**Section 2 - The Internet and the World Wide Web**

Technology in our society is changing at a tremendous pace. People 25 years ago could not imagine much of what we take for granted every day, such as cell phones, global positioning devices, digital cameras, the list goes on and on. In this section, you will learn about the biggest thing to hit our culture since television, the Internet. We will then focus on the most powerful service available on the Internet, the World Wide Web.

**Introduction**

To put it simply, the Internet is millions of computers all around the world connected together. As you might imagine, getting all those computers to communicate and work together is no small task. It is impossible to find out how many computers make up the Internet because nobody knows. No one person, company, or entity owns or controls the Internet. There is no one in charge! It does not have a center or central hub. It is amazing the Internet actually works.

The great thing about the Internet is that it is open to anyone in the world who has access to a computer and a phone line. Even if you do not own a computer or do not have Internet access, there are schools, libraries, Internet Cafes, and other establishments that offer Internet access at little or no cost.

**The Internet’s Hardware**

Much of the hardware components that make up the Internet are owned or shared by thousands of private and public organizations. There are supercomputers called NAPs (Network Access Points), that serve as major hubs. The NAPs are connected to each other and to Regional Routers through the largest lines of the Internet called “Backbones”. The Regional Routers are connected to Regional Networks. These Regional Networks connect to the various ISPs(Internet Service Providers)from which you purchase your Internet access. These ISPs then connect to your home through telephone lines or cable lines. The farther away the lines get from the main backbone line the lower their capacity becomes.

Most of the computers on the Internet perform one of three functions. They either request data, provide data, or help send data along the network. Your personal computer at your house is an example of a computer that primarily requests data, called a Client. Computers that provide data are called Servers, since they “Serve” data to other computers. Computers that help information travel across the Internet are called Routers. Every time data takes a turn on the Internet, a Router is there to send it in the right direction.

**Internet Services**

Although many people think the World Wide Web is the Internet, it is only one of many services found on the Internet. Remember, the Internet is just the connection of all the computers in the world, nothing more. It is what various services use when they connect one computer to another. Listed below are some of the services found on the Internet.

**Voice Over IP(Internet Protocol)** a telephone network that uses the Internet instead of standard phone lines to connect to connect calls. Many businesses around the world have switched from regular phone service to Voice Over IP because it is less expensive.

**Online Muli-Player Gaming** is using the Internet to play games with other people anywhere around the world. Microsofts X-Box Live and PlayStation Network are examples of gaming platforms that use the Internet to connect gamers from various locations. Players will use this network to establish an audio connection with those they are playing with. Using headsets with microphones they can plan strategy and cooperatively work together to win the game.

**Internet Relay Chat(IRC)** allows users to instantly send messages to each other. As of May of 2009, up to 500,000 people were using IRC at any given time. Initially users had to have software to chat with others, now many web sites offer browser based chat right within web pages.

**Peer to Peer File Sharing** is the transfer of files between two computers without the use of a centralized server. This has been used primarily over the past few years to exchange audio and video files. Many of these files are illegally shared as those sharing them do not have the right to do so.

Unlike the server based network used for viewing web pages(see left), peer to peer file sharing software uses the collective bandwith of all users to transfer a file. Users often get different parts of a file they are downloading from several locations at the same time.

**Video Conferencing**

With more people getting high speed Internet connections and as technology continues to improve, video conferencing over the Internet is becoming more and more commong. Computers have now begun to act as video telephones. Apple was the first to provide a high quality experience when in the summer of 2003 they released iChat AV (left).

Many businesses and corporations have turned to high quality video conferencing, like those provide by Cisco Systems (right), to save on travel costs.

**Electronic Mail (e-mail)**

Rivaling the World Wide Web as the most widely used service on the Internet is e-mail. Not only do many people have personal e-mail addresses, but many businesses provide all their employees with addresses as well. E-mail used to require both the sender and receiver to have a software program called an e-mail client, such as Microsoft Outlook or Outlook Express. Now most email users use browser based email you can access througha web page such as Google's GMail.

When you send a e-mail to a friend and you receive a response back the following steps take place.

1) You open your e-mail program, compose a message and press send.

2) Your email is sent to your friend’s Mail Server located at their ISP(Internet Service Provider) via SMTP(Simple Mail Transfer Protocol).

3) The next time your friend checks their e-mail, they download all messages waiting for them from their ISP’s mail server, via POP(Post Office Protocol).

4) Your friend opens your email, reads it, then clicks the Reply button.

5) Your friend’s response is sent to your ISP’s mail server via SMTP(Simple Mail Transfer Protocol)

6) The next time you check your e-mail, all messages waiting for your at your ISP’s mail server are downloaded to your computer, via POP(Post Office Protocol).

7) You read your friend’s response.

**FTP (File Transfer Protocol)**

Many places on the Internet exist solely for transferring files. These are called FTP Servers. They allow users to upload as well as download files. For example, an employer may place files that employees need on an FTP server. Each employee could then download the files he or she needs. If needed, they could upload files to the server for their employer to download. Many FTP Servers are password protected and require users to “log in” with a username and password. Almost all web servers also accept FTP Protocols, allowing you to place the files of your web site online via FTP.

Most people who FTP use an FTP Client, software on your computer that makes transferring the files easier. One such program is Cute FTP(shown below). It includes functions to log onto the network, list directories, and copy files. Shown below is CUTE FTP’s interface. This program has very user-friendly interface. For example, if you want to upload a page from your personal computer to the web server, all you have to do is click and drag that file from the left window and drop it in the right window.

**World Wide Web**

The World Wide Web may be the service on the Internet with which you are probably most familiar. It is definitely the most publicized, primarily because it has become highly commercial in nature. Chances are, if something exists, you can buy it somewhere on the Web. The ability of web pages to display text, graphics, audio and video make it a powerful sales tool. It can also be a great tool for research. The answer to just about any question can be found on the Web. The Web can do anything that magazines, books, newspapers, radio and television have done for us in the past. The big difference is that unlike existing forms of media, anyone can publish to the web. The World Wide Web will be discussed in more detail later in this section.

More and more services are becoming web based. In recent years Chat and E-Mail has moved from software based Internet services to Web based. Microsoft is considering making it's Office software suite available through the web browser as well. The web has provided a platform for many new web site business that are changing the way people live their lives. Listed at the right are web sites that have had a profound effect on our society.

**The World Wide Web**

The World Wide Web is an ever growing number of web pages which are linked together. A Web Page is a document on the Web, consisting of an HTML(HyperText Markup Language) file and any related files for scripts and graphics, and often hyper-linked to other documents on the Web. These links are often in the form of text called Hyperlinks, and they are often underlined and a different color than the rest of the text in the page. Using your mouse, you can click on these hyperlinks to navigate to another web page. The number of web pages on the Web grows by thousands each day.

If you want to view a web page you will need a Web Browser, software that will display a web page on your computer’s monitor. Internet Explorer and Netscape Navigator are examples of web browsers. Like the Web, Browsers are continually changing. Luckily, most Browsers can be downloaded and updated for free from the Internet. Many browsers will even notify you when a update is available.

Web browsers also allow you to open a web page by typing its web address or URL(Uniform Resource Locator) into the browsers search field. A group of web pages found at one web address is called a web site. Web sites are usually devoted to a single subject or purpose. For example, www.nbc.com is devoted to promoted the National Broadcasting Company.

Look at the web address listed below. You can see that it is made up of many parts. Read the color coded text beneath the address to learn what each part of the address represents.

**http://** - This is a “Protocol Prefix” that designates the file being requested as accessible via Hypertext Transfer Protocol.

**www** - designates a requested file as World Wide Web document, originally needed to distinguish between Web files and other Internet files, this is often no longer needed. For example, you can go to edulaunch’s web site by typing http://www. edulaunch.com or just http:// edulaunch.com

**edulaunch** - Domain name that points to the server computer of the edulaunch web site.

**.com** – Domain Name Extension designated for web sites with a commercial focus

**student\_showcase** - Directory or folder within which the web page being requested is located.

**bachelor\_bet.html** - This is the name of the exact file requested.

You may be wondering: What is the purpose of slashes? They signify that you are moving deeper within the web site by entering a new folder or directory. For example, the bachelor\_bet.html file is inside the student\_showcase directory.

**Domain Name Extensions**

The ending three-letter suffix of all top level domains are to designate what type of web site it is. Listed below are some of the most common domain extensions.

.com commercial use

.edu education and research

.gov governmental agencies

.mil military agencies

.net networks or ISPs

.org non-profit organizations

**Country Code Extensions**

There are now over 200 two-letter country code extensions. These designate a web site as originating from a certain country. For example, the web address of the London's famous metropolitan police - Scotland Yard is http://www.met.police.uk Notice the two-letter country code at the end(.uk).

A few examples of Country Code Extensions are listed below.

.ar Argentina .il Israel .pr Puerto Rico

.br Brazil .in India .ru Russian Federation

.cn China .it Italy .tw Taiwan

.es Spain .kr South Korea .uk United Kingdom

.ie Ireland .mx Mexico .us United States

**Client, Router, and Server computers on the Web**

When you open your web browser, type in the address of your favorite web site and press the Enter key, you are setting off a chain reaction across the United States and perhaps the whole world! Your request leaves your computer, travels through your ISP, then through a series of Router computers until it reaches the exact Web Server specified in the address you typed. The Web Server then sends the instructions on how to assemble the web page back through the routers to your ISP, then to your computer where your web browser follows the instructions to assemble the page correctly on your screen.

A server computer can “Crash” if too many people are simultaneously requesting files. For example, if a NBC Nightly News features a web site in their broadcast, hundreds of thousands of people who have their computers close by, may visit the site all at once, causing it to crash. Web sites that expect high levels of traffic often use multiple servers with “Load Balancers” to deal with requests during peak times.

**Searching the Web**

When you navigate through the World Wide Web you are said to be “Surfing the Web”. Most people either know the address of the web page they want to visit or they perform a web search for pages with the information they are looking for. There are several search engines, but most people use the most popular one - Google.

Search Engines use software programs that search the web and record information. These programs are called by many names: spiders, robots, crawlers, or intelligent agents. They are moving throughout the web at all times, day and night, placing information about web sites in a database. Google.com and Bing.com are the two most popular search engines.

When you use a search engine, it compares your request (called a query) to the information in its database. The search engine ranks the web sites for relevancy to your query, pulls the web sites and their related descriptions from the database to display them on and displays search results web page for you to view. Therefore, the web site listed first on the results page should be the one that is most relevant to your query.

**Popular Search Engines**

Google www.google.com

Bing www.bing.com

Alta Vista www.altavista.com

Ask Jeeves www.ask.com

Hot Bot www.hotbot.com

Lycos www.lycos.com

Yahoo www.yahoo.com

**Advanced Searching**

The best way to search is by using Google's Advanced Search Page. This page allows you to search with far greater specificity. It allows you to search using such criteria as time, region, file type, and many others.

**Are You Seeing Everything?**

Did you know that web searches only a cover around 20-40% of the web. Much of the content on the web is hidden through password protected sites, firewalls, Flash™ sites, databases, and other things that search engines can’t read.

**Getting Listed on Google**

It's a "gold mine" for your business if it shows up on the first page of listings on Google. For example, if someone searches Boston Plumber, and your plumbing company shows up on the first page of results, chances are, people will come to your site and do business with you. If a link to your site shows up on the 5th page of links, you're probably out of luck because people will have already found a plumber on the first page or two.

Getting a high listing on Google very, very valuable. Google uses a somewhat secret and often evolving algorythm to determine search rankings. There are many "Search Optimization" companies who claim to be able to get you atop the Google search rankings. Most of them can not. The best way to improve your search ranking is to have a lot of other legitimate sites link to yours. These sites must be real and unique. The practice of building dozens of web sites for the sole purpose of linking them all to your's is called "link farming", and Google is wise to such techniques.

**Web Security**

**Who’s behind the web page?**

For a long time, what was published in print media was nearly always true and reliable. When a publishing house or major newspaper sends a story to print, they have fact checkers make sure the story is accurate. The high cost of publishing and printing kept dishonest and careless people out of the industry.

With the inexpensive and digital nature of the World Wide Web, anyone can design and publish a professional looking site with very little money invested. If these people are dishonest, they could intentionally mislead thousands of people. For example, lets say a 21 year-old college student named John Doe buys the web site address www.factsofhistory.com. He then proceeds to design a professional looking home page that gives a good impression to those visiting the site. He fills his web site with made up stories and facts about American History. Once the search engines find his site, it will start showing up in high school students’ search results. Next, students across the country will start including facts from John Doe’s web site in research papers and listing his site in their bibliography.

In the example above, no laws were broken, and John Doe will never suffer any repercussions for his actions. Anyone can publish to the web, and there no laws to monitor or regulate its accuracy. Therefore it is always a good idea to double-check all information found on the web with a second source. It is also a good idea to get your information from reputable organizations such as http://www.britannica.com/, the official web site of the long standing Encyclopedia Britannica.

**Web Tracking**

When a web site makes a record of your visit, and possibly other sites you have visited, it’s called Web Tracking. When you visit web sites they often place small text file on your computer called a “Cookie”. The next time you visit the web site, it will check to see if your computer has a cookie from their site. If your computer still has the cookie, it tells the web site that you are a returning visitor. Cookies enable the web site to determine how often you have visited their site, the date and time of your last visit, which pages of the site you are visiting. Although the web site has given you a visitor number, it does not know who you are unless you have input that information into the web site.

If you have ever logged onto a site, such as Amazon.com, you may have seen a message on the site that appears to be customized for you. For example, a message may say “Hello, we thought you might be interested in these CDs”, then the CDs listed are all your favorites. Amazon has custom built part of the page for you based upon the information the cookie has given it about pages on their web site you have visited in the past. A cookie by itself is not a bad thing. In fact they can make surfing the web a richer experience and many well known sites will not function properly without them.

Many web sites use a cookie in combination with a request for personal information to develop a more personal profile of you. Once you input your name, address, age, and other personal information into a web site, it can then match your web browsing habits to your name. This is where people become uncomfortable with web tracking. Most people do not want someone or some entity in cyberspace keeping a record of what web sites they are visiting.

**Advertising Spyware**

Advertising spyware is software installed on a computer without the computer owner’s knowledge or permission. It gathers information about that user for later retrieval by those controlling the spyware. Advertising spyware collects data about the user, such as passwords, email addresses, web browsing habits, online purchasing habits, the computer's hardware and software configuration, and all kinds of personal information about the user. It then makes use of the user's internet connection to upload whatever personal information it has gathered, and download advertisements which it will display to the user, usually through pop-up windows or ad banners. All of this can be considered theft if they spyware installs without disclosure. The good news is that you can download software that will scan and remove spyware from your computer. Such removal programs include Adaware(http://www.lavasoftusa.com/support/download/) and Spybot http://security.kolla.de/).

**Online Purchases & Encryption**

If you submit your credit card information online it will travel through many different computers before it reaches its destination. You can prevent someone from viewing your credit card number along the way by encrypting it in a secret code. Encryption converts your text into gibberish. Before someone could read the file, they would have to decrypt or translate it back to its original, readable form. All reputable sites now offer encryption services on their site. They will encrypt your information, then decrypt it once it has safely reached their site. You know you are on a secure web site using encryption if you see the lock at the bottom of the browser window. If you would like to encrypt your own files you can use a free software called PGP(Pretty Good Privacy). This is a time tested program that is widely used because it works.

**Viruses**

A program designed to replicate and spread to as many computers as possible is a Virus. They can be immediately visible or be working unseen on your computer for months. There are many types of viruses. Some are rather harmless pranks, while others can clear off your hard drive erasing years of work. Since e-mail can carry file attachments, it has become the most popular way for viruses to spread. It is never a good idea to open a file attachment from an e-mail unless you are expecting that file attachment. It does not matter if the e-mail is from a friend. Do not open any file attachment until you have confirmed its origin, because your friend’s e-mail may have been taken over by a virus that is using your friends address book to spread itself. A Trojan Horse is a virus that pretends to be something it is not, such as a product update or a free software download. Once you open it, the virus will begin to execute its programming. It is always a good idea to keep up-to-date Anti-Virus Software on your computer. Companies such as Norton Anti-Virus will deliver updates over the web to head off most viruses before they have a chance to infect your computer.