

Small Businesses Connect through WANs

Wide area networks allow a company to share resources, utilize dollar-saving VoIP and more effectively compete with larger firms in the marketplace

Executive Summary

Communication is at the nexus of today's information age economy. The ability to move data across geographic distances — whether it's within a single office or to the other side of the world — is increasingly crucial to business success.

Putting data into the hands of business decision makers when and where they need it determines whether a small business gains a competitive advantage or struggles to adapt to a rapidly changing environment.

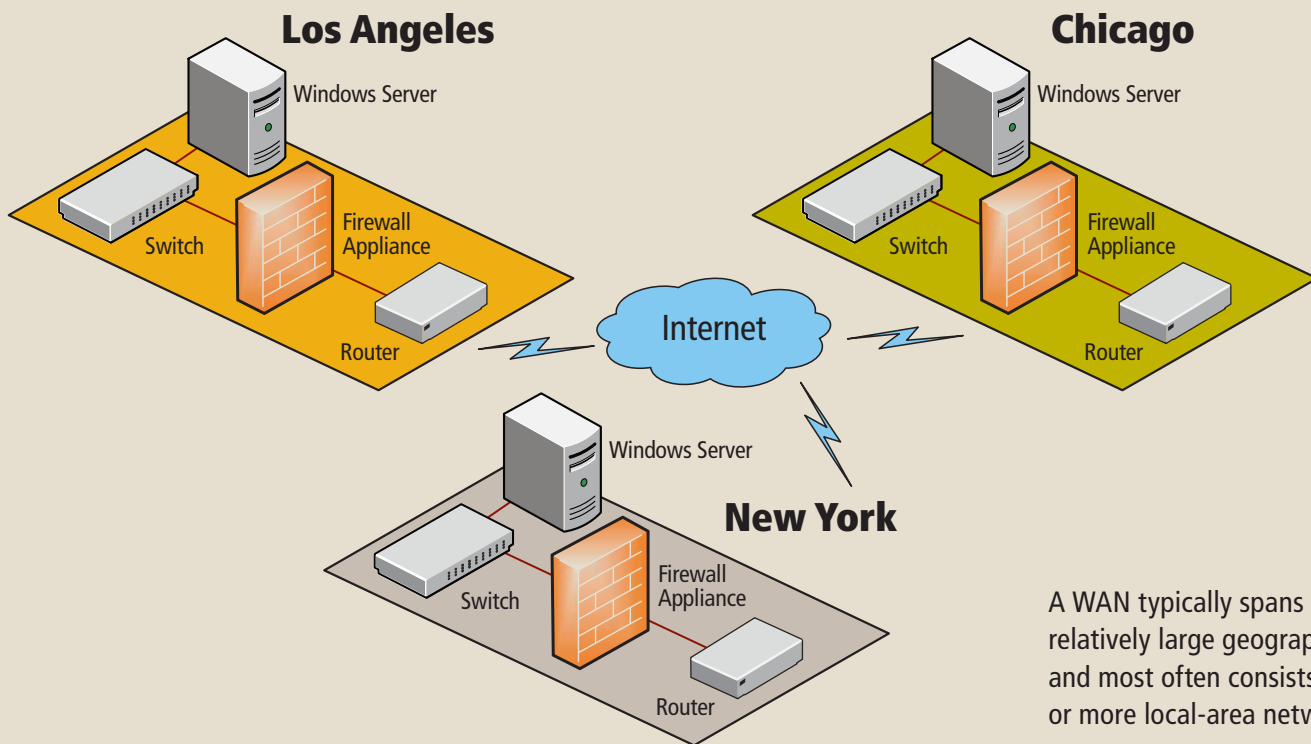
Although many small businesses have turned to local area networks LANs to share data within an office or worksite, business needs and communications requirements are evolving. Today, many organizations operate branch offices, use multiple buildings at the same site and have workers connecting remotely from home offices or on the road.

Ensuring that data flows seamlessly is essential. Poor connectivity can sap productivity, slow decision-making, increase the number of breakdowns and problems, and threaten bottom line results.

As a result, a growing number of small businesses are turning to WANs, which extend the capabilities of a LAN outward to encompass multiple sites, a region, even a national presence.

This approach makes it possible for workers to use enterprise applications, share databases and files, take advantage of unified IP communications (including Voice over IP and IP video), and handle a slew of other tasks that are commonly used across a network. These WANs are breaking down the digital walls that divide workers and are building a bridge to a more productive workplace.





A WAN typically spans a relatively large geographical area and most often consists of two or more local-area networks.

The Business Case for WANs

A decade ago, it was almost unimaginable that a small business could operate a network over extended distances. The cost and technical requirements were steep, and managing such an environment was beyond the scope of all but the most IT-savvy small business.

Since then, networking has matured and IP-based communications has moved into the mainstream of business. LANs and WANs have also become far more prevalent. According to market research and consulting firm AMI Partners, 59 percent of small businesses in the U.S have a LAN in place. Yet, only about 13 percent are currently using WANs.

To be sure, not every small business requires a wide area network. For some, it's enough to rely on a single PC or a group of networked computers at a single location. However, as the environment surrounding business becomes more complex and demanding, the need to communicate instantly and electronically grows.

As a result, small businesses with branch offices and remote workers are turning to WANs to streamline interaction and manage work more efficiently. They are discovering that

extending connectivity unleashes the full power of the network.

The business uses for a WAN are almost as broad as the number of organizations putting them in place. For example:

- A law firm might connect several branch offices so that attorneys and support staff can communicate in real time and share files and content generated at different locations.
- A consulting company might network various enterprise applications, such as customer relationship management (CRM) or an internal knowledge base, so that staff in Singapore can view the latest notes entered from an associate in Sweden.
- A small retailing chain might use the WAN to feed live inventory information to its stores.

A WAN can also serve as a foundation for other enterprise systems, including more sophisticated network attached storage (NAS) and storage area networks (SAN). These devices allow a company to access, store and backup files more efficiently.

In addition, it's possible to make video, audio and other types of unstructured data more

accessible and manageable, and integrate Voice over IP (VoIP).

WAN and VoIP

For many firms, VoIP provides significant advantages over a conventional PBX (Public Branch Exchange). These include lower long distance bills, reduced cabling and administrative costs (associated with reprogramming the systems for changes) and enhanced features.

In fact, VoIP is one of the biggest selling points for a WAN. By connecting a group of LANs at different locations, a small business can use intelligent call routing capabilities and "follow me" features to deliver phone calls to a person at any location on the network.

A user simply plugs an IP phone into an Ethernet port at a desk, cubicle or hotel room and calls automatically stream in. Advanced calling features, such as visual voicemail (which allows a recipient to view all the messages at the same time and choose which ones to listen to first) and computer-telephony integration (which might display relevant data on an IP phone's LCD display or generate a pop up windows on a computer) further boost the value proposition.

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Communication Convergence

Likewise, it's possible to embrace a brave new world of unified communications. With video, voice and other forms of data traveling across the network, a business can create new ways to interact and manage work.

For instance, VoIP audio conferencing makes it possible to assemble a group of employees in different offices without incurring the cost and complexity of a conventional audio bridge.

These participants can use collaboration software to create a virtual workspace where participants

share PowerPoint slides, Excel spreadsheets, video clips, audio and other content using only a Web browser. They're also able to edit documents collaboratively.

Some businesses are also extending the power of LANs and WANs through wireless networking. A business typically sets up a wireless local area network (WLAN) that connects to a router and interacts with the WAN.

This makes it possible to break free of the constraints of a desktop PC while tapping into data that resides on a central server or database. A manufacturer, for example, might use wireless IP phones in the production area or in the warehouse to connect to a LAN. An employee might tap into inventory or supply-chain data instantly and communicate with employees at other locations without making a long distance call.

Ultimately, a WAN helps improve connectivity and the sharing of resources. It makes it easier to manage e-mail and other communications across dispersed locations. Make no mistake, in today's highly mobile and decentralized business environment, extending the reach of the network is a winning proposition.

How a WAN Works

In order to move data across geographic areas, a WAN typically uses transmission facilities provided by common carriers, such as telephone companies and broadband providers. In the past, these systems have relied mostly on dial-up, DSL (Digital Subscriber Line), cable, T1 and T3 lines to transport data and voice traffic over dedicated phone lines or the Internet.

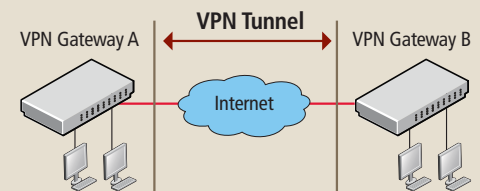
Today, fiber optic cable plays an increasingly important role in carrying data over geographic distances. The high speed and high reliability of fiber networks helps blur the demarcation between a local area network and a wide area network.

A gateway router at each location manages the traffic to various LANs and, when properly configured, makes these different networks look and act like one.

Three different types of network infrastructures are typically associated with WANs:

Wide Area Network (WAN):

A computer network that encompasses two or more local area networks and covers a broader area, including everything from a firm with multiple locations to a business campus, city, region or global area. Using a router at each location, it's possible to connect computers to create a private and closed computing network. WANs use leased lines, circuit switching, packet switching or cell relay to transport data between sites and LANs. They also incorporate VPN (Virtual Private Networks) and other secure communication tools for handling traffic across public networks.



Through the use of the Internet and a site-to-site VPN, high bandwidth connections allow a small business to utilize a WAN via a secure tunnel between two locations. The tunnel contains all the information necessary for gateway A to negotiate a secure and encrypted communication stream with gateway B.

Getting the Most Out of a WAN

Here are five ways to ensure that you're achieving maximum results from a wide area network:

- Buy brand name equipment from leading manufacturers. These devices usually offer the latest technology and greater adherence to standards.
- Map out an architecture before you buy equipment and actually put the WAN in place. It's important to design the network efficiently and provide flexibility and scalability.
- Use a WAN to boost productivity. Making key enterprise applications available to employees and using collaboration tools can provide impressive bottom line results.
- Consider moving to a converged network that handles both data and voice. Eliminating a conventional PBX (Public Branch Exchange) can cut administrative and long distances charges and provide leading edge features through VoIP and unified communications.
- Look to centralize IT management. While a WAN supports decentralized work — an ideal situation for today's Information Age economy — consolidating IT management reduces costs, simplifies administration and ratchets up security.

Frame Relay. This protocol encapsulates network traffic, both voice and data, and moves it seamlessly between LANs and WANs. The advantage of Frame Relay is that it does not require a point-to-point connection. Data can follow constantly changing paths. It's also relatively inexpensive.

ATM. Using cell relay, packet-switching technology, ATM (Asynchronous Transfer Mode) networks create logical, and oftentimes physical, connections between two endpoints. Although ATM systems have gained widespread adoption in the telecommunications industry and at large corporations, its complexity is often a deterrent for small businesses.

MPLS. This packet-switching network technology handles multiple protocols and transmits data across multiple network configurations. It supports TCP/IP (Transmission Control Protocol) and VPNs (Virtual Private Networks).

Thanks to the growing availability of high-bandwidth connections, it is rapidly displacing Frame Relay and eliminating the need for ATM. In fact, MPLS (Multiprotocol Label Switching) excels at handling voice and data traffic traveling across converged networks.

Although numerous equipment and configuration possibilities exist, the one constant in a WAN is the need for a Channel Service Unit/Data Service Unit (CSU/DSU). It serves as a gateway to WAN and Internet connections, and allows an Internet Service Provider (ISP) to manage the connection efficiently. The CSU/DSU is typically considered the demarcation point between the WAN and LAN.

At each location, a router serves as the traffic manager for each LAN. The router directs network traffic and ensures that data arrives at the desired location in a timely manner.

In some instances, an organization may also require a switch to deliver data to multiple devices. Finally, there's a need for a firewall to control incoming and outgoing data traffic, and possibly a VPN appliance to encrypt data between locations and users — particularly when data travels across the Internet.

Today, many products combine multiple functions into a single device. This trims costs,

simplifies IT administration tasks and reduces security vulnerabilities.

Data Becomes Competitive Advantage

As globalization accelerates, the branch office is rapidly morphing from a luxury into a necessity. In fact, it now accommodates more than half of today's workforce. While more and more small businesses recognize that a broader presence translates directly into improved performance and profits, managing a WAN can prove daunting.

Many small businesses, lacking deep pockets and extensive IT resources, find themselves facing important challenges, which include how to configure IT resources, how to manage an environment, and how to ensure adequate security at different locations using different hardware and software systems.

A decentralized IT infrastructure is a double-edged sword. Although it helps an organization become more nimble and flexible, it also places an enormous administrative burden on IT staff and executives.

Customizations, modifications and tweaks make it difficult to maintain an optimal environment. Data that's scattered in various systems across a company lead to administrative complexity and increased costs.

Today, most organizations seek ways to consolidate resources and manage business processes through a single data center. IT consolidation improves decision-making, trims IT expenses, boosts security, and creates standard business processes that span locations and geography.

Ways to WAN

A WAN addresses these issues and provides a strong framework for data consolidation and IT governance. However, putting the right systems in place and configuring them properly is vital.

A number of networking vendors — including Cisco Systems, D-Link, Linksys, NetGear and 3Com — offer sophisticated products that simplify technical tasks associated with operating

a LAN or WAN. Many of these devices are now designed for small businesses; they're affordable and they offer tools that make it easier to configure and manage LANs and WANs.

Cisco's Small Business 100 Series of Secure Broadband Routers- These products offer large enterprise features in devices designed for small businesses. They offer simplified setup; accommodate up to five users; manage DSL, ADSL (Asymmetric Digital Subscriber Line), ISDN (Integrated Services Digital Network), or an Ethernet WAN interface with a 4-port 10/100 switch; and provide secure connectivity with an integrated firewall.

These routers include Cisco's IOS network operating system, a Web-based setup tool and remote management capabilities. The latter feature allows consultants and value-added resellers (VAR) to handle the configuration process and centrally manage the device.

Netgear's ProSafe Gigabit VPN Firewall 25- Here you'll find advanced features at an affordable price for small businesses. The firewall offers dual 10/100 WAN ports, four Gigabit LAN ports, up to 25 simultaneous VPN tunnels, firewall and intrusion detection, high-grade encryption and Netgear's ProSafe Network Management Software. The device is VPNC (Virtual Private Network Consortium) compatible with Cisco IOS, Juniper/Netscreen, Check Point, and other router and networking software. The device supports all leading network protocols.

3Com OfficeConnect ADSL Wireless 108Mbps 11g Firewall Router- This device enables long-range wireless connections within an office, firewall protection, dynamic IP address assignment, URL filtering, VPN passthrough, advanced encryption and other features that today's small businesses require. It is ideal for a home office or small branch location. Besides accommodating ADSL, it works with a cable connection.

Linksys WRT350N Wireless-N Gigabit Router with Storage Link- It offers WAN connectivity but also provides an array of features, including 256-bit encryption, Access Point operational mode, DHCP (Dynamic Host Configuration Protocol) support, firewall protection, MAC (Media Access Control) address filtering, and MIMO (Multiple-input and multiple-output) technology.

The device, which is backward compatible with 802.11G and 802.11b systems, uses multiple antennas at both the transmitter and receiver to improve wireless throughput. It also lets a business connect hard drive or flash-based USB storage devices directly to a network.

WAN Challenges

The right technology integrated into a well-designed WAN pays enormous dividends. That's because a WAN puts enormous pressure on a network. As traffic increases, and high-bandwidth applications such as video and voice are carried over a network, performance can lag.

As a network extends outward and encompasses more locations and nodes, branch workers and others may find applications slowing down to the point that productivity is threatened. WANs pose a particular challenge because as the distance of the network increases the likelihood of latency and bandwidth problems grow.

Part of the problem is TCP/IP itself. It's not ideal for high-latency connections and it doesn't adjust rapidly to changes. When a packet is corrupted or lost, TCP/IP requests that all the data is resent.

This forces the entire sequence to start over and the system to resend all the other packets in transit. When network congestion takes place due to heavy traffic or high bandwidth applications, latency and performance degradation can become especially severe.

In addition, the protocols built into modern graphical user interfaces (GUI), such as Windows "Drag and Drop," often require multiple communication exchanges before a connection takes place and data is transferred.

The end result: across a WAN, dozens, or even hundreds, of data round trips may result from a single transaction. As a result, processing and performance can slow and cause unacceptable wait times. This problem can also appear when using MAPI (Messaging Application Programming Interface) e-mail protocol.

As a result, IT managers and others who oversee network systems must focus on building out the right infrastructure from the start. This includes using equipment that's based on industry standards, laying down a scalable and flexible

technology foundation, and managing utilization and bandwidth effectively. Several other issues are also important.

These include:

Network capacity: An organization must examine what's needed now and in the future to accommodate growth. This analysis should also include wireless connectivity, particularly Wi-Fi used at branch sites. A business should understand how much excess capacity it needs before constructing the foundation for the network.

Branch/Remote locations: The number of locations — and remote users — should factor into the decision about whether to build a WAN or use other approaches, such as separate LANs, to manage enterprise data.

Voice, video and unified communications: A converged network offers numerous advantages, both in terms of cost and capabilities, but it also requires additional capacity, bandwidth and QoS (Quality of Service). A WAN puts additional pressure on a network and, if it isn't configured correctly, mission-critical applications may fail.

Application requirements: Software that employee's use across the network —including Web and server-based applications such as Google Calendar and Salesforce.com — can place a huge bandwidth demands on a network, and especially a WAN. It's vital to understand current usage patterns and future plans for bandwidth intensive applications before putting systems and other infrastructure in place.

ROI and TCO: All networking technology isn't the same. It's wise to gauge the expected return on investment and the total cost of ownership for particular systems and approaches. In addition, understanding how various technology options, including a WAN, impact the budget and affect IT support costs goes a long way toward achieving positive results.

It's also critical to choose an architecture that supports a high level of security. This includes firewalls, intrusion detection, encryption and virtual private networking. A VPN is especially important for organizations with remote workers who connect from Wi-Fi hotspots, satellite offices or home offices.

A VPN creates a communications tunnel that encrypts data as it travels across the Internet. This makes it possible for road warriors and others to create a dedicated network connection with strong security features.

Success Stories

Small businesses that have adopted WANs are realizing impressive results. One aerospace components manufacturer with three sites in the U.S. relies on a WAN to connect its seven engineers. They work on projects collaboratively, using computer aided design software that runs over the wide area network.

In addition, employees are able to access and contribute to a knowledge base, and use VoIP to stay in constant communication. And, if they travel to other sites, they simply plug in their IP phone and receive their calls and messages. Meanwhile, the sales staff is able to view customer orders and other information using a hosted CRM application that's available through the network.

A sporting good store, with five locations in a Northwest U.S. city, installed a WAN to link its stores and make the inventory management system available to its sales staff in real time. If an item is out of stock at one store, it's possible to check the other locations for availability.

In addition, staff can request delivery from another store and have the item transferred via a daily inter-store shuttle. Besides improved customer service, the company has used VoIP to reduce telecommunications costs and speed interactions for sales people and others.

Many small businesses that turn to a WAN find that they're able to achieve ROI after only a few months. They're also able to create new opportunities by working smarter and faster.

As networking technology has matured, many small business have become more sophisticated — in both their approach and their business strategy. They're leveraging the technology in ways that wouldn't have been imaginable only a few years ago.

Conclusion

Wide area networks are no longer the sole domain of large enterprise. In many instances, small businesses extend their network to include a WAN.

These firms are often better positioned to compete with larger companies that have much deeper pockets and far greater resources. Ultimately, a well-designed WAN can level the playing field and create new opportunities and possibilities.

Yet, at the end of the day ROI and TCO require more than leading edge networking technology. An organization must deploy the WAN effectively and ensure that it provides adequate performance and Quality of Service (QoS) across

a wide swath of tasks, ranging from file sharing to data storage and business continuity.

A WAN must also establish adequate security protocols and protections. User authentication, data encryption, VPN and intrusion detection systems are paramount.

In the end, achieving success is all about putting powerful yet affordable technology in place, mapping out ways to collaborate and share data, and designing a network architecture that's robust, flexible, scalable and secure.

It's not surprising that many small businesses with wide area networks find themselves achieving a distinct competitive advantage. They're more able to take their work as well as interaction to a higher level. [◇](#)

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