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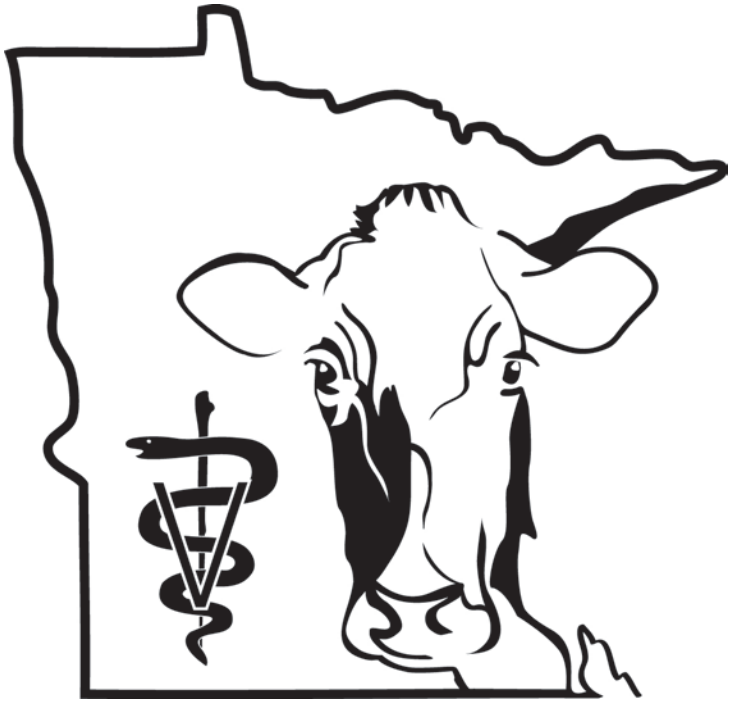

ST. PAUL, MINNESOTA
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# Systems Electronic Information

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## What is the Internet?

The Internet is a loosely organized and as yet unregulated network of computers. It stretches across the entire world, knowing no political or geographic boundaries. The physical connections are usually high speed, dedicated telephone lines. They may be old-fashioned copper wires, modern fiber optics, microwave or even satellite links. There is much redundancy in the connections and the routing of information occurs almost randomly. A computer in Minneapolis may connect to one in California by way of Denver one day and Washington, D.C. the next. No one person or even organization knows exactly how the Internet works. Local system administrators know how their own part of the network operates and what other remote systems they are connected to.

## History of the Internet.

The Internet was born of the U.S. Department of Defense in the 1970's. The predecessor of the Internet was designed to link their various computer installations by several redundant links. The redundancy was to allow continued communications even if one or more individual connections were disrupted (by enemy attack!). The redundancy meant that there was much more capacity in the links than what the Department of Defense could use. DoD generously allowed educational institutions to connect to the network to facilitate information exchange in the educational community. In its early days, before the advent of the personal computer, the only computers connected to the network were institutional mainframes. Communication consisted of entirely text-based messages, scientific data or computer programs. Users, many of them programmers, were highly proficient in computer use since it required strings of arcane commands to send a message.

In the 1980's, a group within the University of Minnesota developed a system to make finding and transferring information much easier for the masses. The system is called "Gopher." It is a client/server system where a server program runs on a central computer and stores information organized in a hierarchical structure of files and directories. It also stores links to other Gopher servers, which can be anywhere on the Internet. Individuals have client software on their personal computers which "talk" to one server at a time and can peruse the directories and retrieve files with simple commands or mouse clicks. Searching programs were written to allow an individual to search across many Gopher servers for information on a particular topic. This drastic increase in ease of use spurred a dramatic increase in the number of connections.

The real revolution took place in 1993 when the Internet developed multimedia capabilities. Servers and clients were designed that allowed not only text, but also graphic images, sound and even movies to be exchanged throughout the Internet. These multimedia servers and personal browsers introduced interactivity into the communication. An individual at their personal computer can search through files

and directories, they can click on a word and jump to a different document or even a different computer half way across the world. They can fill out forms and send information back to the server computer. This system of multimedia servers and browsers make us the Word Wide Web. It runs on the wires of the Internet but is differentiated from it by its graphics, sound and video capabilities. With this point and click ease of use, the World Wide Web has grown exponentially as shown in figure 1. Every communications company is scrambling to provide access to the Web and to provide the public ways of establishing a presence on the Web. Subscribers to CompuServe are allocated storage space to set up their personal documents, called "Home Pages." The number of hosts has increased and there is no sign of the growth slowing down. The number of users can only be estimated, but it numbers in the 10s of millions if not 100s of millions.

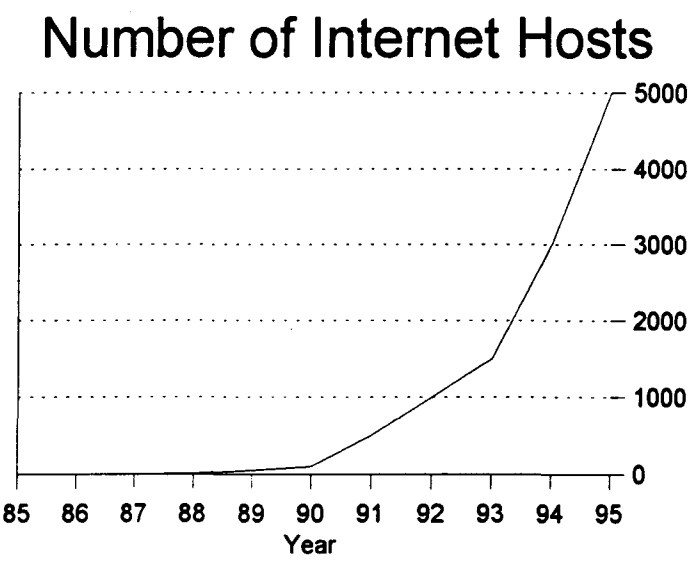


**Figure 1**

**Uses of the Internet**

If you can imagine it, you can probably do it on the Internet. What follows is a list of some of the more common uses.

**Electronic mail (E-mail).** The simplest use is for simple text E-mail. Once a user has an E-mail address, anyone connected to the Internet with the appropriate software can send him\her a message, and the user can send messages to anyone else. Most E-mail software also allows the user to send any other kind of file as an "enclosure" or "attachment." There are some complications caused by the way services like CompuServe treat the data, but with some accessory programs files such as spreadsheets, word processor documents, or even executable program files may be sent.

**News groups.** A group of people with a common interest may form, or join some form of news group. There are two ways of doing this, but the purpose is the same. When one person sends a message to the group it is automatically copied to all members or subscribers to the group. These groups are popular for question and answer types of activity. One person poses a question, and if someone in the group knows an answer they will post it. Everyone in the group sees the question and may learn from the answer. There is a newsgroup at the University that serves as an electronic classified advertisement column. Someone posts a message saying they have an item for sale and a potential buyer would probably send an offer by private E-mail. The two ways of handling these groups are by "Listserves" and by Internet Newsgroups. The Listserve is a program that receives messages from subscribers and forwards it by regular E-mail to all subscribers. An Internet Newsgroup is a program that receives messages from individuals or from other Newsgroup programs on other computers. The messages are then stored until a subscriber accesses the Newsgroup and downloads the messages. The Newsgroup program keeps track of which postings have been read by which subscribers. This way a subscriber only sees a listing of the articles he\she has not yet read. The

advantage of Newsgroups over Listserves is that they keep the news messages out of the regular E-mail stream. A busy Listserve can add 20 or more E-mail messages to your mailbox every day.

**Gopher.** As mentioned earlier, Gopher servers maintain textual information in a hierarchical file structure. They also maintain links or pointers to other, often related, Gopher servers. A user with Gopher client software can access a Gopher server and proceed logically through the directory structure to find a piece of information stored in a file. The file is then downloaded and read. Search engines like "ARCHIE" and "VERONICA" (these are acronyms for long involved phrases with some meaning, but designed mainly to produce a cute acronym) allow a user to search Gopher servers across the entire Internet for a particular piece of information.

**World Wide Web.** Gopher made the Internet useable, but the World Wide Web has made it attractive. The organization of the Web is similar to Gopher, with servers containing the information and clients accessing it. The clients are usually called "browsers." While Gopher servers store only plain text files, a Web server can store and dispense virtually anything. The unit of information is the "page." A page may be one or more screens long. It may contain text, graphics and links to other pages or other Web servers. Pages are written in Hyper Text Markup Language (HTML). The links, called "hyper links" show up on the page as text in a different color or a picture. Clicking with the mouse pointer on a link will take the user to wherever the link points. A person can go bouncing around the country or the whole world with a few clicks of the mouse. The user may not even know where the information is coming from. Originally Web sites were only found at universities and some government organizations. Now there are thousands of commercial Web sites on the Internet. Through the interactive aspect of the World Wide Web, a user can read information, download files, fill in a questionnaire, or even make a purchase over the Internet. At the present time, a user must have an account at a company he\she wishes to purchase from, or use a credit card. The information sent from a user's browser to a Web server could theoretically be intercepted by anyone on the Internet. Therefore, people are hesitant to send a credit card number or other sensitive information. However, technology is currently under way to allow information to be encrypted by the browser and only decoded by the server to which it is directed. As might be expected, Visa and MasterCard are participating in this development. Secure transactions will probably be possible within a year.

**FTP.** File Transfer Protocol is used mostly in support of computer software and hardware. Many manufacturers will maintain FTP servers with such things as software bug fixes or hardware driver software. University sites often keep a library of freeware or shareware software on FTP servers. With a private FTP site the user must have an account, with a user ID and password to access the site. However, many sites allow anyone to log on with the user ID "anonymous." Netiquette requires that an anonymous user enter their E-mail address as a password.

**Telnet.** If a host computer is set up to allow Telnet access then a user at a remote site may connect to it with his or her personal computer and work as if connected with a hard-wired terminal. The user issues the commands for the remote system to accomplish tasks. The computers that run the University's card catalog (LUMINA) allow Telnet access to anyone having a University E-mail account. With the right equipment, students and faculty may access LUMINA from their offices or homes to look up titles and check on their location and availability.

**Internet Relay Chat.** This is probably for entertainment only. The user accesses a "channel" to talk with other users, by typing on the keyboard, in real time. A number of users can be on a channel at one time. A user is identified by a "handle" which appears in front of the text the user types. Channels correspond to interest groups, age groups, or just about any kind of group.

**Internet Telephone.** Software has now been developed such that if your computer has a sound card, a microphone and speakers, and an Internet connection, you can speak to someone, similarly equipped, anywhere else on the Internet. Sound quality is variable and the session has to be set up in advance, so that the two parties can be at their computers at the same time. My personal opinion is that the telephone companies have been providing better, more convenient, and more dependable service of this type for a long time at a reasonable cost.

**Commercial On-line Services**

Once, commercial on-line service providers were alternatives to the Internet for home users who were not affiliated with a university or government organization. Now, most on-line services provide information access in addition to the Internet. They allow ordinary users to connect to various types of information. You can quickly access stock market quotes, weather information, sports scores and on-line encyclopedias. They also provide discussion forums similar to Newsgroups centered around various topics. Many hardware and software vendors sponsor forums for solving problems users have with their products. On-line services also provide libraries of free or user supported (shareware) software.

A user with a computer and a modem can dial into a local telephone number (in at least larger towns and cities) to access their service provider. There is usually an hourly rate for access, although many charge a flat fee for the first block of time with excess connect time being charged by the minute. Some services also add a surcharge for some of their services. It may cost an additional few dollars per hour to access stock quotes or an encyclopedia. These service providers usually provide their access software free. In fact, they bundle their software and special introductory offers with computer magazines, trade journals and even mail out software to purchased mailing lists. The principal on-line service providers and their phone numbers are listed in the appendix.

With the rise in popularity of the World Wide Web, many companies have gone into the Internet access market. These range in size from AT&T (who will provide a monthly allotment of Internet time free if you use their long distance service) to close to mom and pop operations. It is a highly competitive market and prices are still falling.

**What you need to get connected**

What hardware and software you need to buy to get on the "Information Superhighway" depends on what you want to do and how much you are prepared to spend for fast performance.

**Hardware.** Almost any Macintosh or IBM compatible can be connected to some form of on-line information. However, if attractive, graphic screens with "point and click" ease of use is desired, a relatively powerful computer is needed. In the current IBM compatible market, there is no reason to

buy anything less than a Pentium processor. A speed of 75Mhz is perfectly adequate, although modest increases in processor speed are not much more expensive. The Windows™ and Windows 95™ operating systems require 8MB of RAM (Random Access Memory) but 16MB is better. A hard disk of 500MB capacity is standard and more than adequate for on-line access software, although most software titles are growing in their disk space requirements. A color monitor is standard with 15" diagonal measurement being common. Larger monitors tend to be disproportionately expensive. A modem is needed to connect the computer to the telephone. This may be internal (the case has to be opened to install it) or external (plugs into a port in the back of the computer). 14.4 kbs (kilo bits per second) is now considered the low end speed with 28.8 kbs rapidly becoming the standard. Users out in Greater Minnesota may have difficulty finding a local access telephone number with the higher speeds. Faster modems provide faster response times when there is much graphical information being transferred, as with the World Wide Web. A printer is, of course, optional.

**Software.** As mentioned previously, commercial on-line service providers give away their software. This also includes a browser for accessing the World Wide Web. Most Internet-only service providers will provide the software to dial up their computer and a browser to browse the Web. Again, competition gives the consumer an edge. While the most popular Web browser, Netscape Navigator, is relatively inexpensive, at about $40 per license, Microsoft is giving away their Internet Explorer free. Of course the catch is, one must have access to the Internet before one can access Microsoft's library to download their browser. The current crop of Web browsers has such features as E-mail and newsgroup readers built in. They are also able to handle the text files stored on a Gopher server. For downloading files, most Web pages that offer files for downloading have links to accomplish the task withing the browser. Additional FTP software is not a necessity today.

# Appendix

## How to get on the Information Superhighway

The information provided below is believed to be accurate as of April 23, 1996. Online services frequently update their access software and types of service as well as pricing. For up-to-the-minute information call the toll free number provided for each service. 14.4 mbs modem access is necessary for browsing the highly graphical World Wide Web. Although service providers have fast modem access in metropolitan areas, rural connections may be slower. Most services with an hourly fee pro-rate their charges to the nearest minute

## America On Line (AOL) - (800) 827-6364

Flat fee - all services: $9.95 per month, includes 5 free hours of connect time.
Additional hours - $2.95 per hour.

Claim to provide full Internet access. Provide a browser for the World Wide Web with their free software. AOL recently struck a deal with Microsoft - they may be providing Microsoft's Internet Explorer as their Web browser in the very near future. Free month's trial subscription available. Un subscribing tales a separate voice phone call.

Note: AOL provides many more services than the Internet. Most are aimed at business and home users with such features as news services and stock market information. AOL is also home to VIN, the Veterinary Information Network, an information exchange forum for veterinarians.

## CompuServe Information Service (CIS) - (800) 848-8199

Basic rate: $9.95 per month, unlimited access. (Basic rate allows access to only the most basic of CIS services.)
Extended services: $4.80 per hour of connect time. Some of these services also add an additional premium to the connect time charges.

Basic rate includes 3 free hours of Internet access. Additional time costs $2.50 per hour. Web browsing software (Mosaic) is supplied. 14.4 modem access available at most metropolitan locations, but may require Extended Service rates at some sites. Many rural access numbers provide only 2400 bps access (too slow for the Web). Call for details on your location.

Note: CompuServe provides many more services than the Internet. Most are aimed at home and business users with such features as news, weather, encyclopedia, and stock market information. CompuServe is also home to NOAH, an information exchange forum sponsored by the AVMA.

## Delphi Internet - (800) 695-4005

2 tier price structure (as of August, 1995, may be very different now!):

10/4 plan: $10 per month, first 4 hours free, additional time @ $4.00 per hour

20/20 plan: $20 per month, first 20 hours free, additional time @ $1.80 per hour

$9.00 per hour surcharge for peak period access (6 am - 6 pm).

Graphical Web browser should be available by now.

## Prodigy - (800) 776-3449

Basic rate: $9.95 per month, includes 5 free hours of connect time. Additional hours - $2.95 per hour.

Web browser software included.

## Network MCI (800) 779-0949

Access software: $39.95

One time registration fee: $18.95. Monthly rate $9.95 includes 5 free hours of connect time, additional hours - $2.50

Access software includes Web browser.

## Global Network Navigator (GNN) - (800)819-6112

Basic rate: $14.95 per month, includes 20 free hours of connect time. Additional hours - $1.95 per hour.

Although Web browser software is included with the service, it has to be downloaded at the first session. It is a significant size and may take up to an hour to download!

## AT&T (800) WORLDNET (967-53638) (Don't ask how, but this 8 digit phone number works!)

AT&T provides 30 hours of free Internet access to its long distance customers. Access software is free. (As of this writing I have not received their software and thus cannot evaluate the service.)