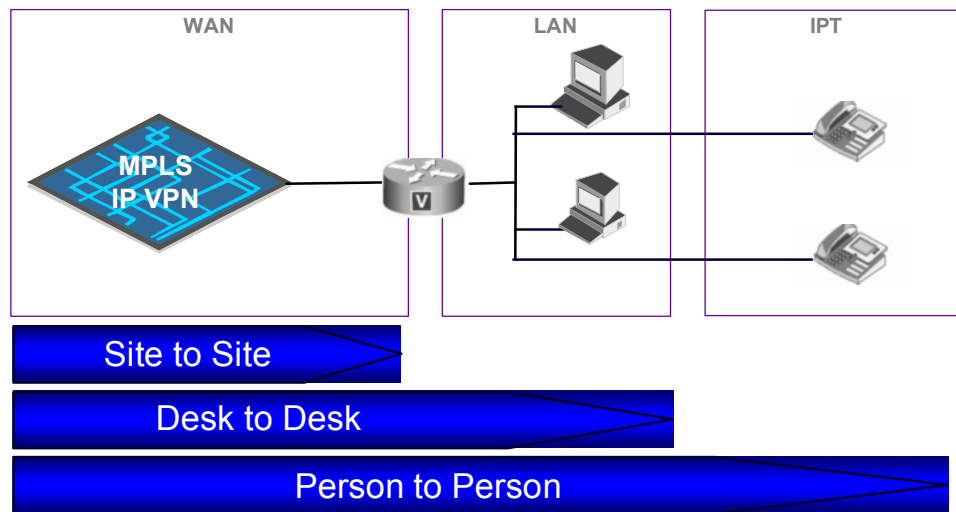
IP Converge is based on our ubiquitous MPLS network but takes this a step further. The MPLS based Wide Area Network (WAN), which comes complete with a managed router, can be enhanced to include, where appropriate, the Local Area Network (LAN), IP Telephony (IPT) and Unified Communications (UC) elements to form a complete connectivity solution.

*60% of the largest Fortune 500 companies rely on networked IT services developed by BT*

With the ease and simplicity of a single contract IP Converge gives our clients the choice of a WAN, providing 'Site to Site' connectivity, WAN and LAN which gives 'Desk to Desk' connectivity or WAN, LAN and IPT which gives a totally converged 'Person to Person' connectivity.

These options are available as fully tested packages that are configured to integrate end to end within the desired proposition.

If a more bespoke arrangement is required IP Converge can be configured to integrate with other or existing equipment and services.



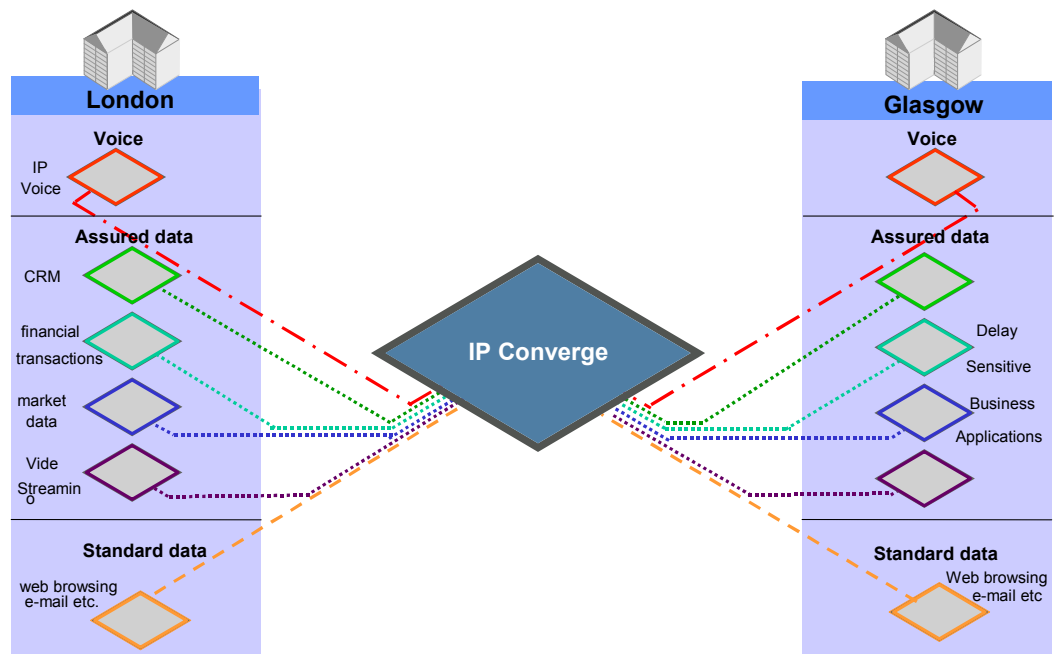
**Figure 1: BT's IP Converge Proposition – The complete converged communications proposition can be provided in part, in stages or complete.**

*In 2007, IP VPNs are the preferred choice for 80% of new enterprises..*

IP Converge is very flexible and efficient because it allows you to prioritise, through the use of Class of Service data handling techniques, key traffic types. Enabling you to ensure, your business critical applications are always given the network capacity they need, when they need it – with you as the 'gatekeeper'.

This new way of handling voice and data traffic can be a real enabler to helping you both improve your operational efficiency and reducing your operating costs.

Figure 2 below demonstrates how multiple applications can be transported and prioritised between sites using IP Converge.



**Figure 2: IP Converge carries data, voice and video over a single network.** This is achieved by prioritising delay-sensitive traffic. Voice, for instance, can't be delayed as it would be hard to have a conversation that is continuously broken up. But an email, on the other hand, can hold another second before being delivered. This shows, in a simplified way, how data can converge on one network through labelling the data packets with 'priority qualifications', ie: Class of Service.

## IP Converge Can Meet your Business Needs

### IP Converge Provides you with Successful Application Networking

The digital networked economy will give you the ability to create new marketplaces and to integrate and manage complex systems at a distance, with greater precision and speed. It can also help businesses achieve a competitive edge; allowing customers to control spending and reduce costs.

However, to succeed in a rapidly changing market, it is essential that real-time and mission-critical applications (such as real-time trading, ordering applications, voice and citrix etc.) are prioritised over less critical traffic (such as email and web browsing and print files etc.). IP Converge gives you this flexibility.

Based on Cisco's ground-breaking routing protocol for IP networks, **our network is application-aware** and can give 'mission-critical "data" traffic' priority over lower priority traffic. This is achieved by **defining six different application classes - Class of Service (CoS)**.

A key benefit for our customers is that, while some have simple MPLS requirements at the moment, they are completely covered for their future networking, convergence and application needs under the feature-rich 6 CoS model

Businesses face significant transformational challenges where the necessary focus on excellent customer service is increasing in order to remain competitive. For this to happen, companies must become more information-enabled, moving from a culture of 'case processing' to one where decision-making supports customer service processes.

Consequently, all our application classes are backed up by aggressive Service Level Guarantees (SLGs), so you can be assured that BT are guaranteed to meet high network performance and customer satisfaction targets.

### IP Converge Provides Substantial Cost-Savings

No company today will change technology without a return on investment. BT creates such opportunities because our MPLS commercial and technology model gives customers the option to review current network architectures – allowing business directors to consider the technical benefits of new approaches.

#### **Why BT?**

*"Standardising the customer experience turned out to be vital to the brand." says Chris Higgins, IT Manager, National Car Rental*

*The IP Converge network is scalable. We can future proof your network to meet business growth*

IP Converge also enables Total Cost of Ownership reduction with direct any-to-any connectivity (giving traffic refinement on capacity and access). In fact, the prioritisation and separation of traffic can lead to a completely new range of opportunities, including:

- Consolidation of applications and processing sites
- Consolidation of services
- Consolidation of Departments and people
- Introduction of new applications or ways of working
- Enhanced network management
- Improved visibility via reporting
- Peace of mind with business resiliency

In addition, business procedures – such as those connected with staff costs, operations and growth can be addressed via IP Converge. With BT offering a simple cost model and any-to-any connectivity, the charges are cost-effective and unlike traditional Private circuits or permanents virtual circuits (PVC's) – these are not distance related.

*BT holds an impressive track record in designing, implementing and managing global IP VPNs*

#### **BT has over 20 years experience with IP VPNs**

BT holds decades of experience in designing, implementing and managing global IP VPN connections for customers. Currently, we have over 2,500 customers, (of which over 1000 are small or medium sized customers) connected to our MPLS platform – a total of almost 118,500 ports in excess of 108 countries with up to 4,000 new ports being connected each month.

As an MPLS provider, BT has led the way in the domestic and global markets over the last 20 years. In fact, we were the first to launch a global multiple-application-aware MPLS network supporting both voice and data. The same is true for our multiple Class of Service model. Subsequently, **we have the largest number of sites per customer (8,000) in the world** and our MPLS network serves corporate, SME's and government organisations across the globe.

Our leadership has won us several accolades.

- 2004 BT was awarded the Frost & Sullivan European Data Communication Service Provider of the Year award.
- 2005 BT was the winner of the Frost & Sullivan award for Business Development Strategy Leadership.
- February 2005 BT received a Gold Award in the Telemark Managed Data Network Services (MDNS) customer satisfaction report.
- 2005 awarded 'Best Global Carrier' at the World Communication awards
- 2005 Frost & Sullivan award for customer service innovation.
- 2005 BT won 3 Telemark gold awards for secure data transfer, long term relationships and understanding customer requirements in IP services. Now seen as 'best in class' for secure data transfer and network availability.
- 2006 Frost & Sullivan winner of Business Development Strategy Leadership.
- 2006 BT's second consecutive Cisco European managed services partner of the year & European markets global partner.
- 2006 Voted "Worlds leading provider of communications solutions" at WTA\*

\*World Travel Awards.

The company beats all competitors (in IP VPNs) by offering six classes of service, supporting voice, prioritised data, real-time data and delay tolerance and the product is monitored 24/7 and provides in-country customer service and local language support.

*Sandra O'Boyle, Current Analysis, December 2005*

'There are only a handful of international network operators that can provide complex ICT solutions that include global WAN services. BT stands firmly among them. It has dozens of years of experience in building and running enterprise networks across the globe.'

*Brownlee Thomas, Forrester, May 2005*

Moreover, we have been ranked as the leader in industry analyst Gartner's "Magic Quadrant for Global and European Network Service Providers, 2004 and 2006" – positioning BT as **the recognised industry leader in global network services**.



**Figure 3: Gartner named BT as the leader for network services. - BT is a recognised global network provider; you can be assured that BT is leading the market in IP VPNs.**

*IP Converge gives you more than just connections to your corporate network. It provides a feature rich service to meet your existing and future needs.*

## Enhancing your Connectivity with a Range of Features

Choosing IP Converge gives reassurance for the future. Enabling you to use a wide range of access mechanisms for small to large sites and even home workers, you can build your application requirements over 6 Classes of Service, moving your business into a converged communications model confidently, and in line with your business growth and application requirements. What's more, with industry-leading Service Level Guarantees backing each Class of Service, you can be assured that your applications will be delivered within expected timescales. Below is a summary of these features and their associated benefits.

Feature	Customer Benefit
<b>Complete Converged and Unified Communications Ready Proposition</b>	With an offering that comprises of both wide and local area networking along with a seamless IP Telephony element, IP Converge can provide the complete package from a single accountable supplier, BT. And all achieved with one point of contact and one contract.
<b>Integrated Local Area Network (LAN), IP Telephony (IPT) and the option to add Unified Communications</b> helps make IP Converge the all-in-one solution.	With the current imperative for businesses to focus more on core activities, many companies need to be able to leave the responsibility for communications management to their suppliers. With IP Converge the integrated LAN, IPT and Unified Comms options take the headache out of networking.
<b>Deep Domestic Reach</b> with more than 118 Points of Presence (PoPs) in the UK and on net access to 108 countries.	Your workers will be securely connected to the corporate network – with both remote and fixed office access for improved business performance.
<b>Multiple Access Mechanisms.</b> There are a variety of access methods for customers to connect to IP Converge including dedicated leased line, Ethernet 'Flex', ADSL, Dial up and International Reach – supporting a wide range of speeds from 64Kbps to 1,000Mbps.	A variety and diversity of access methods ensures the ability to accommodate from very small to very large sites, both in the UK and abroad, as well as addressing roaming users. Flexible / Home working can also be achieved whilst reducing the risks associated with migrating to a new technology / way of working.
<b>Resiliency Options</b> including	Resiliency will give you peace of mind with

*Your business can take advantage of BT's national coverage in the UK, to build an IP-VPN which specifically supports the applications you run. You benefit from BT's investment in development and network infrastructure.*

*In 2007, one node was deployed on BT's MPLS network every ten working days, demonstrating BT's commitment to global markets*

Secure and Secure+ options. Both are delivered over BT's highly resilient Core network, with Secure+ featuring no common point of failure at the site or into the IP Converge network.	your network connectivity in the highly unlikely event of a failure. Your applications will always be delivered on time, giving you an edge on the competition.
<b>Security</b> including a world class security model protecting the network.  BT's MPLS network also has the Government CESG Security stamp of approval.	You can be assured that your network is protected and safe with BT. In fact, IP Converge offers a range of services to pro-actively manage business and technical risks – bringing together professional services and managed solutions, built upon leading edge thinking and technology, to improve business performance and continuity.
<b>Multiple Application CoS</b> supports a variety of voice, multimedia and data applications.	IP Converge gives you the choice to prioritise and schedule applications over 6 different classes – <b>the highest number in the market</b> . This means you can better meet your business priorities and ensures applications are delivered on time for a rich and consistent user experience. The added flexibility will also help future-proof your networking requirements
<b>Service 24/7</b> . BT provides a specialist unit to give technical and commercial support which can be reached by both phone and email.	BT offers you complete service surround, with additional service options being available to ensure a fit to your particular requirements.
<b>Service Level Guarantees (SLGs)</b> IP Converge features Service Level Guarantees covering Service Availability and Restoration, On-Time Delivery and Core Network Performance.	BT provides leading SLGs with a networking infrastructure that truly lives up to them. Moreover, with BT's Applications Assured Infrastructure (AAI) proposition, your applications can be measured evaluated and assured desktop-to-desktop – providing a further level assurance that is difficult to match.
<b>Comprehensive Reports</b> enabling you to access network performance reports via a secure web portal.	BT's Customer Centre <a href="http://icscsm.ignite.com">http://icscsm.ignite.com</a> provides continuous secure access to a variety of reports – giving control and full visibility of services and costs. Enhanced reports are also available to further fine-tune the solution to your exact and changing requirements. See section 5.4

**Figure 4: IP Converge is more than just connectivity to a private network. Our choice of features can meet all your needs from remote access to head-office business requirements.**

## Flexible Access Options for Business Needs

*The wide choice of access options gives customers the ability to select the most suitable type and capacity for each individual site.*

You have the option of many access methods and a wealth of bandwidth choices to enable you to specify a network which is right for you and takes in to account both your budget and your operational requirements including;

- Direct Leased Line Access
- Flex Access
- ADSL Access
- Dial Access
- International Access

The table below lists the various access methods available on IP Converge:

Access	Customer Benefit
<b>Direct Leased Line</b>	Leased Line accesses gives customers a wide range of bandwidth choices: 64kbps, 128kbps, 256kbps, 512kbps, 1Mbps, 2Mbps, 4Mbps, 8Mbps, 34Mbps, and 155Mbps.
<b>Flex</b> accesses allow customers to change their bandwidths at short notice	Flex can ensure customers remain flexible in this dynamic business environment. Customers have a wide choice with bandwidth options of: Up to 2Mbps, up to 10Mbps, up to 100Mbps and up to 1,000Mbps (GigE).
IP Converge's purpose built, Business grade, <b>ADSL</b> accesses are highly secure because they are not provided via the Internet but are instead delivered directly to the IP Converge network.	ADSL access, as well as providing back up for leased line services, also provides a cost-effective solution for smaller sites and home workers. Moreover, with bandwidth options of: 256kbps, 512kbps, 1Mbps and 2Mbps in both Contended (5:1) and Un-Contended (1:1) variants there is even more choice.
<b>Dial</b> access provides both backup and single client PSTN / ISDN / GSM dial capability into a customer defined IP VPN.	For customers with remote or roaming access requirements, secure dial access provides a safe and reliable means of accessing the corporate network wherever you are. Dial access can also, where suitable, be used for low speed back up to leased lines or ADSL circuits.
<b>International Access</b> BT's ever increasing international footprint, currently 108 countries and growing.	Customers can link their international operations and employees on to a single network, just as they would another site in the UK, thereby enabling a sharing of resources and an easier flow of information.

*DSL access provides a secure cost-effective way to connect smaller sites or remote workers*

**Figure 5: Customers can choose from a wide range of access mechanisms to IP Converge – Expanding connectivity from small sites cost-effectively via ADSL or simply using Leased Line for high performance low-risk access.**

## Offering Full Core Network Resiliency

*The IP Converge MPLS network is pro-actively managed from BT's IP Management Centre - 24 hours a day, 365 days a year.*

The IP Converge network is **fully resilient at both the core and the access layers**.

The IP Converge service is delivered over a network that is inherently resilient, using duplicated transmission equipment and a highly meshed network design. Round-the-clock monitoring of the network ensures that any faults are isolated, and repaired rapidly, with minimal disruption to traffic. Furthermore, each access is monitored by BT, to check for any faults on that access line.

The pro-active nature of network management means that we are able to identify and fix most faults before customers are even aware of them. However, facilities are also available to enable customers to report problems to BT. Should a failure occur, customers will always be kept fully informed of repair progress.

Resiliency is assured as BT is one of the few operators that have Class of Services (CoS) defined within the core itself, not just on the access. By applying CoS in the core network this provides enhanced resiliency for critical applications, it also means that in the unlikely event of a failure prioritised data is not compromised by data of a lower priority, thereby ensuring your network continues to function unabated in the event of a core network failure thereby giving you a complete end to end CoS solution from Server to desktop.

## IP Converge Security Management Model

Inevitably, there are always events that cannot be foreseen and in some of these circumstances business may be disrupted or brought down, damaging customer service and causing loss of revenue. Therefore, to manage security risks, BT has defined policies that have been properly communicated and enforced across the enterprise. These policies define how BT protects its, and your, business; how it detects a service failure or deliberate attack against a business; and how it responds and recovers from a business interrupting incident or security attack.

Moreover, because we understand that the protection of your data is paramount, we guard our data network with a number of protective mechanisms.

The use of Virtual Private Networks (VPNs) in conjunction with MPLS protects your data transmissions on the MPLS network by logically separating your data from everybody else's. All management systems are monitored 24/7 in real time to detect unauthorised access or access attempts into the core network.

The IP Converge connections from individual customer sites create a Virtual Private Network, every bit as secure as the physical equivalent. Within the MPLS network IP packets are allocated a tag identifying the customer VPN, the source and the destination. Identifiers are not shared or duplicated within the network. The MPLS network has CESG certification of security, granted independently by GCHQ in the UK.

*BT takes security very seriously, its MPLS network has CESG certification of security, granted independently by GCHQ.*

Our offer is fully compliant with UK leading Security Standard Practices including BS7799 and ISO17799 standards on integrity. On top of that, we have a head start in the security market as BT is a member of **FIRST (Forum of Incident Response & Security Team)** and **CERT (Computer Emergency Response Team)**. Being members of these global security bodies gives BT the opportunity to work with Interpol and the CIA in resolution of criminal investigations.

## Double Protection Through Two Security Control Layers

The need for effective security controls for the explosive growth of various network protocols, especially TCP/IP, is now more important than ever. There are two main layers of security (outer and inner) that are established in the security model and these are explained in detail below.

*At the inner security layer, firewalls and remote access systems protect our network from external intrusion.*

Security Model	Function
<b>Outer Layer of Security (Physical Layer)</b>	The physical security for each router is addressed by placing it inside a secured facility, which is built according to the highest industry standards and where site access is monitored and regulated via specific access controls.
<b>Inner Layer (Network Access)</b>	Our Network Security team has established a solution using front-end security devices to protect the dialup line from unauthorised access through use of a secure token device. Usernames and passwords are unique and randomly generated as added protection. <b>Daily audits are taken of all firewall activity</b> to ensure no unauthorised changes have taken place.
<b>Management Systems (Subsystem)</b>	The management systems (based on UNIX within our campus network) are protected by firewall routers (using detail ACL: Access Control Lists) and/or rule-based firewalls to block unrecognised packets.
<b>Routers (Network Element)</b>	All routers in the network are installed with TACASs (Terminal Access Controller Access System) for authentication, which use individual usernames and passwords.
<b>Virtual Private Networks (VPNs)</b>	All VPN assignments are performed on core network elements using centrally managed configuration systems. These systems reside on a separate secure LAN segment and are monitored for logon failures and other security related issues.

*BT's management systems are protected by firewall routers and/or rule-based firewalls.*

All access controls in the outer security layer are controlled, logged and monitored by BT.

<p><b>Multiple VPN Security</b></p>	<p>The implementation of multiple VPNs is performed to ensure segregation of traffic between VPNs. Each customer VPN is treated as a separate VPN within our MPLS network. IP routing is separated for each VPN by allocating a unique virtual routing field (VRF) table in each router for each customer VPN. This is how the network provides protection against IP routing from one VPN into another.</p>
<p><b>Password Management</b></p>	<p>Access to routers, access nodes, management systems, VPN order and assignment systems must be requested, reviewed and approved by security organisations. Router passwords are one-time password supported by the use of SecurID cards.</p>
<p><b>Audits</b></p>	<p>Real time: Router SNMP (Simple Network Management Protocol) traps and telnet failures are sent to network operators via console alerts. All internal systems (including management systems) critical syslog errors are also sent to network operators via console alerts.</p>

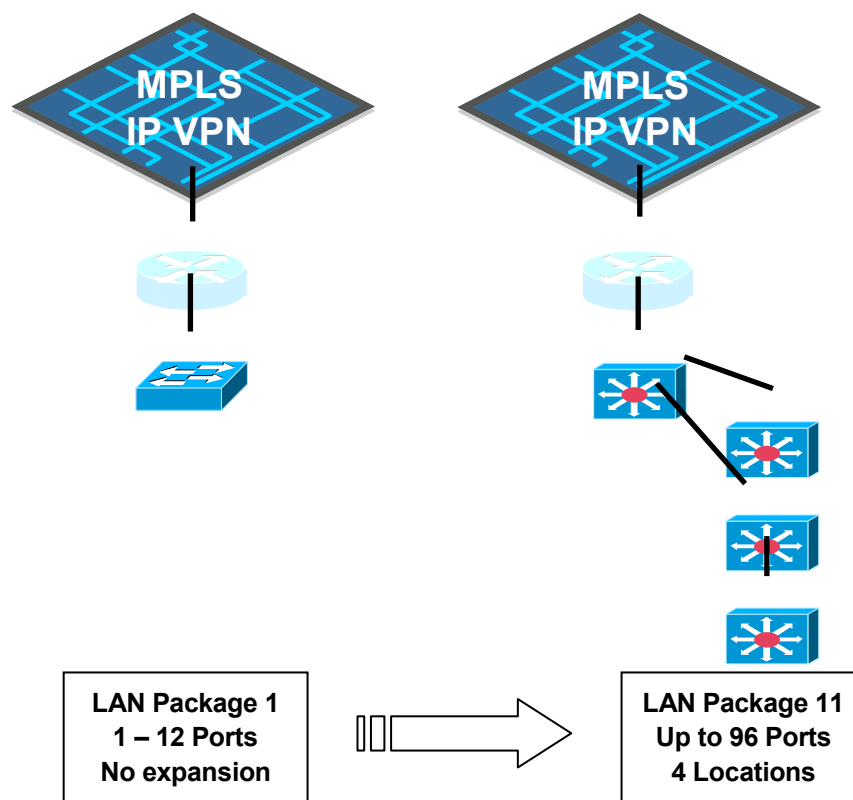
**Figure 6: IP Converge offers a strong secure network - It is imperative that security is not compromised whilst you are building closer relationships with suppliers, distributors and end-customers. BT's security model for IP Converge ensures this.**

## 2. Integrated Local Area Network

For those customers who prefer a single supplier approach to networking IP across remote sites IP Converge's Desk to Desk proposition gives you a simple choice of LAN packages that have been designed and fully tested to be integrated with the service concepts of IP Converge. These packages are ideal for sites with up to 96 ports; however, larger or bespoke requirements can be tailored to suit your specific needs. Many of the packages on offer include simple and prescriptive configuration, but still allow for integration with customer's own existing LAN / IPT structures.

There is a base choice of 11 LAN packages all based on Cisco LAN switches; each has in-tariff project co-ordination, installation, design, and maintenance. Further options such as project managed install and are also available. The packages range from; up to 12 ports at a single location with no "in line" power, up to 96 ports spread over multiple locations, within a single site, with in line power to support IP Telephony. Larger or bespoke designs can also be easily accommodated.

A choice of 11 LAN Package options allows you to choose the right one for your business requirements



**Figure 7: A wide range of LAN packages to meet your business requirements** – With eleven default LAN packages readily available and the combinations therein, there is a configuration to meet most client's requirements off-the-page; and where they do not, we provide a bespoke service that can even integrate existing systems.

### **3. Implementing IP Telephony across your Business**

Whether your organisation already has an IP Telephony phone system or not you may be looking for an easy first step to transform the way your business operates. Consequently implementing a business class converged (voice and data) network will be key to achieving that success.

IP Converge is that business class voice and data network which is key to achieving success.

If you have already implemented an IP Telephony phone system we can work with you to help you integrate the solution across all your sites or if you are still looking to implement an IPT Solution then again BT can help you achieve this goal.

If you are still wondering how the latest developments in the “Converged” or “Unified Communications” market place can benefit your company and you are looking for a single supplier who has years of experience and can help you through the maze then BT is ideally placed to offer you a single source for all your needs, ie: WAN, LAN, IPT and Unified Communications.

BT operates on a best of breed basis sourcing products and services from various suppliers to ensure you get what is right and suitable for your organisation.

As well as building bespoke or custom packages BT is also able to use its years of experience of building combined voice and data solutions to offer simple pre formatted and pre templated IP Telephony solutions for multi-sited businesses. These are designed to make life easy by reducing any business risk, simplifying the implementation and thereby reducing cost.

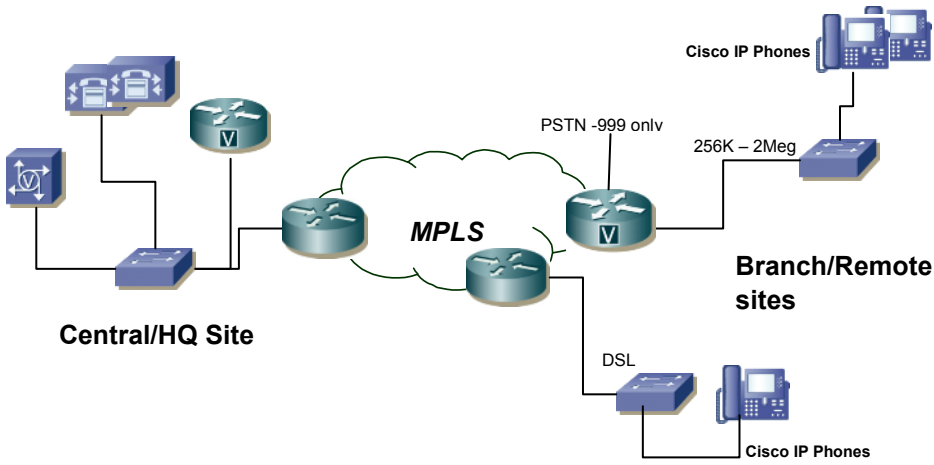
Our pre-packaged IP Telephony options are all based on the Cisco Systems' IP Telephony portfolio. IPT replaces the need for a traditional circuit switched PBX by enabling voice functionality to be provided over a customer's Local Area Network. Essentially these solutions will 'voice-enable' a customer's LAN allowing the creation of a multi-service platform to carry voice, data and video.

All the packages have been pre-designed by specialists from BT and Cisco Systems. Therefore, no further technical design is required, giving you the assurance of a tried and tested solution.

The IP Converge IP Telephony packages provide the following;

No further technical design is required, giving you the assurance of a tried and tested solution.

Hardware/Software	Function
Call Manager	IP PBX (Single or Dual cluster)
Unity	Voice mail
Cisco Attendant Console (CMAC)	Operator Console
Central Site Voice Gateway's	<ul style="list-style-type: none"> <li>Centralised Access to the PSTN</li> <li>SRST (<i>provides limited telephony backup in the event of Call manager failure</i>). Ideal for Single call manager deployments.</li> </ul>
Remote Site Voice Gateway	<ul style="list-style-type: none"> <li>SRST for intra office calls only</li> <li>Local breakout for 999 calls only (via single PSTN)</li> </ul>



**Figure 8: IP Telephony – Convergence of IP Telephony brings all of your communications into the secure, resilient MPLS network.**

## 4. Unparalleled Classes of Service (CoS) Model

One of the key problems facing business to day is how to get more for less? Traditionally the solution to performance problems within a LAN or WAN environment has been to throw bandwidth it!

Unfortunately, although the cost of communications has been coming down, this still has a cost implication and there is no guarantee that bandwidth alone will produce a long term fix.

One of the main problem areas is how do you stop non priority data traffic swamping a network and dominating utilisation of the resource, ie: How do you stop print files or web browsing / E-mail traffic across the network impinging on the bandwidths required for more important applications where staff or customers are waiting to be serviced?

BT has addressed this issue by implementing an industry leading and industry standard "Class of Service" prioritisation across it's IP Converge network.

Class of Service marking enables dynamic bandwidth allocation so non time critical data traffic can be throttled back ensuring enough bandwidth is always available for those more important applications as and when you need it?

To ensure maximum utilisation of the Networking resource the low priority applications can burst back into the spare bandwidth as soon as it is vacated by the priority applications.

To service this demand and offer Service Level Guarantees regarding network availability and performance BT uses a 6 CoS model.

*DSCP is an industry standard marking scheme. BT's CoS model outstrips all our competitors by implementing a 6 Class model.*

- The 6 CoS Model, using Differentiated Services Code Point (DSCP) – the de facto standard for CoS implementations, will give you the ability to enjoy a greater degree of premium bandwidth granularity. You may also choose to prioritise premium data and IP applications such as Siebel, SAP, Oracle, Lotus Notes and multimedia applications into distinct prioritisation data classes enabling multiple applications to run simultaneously with prioritisation. In addition, customers will be able to run prioritised multimedia applications as well as Voice over IP (VoIP), enabling customers to gain a high level of convergence on the MPLS platform.

Whats more, the 6 CoS model gives a high degree of flexibility and scalability. Customers can simply burst between classes without the need for complicated configurations. In such instances, changes to the network to support the new CoS model are kept to a minimum, with end-to-end transparency allowing configurations to occur easily and swiftly across a number of your sites.

*CoS in the core delivers impressive application performance because all the traffic relating to an application is treated with equal priority from end to end.*

6 CoS Feature	Customer Benefit
A default bursting capability for assured data and multimedia classes	Spare capacity can be fully utilised for cost-effective connectivity.
The prioritisation of packets from end to end with guaranteed performance backed by SLG's	Better application performance, thereby giving the end user a better customer experience and fewer delays
An end-to-end (host-to-host) assurance of application performance	CoS enabled networking across the WAN can be easily achieved even in a non CoS enabled LAN environments—making networking simple.
End-to-end transparency using DSCP	DSCP allows you to mark applications in your LAN environment and transport these across the WAN without the need for reconfiguration. It also allows you to plan, optimise and utilise your bandwidth efficiently in line with the demands of your applications.
A scalable approach to delivering multiple applications in line with business demands and growth, coupled with the support for real-time applications e.g. Voice & videoconferencing etc.	Scalability to deal with current, future and unforeseen business requirements. This offers you a truly scalable and fully future-proof network.

If you have not already seen it why not ask to see a demonstration of BT's 6 CoS network in action?

6 CoS demonstration facilities exist in most of BT's Business Show case centres, eg: London, Birmingham, Manchester and Edinburgh.

**Figure 9: BT's 6 CoS model offers a wealth of commercial and technical benefits - Future-proofing your network is key to business success and return on investment.**

*Using a supplier who does not apply prioritisation at all points may make a business prone to higher risk and costs.*

## IP Converge Offers You CoS in the Core of its Network

Customers will experience a high quality service through advanced application performance. BT's CoS scheme ensures that "queues" are in the heart of its network from the edge to the core. The queues in the IP Converge networks allow complete end-to-end prioritisation of customer applications – ensuring that a voice application keeps priority over a data application and an Oracle transaction is delivered before an Intranet download. In the case of voice, this means that voice data is suitably prioritised avoiding poor voice quality.

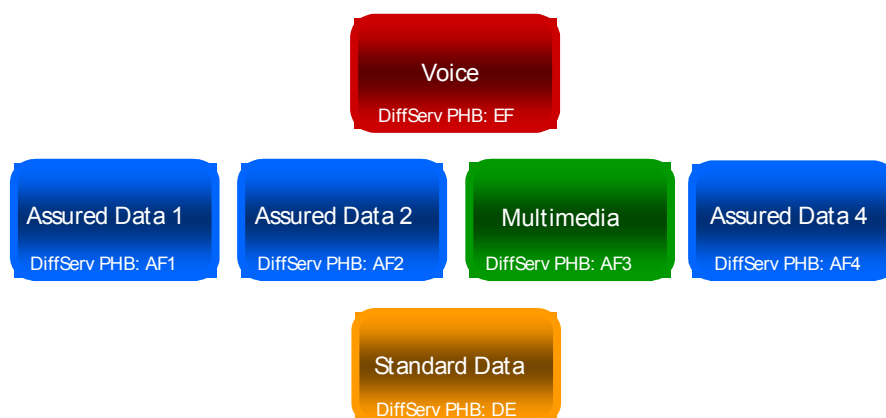
Using a supplier who does not apply prioritisation at all points may open a business to greater risk. The increasing value of the transactions carried over the typical business critical applications that IP Converge services support makes it essential that companies limit the chances of impacting the end customers and their business.

## BT's 6 CoS Model

Our CoS model uses Differentiated Services Code Point (DSCP). BT will custom configure the MPLS CoS model with customers and their application providers. The 6 CoS model is outlined below:

*IP Converge offers more Classes of Service than anyone else in the global market.*

- Voice (EF) – (e.g. VoIP and PSTN breakout)
- Assured Data (AF1) – ERP applications or Real-time Multimedia (e.g. Video conference and other interactive service)
- Assured Data (AF2) – ERP applications
- Assured Data (AF3) – ERP applications
- Assured Data (AF4) – ERP applications
- Standard Data (DE) – email, intranet, FTP and Internet Breakout Telnet and other network management



**Figure 10: With BT's MPLS 6 CoS model you have the opportunity of using a multimedia class as well using all the Assured Data classes for ERP applications - Assured Data traffic is also partitioned to give fine granularity and to provide the choice of low-to-high drop probabilities for a specific application.**

## What is DSCP?

*DSCP offers transparency on your connection, eliminating the need for reconfigurations.*

DSCP is an IETF (Internet Engineering Task Force) industry standard methodology of marking Class in IP packets for scalable service differentiation in IP networks. It gives you the facility to carry your own Class of Service Markings transparently across the BT service without the need and resource for reconfiguration.

DSCP uses the first 6 bits in the Type of Service (TOS) field of an IP header. This means that businesses seeking to buy a networking service, such as IP Converge, are often working in an environment where their installed hardware, client and server software (and even desktop applications and operating systems) are using DSCP by default.

DSCP can provide customers with transparency for their traffic across the MPLS service. In fact, the DSCP marking has already been adopted by many of our MPLS customers and the benefits, such as ease of configuration, have proven valuable.

For further details on IETF policies please visit URL <http://www.ietf.org/>

## Complete Optimisation with Bursting

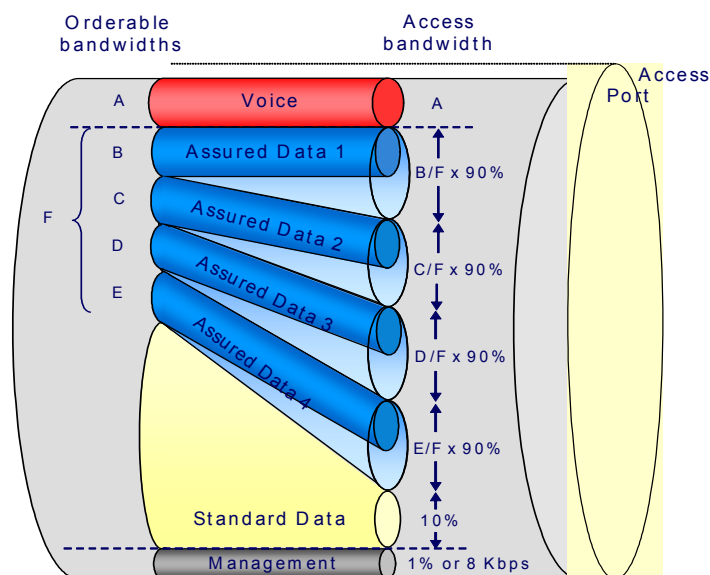
The 6 CoS model offers flexible bursting, ie: priority traffic can burst in to any spare bandwidth not already being used. This ensures, spare bandwidth can be optimised to the fullest capacity.

*You can optimise your network connection to its fullest capability by bursting between classes.*

Traffic labelled as "Priority" can burst up to 90%\* of the access speed, For example, any traffic sent in excess of the ordered amount of a given Assured Data Class is still delivered over the access. This traffic will then be marked as 'out of contract' allowing application data within an assigned Assured Data class to burst up to the access rate.

\*NB. 10% is always reserved for Default or Standard Data

The figure below provides a graphical presentation of the various CoS bandwidths.



**Figure 11: BT's 6 CoS Model delivers the flexibility to suit your current and future business needs. BT's 6 CoS model allows bursting when an Assured Data application's demand for bandwidth increases rapidly, exceeding the usual limits for that class. BT will usually carry the extra traffic on an "out-of-contract" basis when entering the BT network that exceeds purchased service levels. It will be carried if sufficient resources are available in the core, but it risks being queued or dropped if needs change. "Out-of-contract" data is identified with a Drop-Priority Tag in the DSCP.**

## 5. A Trustworthy Service with BT

*BT has been awarded three excellent ratings and one Outstanding rating for customer service by Telemark.*

Industry Analyst Telemark has commended BT for strong performances in its latest report *Benchmarking Customer Satisfaction: International IP Services* (April 2006). BT achieved two Best in Class Gold Awards showing an exceptional level of customer satisfaction as well as three excellent ratings.

### Standard Service Elements Available to You

You will be provided with a **dedicated single point of contact**, which will have overall responsibility for your network connectivity with BT. Your designated **Network Management Centre** will provide you with total service surround consisting of the following:

Service Element	Function
<b>Customer Management</b>	This includes 24/7 support, 365 days a year and standard customer and network performance reports.
<b>Order Management and Implementation</b>	This includes standard order process, order confirmation, notification of delivery dates, progress reports on orders, field service support, pre-delivery check, hand-over, on-time installation and notification of order completion.
<b>Network Monitoring and Modification</b>	This includes remote diagnostics and repair, notification of planned outages and proactive monitoring of core network.
<b>Fault Management</b>	This includes 24-hour fault reception, fault ownership, field service dispatch, repair within clear time objectives, fault maintenance progress reports, automatic escalation and notification of fault clearance.
<b>Billing</b>	This includes a tailored billing service so that you can manage your costs within your business.
<b>Customer Centre</b>	This includes a user friendly interface with access to Bronze network reports.

*BT will provide a dedicated single point of contact.*

**Figure 12: BT can ensure that service surround is an enabler for effective business operations and not an inhibitor - Inflexibility and inconsistencies in service and fragmented resources are avoided by using a single supplier, such as BT.**

*Your business will run better with our support; our service centre can proactively detect and raise faults.*

While BT proactively monitors the core MPLS network and will **proactively take action** to remedy any service affecting faults, proactive alarm monitoring and rapid fault diagnostics also comes as standard on the IP Converge access services. BT's optional proactive fault and service management services can ensure that many potential faults are identified and addressed before they occur or with minimum downtime. The BT Customer Service Centre is there to give dedicated service support ranging from high level faults to technically complex issues. To address this,

effectively four 'escalation levels' are available to customers coupled with stringent turnaround and fix times according to the fault encountered.

BT holds world class technical expertise and has a dedicated line of business for research and development – often partnering with lead technology organisations such as Cisco, EMC, Oracle and Nortel. Consequently, we are ideally placed to prevent faults and to fix them rapidly if they occur.

## How IP Converge Service Level Guarantees Give Assurance

High speed, excellent throughput and in-depth geographical coverage are essential for effective business. Performance can be a factual indicator of the reliability and technical expertise that a network supplier can offer. However, everyone wants further assurances when entering a business relationship and the main purpose of BT's Service Level Guarantee (SLG) is to provide that promise of high performance. Based on your specific business needs, we have a set of high-quality and target-based SLGs that safeguard your interests and enable you to deliver to your customers with confidence.

### Which Service Elements are Covered by our SLGs?

The following service elements are covered by SLGs; this allows a financial claim to be made if the standards are not met.

- **On Time Delivery** – The On Time Delivery SLG is against the Contracted Delivery Date (CDD), giving peace of mind that the delivery will be expeditious.
- **Service Availability and Restoration** – If the customer experiences a loss of service that cannot be circumvented and cannot perform certain functions e.g. a complete failure without backup circuits. This includes core network failures.
- **Core Performance** – The Core Performance SLG covers;
  - Round Trip Delay - the time taken for a packet to travel from one host on the network to a remote host and back to the initiating host.
  - Packet Delivery - the percentage of packets successfully transmitted between hosts.
  - Jitter - the variation in one-way delay between different packets as measured by SAA probes on the network.

*IP Converge features Service Level Guarantees for: On-Time Delivery, Service Availability and Restoration, and Core Network Performance.*

## **Class Of Service - Service Level Guarantee**

### **Core Performance - Target Value**

#### **Voice (EF)**

*Round Trip Delay (RTD)*

20 milliseconds (ms)

*Packet Delivery*

99.9%

*Jitter*

3.5ms

#### **Data – In Contract (AF)**

*Round Trip Delay*

23ms

*Packet Delivery*

99.95%

#### **Standard Data (DE)**

*Round Trip Delay*

30ms

*Packet Delivery*

99.8%

The SLG for AF within the DSCP CoS model is the same for each of the AF classes, AF4, AF3, AF2 and AF1.

For the attention of the Editor of this document, you can find further information on SLG's via the technical product description via the intranet site below:

<http://globalservices.intra.bt.com/products/ipconverge/library.html>

## Effective Reporting for IP Converge

*BT gives you secure access to a variety of networking and Class of Service reports, anywhere and at anytime, via BT's Customer Centre portal.*

One of the keys to managing your business successfully is Network reporting. IP Converge offers a suite of reports from Bronze, which are included as standard through the enhanced options of Silver, Gold and Platinum reports. These provide a detailed overview of your network connectivity and **key information on network performance**. These reports will enable you to view, plan and optimise your network connectivity efficiently and cost-effectively throughout the life of the contract.

BT also offers a variety of Technical Advisory Services which can be used to analyse network performance and make recommendations on network design. This provides you with information to assess current performance and allows you to plan future changes so you can stay ahead of your networking requirements.

Core reports provide statistical information gathered from the network switches and are processed to represent customer specific information. Additionally, core reports include information on your inventory. This can be useful to check precisely what is being reported on – and any changes that have occurred within the network since the last set of monthly reports.

The reporting environment provides customer network statistics reports in both graphical and tabular format. Report delivery is automated and geared for high volume and made accessible via the internet.

Customer reports are supplied in the following categories:

Report	Function
<b>Customer Bandwidth Utilisation Summary and Time Trends</b>	This report provides a tabular summary of <b>inbound and outbound utilisation</b> by each customer site or, where a site supports multiple VPN's, for each VPN connection on each site. Average values are calculated from the polls taken at 5 minute intervals over a 168 hour week. The peak (busiest hour average) is calculated by averaging the 5 minute data over the busiest hour in the weekly reporting period. Utilisation is shown as a percentage of the contracted bandwidth averaged over the defined period.
<b>Core Network Summary</b>	This report provides network performance data for the BT 'Core' network that connects all the local network access points together. This report runs over a calendar month period and represents the performance measures against the core SLG. The report shows averaged measured values with

	associated SLG target values for each parameter.
<b>Reference Paths</b>	<p>The Reference Paths report provides network performance data for a representative set of paths in the BT core network that connects the local BT network access points together. The report runs over a calendar week and shows averaged measured values for:</p> <ul style="list-style-type: none"> <li>• Jitter (class 1 only - milliseconds)</li> <li>• Round Trip Delay (RTD - milliseconds)</li> <li>• Packet Delivery (percentage)</li> </ul>
<b>Class of Service (CoS) Utilisation Breakdown</b>	<p>These reports provide a breakdown of peak port utilisation and average discards for each CoS in both inbound and outbound directions. The report will show both peak utilisation and average packet discard (two-way packet loss) statistics for all the Classes you have purchased for both inbound and outbound.</p>
<b>Service Management Reports</b>	<p>Service Management Reports cover:</p> <ul style="list-style-type: none"> <li>• Service Orders</li> <li>• Service Problems</li> <li>• Service Inventory</li> </ul> <p>These are simple and easy to use textual reports.</p>

***Figure 13: IP Converge's wide range of reports can be accessed via BT's Customer Centre. You can optimise and plan your network to its fullest extent by using these reports and they are available to you via a web interface.***

## Performance Reporting Upgrade Packages

The Bronze service is inclusive with the standard package options for WAN, LAN & IPT. The following upgrade packages, minimum term 12 months, are also available at additional cost.

### Silver Reporting Package Option

The silver package contains a dashboard from which, the user will be able to drill down information for devices selected. Performance is paramount and users are able to gain visibility of instances where devices have exceeded pre-defined performance thresholds. Trend information, a high-level health summary highlighting situations to watch and a basic indicator of capacity planning is also available. Scheduled reports are produced and accessible in user-friendly manner.

Note: The Silver Package is the entry level package for the Cisco IPT Option.

#### **Top N Reports**

This report provides a list of the top devices for options selected under each of the technology areas listed in the table in Section 2.1 (Dashboard). For example Top N Reports will be available via drill down on Class of Service for Bandwidth, Memory, CPU Utilisation, Jitter, Round Trip Delay and Packet Loss.

#### **Trend Report**

This report shows the trend performance over time on a device for the selected variable.

#### **Health Summary**

The Health Summary is made up of the following four reports:

##### *Total Network Volume by day*

Total network volume by day (actual and baseline) to identify regular traffic patterns

##### *Average Network Volume by Hour*

Total network volume averaged over the baseline period for the same time period

##### *Average Health Index by Hour*

Overview of the health of all devices

##### *Situations to Watch*

List of 10 devices which have exceeded threshold or are predicted to exceed threshold

## **Gold Reporting Package**

Providing the recommended entry level for converged voice, data and multimedia solutions. Sites benefiting from the Gold standard of reporting will receive the SILVER package plus At a Glance, Health and more detailed Capacity Planning reports including Class 2 (Business Critical IP Applications, including video) and Class 3 (all other IP traffics e.g. e-mail). The package will also include Quality of Service reports for Fault Management and Service Level Agreement. Gold reports are required for all sites included in a regional CSM upgrade option.

### **Health Summary**

The Health Summary is made up of the following reports:

#### *Volume Leaders Graph and Table*

Top 10 devices that have the highest volume for the previous day.

#### *Health Index Leaders*

Top 10 devices showing the highest health index for the previous day.

#### *Volume Change Leaders*

Top 10 devices that experienced the largest percentage of change in volume between the report day and the baseline average

#### *Health Index Change Leaders*

Top 10 devices that had the largest change in health index from the previous day to the reporting day.

#### *Device Top N*

Comparison of the health and performance of the Top N devices for bandwidth utilisation and health index (these reports vary slightly for each technology)

#### *Element Detail*

Graphs showing Element Volume Vs Baseline, Utilisation and Average Health Index

#### *Availability*

Percentage of time each device was active and running

#### *Reachability*

Percentage of time devices are reachable

#### *Latency*

Percentage time (in milliseconds) taken to ping the device

### **At a Glance Report**

The At a Glance Report is used to drilldown on problem elements. It correlates key performance and availability statistics in a single page presentation for a specified time interval. At a Glance Reports can reduce time spent troubleshooting problems by automatically capturing performance data and providing it in a uniform presentation. They provide extraordinary detail for all critical performance parameters available.

### **Capacity Planning**

What-If Reports can only be generated from the Web Interface. Each report is an interactive Web-based tool that allows the customer to perform capacity planning by observing effects of changes in capacity and demand.

The report is first generated using historical data in the database. The customer can then adjust the capacity and demand as a percentage of the historical data and then rerun the report.

### **Quality of Service and Service Level Agreement**

Information for the QoS reports is taken from Remedy the BT Fault Management System and supplied to Concord who produce the reports in a graphical format. The QoS reports are provided on a monthly basis and will cover faults for the whole of the previous month. These will be available for viewing by the customer on the 2<sup>nd</sup> working day of the following month. For example, the reporting period for March would be the 1<sup>st</sup> – 31<sup>st</sup> and the reports would be available for viewing from the 2<sup>nd</sup> April.

Reports are accessed via a hyperlink on the reporting dashboard.

## **Platinum Reporting Package**

Viewed by many as the benchmark for converged solutions or devices supporting mission critical voice, data or multimedia traffic. The Platinum level of reporting automatically provides all the benefits of the Silver and Gold packages, plus much more. The 'MyHealth' suite provides a highly flexible and intuitive e-Business Reporting capability which allows users to create custom views of specific data that is important to them.

### **My Health**

Too often existing solutions force the customer to plough through printouts or irrelevant screens to see the few statistics that are required. This can slow down the process when isolating performance issues.

'MyHealth' is the easy personalised reporting environment that allows the user to tailor end to end views to meet individual e-business requirements. It gives complete visibility into the performance and availability of the entire network infrastructure.

## Remote Access Security Report

Security Reports are available for the roving dial up service and detail the following information:

<b>Summary of User Activity</b>	Name of User Number of Times User has logged on. Length of time User Logged on. Amount of Data User has Transmitted Amount of Data User has Received.
<b>Detailed User Activity</b>	Name of User Date Time User Logged Off Amount of Data User has Transmitted Amount of Data User has Received.
<b>Top Ten User Activity (Data Transmitted)</b>	Name of User Amount of Data Transmitted
<b>Top Ten User Activity (No of Times Logged on)</b>	Name of User Number of times logged on
<b>Bottom Ten User Activity (Data Transmitted)</b>	Name of User Amount of Data Transmitted
<b>Bottom Ten User Activity (No of Times Logged on)</b>	Name of User Number of times logged on

## End User Helpdesk Quality of Service Reports

Remote access Customers may also opt for specific End User Quality of Service reports detailing:

### **End User QoS Report**

#### **Summary**

Total Number of Calls / Faults Reported to the Thurso Helpdesk  
Number of Cases Opened and Closed this month within Target by Severity  
Number of Cases Opened and Closed this month outside Target by Severity  
Number of Cases opened Prior to this month and Closed this month

#### **Detail**

Number of Cases open for greater than 30 minutes.  
Case Detail – Number of Cases Still Open  
Case Detail – Number of Cases Closed within Target  
Case Detail – Number of Cases Closed outside Target

#### **Top Ten User of the Helpdesk by Number of Calls**

Name of User  
Number of Calls to the Helpdesk  
Length of Call / Case

#### **Top Ten Users of the Helpdesk by Length of Call / Case**

Name of User  
Number of Calls to the Helpdesk  
Length of Call / Case