1. Fundamentals

1.1. Introduction to Internet

By the turn of the century, information, including access to the Internet, will be the basis for personal, economic, and political advancement. The popular name for the Internet is the information superhighway. Whether you want to find the latest financial news, browse through library catalogs, exchange information with colleagues, or join in a lively political debate, the Internet is the tool that will take you beyond telephones, faxes, and isolated computers to a burgeoning networked information frontier.

The Internet supplements the traditional tools you use to gather information, Data Graphics, News and correspond with other people. Used skillfully, the Internet shrinks the world and brings information, expertise, and knowledge on nearly every subject imaginable straight to your computer.

1.1.1. What is Internet

The Internet links are computer networks all over the world so that users can share resources and communicate with each other. Some computers, have direct access to all the facilities on the Internet such as the universities. And other computers, eg privately-owned ones, have indirect links through a commercial service provider, who offers some or all of the Internet facilities. In order to be connected to Internet, you must go through service suppliers. Many options are offered with monthly rates. Depending on the option chosen, access time may vary.

The Internet is what we call a metanetwork, that is, a network of networks that spans the globe. It's impossible to give an exact count of the number of networks or users that comprise the Internet, but it is easily in the thousands and millions respectively. The Internet employs a set of standardized protocols which allow for the sharing of resources among different kinds of computers that communicate with each other on the network. These standards, sometimes referred to as the Internet Protocol Suite, are the rules that developers adhere to when creating new functions for the Internet.

The Internet is also what we call a distributed system; there is no central archives. Technically, no one runs the Internet. Rather, the Internet is made up of thousands of smaller networks. The Internet thrives and develops as its many users find new ways to create, display and retrieve the information that constitutes the Internet.

1.1.2. History and Development of Internet

In its infancy, the Internet was originally conceived by the Department of Defense as a way to protect government communications systems in the event of a military strike. The original network, dubbed ARPANet (for the Advanced Research Projects Agency that developed it) evolved into a communications channel among contractors, military personnel, and university researchers who were contributing to ARPA projects.

The network employed a set of standard protocols to create an effective way for these people to communicate and share data with each other.

ARPAnet's popularity continued to spread among researchers, and in the 1980's the National Science Foundation, whose NSFNet, linked several high speed computers, took charge of the what had come to be known as the Internet.

By the late 1980's, thousands of cooperating networks were participating in the Internet.

In 1991, the U.S. High Performance Computing Act established the NREN (National Research & Education Network). NREN's goal was to develop and maintain high-speed networks for research and education, and to investigate commercial uses for the Internet.

The rest, as they say, is history in the making. The Internet has been improved through the developments of such services as Gopher and the World Wide Web.

Even though the Internet is predominantly thought of as a research oriented network, it continues to grow as an informational, creative, and commercial resource every day and all over the world.

1.2. Introduction to WWW

The "Web", short for "World Wide Web" (which gives us the acronym www), is the name for one of the ways that the Internet lets people browse documents connected by hypertext links.

The concept of the Web was perfected at CERN (European Organization for Nuclear Research) in 1991 by a group of researchers which included Tim-Berners Lee, the creator of the hyperlink, who is today considered the father of the Web.

The principle of the Web is based on using hyperlinks to navigate between documents (called "web pages") with a program called a browser. A web page is a simple text file written in a markup language (called HTML) that encodes the layout of the document, graphical elements, and links to other documents, all with the help of tags.

Besides the links which connect formatted documents to one another, the web uses the HTTP protocol to link documents hosted on distant computers (called web servers, as opposed to the client represented by the broswer). On the Internet, documents are identified with a unique address, called a URL, which can be used to locate any resource on the Internet, no matter which server may be hosting it.

1.3. Introduction to Web Browsers

A web browser is a software application which enables a user to display and interact with text, images, videos, music, and other information that could be on a website. Text and images on a web page can contain hyperlinks to other web pages at the same or different website. Web browsers allow a user to quickly and easily access information provided on many web pages at many websites by traversing these links. Web browsers format HTML information for display so the appearance of a web page many differ between browsers.

Some popular web browsers are Firefox, Chrome, Opera, Safari and Internet Explorer.

1.3.1. Protocols and Standards

Web browsers communicated with web servers primarily using HTTP (hypertext transfer

protocol) to fetch web pages. HTTP allows web browsers to submit information to web servers as well as fetch web pages from them. Pages are identified by means of a URL (uniform resource locater), which is treated as an address, beginning with “http://” for HTTP access.

The file format for a web page is usually HTML (hyper-text markup language) and is identified in the HTTP protocol. Most web browsers also support a variety of additional formats, such as JPEG, PNG, and GIF image formats, and can be extended to support more through the use of plugins. The combination of HTTP content type and URL protocol specification allows web page designers to embed images, animations, video, sound, and streaming media into a web page, or to make them accessible through the web page.

1.4. Introduction to Web Servers

If you need your server to publish websites to the internet, you will need to install a webserver! A webserver is a process which runs on your server and which listens on one or more ports for requests using the various web protocols (-such as HTTP, SSL, FTP, etc). When someone types in one of your URLs, the HTTP request will be sent to the port on your server where your webserver is listening; your webserver will then interpret the request and reply to the client with the requested page or resource.

By default webservers listen for HTTP requests on port 80 and SSL on port 443, but these can be tied to different ports as required.

Unless your sites consist of static (-e.g. HTML) pages, you will normally require a web scripting language and a backend database.

Some of the most popular web servers are Apache, Nginx, Lighttpd and Microsoft IIS.

1.5. Introduction to URL

A URL, or Uniform Resource Locator, is the location of a file on the web. When you type the address of a web page into your browser, you are typing a URL.

1.5.1. http://

The first portion of the URL (http) designates the protocol that is used to locate the file or resource on the web.

A protocol is a standardized means of communication among machines across a network. Protocols allow data to be taken apart for faster transmission, transmitted, and then reassembled at the destination in the correct order.

Here, http represents the HyperText Transfer Protocol, which is used to transfer webpages across the Internet to web browsers such as Internet Explorer, Safari, Firefox, or Chrome. Other common protocols include https (for secure webpages—the s stands for "secure"), ftp (file transfer protocol), and news (for newsgroups).The protocol of a URL is followed by a colon and two slashes (://).

1.6. Multipurpose Internet Mail Extension

MIME (Multi-Purpose Internet Mail Extensions) is an extension of the original Internet e-

mail protocol that lets people use the protocol to exchange different kinds of data files on the Internet: audio, video, images, application programs, and other kinds, as well as the ASCII text handled in the original protocol, the Simple Mail Transport Protocol (SMTP). In 1991, Nathan Borenstein of Bellcore proposed to the IETF that SMTP be extended so that Internet (but mainly Web) clients and servers could recognize and handle other kinds of data than ASCII text. As a result, new file types were added to "mail" as a supported Internet Protocol file type.

Servers insert the MIME header at the beginning of any Web transmission. Clients use this header to select an appropriate "player" application for the type of data the header indicates. Some of these players are built into the Web client or browser (for example, all browsers come with GIF and JPEG image players as well as the ability to handle HTML files); other players may need to be downloaded.

1.7. HTTP(S)

Short for Hyper Text Transfer Protocol, HTTP is a set of standards that allow users of the World Wide Web to exchange information found on web pages. When accessing any web page entering http:// in front of the address tells the browser to communicate over HTTP. For example, the URL for NCIT is http://www.ncit.edu.np. Today's browsers no longer require HTTP in front of the URL since it is the default method of communication. However, it is kept in browsers because of the need to separate protocols such as FTP. It uses port 80 by default for communication.

Short for Hypertext Transfer Protocol over Secure, HTTPS is a secure method of accessing or sending information across a web page. All data sent over HTTPS is encrypted before it is sent, this prevents anyone from understanding that information if intercepted. Because data is encrypted over HTTPS, it is slower than HTTP, which is why HTTPS is only used when requiring login information or with pages that contain sensitive information such as an online bank web page. It uses port 443 by default for communication.

1.8. POP

The POP (Post Office Protocol 3) protocol provides a simple, standardized way for users to access mailboxes and download messages to their computers.

When using the POP protocol all your eMail messages will be downloaded from the mail server to your local computer. You can choose to leave copies of your eMails on the server as well. The advantage is that once your messages are downloaded you can cut the internet connection and read your eMail at your leisure without incuring further communication costs. On the other hand you might have transferred a lot of message (including spam or viruses) in which you are not at all interested at this point.

1.9. IMAP

IMAP (Internet Message Access Protocol) – Is a standard protocol for accessing e-mail from your local server. IMAP is a client/server protocol in which e-mail is received and held for

you by your Internet server. As this requires only a small data transfer this works well even over a slow connection such as a modem. Only if you request to read a specific email message will it be downloaded from the server. You can also create and manipulate folders or mailboxes on the server, delete messages etc.

1.10. SMTP

The SMTP (Simple Mail Transfer Protocol) protocol is used by the Mail Transfer Agent (MTA) to deliver your eMail to the recipient's mail server. The SMTP protocol can only be used to send emails, not to receive them. Depending on your network / ISP settings, you may only be able to use the SMTP protocol under certain conditions.

1.11. FTP

File Transfer Protocol (FTP) is a standard Internet protocol for transmitting files between computers on the Internet. Like the Hypertext Transfer Protocol (HTTP), which transfers displayable Web pages and related files, and the Simple Mail Transfer Protocol (SMTP), which transfers e-mail, FTP is an application protocol that uses the Internet's TCP/IP protocols. FTP is commonly used to transfer Web page files from their creator to the computer that acts as their server for everyone on the Internet. It's also commonly used to download programs and other files to your computer from other servers.

As a user, you can use FTP with a simple command line interface (for example, from the Windows MS-DOS Prompt window) or with a commercial program that offers a graphical user interface. Your Web browser can also make FTP requests to download programs you select from a Web page. Using FTP, you can also update (delete, rename, move, and copy) files at a server. You need to logon to an FTP server. However, publicly available files are easily accessed using anonymous FTP.

Basic FTP support is usually provided as part of a suite of programs that come with TCP/IP. However, any FTP client program with a graphical user interface usually must be downloaded from the company that makes it.

1.12. DHCP

Short for Dynamic Host Configuration Protocol, a protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address every time it connects to the network. In some systems, the device's IP address can even change while it is still connected. DHCP also supports a mix of static and dynamic IP addresses.

Dynamic addressing simplifies network administration because the software keeps track of IP addresses rather than requiring an administrator to manage the task. This means that a new computer can be added to a network without the hassle of manually assigning it a unique IP address. Many ISPs use dynamic IP addressing for Internet subscribers.