



## The MPLS Network: A Future-Proof Engine for Voice-Data Convergence

**Addressing network traffic trends with new opportunities for business communications**

## I. MPLS: The Foundation for the Way Today's Business Works

The convergence of voice and data on a single wire is, perhaps, the most exciting network development since the invention of the private branch exchange (PBX). Over the past decade, Multi Protocol Label Switching (MPLS) technology, which enables voice and data to be transported together on wide area networks (WANs), has matured to provide a platform for almost unimaginable communications and cloud-computing possibilities. This is especially important considering the increasing network traffic trends that affect organizations—large and small, public and private sectors—across the globe. MPLS helps solve the service management problems brought by the fast-ramping demands of video and other bandwidth-intensive, jitter-sensitive, and latency-sensitive applications.

### The Origins and Future of MPLS

Originally designed to allow Internet protocol (IP) routers to mimic the speed of much faster Asynchronous Transfer Mode (ATM) switches, MPLS assigns labels to data packets; the packets' forwarding action is executed based solely on the contents of the label, rather than by the router examining the details of the entire packet. This feature dramatically increases the network traffic routing speeds.

Currently, MPLS is the fastest-growing WAN technology on the market because of its performance and versatility. For example, MPLS is called multiprotocol because it works with the IP, ATM and Frame Relay protocols. Its packet label orientation allows end-to-end circuits to be created across any type of transfer medium, using any supported protocol, which allows organizations to combine the performance of high-speed legacy WAN technologies with the flexibility and cost advantages of an Internet-based network.

MPLS enables new routing functionality and capabilities that were not available with conventional IP routing, such as:

- Virtual private networks (VPNs) that are in widespread use today
- Traffic engineering
- Layer 2 transport in the OSI network stack

With reference to the standard model for a network (the Open Systems Interconnection, or OSI model), MPLS allows most packets to be forwarded at the layer 2 (switching) level rather than at the layer 3 (routing) level.

- Guaranteed bandwidth services

MPLS has emerged as the ideal future-proof network technology because it:

- **Enables data and voice to travel on the same network**

Called “network convergence,” this capability supports a myriad of exciting new applications—such as voice over IP (VoIP) Internet telephony, unified communications, corporate video, cloud computing, etc.—as well as the ability to scale existing applications. Corporate video and cloud computing are topics of particular excitement in business circles and are discussed further in Section II.

- **Provides for four classes of service (CoS)**

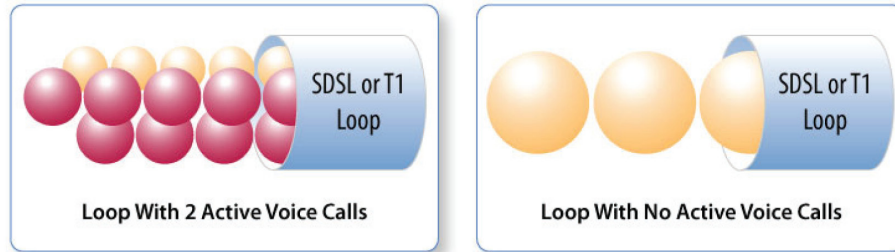
This capability allows service providers' network engineers to segregate voice, data, and video traffic into different CoS, ensuring that performance-sensitive applications—such as VoIP—have a clear, uncontested path across the network. For example, most MPLS networks today segregate traffic on the core network by the following CoS priorities:

- o Real-time, for voice and video
- o Critical, for mission-critical activities—such as processing credit card transactions, polling, etc.
- o Business, for business-critical for enterprise applications, database access, and surveillance monitoring
- o Data, for lower-priority traffic—such as Internet browsing and FTP file transfer

• **Allows for prioritization of traffic**

In MPLS networks carrying voice and data traffic, the most advanced service providers use both IP address and traffic classification to ensure voice traffic delivery. This is done using a two-layer strict priority queue on a private T1 circuit. Most contention occurs on this link, and the queuing strategy ensures that voice traffic will always take priority.

### Dynamic Bandwidth Allocation



When there are no active voice calls all bandwidth is available for data traffic



• **Allows for dynamic bandwidth allocation and quality of service (QoS)**

CoS, combined with dynamic bandwidth allocation, allows MPLS service providers to ensure QoS, including prioritizing voice traffic. QoS is essential because it :

- o Enables the prioritization of business-critical applications

Unified communications is the integrated delivery of voice, data, and video communications. It can help SMBs accomplish four critical goals: Improve employee productivity by allowing people to communicate more freely and efficiently, integrate communications into business processes, simplify operations by connecting people and information more effectively, and reduce capital and operating expenditures.

- o Gives companies control over how their bandwidth is used
- o Ensures consistent, interruption-free network performance
- o Prevents critical applications from failing due to network congestion

Throughout the MPLS network, bandwidth is shared to support simultaneous voice and data traffic. When a voice call is received or made, the necessary bandwidth is immediately provided. Because of QoS, voice traffic always takes priority over data traffic.

## MegaPath: A Leader in Converged Network Solutions

MegaPath is the leading provider of managed IP communications services in North America. It has the largest broadband reach of any network in North America, and owns and operates a fiber optic core network that has run MPLS since 1999. MegaPath has the nation's broadest QoS-enabled voice network, offering a broad portfolio of services that leverage data and voice convergence.

The Hosted Voice and Data service combines business-class phone service and high-speed Internet access. The Hosted Voice service comprises:

- Hosted Voice uses new or your existing analog equipment and phones.
- Hosted Voice PRI uses existing digital PBX equipment and phones.

- Hosted Voice SIP Trunking uses existing IP-PBX equipment and phones.
- Hosted Voice+MPLS, an integrated access solution, provides MPLS VPN, voice, Internet and Managed Security Services.
- Hosted Voice, an ideal solution for businesses one or multiple locations, is a hosted, enterprise-grade, cloud-based IP phone service that connects all employees into one unified phone system with the same business features in every location.

The capabilities of MegaPath's MPLS network, and its Managed Security Service, are further discussed in Section III.

## II. Cost Savings and More: Unlimited Application Potential

Because telecom expenses represent 1-2% of an organization's operating costs, it is not surprising that most companies are initially attracted to converged services because of the cost savings made possible by VoIP communications. Indeed, Sage Research finds that 83% of companies turn to IP voice communications for savings. As long-distance toll calls disappear, phone bills can be reduced by at least 20-30%; most companies can fund their entire converged network via their voice savings.

Integrated Voice provides significant savings - up to 45% over traditional phone service.

- **Buy only one circuit**  
Voice and Data can share one circuit.  
No need to purchase circuits separately.
- **No waste**  
Buy only the lines, trunks or full PRIs you need for efficient growth management.
- **Improve efficiency**  
Voice compression and dynamic bandwidth allocation optimize bandwidth usage.
- **Boost productivity and mobility**  
Hosted services—such as Find Me/Follow Me and Remote Office—increase productivity and mobility.
- **Save on usage**
  - o Share long distance minutes company-wide and carry forward unused minutes monthly
  - o Unlimited local calling included with all service plans
  - o Free on-net calling between all MegaPath Voice locations

## New Applications Demonstrate the Potential of MPLS networks

A wide range of new applications is available, is being rapidly adopted, and promises to fundamentally improve the way companies function and how people work. These applications illustrate the unlimited potential of converged voice and data, and generally fall into two major categories:

- **Corporate video**  
Although the media tends to generate the most buzz about consumer-facing content, corporate video—as deployed in small- and mid-size businesses, and large enterprises — presents exciting new opportunities for companies of all sizes to reduce costs and improve efficiency. Video is used in a very wide range of marketing, communication and business capacities, including:

**o Training**

Video is quickly replacing classroom training as the most effective and economical way to train workers. Students can proceed through material at their own pace, and their progress is automatically tracked.

**o Meetings**

The high cost of business travel is driving many organizations to adopt videoconferencing as a means for saving time and money. One-on-one and group meetings can be conducted easily via video, delivering the immediacy and face-to-face communication.

**o Human resources**

Video-based tutorials on new policies and procedures, and informational videos about company benefits, can be delivered highly effectively via corporate video. Online tracking can be used to verify viewing, an essential element for compliance issues.

**o IT troubleshooting**

IT personnel are nearly always stretched thin, particularly when addressing a queue of break-fix issues. Corporate video is especially useful in working with hardware or software that can't be remotely accessed; it allows an IT expert in one location to walk another employee through a step-by-step repair or maintenance procedure, from a distance.

**o On-premise security**

In retail environments, Internet-based video surveillance presents a cost-effective way to monitor premises, as well as protect customers and employees.

**• Cloud computing**

Cloud computing typically involves the provision of dynamically scalable, virtualized resources as a service, delivered through the Internet cloud. Cloud computing providers offer a wide range of common business applications online, accessed via a Web browser, while the software and data are stored on provider-maintained servers.

Cloud computing presents a dramatic shift in the economics of business computing because customers often do not own the physical infrastructure associated with the services they consume. Instead, they avoid capital expenditure (CapEx) by typically renting usage from a third-party provider and paying only for the resources they consume.

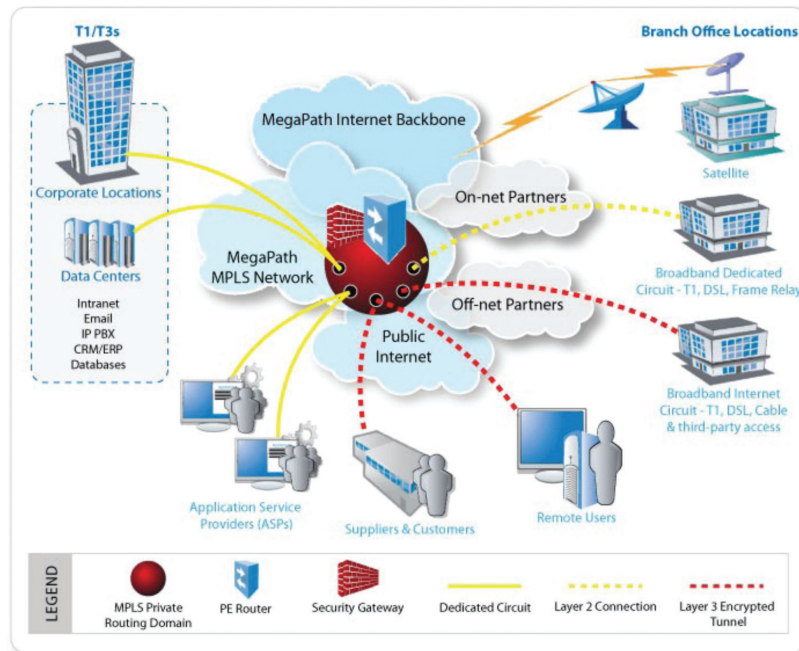
Companies of all sizes use a wide range of computing resources delivered through the cloud, including:

- Hosted VoIP services – The ideal telephone communication solution for businesses with multiple locations
- Bundled and Managed services – Managed security offerings—for example, alleviate the need for SMBs to deploy, manage, and maintain their own network security infrastructures
- Pay-for SaaS applications – Salesforce.com's customer relationship management (CRM) SaaS and other business SaaS applications give SMBs ready access to enterprise-class applications, yet require network support for consistent, reliable, quality performance
- Free applications — SMBs can enjoy free enterprise-class services—such as email and collaboration; for example, Google Gmail<sup>™</sup> is an email platform used by many SMBs, while collaboration environments such as Google Wave<sup>™</sup>—will also likely gain widespread adoption.

### III. About the MegaPath MPLS Network

As the leading provider of managed IP services in North America, MegaPath serves over 23,000 customers and 84,000 endpoints with an MPLS-based Tier 1 all-optical IP network.

MegaPath operates approximately 30 points-of-presence (POPs), all of which are located in fault-tolerant, carrier-grade facilities. The POPs are connected to the network via multiple optical circuits (OCx) for complete redundancy.



Site-to-Site MPLS VPN

MegaPath’s all-optical switching technology allows coast-to-coast single hop networking for on-net traffic, which significantly reduces latency as traffic traverses the network. With a redundant path for every connection, traffic is instantaneously rerouted in the event of a network failure, ensuring uninterrupted, high-quality service.

The end result is a powerful, business-class MPLS core network that provides secure multi-site and remote access connections to empower today’s distributed enterprises with converged IP data, voice, and video services.

#### A Catalyst for Convergence

MegaPath’s national footprint ensures that companies will always have a single source for their network access requirements. With MPLS routing technologies and Tier-1 peering infrastructure, MegaPath customers can be assured they are getting the best performance possible.

MegaPath’s innovative network architecture allows companies to extend VoIP, corporate video, cloud computing, and other emerging broadband access applications to remote sites and teleworkers. These applications—which require broadband access technologies—can be delivered across the extended enterprise with a combination of more traditional analog dial, frame relay, and private line networks for a complete connectivity solution. With network connectivity from MegaPath available in a variety of access speeds – from DSL to DS3 – companies can select the right speed for each individual user or remote location.

MegaPath offers the widest array of broadband access services with the widest coverage available from a single provider. By partnering with all known broadband service providers nationwide, MegaPath enhances the chance that Internet connectivity services will be available in needed areas, and that remote locations will always get the best service at the best price.

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## MegaPath Hosted Voice: Enterprise-grade VoIP Quality and Service for Less

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MegaPath Hosted Voice is the ideal solution for businesses with one or multiple locations. It is an enterprise-grade, cloud-based IP phone service that provides all employees with a unified phone system that offers the same business features in every location. Hosted Voice is available nationwide and includes either T1 or SDSL access.

MegaPath Hosted Voice leverages a dedicated MPLS VPN network to provide crystal clear voice quality and reliable call stability. In addition, it can help companies achieve significant cost savings. With no expensive PBX equipment to lease, purchase, or maintain, MegaPath's hosted VoIP solution costs up to 50% less per employee than a traditional PBX or key system, and it offers more essential business features.

MegaPath gives companies a choice of affordable phones, features, and calling plans. In addition, it provides all of the advanced IP features, so companies don't have to worry about technology obsolescence. MegaPath can also work with existing telephone systems, allowing companies to migrate to IP at their own pace.

MegaPath Hosted Voice includes:

- A fully managed total IP phone system
- Low up-front capital expenditure and a predictable monthly expense
- Network-based Quality of Service (QoS) for clear voice service and built-in security
- Advanced IP business features on every phone, in every location
- Easy-to-use online portal to simplify system and individual phone management
- Flexible plans and system configurations
- Selection of popular IP phones and enterprise-grade equipment
- Professional installation (optional) and support

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## MegaPath Managed Security Service: Protection in the Cloud

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MegaPath complements its robust national network—which is comparable to those maintained by larger telecommunications providers—with products and services that are designed specifically for the business communication needs of SMBs, all the way up to the enterprise level. One of the most innovative services is MegaPath's Managed Security service, which delivers comprehensive unified threat management through the network cloud.

MegaPath Managed Security service is a hosted solution that requires no customer premise equipment (CPE)—relieving customer IT personnel from the burden of buying, deploying, and managing firewalls, anti-spam protection, and a host of associated security functions. The MegaPath Managed Security service allows for proactive monitoring of customers' networks through MegaPath's multiple redundant network and security operations centers.

MegaPath Managed Security service complies with selected industry-specific standards—such as the PCI for credit card processing—and offers exceptional depth and breadth of security features including:

- Managed firewall
- Anti-virus protection
- Intrusion prevention
- Spam Tracker
- Content filtering
- White list / Black list

In addition, Fortinet, a world leader in unified threat management, protects the MegaPath network from large-scale threats—including zero-day attacks.

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## The Advantages of MegaPath Managed Security Service

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MegaPath Managed Security service allows companies to realize a number of important benefits, including:

- **Protects critical resources**

Filters inbound and outbound Internet traffic at the network edge, protecting all network devices—not just computers. It complements the security programs that may be installed on individual computers by providing an extra layer of security to protect companies from viruses, spyware, attacks, and visits to unauthorized websites.

- **Reduces wasted time and resources**

Tags spam and proactively blocks network-based attacks, viruses, worms, and non-productive Internet surfing; providing detailed reports on all security-related network activity.

- **Reduces liability**

Prevents access to illegal and harmful websites.

- **Saves money**

Eliminates the need for dedicated hardware and specialized security staff, and reduces the need for traditional security skill sets. By reducing bandwidth consumption, MegaPath Managed Security service can reduce bandwidth requirements while increasing uptime and employee productivity.

Finally, the MegaPath Managed Security service infrastructure provides the foundation for site-to-site security services that our customers can subscribe to remotely. This CPE-based extension of the Managed Security service allows our customers to achieve the same high levels of site-to-site communications security within their private MegaPath networks.

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## IV. Success Snapshot: VIZIOSoft Builds Client Relationships and Its Business with MegaPath Hosted Voice

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In an era in which the IT services industry touts “bigger is better,” VIZIOSoft is a high-tech solutions boutique that bucks the trend; it focuses on rapid software application development and IT outsourcing services. The company has a passion for partnership that extends to customers and providers like MegaPath. VIZIOSoft and MegaPath recently teamed up to deliver a cost-effective VoIP customer solution that is based on MegaPath’s Hosted Voice and Data service, which is delivered via MegaPath’s MPLS network.

When VIZIOSoft customer Velocity Athletics—a sportswear company with U.S. operations in Jacksonville, FL and Las Vegas, NV, as well as a clothing production facility in the Philippines—looked to VIZIOSoft to replace its traditional analog phone system with VoIP technology, VIZIOSoft turned to MegaPath for help.

“When we started talking with service providers about how to architect a VoIP solution for Velocity Athletics, MegaPath was much more responsive and worked with us in an individualized way,” says Omar Akram, co-founder and president of VIZIOSoft. “Some other vendors wanted VIZIOSoft to pay up-front to resell their services, but did not take time to have a conversation with us. MegaPath provided us with the domain expertise we needed to put together the right solution for Velocity Athletics.”

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## MegaPath Hosted Voice and Data Is Ideal for Small and Medium Businesses

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In collaboration with MegaPath, VIZIOSoft proposed—and subsequently implemented—a cost-effective hosted voice and data solution. By integrating Velocity Athletics’ voice and data applications over a consistent solution that is supported by T1 connectivity, VIZIOSoft and MegaPath enabled the customer to increase productivity without increasing resources or overhead.

Specifically, the solution integrates Velocity Athletics' customer relationship management (CRM) system and includes advanced VoIP features—such as the use of four-digit dialing to communicate as a single organization across its U.S. facilities and the factory in the Philippines. Akram says, “The Hosted Voice solution lets our customers leverage their existing analog switches while getting a productivity boost from VoIP applications and features.”

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## Teamwork Ensures a Seamless Transition

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Akram was impressed with the high quality of the Hosted Voice service offering, but his relationship with MegaPath was sealed by MegaPath's commitment to customer service. During the deployment, MegaPath worked closely with the VIZIOSoft team and provided real-time guidance on system configuration and other issues. “The Velocity Athletics system went live with no service interruptions,” Akram recalls. “Thanks to MegaPath, it was an exceptionally smooth cut-over.”

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## V. Summary: The Advantages of the MegaPath MPLS Network

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As an engine for convergence, an MPLS network provides significant advantages, starting with the reduced costs via VoIP communications. For many companies, the savings in traditional telephony charges can fund the entire converged WAN solution. In addition, there are no long-distance charges for site-to-site calling.

With MegaPath converged services, customers can experience additional savings because the single connection supports their current and future WAN needs. Customers can enjoy immediate savings by leveraging their existing “plug and play” analog and PRI equipment, which requires no costly voice infrastructure capex.

Similarly, MegaPath's Managed Security service provides reliable network-based managed security and negates the need for customers to purchase and manage related CPE; thus reducing in-house IT resource requirements. If customers want to enhance their site-to-site security, they can supplement the Managed Security service with additional MegaPath offerings.

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## High Performance, From the Core to the Edge

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MegaPath's all-optical switching technology allows coast-to-coast single hop networking for on-net voice and data traffic, which significantly reduces latency as traffic traverses the network. Because MegaPath doesn't hand off voice traffic to the public Internet—unlike many traditional Internet service providers (ISPs)—MegaPath delivers voice and video that are crystal clear and of exceptional quality. With a redundant path for every connection, traffic is instantaneously rerouted in the event of a network failure, ensuring uninterrupted, high-quality service.

In addition, MegaPath provides a range of high-performance add-ons that customers can use to tailor their converged environments, including:

- A PCI module for retail for secure, logged credit card transactions
- Excellent last-mile offerings—from DSL to DS3, as well as wireless options that blend seamlessly with the core network
- The largest private DSL footprint in the U.S.
- SSL and Web-based access to allow easy, affordable, secure, browser-based remote access from anywhere

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## MegaPath Offers Distinct Service Advantages

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With resources on par with any national telecommunications service provider, MegaPath offers enterprises of all sizes a unique flexibility to scale the service based on customer need. For example, a company can immediately gain the benefits of voice-data convergence with MegaPath's Hosted Voice and Data service, using existing analog equipment. As needs grow, the customer can migrate to Hosted Voice PRI, Hosted Voice SIP Trunking, or Hosted Voice+MPLS, as well as MegaPath Hosted Voice Services that provide smart phones and hosted Unified Communications applications.

MegaPath's customer centric focus extends to its ability to develop custom MPLS solutions. For example, MegaPath can set up multiple VLANs for retail customers so they can segregate sales (PCI) traffic from all other Internet traffic. MegaPath can also help its other customers use a mix of last-mile connectivity to transmit daily inventory and sales information.

For all customers, MegaPath provides a dedicated project management team to oversee the network environment rollout. This includes working with voice and data teams in IT organizations to help ensure a smooth transition to the new converged network.

Please visit [www.megapath.com](http://www.megapath.com) for more information about how MegaPath can help your organization can benefit from voice and data convergence.

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## MegaPath receives Industry Recognition

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- Internet Telephony's 2008 & 2007 Product of the Year (Duet)
- Unified Communications 2008 Product of the Year (Site-to-Site MPLS VPN)
- Communication Solutions 2008 Product of the Year (Managed Security Services)
- Telecom Associations Members Choice Award 2009
- CRN's 2009 Channel Chiefs
- Inc. Magazine's 2009 Inc. 5000 Fastest-Growing Private Companies and Top 100 Telecommunications Companies
- VAR 500 Top Technology Integrator, six consecutive years Deloitte Fast 500 Technology List.