

Bell Canada

IP VPN Service via MPLS Launched with Quality of Service On-Demand



“The IP VPN Enterprise service takes the flexibility of the Internet, adds to it a class of service capability, and offers businesses a way to improve their organization from the inside out, rather than from the outside in. No other technology comes close to MPLS in enabling the VPN capability that makes these services private, flexible, and secure.”

—Jeremy Wubs, IP VPN Enterprise Product Manager, Bell Canada

Virtual private networks (VPNs)—networks deployed on a shared, public infrastructure for private use that have the same policies and security as private networks—are not new. Companies have for several years recognized that extending their corporate networks and extranets over a VPN service enables them to effectively connect dispersed offices and partners over Frame Relay or Asynchronous Transfer Mode (ATM) and service provider backbones. The VPN has made possible applications such as joint product development, inventory management, online ordering and electronic commerce, sharing of proprietary data, customer support and service, and data backup and warehousing.

More recently, the Internet—with the Cisco IOS[®] Software feature Multiprotocol Label Switching (MPLS) in particular—has greatly simplified the deployment, management, and flexibility of VPNs. The IP VPN can also support a wide array of applications, from mission-critical data to e-mail, telephony, and videoconferencing.

With the majority of IP traffic in Canada traveling over the Bell Canada network, no service provider was better positioned to augment its IP services in a next-generation IP VPN offering. Working closely with Cisco Systems beginning in the winter of 1999, Bell Canada in 2001 announced broad availability of IP VPN Enterprise, the first such service with a powerful Web portal that lets customers configure bandwidth and classes of service on-demand.

MPLS Optimizes VPNs

Previously, VPNs using ATM or Frame Relay networks required virtual circuits to be built and maintained between separate sites. Traffic first went to a central network hub and then out to the receiving site. With traditional Layer 3 (the network layer) IP routing, each router extracted all of the information relevant to forwarding from the Layer 3 header of each packet. That information was then used as an index for a routing table lookup to determine the packet's next hop. This was repeated at each router

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across a network. At each hop in the network, the optimal forwarding of the packet had to be determined once again.

With the Cisco MPLS solution operating on Bell Canada's IP Network backbone, routers at Bell Canada assign forwarding paths for packets just one time, when they enter the MPLS network. Packets are switched instead of routed within the network core. MPLS affixes a short, fixed-length label to each packet. Network switches look up predetermined forwarding paths for the packets based on the labels.

With MPLS, the complete analysis of the Layer 3 header is performed only once, at the edge label switch router, which is located at each edge of the network. Only the label at the core is examined in the incoming packet to send the packet on its way. At the other end of the Bell Canada's network, a provider edge router removes the label and delivers the original packet to the destination IP network. A key result is that forwarding decisions can be achieved through a single table lookup from a fixed-length label. This enables MPLS to empower routers and switches to make forwarding decisions based upon multiple destination addresses.

The Customer Premises Edge routers, ranging from the Cisco 1720 to Cisco 7204, are installed at each customer site. These interface in various ways, based on the customer's infrastructure, with Cisco 7500 Series routers at Bell Canada's network edge and Cisco's industry-leading 10-Gigabit 12400 Internet Routers within Bell Canada's IP backbone. MPLS runs on the 7500 Series and 12000 series Internet Router family.

Due to this network infrastructure, Bell Canada's IP VPN Enterprise customers don't have to pay for permanent virtual connections. Instead, virtual connections can be configured and managed by Bell Canada or through the Web interface made available to customer network administrators. No capacity planning on behalf of its customers is required, since Bell Canada lets its customers know when additional bandwidth is needed, and "any to any" connectivity and easier management is possible.

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BACKGROUND: Bell Canada is Canada's leading Internet service provider, offering connectivity to residential and business customers through wired and wireless voice and data communications, high-speed and wireless Internet access, IP-broadband services, and e-business solutions. Bell Canada's coast-to-coast IP-broadband network has more than 100 points of presence in key locations throughout Canada and the United States. Key partnerships with Cisco Systems and Nortel Networks have enabled Bell Canada to evolve its carrier-class IP network, pioneering next-generation Internet capabilities and connecting enterprises to the world.

CHALLENGE: Realizing that corporations are extending mission-critical, Intranet-based applications to customers, suppliers and partners, Bell Canada saw the opportunity to offer competitive IP-based multiservice network solutions. Bell Canada's IP VPN Enterprise service had to deliver secure, scalable, reliable, well-managed, configurable access to information at any time and from anywhere. It also had to demonstrate to customers the savings in managed services over a less expensive public infrastructure.

CISCO SOLUTION: Bell Canada introduced the IP VPN Enterprise service in April 2001. The service is based on the Layer 3 packet routing efficiencies of Multiprotocol Label Switching (MPLS), a feature of Cisco IOS software. Bell Canada's IP VPN Enterprise service provides secure, cost effective access to a company's corporate network from anywhere in the world for regional and international offices, business partners, remote workers and traveling employees over an end-to-end IP network. The service also allows customers to consolidate voice, data, and video into one network. A unique feature is a Web portal that allows customers to self-provision bandwidth and quality of service on-demand, view reports, place orders, and pay for services. Other services can be deployed by Bell Canada with the same infrastructure, including intranet outsourcing and turnkey IP call center.

RESULTS: A proven success in beta release for several large enterprise customers, Bell Canada's IP VPN Enterprise service lets businesses conduct e-commerce and share content with their customers and partners on a secure, flexible, high-speed, scalable, private network over Bell Canada's IP backbone. Avoiding the need to host, manage, and administer the VPN services themselves, customers can choose to outsource some or all of their network services. Future services available over the IP VPN Enterprise service will be externally hosted applications in Bell's Internet data centers. Connectivity to the IP VPN Enterprise can even be extended internationally, for truly global networking.

inside out, rather than from the outside in," says Jeremy Wubs, Bell Canada's IP VPN Enterprise Product Manager. "No other technology comes close to MPLS in enabling the VPN capability that makes these services private, flexible, and secure."

Instead of having to manage the policies and applications in Layer 3 of their IP networks on top of their carrier's Layer 2 network, busy enterprise customers can now rely on Bell Canada for the secure management of these services, based on strict service level agreements.



Customers can deploy the service without changing the IP addressing scheme, and the IP VPN can also rapidly scale to meet the needs of enterprise customers, who can add or delete links to partners, suppliers, and their own customers quickly.

Configuring Quality of Service On-Demand

At Layer 3, all traffic can be identified, prioritized, and forwarded based on customer-selected quality of service requirements to ensure that mission-critical data gets through. In other VPNs, even those deployed on IP networks, customers have had to contact service providers to track usage and change quality of service attributes. But Bell Canada’s IP VPN Enterprise service was built with a customer Web portal that allows users to alter their bandwidth requirements on demand, and turn on and off different quality of service selections throughout their IP VPN. Three different classes of service are available: Standard (for e-mail, file transfer, and non-critical Internet access), Priority (for critical Internet access, point-of-sale, and streaming video), and Near Real-time (for voice over IP and videoconferencing).

The ability to change class of service and bandwidth features on-demand lets customers take advantage of seasonal and other special or short-term fluctuations in traffic, such as an e-mail surge in response to a marketing

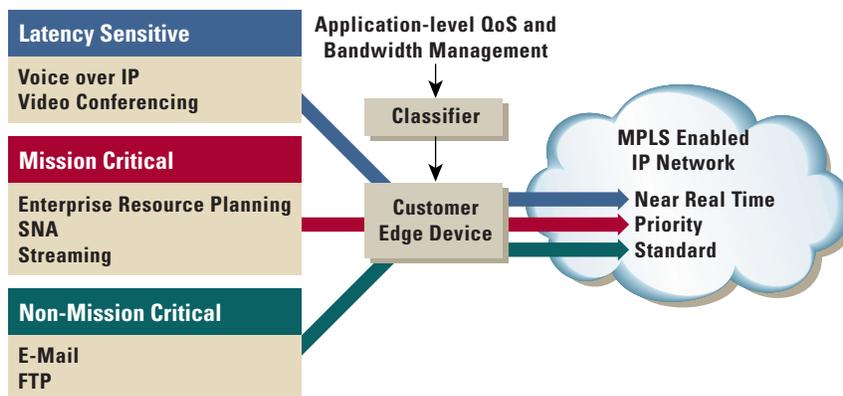
“OUR CUSTOMERS WANT TO MOVE TO A MANAGED SERVICE SOLUTION, BUT THEY STILL WANT TO HAVE SOME CONTROL. WHO BETTER THAN THE CUSTOMER TO KNOW WHEN THEY WANT TO CHANGE BANDWIDTH OR ORDER ADDITIONAL CLASSES OF SERVICE?”

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Bell Canada

campaign or a streaming video sales presentation. Billed only for what they use, customers of the IP VPN Enterprise service only pay for what they want when they want it.

“Our customers want to move to a managed service solution, but they still want to have some control,” says Wubs. “Who better than the customer to know when they want to change bandwidth or order additional classes of service?”

Figure 1 IP VPN Enterprise Traffic Classification



For customers with existing ATM or Frame Relay infrastructures, the IP VPN Enterprise service can be leveraged as a high-performance transmission medium. Branch sites can use existing Frame Relay interfaces to access the IP VPN and the existing ATM network can be leveraged for high-speed access to the MPLS core.

“IP VPNs are a means to extend the reach and scalability of legacy Frame and ATM networks, not a replacement for these services,” says Wubs.

High Adoption Anticipated

The IP VPN services market in Canada was \$64 million in 2000 and is expected to grow 40 to 60 percent by 2003, based on research conducted by the Canadian Data Communications Service. For U.S.-based carriers, IP VPN growth is forecast to go from US\$1.28 billion in 2000 to nearly US\$10 billion by 2005, according to a study by the International Data Corporation. That adds up to a compound annual growth rate (CAGR) of 51 percent for that period, which would make IP VPNs one of the fastest-growing segments of the IP telecommunications market.

In April 2001, Bell Canada’s IP VPN Enterprise was officially launched throughout Canada. The Canadian Life Assurance Company and IBM Canada were the first two customers to use the service. At least 15 large enterprise customers are expected to be users of the service by the end of the year.

Bell Canada’s IP VPN Enterprise can also support voice and videoconferencing applications over the same network, giving customers the choice of outsourcing some or all of these services.

“In the near future, Bell will offer businesses the ability to host applications in our Internet data centers and to transport those applications to desktops across Canada on the same IP VPN network,” said Wubs. “Each application will offer the same differentiated levels of service, flexible bandwidth, and end-to-end management that are available on a customer’s own private network.”



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