

THE INTERNET: BUSINESS IN CYBERSPACE

Opened to commerce in 1991, the Internet has experienced explosive growth. Companies attracted to the wealth of business and technical information must be cautioned, however, that cyberspace can be a hostile environment, populated with hackers, virus worms, and 'trojans'. It is important that user education and access policies be in place prior to opening the Internet doors. This Research Note examines the issues surrounding the implementation of Internet access.

Key Issue

How can organizations leverage the Internet for business purposes today?

What organizational problems will be encountered as a company implements a business strategy that includes the Internet?

Assumptions

The Internet is valuable as a strategic tool for improving business processes and decision making.

The Internet is not safe for 'official correspondence' such as billing and contractual transactions, and EDI purchase orders.

INTRODUCTION

Growing slowly in the dark recesses of university laboratories for the last 20 years, the Internet has suddenly mushroomed into a vast array of data networks, spanning the entire globe. Opened to commercial entities in 1991, the Internet (the Net), has registered 21,000 commercial domains offering information on products and services. Currently a collaboration of over 70,000 smaller network domains, the Net connects over 2 million people in over 100 countries.

In 1993 the hip question among business and technology elites was "Are you on the Net?", and the truly hip listed an Internet address on their business card. This year's hip question is "Are you on the Web?", referring to the World Wide Web service on the Internet. Increased public awareness of the Internet resulted in a media blitz last year with articles appearing in most publications in the United States. The sudden attention has sent the public, and therefore business, to the Net with the hope of it becoming a marketplace with no geographic boundaries.

The Internet's wealth of technical and business information offers new opportunities for accessing a global audience. For all the media hype, however, the Internet is a hostile environment in which companies are learning how to conduct themselves. Though some firms are showing tangible savings by using the 'Net, for most companies it is a period of experimentation.

What & Where Is Cyberspace

The term cyberspace was coined by science fiction writer William Gibson, circa 1984. Gibson's cyberspace is an unhappy word, representing a desparate vision of the future. It is in fact, a word that gives a name to a new stage in the elaboration of human culture and business under the sign of technology.

Not real in the material sense, cyberspace is a globally networked, computer-sustained, computer-accessed, and computer-generated virtual world.

In cyberspace, institutions and businesses have a form, identity, and working reality - in a word, an architecture - that is different to the form, identity and working reality they have in the physical world.

The Internet represents society's first large-scale foray into this realm.

Figure 1. The Birth Of Cyberspace

ORIGINS

For the general public, the Internet leapt to visibility in 1994. Its birth however, dates back to 1969 when the Pentagon challenged computer scientists to develop a distributed computer system to connect an unlimited number of computers. The system also had to be fault tolerant by providing multiple communication routes from one computer to another. The results of the research done at the Advanced Research Projects Agency (ARPA), evolved into a network known as ARPANET.

Originally connecting computers in four laboratories, by 1972 the ARPANET had expanded to link 50 universities and research centers. In that same year, work was begun on a set of protocol suites which would become known as Transmission Control Protocol/Internet Protocol (TCP/IP). The Internet derived its name from a portion of that protocol suite - the Internet Protocol(IP). Under development until 1982, TCP/IP became the official protocol of the Internet in 1983, replacing the original ARPANET protocol - Network Control Point (NCP).

Note 1:

Too Much Hype?

In a recent article, one writer acrimoniously reported, "Articles written about the Internet: 3,796, money made on the Internet: \$0".

Note 2:

What Is A Protocol?

Protocols are agreed upon methods of communication used by computers.

THE INTERNET TODAY

Today, the Internet's population numbers in the tens of millions of *Internauts* (or cybernauts, if you prefer), with daily data exchanges measured in *terabytes*. The information contained on the Internet includes the traditional institutional and governmental repositories, a plethora of discussion groups, and thousands of commercial 'storefronts' offering product information, corporate marketing, periodical publication, and technical help.

Early adopters of the Internet found that being '*on the Net*' was a mixed blessing, given the vast amount of information which is not always easy to find. Since no one "owns" the Net there is typically no pre-established logical relationship between one piece of network accessible information and another.

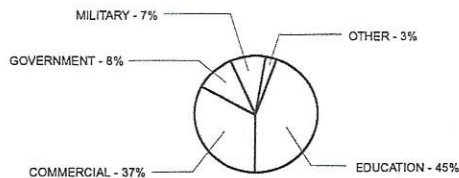


Figure 2. Breakdown Of The Net

The World Wide Web (WWW or the Web network is an attempt to bring order to this chaos. Developed by the European Center for Nuclear Research (CERN) in Geneva, the Web in conjunction with the immensely popular browser - Mosaic, transformed the Internet by significantly reducing the complexity of viewing Internet data.

The Web is a wide-area information retrieval initiative for universal access to a large universe of documents using a hyperlinked multimedia environment. The Mosaic software program is a GUI-based Internet browser, available free on the Net.

WHAT'S OUT THERE

The Internet offers a collection of resources and services arranged in a collaborative, if not somewhat redundant architecture. One way to understand how data resides on the Net is to envision 'virtual information worlds' in the cyberspace of the Internet. The composition of each world is determined by the tool or service used to organize the information within. Figure 3 graphically depicts six major 'worlds'.

To explore each information 'world', we begin by examining the six basic activities possible on the Internet: 1) Electronic Mail, 2) Downloading/Uploading data, 3) Running programs on other computers, 4) Searching for files and databases, 5) Discussion Groups, and 6) Playing Games.

Note 3.

Hypertext

Hypertext is text which contains links to other text. The HyperText Markup Language is the standard used to format the links.

Hypermedia

Hypermedia is a term used for hypertext which is linked to graphics, video and sound.

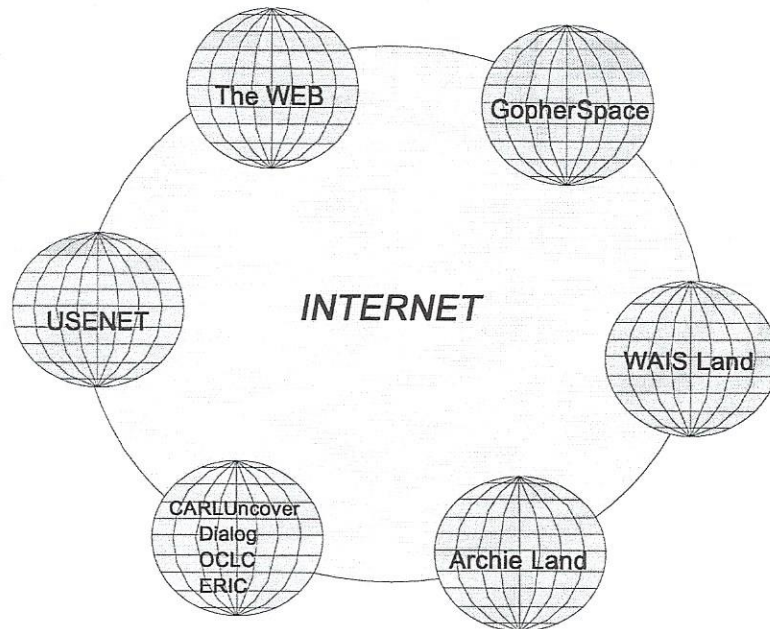


Figure 3. Major Information Sources of the Internet

The process of sending E-mail to and receiving it from others is probably the most widely used resource on the Internet. You can also search databases and have the results posted to your mailbox, or have news mailed to you.

The process of uploading and downloading files involves a service on an Internet service called FTP (File Transfer Protocol), a means of transferring files regardless of a computers operating system. Millions of files are stored on servers accepting anonymous FTP. Archie Land shown in Figure 3 represents the linking of those servers through a software tool called Archie. At present, eleven Archie servers index files located on over 1000 FTP-based servers on the Internet.

NOTE 4:
Anonymous FTP

With *anonymous* FTP you do not need an account or password to access a remote computer.

The remote machine accepts *anonymous* as you name, or *guest* as your password. You are then free to access files on the remote machine.

The process of running programs on other computers is accomplished through a Internet service called Telnet. Telnet allows users to run large databases such CARLUncover which contains data from over 10,000 journals, or ERIC, a database for educators. Although Telnet is a fully functional package, it is increasingly being run as a menu item in a Internet browser such as Gopher or Mosaic.

Note 5:

Surfing Gopherspace

Gopherspace uses two tools to collect data from the various Gopher servers: VERONICA and Jughead.

VERONICA stands for 'Very Easy Rodent Oriented Network Index to Computerized Access'. This tool is the primary means to collect and search Gopher menu entries.

Jughead is a tool which searches a limited area of Gopherspace.

The process of searching files and databases utilizes one of three services on the Internet: WAIS, Gopher or the World Wide Web. WAIS is an anagram for the Wide Area Information Server. WAIS Land is actually a system of 400+ sources indexed on WAIS servers. It's text-based interface, however, is a little user-hostile.

Gopher was developed at the University of Minnesota to rapidly tunnel through the vast amount of data on the Internet. It does this by integrating other Internet services such as FTP and Telnet, so that once you found what your searching for, you can go straight to it. Gopherspace (the Gopher menus on all Gopher servers), includes all Gopher servers internationally, now numbering over 13,000. Gopher, however, is a hierarchical menu system, where one menu leads to other menus. The World Wide Web, on the other hand, uses hypertext to link documents to other documents or services anywhere on the Internet.

The Web, a system of 7000 servers, is the first widely deployed system for structuring information distributed throughout the Internet in a logically accessible way. Clicking on a hyperlinked word in a Web document may transparently connect you to Gopher server, or to a discussion database on USENET, while retaining the advantages of the GUI interface. The Web is also the immensely popular with businesses who wish to offer information on products and services via 'Home Pages' on Web servers.

Note 6:

Examples of Commercial Internet Domains(with addresses)

- GE Plastics
<http://www.ge.com/gep/hoepage.html>
- J. P. Morgan & Co.
<http://www.jpmorgan.com>
- Hyatt Hotels
<http://www.travelweb.com/thisco/common/hyatt.html>
- Compaq Computers
<ftp.compaq.com>

New WAIS, Gopher and Web servers are being added to the Net every month. If you can think of a topic or service, chances are, information is available on the Net. Individuals can access conference presentations, new services, the Library of Congress catalog, various University and public libraries, discussion groups and even satellite weather maps. They can also post messages to the White House, order flowers, make hotel reservations, and in some cities, order pizza for delivery.

Business looks to the Net for world events news service, financial news, banking services, legal services, market analysis, technical associations, professional forums, and government regulations. A number of marketing experiments are underway utilizing the 'Home Page' concept on Web servers. Home Pages are compilations of hyperlinked information on products or services, offered to anyone on the Net who has a Mosaic-based browser.

GOVERNMENT ON THE INTERNET

Name/Address	What To Expect
White House Home Page http://www.whitehouse.gov/	Documents, sound, video from the executive branch
Sunsite-based Government Doc.s ¹ http://sunsite.unc.edu/govdocs.html	Nicely organized site with an emphasis on telecommunication and high-tech
Infomine http://lib-www.ucr.edu/govpub/	Extensive Internet resource list, maintained by the University of California
Wiretap Gopher gopher://wiretap.spies.com/11/Gov/	Database of historical documents
U.S. Census Bureau Home Page http://www.census.gov/	Census news, on-line databases highlight excellent example of well run Web site
FedWorld Information Network http://www.fedworld.gov/	U.S. government-sponsored clearinghouse of federal information, includes many links

Figure 4. Government Bursts Onto The Internet

MAKING THE CONNECTION

There are four primary methods of gaining access to the Internet (See Note 7). The differences among these connections are how fast data is transferred, the protocol used, and the cost and permanency of the connection.

Note 7:
Types Of Internet Access

1. Direct, permanent
2. Dial-Up Terminal
3. On-Demand
4. Mail-Only

Direct, Permanent connections are available directly through a TCP/IP network using Ethernet and require dedicated bandwidth (high speed) lines. Direct permanent connections are the most expensive.

On-Demand connections are a variation of the direct connections, and are designed for telephone lines. These connections use either the Point-To-Point Protocol (PPP) or the older Serial Line Internet Protocol (SLIP). An account with an Internet Service Provider (ISP) and a modem is all that is needed to become a full Internet participant. These connections can be very cost-effective and deliver good performance.

Dial-Up Terminal connections link to an ISP in the same fashion that a user would access a host system with a terminal emulator. The Internet software that a user runs is run on the ISP's system, not the users system. Normally used with low speed modems at the user's end, file transfers can be time consuming.

Mail-Only connections only allow a user to send and receive E-mail. These connections are the easiest to establish, and the least costly to maintain. Many companies are using this feature for intercompany mail. Mail-only connections may be attained via the dial-up method described above, or through a service like Compuserve or America Online.

Note 8:
Internet Issues:

1. Security
2. Lack of Auditability
3. Performance
4. Ease of Use

REAL WORLD CHALLENGES

The rise in popularity of the Internet has been phenomenal. It is a cultural and sociological event as well as an information technology event, evident by the media *firestorm* over the past 12 months. Unfortunately, much of this coverage focuses on the Internet's glitz instead of its guts. Behind the Web servers stuffed with wondrous amounts of information, the free bulletin boards, and 'E-mail everywhere' lies a network lacking auditability, privacy and security.

In the 1990's, those organizations without a proactive strategy for Internet access will have that access defined *for* them from the bottom up. Employees with modems and personal Compuserve or America On-Line accounts can easily attach their networked company PC to the Internet. This scenario, granting outsiders free access into the company's information infrastructure should give chills to any security officer.

Here are some of the major issues organizations should consider when investigating the Internet:

Security, Auditability

Security issues on the Internet come in many varieties: keeping out hackers, preventing unauthorized access to the Net by employees, and monitoring the data imported from the Net and exported to the Net.

The Internet lacks reliable audit trails. 'Spoofing' a process by which someone masquerades as another correspondent, is easily done. The Christmas '94 break-in at the San Diego SuperComputing Center was done by hackers using 'IP Spoofing' which allowed a computer with an external IP address to fake a internal IP address known to the Center.

The Internet also allows users to send messages through re-mailers so that the originating address is not attached to the message when it arrives at its final destination.

Note 9:
Firewalls Under Attack
The firewall breach at the San Diego Computing Center resulted in the theft of thousands of E-mail messages and other files of an undisclosed nature.

The infamous Internet worm of November, 1988 caused major disruptions at universities and research labs. By replicating itself, the worm jammed computers, sending a wake-up call to the vulnerability of the Internet community.

SEEKING INFORMATION ?

IS MANAGERS SEEKING:

- **General network security information**

SHOULD

Contact Computer Emergency Response Center Team at 412-268-7090 or cert@cert.org

- **CERT advisories on recent development**

SHOULD

Send anonymous FTP to: [infor.cert.org](ftp://infor.cert.org)

- **Technical papers on IS spoofing**

SHOULD

Send anonymous FTP to:
[ftp.research.att.com/dist/internet_security](ftp://ftp.research.att.com/dist/internet_security)

- **Netlog monitoring software to detect IP spoofing**

SHOULD

Send anonymous FTP to:
[net.tamu.edu/pub/security/TAMU/netlog1.2.tar.gz](ftp://net.tamu.edu/pub/security/TAMU/netlog1.2.tar.gz)

Figure 5. Sources For Security Information

According to the Federal Bureau of Investigation's computer crimes report, 80 percent of all computer crimes reported to the agency involve the use of the Internet to break into computer systems. Limiting access, installing firewalls, and using data encryption and user authentication are tools which can help ease security concerns.

Note 10: Firewalls

A firewall can be as simple as a programmable router that accepts traffic only from certain address. Or it may be as complex as a three-computer gateway where one internal computer accesses the corporate network, another communicates with the Internet, and a third receives, screens, and retransmits data between PCs.

Performance

The Internet is a network of networks, composed of a high performance backbone linked to subnetworks which are not always reliable. A message sent over such a system may be delayed or never reach its destination point. Furthermore, with many subnets operated by volunteers, a subnetwork may be taken off-line without any notification.

Internet performance has been purported to be immune to explosive growth. The Gartner Group, however, predicts that this explosive growth will create network performance and support problems in the near future.

Ease Of Use

User-friendly graphical interfaces are just emerging on the Internet from a number of independent software vendors (See Note 11). These software programs are enhancements to the NCSA's program, Mosaic, which by itself is sufficient to comfortably 'surf' the Net. Improved navigation capability, however, will not obviate the need for training and support.

THE BUSINESS CASE

Touted as an on-ramp to the National Information Superhighway, businesses are clamoring to connect to, and establish a presence on, the Internet. What are the business drivers encouraging these companies onto the Net? What impact has Internet access had on the organizations image, productivity, or profitability?

As Internet acceptance (and in some cases, expectancy) grows, organizations, in general, have been accessing the Net for the following reasons:

- Present information about products and services
- Strengthen client relationships
- Competitive pressures - industry rival already a presence on the Internet
- Use Net as backbone for internal and external communications
- Leverage research/news information in business decision making process

In the recent rush to Net, most organizations are using the Net to post a Home Page on the Web. The Home Page is then associated with an Internet mailbox, allowing clients to post messages to an ISP's server for later downloading to the organizations internal mail system. (See Figure 6). At this writing, the Internet is not secure enough for business transactions such as EDI purchase orders, credit card purchases, etc.

Companies with a presence on the Internet such as J.P. Morgan, Schlumberger and GE Plastics report indirect savings in areas such as reductions in voice traffic and Federal Express fees, improved image with clients, and business benefits of having access to leading-edge thinking, research information, and financial, political, and global current events.

Note 11:
Internet Access Tools

For Free:

NCSA Mosaic

ftp.ncsa.uiuc.edu

WinWeb

ftp.einet.net

Lynx

ftp2.cc.ukans.edu

Cello

fatty.law.cornell.edu

For A Fee:

Netscape

Netscape Communications

800-NETSITE

sale@mcom.com

Price: \$99

Internet Chameleon

NetManage Inc.

Price: \$199

Internet-In-A-Box

Spry Inc.

Price: \$149

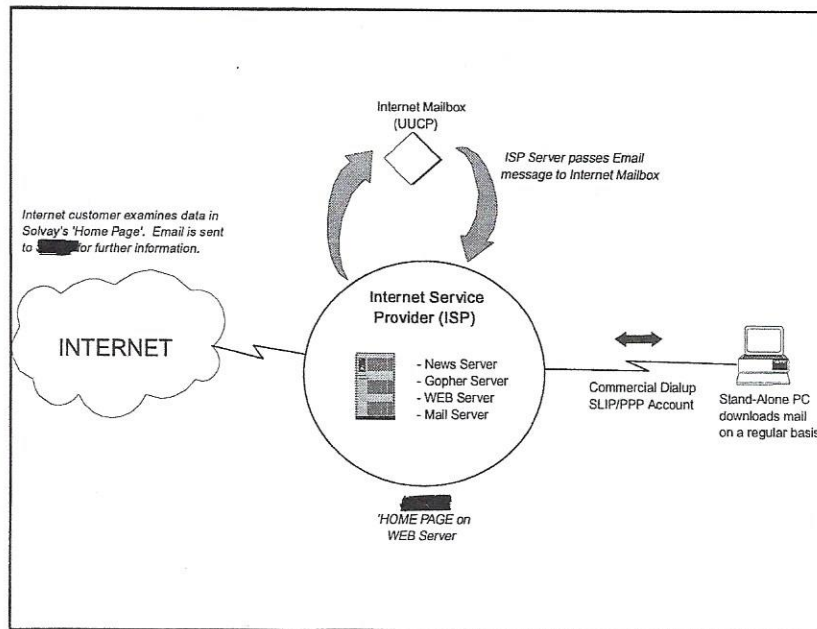


Figure 6. WEB Server @ ISP Site with Email Gateway

Justifying Internet access in 1995 is similar to justifying PC's in the 1970's, or LAN's in the 1980's. It is difficult to know what it will be used for until you acquire and familiarize yourself with the technology. Certainly, as the critical masses move to the Internet, companies will be impelled to do the same to remain competitive.

BOTTOM LINE

For under \$10,000, [redacted] could pilot a Home Page to establish an Internet presence and test the viability of this marketing avenue. Fortunately, offering Home Page information on the Internet is an interactive process. [redacted] will collect data on the number of 'hits' to the Home Page, who the hits came from and the timing of the hits.

Although prices are changing on a daily basis, it will cost between \$5,000 to \$8,000 for the following:

- Establish a domain name and address
- Design a Home Page
- Convert of data to HTML format for hyperlinks
- Send notification out to BBB's, discussion groups, etc. announcing that a Home Page is now available
- Establish Email account and address

Monthly maintenance charges for the Home Page located on an ISP's server will average approximately \$300 for a Home Page of 5MB. A commercial dial-up SLIP/PPP account (required to use a Web browser tool such as Mosaic), will average \$80, with a one time \$80 fee. The final cost of Home Page development is determined by how much data will be used in the Home Page.

Note 12:
ISP's in Houston

Neosoft
968-5800
Sesquinet
527-4988
South Coast Computing Services
800-221-6478

Should [redacted] post a Home Page on the Internet? In the first quarter of 1995, the Home Pages of Phoenix Polymers, J.M. Huber Polymers, Monsanto and GE Plastics are displayed when a query for 'polymers' is made on the Internet. Research indicates that Himont is actively pursuing development of a Home Page. There is also a wealth of technical information and discussion databases existing on the subject of polymers.

A proactive use of this access would be to dedicate one individual to monitor the polymer BBB's and discussion groups to watch for Internet users with questions regarding polymers. Answering with a reference suggesting the enquirer to review the [redacted] Home Page would help market our presence on the Net.

Choosing A Domain Name

Registering a domain name is sure to cause some controversy. Associated with this domain name selection is the issue of the Home Page - should it be a '[redacted] Page', a '[redacted] Page', or a '[redacted] Page'? Our collective lack of experience with establishment of an Internet presence defines any attempt at this activity as experimental in nature. In piloting a Home Page, the simpler the structure the better. Given this, a [redacted] Home Page would be the logical choice over a multi-company Home Page. [redacted] has reserved the domain name [redacted].com, requiring [redacted] to take a creative approach. A domain name such as [redacted].com or [redacted] etc. could be utilized for the pilot.

Fortunately, any investment made by [REDACTED] on Home Page development would not be lost, if later an [REDACTED] or "[REDACTED] Home Page' was deemed as the direction to take. The [REDACTED] Page could be linked to that page.

Developing a strategy for accessing and leveraging the Internet will require a team comprised of technical, marketing, sales and legal representatives to answer the five W's used in journalism:

WHO will use the Net?; Who is the target audience?

WHAT type of connection(s) will be required?

What policies will be required to control access and data flow?

WHERE will Internet access be made available?

WHY are we accessing the Internet? (business needs)

WHEN will this be implemented?

[REDACTED] Management Services is in the process of setting up two stand-alone PC's with SLIP/PPP connections - one at the [REDACTED] Offices and one at [REDACTED]. The ability to browse the Net will help team members to understand that environment and develop a marketing plan for cyberspace.