

BT Group—MPLS-Based IP VPNs Built on Cisco IOS Software Enable Streamlined and “Applications-Aware” Enterprise Network Services

BT Integrates its Domestic and International MPLS Platforms, Enabling Efficient, Cost-Effective and Quality of Service-Enabled Multiservice VPNs.

With more than 20 years' experience, BT Group is recognized as one of the leading providers of data networking services in Europe. The company has been designing, installing, and managing virtual private networks (VPNs) since its inception in 1991, delivering them to businesses of all sizes worldwide, and is at the forefront of the industry and at the heart of the development of new technologies.

Until recently, companies with branch offices in different regions and countries had to create multiple, expensive network solutions to interconnect and extend their corporate networks. VPN services have been effective in connecting partners and offices using Frame Relay or Asynchronous Transfer Mode (ATM) over service provider backbones. BT Global Services—BT's international business services and solutions division which is focused on serving the European needs of global, multisite organizations and the global needs of European organisations—worked closely with Cisco Systems® to become the first international service provider to greatly simplify VPNs over Internet Protocol (IP) networks by using Multiprotocol Label Switching (MPLS), available in Cisco IOS® Software.

BT Global Services provides managed services and solutions for multisite organizations with global operations. In 1999, the division launched an MPLS-based IP VPN service—called BT MPLS—to help customers rapidly and cost-effectively obtain global, multipoint, data, voice, and video network services that prioritise and supports any mix of IP applications. BT MPLS is offered with comprehensive service-level agreements (SLAs) covering delivery, availability and network performance.

The popularity of the MPLS service was quickly evident, as some of the world's largest companies and leading brands subscribed. The service was awarded the prestigious “Well-Connected Award” for best international IP service by *Network Computing Magazine*.



Changing the VPN Paradigm

In the past, service providers and enterprises implementing VPNs with Frame Relay or ATM networks had to create permanent virtual circuits between each site—an expensive and time-consuming proposition to deploy and maintain. After the virtual circuits were established, traffic from one site had to go through a central network hub at the service provider before going to its end destination, even if the two sites were in the same town and the hub was not. But MPLS core networks work differently from pure IP-based cores: In an IP core, at each network hop, routers must extract the forwarding information from each packet and use this as an index for a routing table lookup. In contrast to IP-based routing, MPLS-based solutions are able to choose the optimal path to route packets dynamically.

Today, Cisco® routers in the BT MPLS network assign forwarding paths for packets only once, when they enter the network edge. The packets are dynamically switched instead of routed in the network core and analysis of the IP packet header is handled once by Cisco edge label switch routers. The idea is to decouple the activities of forwarding packets through the network from the routing decision of where they have to go. The process is similar to how ATM or Frame Relay switches work, and simplifies the work that core MPLS switches need to do, without sacrificing the dynamic efficiency and flexibility of IP routing. The same label header that is used to speed the switching of the packets through the network core is also used to provide the separation of customer's traffic into multiple, secure VPNs.

“Frame Relay and ATM are proven, trusted, and popular technologies” says Mark Logan, head of BT Global Services VPN Products. “BT has more than 4000 customers who rely on these VPN services to support their business-critical operations. IP and MPLS have emerged as the next steps in the path to move businesses into an increasingly connected and network-centric world. By developing our IP-enabled services we have created a bridge between traditional VPNs and IP-based VPNs that enable customer networks to evolve to IP with minimal disruption.” The MPLS VPN service is available on five continents (see Figure 1).

In addition to the savings and efficiencies derived from more streamlined routing, switching, and provisioning of MPLS, BT's global MPLS IP VPNs also offer quality of service (QoS) commitments for delay and loss-sensitive traffic. Multiple classes of service are available, including: Voice Class (supporting “IP Voice Service”, voice over IP connectivity with special prioritization to eliminate delay variation); Premium Service (for time-sensitive and mission-critical data applications such as enterprise resource planning); and Standard Data Service (for non mission-critical data traffic such as e-mail, file transfers, Web, and intranet browsing).

With MPLS, different classes of service are assigned to labeled packets. The network uses labels to switch packets based on different levels of priority and other specific QoS characteristics, which can be predefined and based on different service classes.

“An important element of BT's strategy is to provide businesses with a smooth migration path from their existing networks to IP,” Logan explains. “With the IP Voice Service, QoS gives our customers dependable service that they can use with their existing PBXs [private branch exchange systems] and private dial solutions. We are introducing our clients to converged voice and data, which can be implemented in stages—per office, region, or country—and which makes the most of their investments in existing infrastructure.”



The IP VPN will be delivered through BT IP Clear, a “wires only” service designed for system integrators and multisite corporate customers that gives them complete control over router selection and configuration. Other MPLS-based IP VPN offerings from BT include BT MPLS, its global IP/VPN service, BT equIP (a fully configured and managed IP VPN service delivered with routers and integrated Internet access and dial access in the U.K.) and BT metroVPN (a service similar to equIP focused on government-sector businesses such as local authorities and health trusts and offered with a closed user group [CUG] facility and competitive regional tariffs).

In Europe, BT has signed one of the largest MPLS contracts ever in the Netherlands with the Dutch purchasing group Superunie. With a 25 percent market share and 45 years of experience, Superunie is a leading retail organization representing 17 supermarket chains that operate nearly 2500 stores.

Efficient management of Superunie’s supply chain depends on high-quality data communications. With BT MPLS, Superunie members can streamline their entire networks while making improvements in the quality and flexibility of the services that they provide.

“Superunie members are market leaders in their fields. Their knowledge of regional and local markets enables them to compete with the large national chains,” says Guus Slik, director of Superunie. “They deserve the best quality communications services in an easily manageable package, so that they can expand their bandwidth and applications in line with their requirements. We found BT very receptive to our wishes and the requirements we imposed on the system, and the company’s offering was excellently suited to our needs.”

“The ‘connectionless’ nature of MPLS, which eliminates the need for maintaining private virtual circuits, as well as the growth of converging services over IP networks, has made the use of MPLS for IP VPNs very attractive to our customers,” Logan explains. “Our global IP VPN service is fast, secure, and reliable. It provides true business-class performance and is flexible enough for customers to outsource the service entirely or buy what they need while taking full advantage of their existing infrastructure and IT expertise. We offer multiple classes of service to let our customers use the service more efficiently and give critical applications highest priority. In addition, our ongoing program of research and development helps us improve the service, introducing new capabilities and enhancements as the technology advances.”

Executive Summary

Background

Companies within the United Kingdom’s BT Group PLC collectively address different sectors of the market for global telecommunications services and solutions. From network infrastructure to the latest IP solutions, BT delivers a wide range of business solutions and technologies to multisite corporations, other service providers, national governments, and international nongovernment organizations (NGOs) across Europe and around the globe. The BT Global Services subsidiary is an international network business focused primarily on corporate and wholesale markets. Twenty of the top 50 Fortune 500 companies and 80 of the Financial Times Stock Exchange (FTSE) Top 100 companies use BT networks, which are available in more than 100 countries.

The company’s relationship with Cisco Systems represents BT’s most long-standing alliance. BT is a Cisco Gold Partner and has an experienced staff with specialist Cisco skills and certifications in IP Telephony, Wireless LAN and VPN/Security technologies. BT’s LAN and WAN networks also hold the Cisco Powered Network designation, demonstrating BT’s experience in designing a network built end to end with Cisco equipment. Both BT and Cisco Systems place a great deal of importance on research and design and the organizations benefit from joint research



and design, beta testing, and early releases of new products. The Cisco strategy of providing new-world technology solutions for the Internet directly supports BT's strategic direction of delivering managed or outsourced total business solutions for customers involving voice, managed data networks, customer relationship management (CRM) and e-business solutions. Through the relationship, both BT and Cisco are aligning their strategies and ensuring complementary approaches to new markets to offer customers best-of-breed solutions.

Challenge

With customers around the world, BT needed a global IP VPN service to offer businesses as the next step from their Frame Relay and ATM networks. In addition to having worldwide reach, the IP network needed to be reliable, efficient, and highly secure to meet BT's exacting standards. BT was one of the first companies to realize the potential of Multiprotocol Label Switching (MPLS) for efficient routing and switching and the ability to create different classes of service based on quality of service (QoS) technology. A key requirement was the integration of several separate MPLS networks into one global network that could seamlessly accommodate customers around the world with IP VPNs utilizing MPLS.

Cisco Solution

BT worked closely with Cisco Systems to develop its global MPLS network and services, viewing Cisco as the world leader in internetworking and a ready partner to assist in the design, testing, and deployment of leading-edge solutions. MPLS networks supporting more than 70 countries were integrated, encompassing 1000 points of presence (POPs), serving more than 1300 customers and supporting more than 23,000 customer ports. The BT MPLS IP-VPN service network is based on Cisco 7200, 7500, and 12000 series routers all running Cisco IOS Software, the most advanced network operating system available. For customers, access into the MPLS network can be provided in a number of ways including leased line, Ethernet, Frame Relay, ATM, dial and xDSL. The VPN network is designed as a three-tier architecture with Tier 3 POPs located as close as possible to remote customer sites to ensure that the local connections are as short and therefore as cost-effective as possible.

Results

The BT MPLS network is regarded as a state-of-the-art IP VPN, combining the performance, reliability, and security of a leased-line network with the advantages, flexibility, and scalability that an any-to-any IP network can provide. The BT IP-VPN service can support mission-critical data applications requiring exacting performance, and is also capable of carrying multimedia applications and voice traffic. Multiple classes of service are available for priority voice, mission-critical and non mission-critical applications. Hundreds of corporate and government customers have signed up for the BT MPLS service, which can be purchased as a fully managed solution with integrated hardware or as a "wires only" business connectivity service. Additionally, BT has developed a series of IP-enabled options to give customers the ability to migrate their existing networks to IP smoothly and at their own pace.

"Key to the success of the BT MPLS service is the close partnership between BT and Cisco," says Logan. "The relationship with Cisco Systems is BT's longest established alliance, and since 1994, we have been a Cisco Gold Partner. By investing in skills development we have also been awarded numerous Cisco specialisations including IP Telephony, Wireless LAN, and VPN/Security technologies. Our unique partnership has given both organisations the benefit of joint research and development, testing and early evaluation of new products and we are using this experience to continue development of our world-class, market-leading MPLS service and unmatched customer support."



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