CORRELATIVE Incorporated

Executive Briefing: Using the Internet for Commerce

INTERNET	
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Section I

Introduction

How to Use this Document

This document was created to serve as an introductory guide to the Internet and its business benefits. This guide provides an overview of the following topics:

The Internet and its Uses
Options in Conducting Commerce on the Internet
How Technology Used for eCommerce Works

What is the Internet?

The Internet is a world-wide network of computers, resources and users which was designed to promote easy communications and exchange of information between government, businesses, users and other organizations. In general, the Internet was designed to provide free and unrestricted publishing of information and access to public computer resources world-wide. More recently the Internet is being transformed to efficiently support electronic commerce and other business functions.

Some of the main features of the Internet include:

Internet E-Mail

Internet e-mail allows electronic messages and correspondence to be sent to recipients on the Internet. An e-mail message may be as simple as a note or as complex as a message with multiple files (documents, graphics, programs, spreadsheets, etc.) sent as one parcel.

When creating an e-mail, the sender specifies the recipients, a subject for the e-mail, a message, and optionally one or more attachments (files). Each Internet e-mail user has a unique address assigned. This address is used when composing an e-mail and specifying the recipients. Upon receiving an e-mail, the recipient may read it, reply to the sender, forward the e-mail to others, or delete it.

World-Wide Web

The World-Wide Web (WWW) is a network of graphical web sites which provides the user with a collection of multimedia web pages. These web pages can combine text, graphics, files, sound clips, music, animation, data entry forms, and more in order to present information intended for its audience. In addition, one or more links to other web pages and sites may exist. These links allow the user to easily navigate to other web pages and sites normally containing related information.

The World-Wide Web is one of the most exciting and growing features of the Internet.

Searching

Numerous search tools exist on the Internet. These tools allow the user to search for information such as web sites, news groups, files, other Internet users, businesses and organizations. Search methods can vary, but normally are performed by supplying keywords of the content desired.

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File Transfer Protocol

File Transfer Protocol (or FTP) is a method of publishing and downloading computer files on the Internet. A user or organization selects the files in which to publish and defines what types of access other Internet users will have to these files. Other users or organizations who are intended to access the files can then download the files for their use.

News Groups

News groups are special-interest forums which allow users to communicate on a related subject via a special electronic mail interface. Thousands of unique news groups currently exist on the Internet. A news group focusing on nearly any topic can be found on the Internet. For example, news groups exist for such varied topics as computers, religion, food, travel, pets, art, business, movies, politics, etc.

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Section II

Commerce Options on the Internet

How Can the Internet Benefit My Business?

Publishing Web Sites

Many businesses are deploying World-Wide Web sites to market their goods and services. Although the function and content of web sites are limited only by the imagination of it's creators, businesses commonly use these web sites to provide a listing of their products and services, solicit inquiries for additional information from prospective customers, supply company profiles and provide news on upcoming developments in products or other company events. Additionally, businesses are using the World-Wide Web to provide easy-to-access support of their products and services.

Creating Electronic Store-Fronts on the Web

With the maturation of the Internet, businesses and individuals are now exploiting the possibilities of creating on-line store fronts in order to market goods and services. In addition to publishing web sites to simply provide information of goods and services provided, these sites can allow on-line ordering, electronic payment, and tracking.

As an example, a mail order computer vendor may have traditionally accepted orders via phone. Payment of these orders may have included the taking of the customer's credit card number verbally. Now this same vendor could develop a web site which provides an on-line catalog of products and accepts orders via a web page including an order form. This form would have fields to accept the customer's name, address, phone, form of payment, etc. If payment by credit card is chosen, the site could accept the credit card type, number and expiration. This information would be sent directly to the order fulfillment department electronically for processing. Through accepted security standards such as Secure Socket Layer (SSL), this sensitive information would be encrypted before transmission across the Internet and decrypted only upon reaching its intended destination (the order fulfillment department in this case).

Conducting Research via the Web

Businesses and individuals can perform searches for information. Many search engines exist on the World-Wide Web which provide keyword and subject-level searching of information.

For example, a business may be interested in finding potential vendors advertising on the web. The business could access one of the numerous search tools and specify to search for any site containing the topic, "power generator suppliers." The business would then be presented with a list of links and descriptions which reference "power generator suppliers." The business could click on the desired link and be immediately connected to that web site.

Additionally, the majority of educational institutions and government agencies have presences on the Internet. A corporate attorney, for example, may commonly search government web sites to obtain updated laws and regulations on a given subject matter. Government forms and instructions are routinely updated and made available for downloading via the World-Wide Web.

Communicating via Internet E-Mail

Many businesses and individuals routinely use Internet e-mail to communicate. For example, a business can correspond quickly and efficiently with its staff and customers. Since Internet e-mail spans the world, it provides an economical and simple means of communication.

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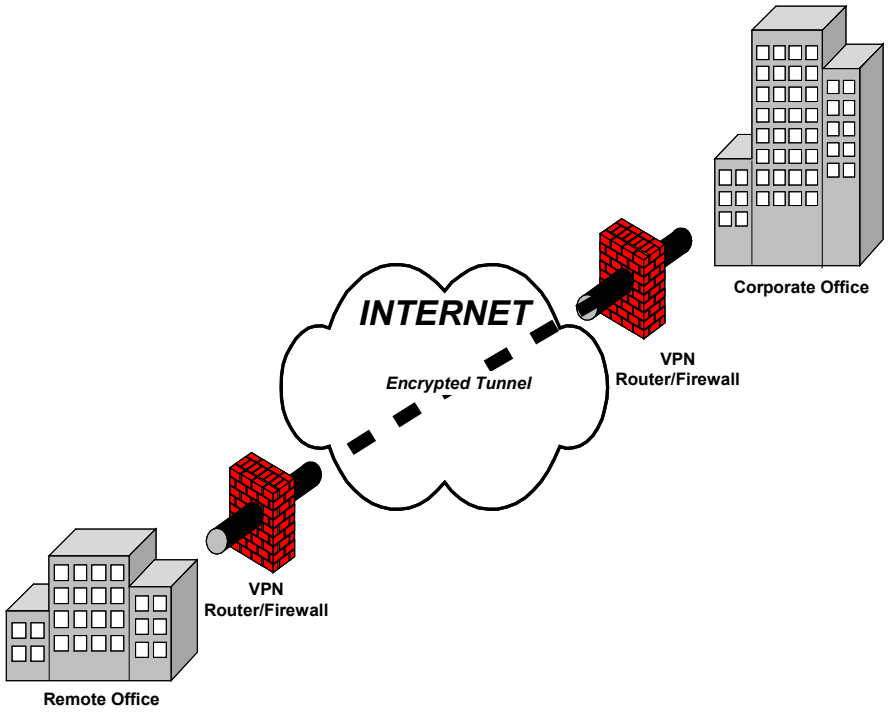
Conducting Research and Obtaining Information via News Groups

News groups can provide a valuable research tool for sharing and obtaining information of a specialized interest. News groups exist for most aspects of commerce, business types, finance, computing, and current events.

Connecting Remote Sites Together via Virtual Private Networks

Traditionally, if a business needed to connect the networks of two or more geographically-separated sites, a wide-area network (WAN) would be implemented. A WAN involves the leasing of one or more dedicated communication links from a telecommunications service provider. Leasing and implementing WAN links is costly, but provides a consistent level of data transfer rate (bandwidth), a high-level of reliability and flexibility in designing the WAN.

Another approach in connecting multiple sites is emerging–virtual private networks (VPNs). VPNs create secure wide-area network links across the Internet. A business would lease dedicated Internet connections at each site to be connected. VPN-enable router hardware and software is installed between each site's network and the dedicated Internet connections. This hardware and software is configured to establish one or more VPNs over the Internet. Any data destined for a remote site would be encrypted and transmitted over one of the VPNs which connects to the desired site. Once the encrypted data is received at the destined site, it is unencrypted by the VPN hardware/software and delivered. To each site, the VPN acts just like a WAN.



Connecting Remote Sites Together via Virtual Private Networks

VPN technology is still evolving and currently has several limitations. For one, bandwidth (the rate at which data can be transferred) across the Internet is not guaranteed and can be much lower than may be achieved with dedicated WAN links. Also contributing to the potential for lower realized bandwidth is the additional time required to encrypt and unencrypt the data. Lastly, VPN hardware/software vendors

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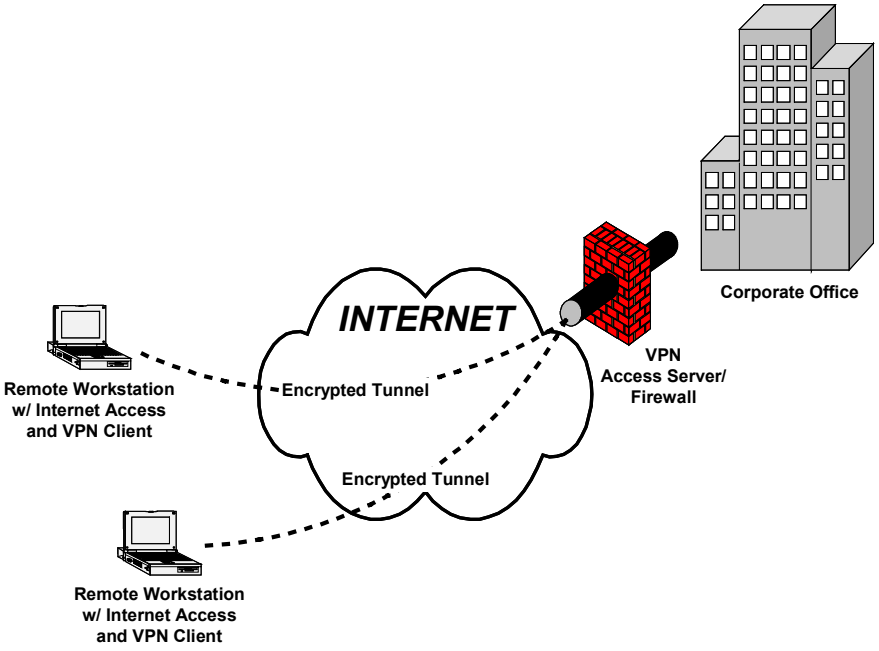
can deviate on which standards they base their products upon. As a result, connecting VPN hardware/software from different vendors may not exchange data correctly.

However, if a company is looking for simpler and more cost-effective means of connecting remote sites, VPNs are worth considering. The next year or two should yield enhanced VPN offerings which will make this technology a more mainstream option.

Connecting Remote Users to Network Resources via Virtual Private Networks

Just as remote sites can be connected via virtual private networks (VPNs), remote users can connect to their host networks via VPNs. Instead of relying on dial-up access via a modem, the remote user can access the host network via a VPN from any Internet connection in which the remote computer is connected. A number of remote access and operating system vendors have or are developing such VPN-enabled remote access solutions.



Connecting Remote Users to Network Resources via Virtual Private Networks

Creating Business-to-Business Networks (Extranets)

In addition to leveraging the Internet to link customers and their vendors, a new trend is emerging—using the Internet to tie partnering businesses together. A portion of each partnering business' network resources are published and made accessible to its partner businesses. The Internet is fabric which connects each of these business partners together. Although the actual technology used to create these Extranets vary depending of the partners' requirements, a well designed Extranet will be highly secure from outside attacks and unauthorized access.

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Section III

A Closer Look at Internet Technology

TCP/IP Primer

Inside the IP Packet

The Internet Protocol (IP) is the foundation of communications on the Internet. IP is a protocol that is used to transforms data into packets which in turn are transmitted across networks such as the Internet. Packets contain a header and datagram portion. The header contains information used in routing the packet from the source to destination computer, specifying the type of data being sent and ensuring that all packets are received and reassembled correctly. The datagram portion of each packet contains all or a portion of the data being sent.

IP packets have a limited size. If the data being transmitted will not fit within one packet's datagram, the data will be disassembled into sections and sent in multiple packets. The Transmission Core Protocol (TCP) is a companion protocol which is used to ensure that the IP packets arrive correctly and that they are reassembled correctly at the destination computer.

Addressing

All devices communicating via IP are assigned an IP address. The IP address is a unique 32-bit (four byte) address used to identify and forward packets to the device. IP addresses are written with each octet (byte) separated by decimals (e.g. ***208.28.32.5***).

Ports

Each IP and TCP/IP packet header contains a port field to specify the type of data or request contained within the packet. The port is a two byte number. Many of the ports are well-known and identify a unique Internet protocol. Some well-known ports include:

SMTP:	Port 25
FTP:	Port 20
HTTP:	Port 80

Ports are used by Internet devices to determine what process on a device should process the packet. For example, a web server residing on a UNIX server would listen for and process all incoming packets of port 80 (HTTP).

Networking Components for Building Internet Commerce

Firewalls

A firewall is a device that sits between an organization's private (internal) network and the Internet. It is responsible for filtering what types of Internet traffic should enter the private network and what traffic originating from the private network should be passed to the Internet. Rules are defined on the firewall to filter or allow traffic by its:

- Source Network (either Internet or internal network)
- Destination Network (either Internet or internal network)
- TCP/IP Port or Type (such as HTTP, SMTP, FTP, etc.)
- Other qualities such as source user id, application-specific data contained in the traffic, etc.

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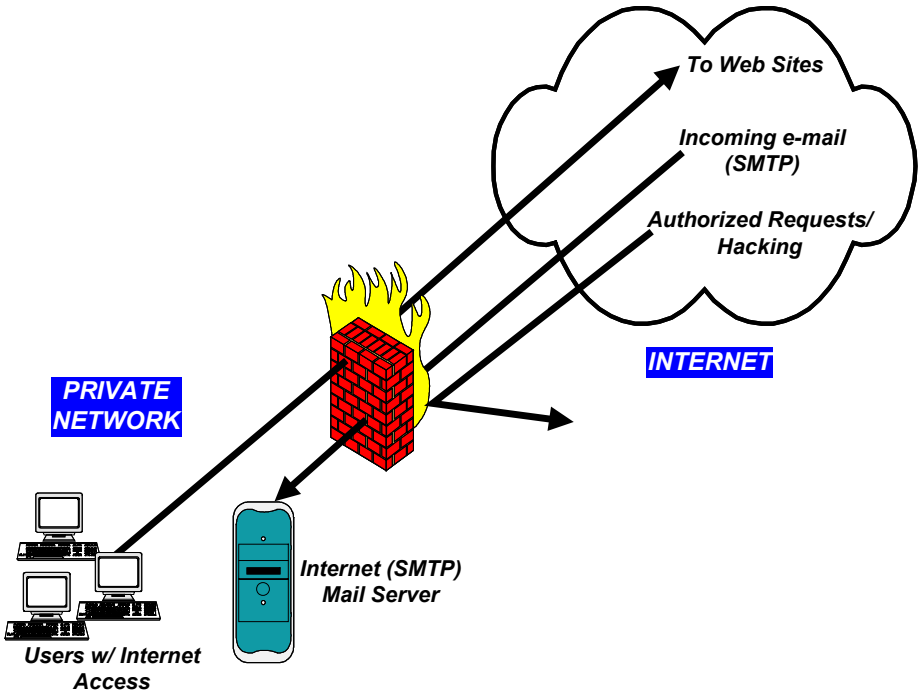
For example, a typical firewall configuration may allow the following traffic to pass:

- Restrict all traffic originating from the Internet from passing into the private network except for e-mail (SMTP).
- Restrict all traffic originating from the private network from passing to the Internet except for web browsing (HTTP), e-mail (SMTP) and FTP.



Example of Using a Firewall to Protect the Private Network

In the above-mentioned scenario, most traffic originating from the Internet is restricted from passing onto the private network, however some traffic is being allowed to pass (SMTP in this case). A more secure technique in making internal services available on the Internet would be to deploy a DMZ (Demilitarized Zone) in conjunction with the firewall. A DMZ is a separate network directly connected to the firewall (in addition to the private network and Internet) which only allows the following traffic to pass:

- Select traffic originating from the Internet to the DMZ.
- Select traffic originating from the private network to the DMZ.

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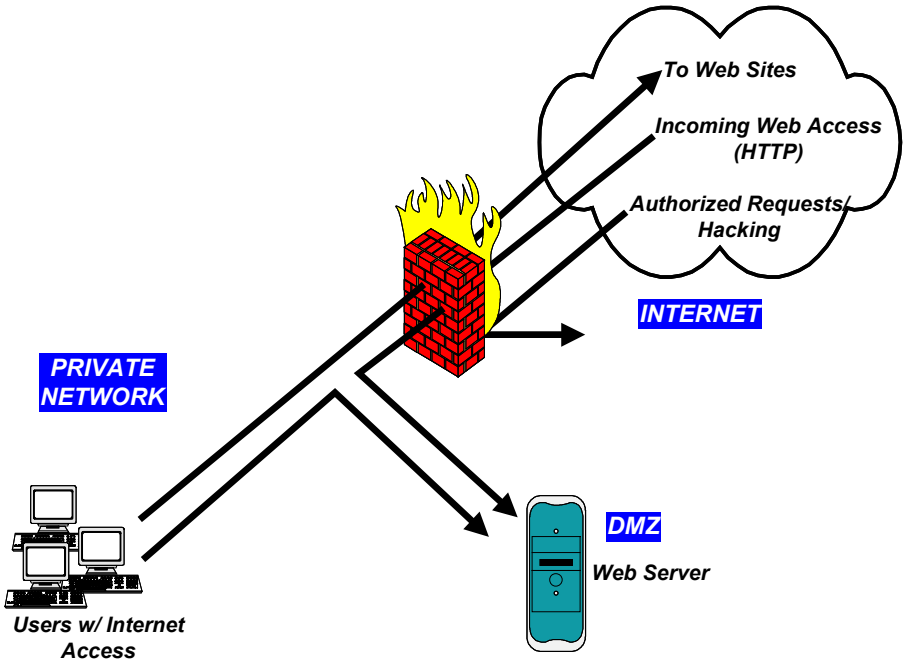
All internal services which require access from the Internet are placed on the DMZ. Because traffic originating from the Internet can only pass to the DMZ and not the private network, internal resources stand no risk of being compromised by outside hacking.



Example of Using a Firewall w/ DMZ to Publish Designated Internal Resources on the Internet

Proxy Servers

Proxy servers are normally combined with most firewall software/hardware to provide a complete Internet access solution. In most cases, if a business wants to allow its internal workstations to have access to the Internet via its firewall, they will implement proxy services to facilitate this. In this configuration, a proxy server (firewall) is the only resource that is directly connected to the Internet. Internal workstations direct all Internet communications to the proxy server. In turn, the proxy server relays these communications to the desired Internet destination. Incoming Internet traffic targeted for an internal workstation is first received by the proxy server and then relayed to the intended internal workstation. This technique is call Network Address Translation (NAT for short). In essence, all internal workstations appear to be the one proxy server to the Internet.

Since the proxy server is the intermediary for all communications between the internal network workstations and the Internet, a high level of security can be maintained. Additionally, proxy servers allow many workstations to share one or a few Internet-registered IP addresses. Since the number of Internet-registered IP addresses an organization can obtain is severely limited, proxy servers allow many more workstations to access the Internet than would be feasible if each workstation was directly connected to the Internet.

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Section IV

How to Obtain Additional Information

About Correlative and the Author

Correlative is an international consulting and outsourcing company. Correlative specializes in providing cutting-edge networking, directory services, e-commerce and groupware solutions.

Christopher J. Leone is Correlative's President and Senior Project Manager. Christopher brings 15 years of IT and 10 years of management experience to the company. Christopher has extensive professional experience in the legal, corporate consulting, government contracting, and technical education industries. In addition, Christopher has significant experience in international business administration and practices. Christopher resides in both the United States and Asia and is very knowledgeable in Asian cultures. He has also served as an active member of a number of technological professional organizations and advisory boards. Chris Leone can be reach via e-mail at ***cleone@correlative.com***.

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Other Useful Resources

Internet Engineering Task Force

The Internet Engineering Task Force (IETF) is a large open international community of network designers, operators, vendors and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. The majority of Internet-related standards are established and published by the IETF. All formalized Internet standards are published by the IETF as Requests for Comment (RFCs). These RFCs and other useful information can be found at:

Web: www.ietf.com

Yahoo!® Computers and Internet Directory

Yahoo!® is a web portal hosting a vast collection of links to useful information. Various tutorials and reference information about the Internet can be found at:

Web: dir.yahoo.com/Computers_and_Internet/Internet/

Internet RFC/STD/FYI/BCP Archives

This web site contains an easy-to-use index and search facility for locating all IETF-published RFCs and Internet standards:

Web: www.faqs.org/rfcs/np.html

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