CHAPTER 3
THE INTERNET
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This chapter describes the information about the Internet as follows:

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3.1 Categories of Networks

There are five categories of networks: local area networks, metropolitan area networks, wide area networks, wireless networks and internetworks. The category of a network is determined by its size, its ownership, the distance it covers and its physical architecture.

3.1.1 Local Area Network (LAN)

Local area networks, generally called LANs, are privately-owned networks within a single building or campus within a few kilometers. LANs are designed to allow resources to be shared between personal computers or workstations. The resources to be shared can include hardware, software, or data. A common example of a LAN, found in many business environments, links to a work group of task-related
computers. One of the computer may be given a large-capacity disk drive and become a server to the other clients. Software can be stored on this central server and used as needed by the whole group. LANs are distinguished from other kinds of networks by three characteristics: size, transmission technology and topology.

3.1.2 Metropolitan Area Networks (MAN)

A metropolitan area network or MAN is designed to extend over an entire city. It may be a single network or it may be a means of connecting a number of LAN into a larger network so that resources may be shared LAN-to-LAN as well as device-to-device. It might cover a group of nearby corporate offices or a city and might be either private or public. A MAN can support both data and voice, and might even be related to the local cable television network.

3.1.3 Wide Area Network (WAN)

A wide area network or WAN provides long-distance transmission of data, voice, image and video information over large geographical areas that may comprise a country, a continent or over the whole world. The hosts are connected by a communication subnet, or just subnet for short. The job of the subnet is to carry messages from host to host, just as the telephone system carries words from speaker to listener. By separating the pure communication aspects of the network (the subnet) from the application aspects (the host), the complete network design is greatly simplified. In most WANs, the network contains numerous cables or telephone lines, each one connecting a pair of routers.

3.1.4 Wireless Networks

Digital wireless communication is not a new idea. As early 1901, the Italian physicist Guglielmo Marconi, demonstrated a ship-to-shore wireless telegraph using Morse Code. Modern digital wireless systems have better performance, but the basic idea is the same. Wireless networks have many uses. A common one is the portable office. People on the road often want to use their portable electronic equipment to send and receive telephone calls, faxes, and electronic mail, read remote files, login on remote machines, and so on, and do these from anywhere on land, sea, or air.
Wireless networks are of great value to fleets of trucks, taxis, buses, and repairpersons for keeping in contact with home. Another use is for the rescue workers at disaster sites (fires, floods, earthquakes, etc.) where the telephone system has been destroyed. Moreover, they are important to the military. If war is to be fought anywhere on earth on short notice, counting on the use of local networking infrastructure may be impractical. Wireless networks come in many forms. Some universities are already installing antennas all over campus to allow students to sit under the tree and consult the library’s card catalogue and other services, access online journals and databases.

3.1.5 Internetworks

Many networks exist in the world, often with different hardware and software. People connected to one network often want to communicate with people attached to a different one. The desire requires connecting together different, and frequently incompatible networks, sometimes by using machines called gateways to make the connection and provide the necessary translation, both in term of hardware and software. When two or more networks are connected, they become an internetwork, or internet. Individual networks are joined into internetworks by the use of internetworking devices. These devices include both routers and gateways.

Conclusion:

Despite five significant network types, i.e. local area network (LAN), metropolitan area network (MAN), wire area network, wireless network and the Internet, users are mostly familiar working with the foremost LAN and Internet. As described in this section, LAN is used in a diameter of several kilometers as private or institutional based network. The Internet, called the “Net” by most common users, is the most widely used network of the times. For this reason, the researchers have devoted much time and effort to explain it.

The ‘Net’ consists of several personalized networks united into a major system for the benefit of inter-communication. Most users are aware of websites, WebPages, etc., available and many sites offer free membership. Therefore, they have wide membership of several hundred thousand users and are still expanding. Internet will be defined and discussed in the next section.
MAN is a larger network than LAN, designed for city based on metropolitan use. WAN is the next largest network, as its full name suggests “Wide Area Network” and used to transmit and communicate across a wider distance than city limits. While MAN can connect businesses, offices, etc., WAN can expand to cover countries, continents and other larger bodies of land. The fourth type of networks is “wireless”. The researcher has found that wireless is popular among the mobile class of people in a society, as its uses allow access to various services via long-distance (remote control) Despite these five networks’ advantages, users remain familiar mostly with LAN and the Internet.

3.2 Definitions of the Internet

There are a lot of meanings of the Internet in publication as follow: Internet is also called the Net, a rapidly growing network of millions of computers around the world. Internet is not an individual organization or network, but a collective term for hundreds of thousands of networks connecting millions of users in 165 countries. It has no central computer; each message bears an address code that lets any computer in the network to forward it towards its destination.11

Internet is network which is being developed by the cooperative interconnection of thousands of computers and networks. Internet is a jargon which is being coined from the word ‘Interconnection’ and ‘network’. Hence Internet can be defined as network of computers, usually made up of different kinds and varied technologies that are put together in such a way that they appear as a single network. It is the global computer and communication system linking millions of businesses, organizations and private users.12

The modern telecommunication system facilitates the technical transmission of voice, data and video information from one location to another. It is an advance in telecommunication technology that have boosted the computer based library systems. This has resulted in the collection of a large variety of information databases stored and widely used in the Internet.13

Internet is a vast cyberspace where you can gather, disseminate, and exchange all types of information.14 Internet is not really a network – it’s a network of networks, all freely exchanging information. The networks range from the big and formal to the
small and informal and everything in between. College and university networks have long been part of the net, and now high schools and elementary school are joining.\textsuperscript{15}

Internet has two meanings (a) Generally (not capitalized) any collection of distinct networks working together as one. (b) Specifically (capitalize) the world-wide “network of networks” that are connected to each other, using the IP protocol and other similar protocols. Internet provides file transfer, remote login, electronic mail, news, and other services.\textsuperscript{16}

Internet is a large interconnected network of computer networks linking people and computers all over the world, via phone lines, satellites, and other telecommunications systems.\textsuperscript{17} The Internet is a collection of networks and routers that use the TCP/IP protocol suite and function as a single, large network. Internet reaches government, commercial, and educational organizations around the world.\textsuperscript{18}

Internet is an international wide area network that provides file and data transfer, together with electronic mail functions for millions of users around the world; anyone can use the Internet and access any of the several million computers that are linked (by telephone).\textsuperscript{19}

Internet is a net of world wide networks. It is a group of different small networks spread in different countries throughout the world. It connects hundreds and thousands of educational, government, military, personal and public computer systems and makes lackhs of people with different culture capable of sharing and communicating other resources.\textsuperscript{20}

Conclusion:

In this section, the researcher has defined and described the Internet according to common understanding. To begin by its own dimensions, the Internet is not a single network like the ones discussed earlier. It is actually a collection of networks conducting inter-communication. Internet is abbreviated from “Inter-network”. As capitalized, Internet is known by WWW or World Wide Web therefore, its range is totally international. Its most common uses include browsing or surfing, electronic mail, on-line chatting and chatrooms on many subjects, etc. A user who seeks information either types URL or uses search engines such as google.com and enters the keyword of information in the space provided. Today, Internet as it is commonly called has many hundred thousands of users around the world.
3.3 History of the Internet

The original concept for the Internet began at ‘The Red Corporation’ in the early 1960s. Following the Cuban Missile Crisis, several researchers began discussing the idea of a decentralized network spanning the United States.\textsuperscript{21} In the late 1960s during the Cold War, and the U.S. Department of Defense was particularly concerned with the possibility of nuclear attack.\textsuperscript{22} Historically, the Internet has its roots in ARPAnet, established by the Advance Research Project Agency. It was researched and defense network created by the U.S. Department of Defense in the early 1970s allowed scientists and researchers better communication and data exchange.\textsuperscript{23}

The ARPAnet was especially important to the Internet project, and was often called the backbone network because it was the central WAN that tied researchers together. Each researcher working on the Internet project had a computer connected to the ARPAnet.\textsuperscript{24} In 1972, the number of centres connected to ARPAnet was 23 and increased to 40 in 1974.

The technological evolution added strength to the Internet and that transformed ARPAnet into Internet of today which included: the openness of the Unix operating system, the distribution of "Unix-to-Unix copy" (UUCP) programme for electronic mail transfer services among computers, the creation of USENET news relay system by students, the distribution of software tools by University of California at Berkeley called BSD (Berkeley Software Distribution) and the invention of Ethernet. All these jargons may sound strange to non-technical users, but all of this meant that public-domain distribution and source code licensing to academic institutions happened to be the key success factor in the phenomenal growth of the Internet.

One of the early outcomes of this initiative was the development of new ways of routing data in multiple paths using unit of data (packets). The standard for communicating on the Internet today known as “TCP/IP” is the abbreviated form for Transmission Control Protocol/ Internet Protocol. The key concept in TCP/IP is that every computer has to know or be able to figure out where the other computers are on the network, and can send data by the quickest route, even if part of the route is down.\textsuperscript{25} If it finds that none of the computers are responding being very busy, or does not receive the message, then it can be checked on proposed network map through
network topology. Hence, it searches some other computer for communication of message. Thus computer, using TCP/IP can link with Internet.  

Around 1980, two unaffiliated networks started up. Usenet and BITNET were grass-roots networks based on the concepts of free access to information and ease to use. These two networks were unaffiliated with the ARPAnet, but as the ARPAnet grew, users wanted to share information across networks. Thus, connections were built between the networks so that mail and news could be connected. Other new commercial networks such as CompuServe and American On-line (AOL) also drew large constituencies, and many people found themselves on more than one network.  

NSFNET (National Science Foundation Network), known as the backbone of Internet came into existence in 1986 and until 1995 NSFNET was operated by ANS (Advanced Network & Services) a research oriented non-profit company set up by Merit Network, IBM and MCI in 1990 under a cooperative agreement between NSF and Merit. After 1995 this contract ended, the running and maintaining of NSFNET has been taken over by Internet services providers like America On-line MCP and sprint in the United States. On an overall basis II of Internet Engineering Task Forces represented by the government and academic organizations largely governs the Internet.  

From a few connected institutions, word spreads about the value and ease of collaborative work and, over time, and more people connected their research institutions to each other. They also began to connect the manufacturers of equipment, computers and software which are used to support the scientific and research mission. For over twenty years, this network served the research community well, and it grew each year as more people move out from the larger, earlier-connected institutions to small institutions.  

**Conclusion:**

Section three outlined the history of the Internet, from its inception in 1960 until the present. After the Cuban Missile Crisis (USA) in the 1960s, ARPAnet was established and is considered the root of Internet. ARPAnet is an early model of wide area networking (WAN) which we have explained in section one earlier. Following that, there was considerable technological evolution. In the 1980s Usenet and BITNET were established with free access. Internet was first a tool of the US
Department of Defense and later used for extra-curricular education. Today, its uses include researchers, business people, scholars and students of both secondary and higher education.

3.4 Internet in Thailand

In the early 1980's computers were visible but not widely used as they were expensive and incomprehensible for most Thais, due to the lack of Thai language software and the lack of computer standardization. As in most countries, Internet in Thailand began in academic circle. However, initially it developed a bit slow. Study found that even in the late 1980s, Internet still limited its role only within academics, researchers, engineers, and computer professionals. Since 1995 Internet turned to be popular in business and commerce. The Thai Internet also grew out from the UNIX based educational community in the late 80's. While the majority of the people were using PC and DOS, a few UNIX machines located in Songkhla, Pathumthani and Bangkok.

Dr. Kanchana Kanchanasut, a professor at the Asian Institute of Technology (AIT) in Thailand, was the first person to send an e-mail from Thailand in 1986. She did her doctoral studies at the University of Melbourne (UM) in Australia and when she returned to Thailand, she was disappointed that she could not maintain e-mail contact with her colleagues in Australia. Dr. Tomonori Kimura, an AIT colleague was also another who wanted to keep in touch with friends and colleagues in Tokyo, so together they used the Communications Authority of Thailand's (CAT) Thaipak X.25 service to "uucp" with servers at UM and the University of Tokyo. Through this connection, the first e-mail message was sent.

The need for an academic and research network has been identified since 1987, when NECTEC (National Electronics and Computer Technology Centre) put networking as one major issue among ten other missions. Network development was then started as the Inter-University Network Project. Development was concentrated on the key issue of telecommunication infrastructures and databases.

In 1988, the Australian International Development Plan (IDP) provided technical assistance in setting up the first e-mail network in Thailand. Dubbed "TCSNet" (Thai Computer Science Network), comprised of AIT, Prince Songkhla
University (PSU), and Chulalongkorn University (CU). With AIT and PSU acting as gateways, academics could dial into either AIT or PSU, with UM polling AIT and PSU twice daily (via long distance dial-up) in order to pick up and/or deliver mail to the local servers.\textsuperscript{34}

The early development of Thai Internet community was typically supported by individual contributions and personal volunteer ethics. Trin Tansetthi, who was at the time a software architect for DEC (Thailand) and later became president of Thailand’s first commercial Internet Service Provider (ISP) Internet Thailand, was among Thailand’s Internet pioneers and was in no small part responsible for bringing Thailand’s first gopher, ftp, usenet news and web servers to Internet users in Thailand.\textsuperscript{35}

Initially the Thai Government was very slow to acknowledge the importance of the Internet and reacted to the country’s shortage of human resources by limiting the access to the Internet to state academic institutions and Government agencies.\textsuperscript{36} But later the Thai Government, working through the IT-2000 project (the Telecommunications Master Plan), with NECTEC and TOT, telecommunications and Internet providers, has demonstrated its intent to provide networking to every school in the country for free. This provides access for schools and communities to utilize Internet for informational and educational purposes.

At the end of 1992, Chulalongkorn University in Bangkok acquired a 9.6 Kps link from the Communications Authority of Thailand (CAT) to connect UUNET. Chulalongkorn paid CAT for both halves of circuit at 25% discount. It costs around 3 million bath a year for the line. UUNET contributed by waiving the connection fee (access fee). With this leased line, Chulalongkorn became Thailand’s new gateway for the so-called “ThaiNet ” consortium, which included AIT, Chiangmai and Assumption University. Chulalongkorn also allowed Thaisarn members to use the Internet via 9.6 Kbps local leased line as a courtesy through NECTEC.\textsuperscript{37}

In the same year, six academic/research institutions were on-line with the Internet on a full-time basis. (Chula, Thammasat, AIT, Prince of Songkla, Kasetsart and NECTEC). The Thai Social/Scientific, Academic and Research Network (ThaiSarn) was formally declared the second-phase of the Inter-University Network Project.\textsuperscript{38} Digital Equipment (Thailand) joined ThaiSarn in this year but was later
disconnected because commercial organization was not allowed to use educational Internet in Thailand.

As of September 1994, the Internet Society (ISOC) ranked Thailand number six in the Asia-Pacific region after Australia, Japan, Taiwan, Korea, New Zealand. It was slightly ahead of Singapore, Hong Kong and Indonesia. With the launch of two authorized Internet operators in Thailand in December 1994, it was expected that Thailand should have a big growth in network size, host counts and data traffic. To evaluate the success of Internet in the academic and research sectors, the major milestone for the completion of the inter-university networking phase of ThaiSarn had been set for March 1995. In fact, the majority of Thai Universities were on the Net by the end of 1994 already.

The Internet community in Thailand began to grow more rapidly in the mid 1990’s. After commercialization in early 1995, the growth of commercial Internet usage in terms of individual users and corporate node connection was at a rate of 23 percent per month in 1995. By the end of 1995, there were at least 60 corporate nodes with independent Internet domains connected to commercial ISPs. The total number of Internet users in Thailand was at least 100,000 persons, the majority of which had access via their corporate nodes. About half of the users were associated with research or academic institutions.39 Internet Thailand Company Limited was jointly planned by NECTEC/CAT/TOT, with its name pre-registered with the Ministry of Commerce for future incorporation. The pricing and service structure was announced on January 12, the day Thailand declared 1995 as the IT-Year.

In 1996, Internet Thailand Service Centre was introduced as the first commercial E1 (2 million bits per second) Internet connection between Thailand and USA. This link is a fiber optic circuit between Bangkok and Hayward, CA, USA. The Communications Authority of Thailand launched Thailand-National Internet Exchange (TH-NIX) and International Internet Gateway (IIG) to serve local ISPs.

In 1997, Thai Government approved the budget of 376 million baht to upgrade the nation’s Academic/Research network ThaiSarn into its third generation. The ThaiSarn III project will expand the current 2Mbps backbone to 155Mbps ATM backbone, with nationwide coverage to support many thousands of schools. Other companion projects are: GITS (Government Information Technology Service Office) and Thailand Software Park.
In 1998, Her Royal Highness Princess Maha Chakri Sirindhorn graciously declared a nationwide access service for the SchoolNet@1509. Thailand began using the special access number 1509. This is a major breakthrough for Thailand's National Information Infrastructure. Secondary schools all over Thailand are permitted to use a local access number 1509 to access the Internet free of charge. NECTEC launched Linux-SIS Version 2.0. SIS, School Internet Server, is a complete Internet server software suite to enable a PC to connect the Internet as a node for schools, universities, small business and any organizations. In 1999, Internet in Thailand has grown up to more than 100 Mbps of international bandwidth, with KSC as the first ISP in Thailand that started a 34Mbps link (simplex, satellite circuit). In 2000, the tremendous growth of the Internet in Thailand concluded: International Bandwidth growth 209%, domestic data volume exchange growth 188% and domestic exchange bandwidth growth 36%.40

The Thai Academic network gradually translated to full TCP/IP in 1992. Boosted by the strong economic growth of the early 1990s, collaboration occurred with the private sector and was augmented by international financial support. The use of Internet in Thailand is now highly valued, especially by the younger generation. Currently, Internet is not only a significant tool for information shared among academics and students, but also a new business opportunity for Thais. The state of academic networking in Thailand has grown significantly.

However, the growth has been considerable with evidence that Internet growth in Thailand is moving towards an exponential path. Recent statistics, taken in September 2003, show an international bandwidth to and from Thailand of 1364.125 Mbps and a total domestic exchange bandwidth of 7985.5 Mbps, enabled by at least the following infrastructure:

- **19 Commercial Internet service providers.**
- **7 Non-commercial internet hubs** (PubNet, SchoolNet, ThaiSarn, UniNet, etc).
- **2 Domestic Internet exchanges** (NECTEC-IIR, CAT-N IX).
- **27 International providers** (Reach, Teleglobe, Hutchison, Intelsat, etc).
- **1 International Internet Gateway.**

With an ICT market growth at more than 15% there are now over six million Internet users with Thai PC brands holding 75% of the market share and selling for less than 20,000 Baht. The PC market has almost doubled since 2000 with 910,000
PCs sold in 2003 compared with 496,000 sold in 2000. Users are becoming more confident in the technology using.

### 3.4.1 Internet Access in Thailand

#### (1) Dialup Modem

Internet Service Providers (ISPs) currently offer both Internet access and an E-mail account for 10 Baht to 40 Baht per hour, and are available throughout Thailand. Thailand’s largest ISPs include Internet Thailand, Internet KSC, Loxinfo, CS Internet, etc. Some ISPs offer packages that provide a certain number of hours per month, while others are on a pay-per-usage deal. All of the bigger ISPs provide domestic roaming and some include international roaming. Internet access requires a good communication infrastructure (eg. digital land telephone lines), which is lacking in some areas in Thailand and not all locations in the country have an adequate supply of phone lines. Each local phone call in Thailand costs 3 Baht.

#### (2) ISDN (Integrated Service Digital Network)

ISDN offers a reliable connection to the Internet at speeds ranging from 64 to 128 Kbps. However, this service is not available in all areas of Thailand and is expensive (a special modem and phone line are needed). Some ISPs provide full time connections at a fixed monthly rate, which is similar in price and functionality to leased lines. Loxinfo has both individual dial-up accounts and permanent connection accounts for corporations. Monthly costs for an office LAN that's connected to the Internet during normal business hours would be about 20,000 Baht for a 64Kbps line, including equipment. Installation and configuration are done by technical professionals only. Loxinfo's service is restricted to some areas in Bangkok, but some ISPs provide ISDN in other urban centres. Contact TOT (Telephone Organization of Thailand) regarding locations where ISDN can be installed and then contact an ISP.

#### (3) Leased Line

Leased lines (permanent reliable connections to Internet) are available in many urban centres of Thailand, which are very expensive (60,000 Baht per month for a 64 Kbps line). In Hong Kong and Singapore, prices for the same line would be around 20,000 Baht. For corporations that need to use the Internet as a backbone for global enterprise communications and for E-Commerce, a leased line is required for reliability and connectivity.
3.4.2 Commercialization and Expansion of Thai Internet

While Internet was expanding rapidly in the educational and research community in the early 1990’s, growing demands in the private sector was unmet. The demand was not met until early 1995 when Thai Internet was commercialized. After six months of feasible study, CAT and the Telephone Organization of Thailand (TOT), both Thai telecommunications, approved a joint venture proposal from NECTEC to commercialize it. In February 1995, Internet Thailand Company Limited was established as a state enterprise joint venture of CAT, TOT and the National Science and Technology Development Agency (NSTDA), an agency under the Ministry of Science, Technology and Environment, with CAT and TOT holding 33 percent each of the total shares and NSTDA 34 percent. Internet Thailand Service Centre (ITSC) received an operating license from CAT and began operating as the first commercial Internet Service Provider (ISP) in March 1995.

3.4.3 Internet Service Provider in Thailand

Thailand has two domestic Internet exchanges (NECTEC’s IIR and CAT’s NIX or National Internet Exchange), one (monopolistic) International Internet gateway run by CAT, four non-commercial Internet hubs (including PubNet, ThaiSarn, SchoolNet and UniNet, all provided by NECTEC), and nineteen operating commercial ISPs in Thailand.

3.4.4 E-Commerce growth in Thailand

The future of E-Commerce in Thailand is bright. Both the government and business sectors are well positioned to experience the benefits of E-Commerce on a significant scale. The Thai government's ICT plan (2000-2010) played an important role in building an environment to facilitate E-Commerce by identifying and developing key building blocks, and enhancing the electronic environment for trade or transactions among businesses. The information infrastructure is becoming more universal and less expensive. Security, privacy protection, and trust are being enhanced so that consumers will have more trust and confidence, which will encourage them to try different products and services in the future.

As present, companies in Thailand still find it difficult to aggressively engage in E-business. The difficulties include the shortage of IT infrastructure and a lack of
confidence in the electronic legal framework and payment system. In order to prepare the country for the digital economy, the Thai government has reformed IT roles, functions and structure. It had formed a new Ministry of Information and Communications Technology (MICT) in 2002. A National IT Policy has been established, which aims to move Thailand towards a knowledge-based economy by 2010. Successful implementation of this policy would bring about vast opportunities for the IT industry in Thailand.

3.4.5 Internet and EDI Infrastructure

According to a survey conducted jointly by the National Statistic Office and NECTEC, there were approximately 3.5 million Internet users in Thailand by mid 2001. Another NECTEC survey at the end of 2001 revealed that more than half of the Internet users are people in the urban areas.

(1) Internet Services Providers (ISPs)

There are 19 commercial Internet service providers (ISPs). Besides constant development of basic infrastructure such as, the size of international and domestic bandwidth, number of access lines, and other network equipment to improve internet connections. ISPs are also focused on providing service in other web-related areas, such as, web hosting, dedicated servers, and co-locations. The medium and large-sized ISPs are aiming more than that. They have diversified their businesses into a new source of revenue such as, portal, on-line shopping mall, application services, e-commerce solutions, especially data centre, a new trend to lure corporate customers.

(2) Public Internet Access to Under-Served Areas

To ensure an equal opportunity to Internet benefits, especially in sub-urban and rural areas, one of several initiatives supported by the government is to provide public Internet terminals for users accessing Internet to surf web sites. The idea is analogous to a public telephone, which contains a telephone booth and a payphone handset. For the public Internet, there is a booth covering a personal computer equipped with a 56K modem and a TOT Corporation Public Co., Ltd., previously known as Telephone Organization of Thailand (TOT) web browser programme (TOT On-line Service) to access to the TOT Internet. Initially, TOT installed 300 public Internet booths in TOT service offices in major areas.
(3) Tambon Net (Internet to All Local District Offices)

The Department of Local Administration (DOLA), Ministry of Interior, launched Internet access points in all Tambons (district, or a group of villages). This Internet service was available for 7,200 Tambons within 2003. These Internet services are used for administrative work within the Ministry of Interior, and is expected to be utilized for e-commerce activities related to another national-wide Government’s policy on economic development at the grass roots level of “One District One Product” project (promoting local community-based products of all districts in the country).

(4) The Communications Authority of Thailand

The Communications Authority of Thailand (CAT), the organization that provides various telecommunications services in Thailand especially, International Telephone, Cellular and Data Communications, has been working on the projects Bill Payment, Shopping Mall and Certification Authority (CA).

(5) Network for Supporting EDI and e-Commerce

TOT Corporation Public Company Limited (TOT) has not fully implemented EDI yet. However, at present TOT is using e-commerce simultaneously with the process of privatization. With TOT powerful resources such as IP Network and ATM Network, which can offer variety of services that can greatly support EDI. TOT Academy, a Human Resource Development Centre of TOT is willing to provide awareness and educational programmes and activities support for fully utilization of EDI.

Conclusion:

This section brings Internet closer to home. In this section, the researcher has outlined the history of Internet from the time of its arrival in Thailand, 1980, but it is noted that its use was limited. Lack of familiarity, particularly among language translators, can be seen as a cause. Since its origin is foreign, no programmes or other software, or manual, existed in Thai until the 1990s. The users were mostly academicians, researchers, engineers and other qualified persons. With increased familiarity of the personal computer, small or medium enterprises especially in Bangkok began to use computers while families bought, mostly games for children of upper primary education age (from the researcher’s own observation).
The researcher has traced Thai Internet use to UNIX based education during that decade (1980s). The first e-mail from Thailand was issued in 1986 but there had to be a local connection to transmit. In the 1990s, nearly ten years later, Thailand Internet Services Centre introduced the first commercial E1 (two million bits per second) connection with the USA, joining Bangkok with the city of Hayward, California. The remainder of this section describes the cause of events in Thailand from access, such as dial-up to leased-line and the commercial use of the Internet. The researcher also included the number and name of Thai Internet Service Provider along with website and inception date. Among commercial applications in Thailand is e-commerce which is now universal and can be seen in India too. Although it is gaining more acceptances in Thailand, infrastructure remains a problem to be solves.

3.5 Basic Internet Services

Internet is physically a network of networks. It connects small computer networks by using a standard or common protocol, i.e. TCP/IP, which allows all different networks worldwide communicating to each other. Consequently, the Internet becomes an electronic media in which network users are communicated. Various services are developed on the Internet network. Important services are as follows:

3.5.1 WWW

WWW (World Wide Web) or WEB is a network of servers that uses hypertext links to find and access files. It offers a different approach to browse the Internet. Users simply read the text provided and select the items they wish to jump to for viewing. A user can follow many different “trails” of information while browsing through the text. WWW client programmes come in several forms, both text-based and graphic-based interfaces. Information stored in WWW can be in multimedia forms. Using an efficient WWW client programme, users are facilitated in searching and managing information from various WWW sites in the Internet. It is the most popular Internet browsing service that uses hypermedia. The service is a mechanism that links together information stored on many computers. In essence, it allows the references in a document on one computer to refer to textual or non-textual
information stored in video image on other computers. Users can browse through it without knowing where the information resides.\textsuperscript{43}

3.5.2 Search Engines

A web search engine is an interactive tool to help people locate information available via the WWW. There are many search engines available on the web. A web search engine provides an interface between the user and the underlying database. The interfaces presents the user with a place to type in a search string, which may be a word, a phase, a date, or some other criteria, and a way to submit the request.\textsuperscript{44}

Promoting a site on the WWW involves getting a web site covered by as many search engines as possible, especially robot search engines. A robot search engine will, once it has the URL of a web site, periodically visit that site and add the contents to its searchable database.\textsuperscript{45} Because the web is so large and growing rapidly, automated search engines have become an essential part of finding information. Without such tools, the task of browsing through pages manually is overwhelming, and the probability of finding the information is extremely small. With help from a search engine, a user can narrow the search to a reasonable set of initial pages.\textsuperscript{46}

Some of the widely used search engines are:

(1) AltaVista (www.altavista.com)
(2) Excite (www.excite.com)
(3) Google (www.google.com)
(4) Hotbot (www.hotbot.com)
(5) Infoseek (www.infoseek.com)
(6) Lycos (www.lycos.com)
(7) Yahoo (www.yahoo.com)

3.5.3 On-line Discussion Services (or Chat)

The on-line discussion services are as following:

(1) Chat service is the real time on-line discussion only between two people. Chat is the easiest way of conversation and saves cost but the user must denote e-mail address of the person whom he/she wants to chat with. The on-line chat has been used throughout the world to exchange views. Nowadays, it is very popular.\textsuperscript{47} Nowadays, multi-person voice chats are coming that allow Internet audio-conferences. Users can
use the Internet to make phone calls by adding the microphone and speaker into computers. If users connect digital video or webcam to computer, their friends can even see them as they talk or type. The Internet Phone service using telephone through Internet is called “Net Meeting”.48

(2) IRC (Internet Relay Chat) service is a group of people who discuss via network by typing messages in response similar to phone call. IRC user chat on-line by typing, either on a one-to-one basis or in groups on IRC channels, which are virtual gathering places where two or more people may chat interactively. The system, nowadays, is developed for easy usage in which some system is developed by displaying graphic or animation to offer more vitality. User can talk (or type) live to other network users from any and all parts of the world. To chat on the Internet, one can use an instant message programme like AOL Instant Messenger, Yahoo Messenger, or Windows Messenger or an Internet Relay Chat (IRC) programme like mIRC.49

3.5.4 Electronic Mail

Electronic Mail, or E-mail in short, allows an Internet user to send a message (in an electronic form) to any Internet users via a computer that is connected to the Internet. The first electronic mail software provided only a basic facility: it allowed a person to use one computer to type a massage and send it across the Internet to a person using another computer.50 The basis of e-mail are sending, reading, replying a message, forwarding mail and sending it to multiple recipients, composing mail massage in word processing programme, sending attachment, saving e-mail address, spell checking, attaching a signature, finding Internet e-mail address, etc.

The process of e-mail is similar to the work in post office but it is automatic only done by network computer. Senders can send e-mails to recipients around the world. An e-mail massage consists of a header, the massage (body), and any attachments. The header contains the original message, the address (of the destination mailbox), a time stamp and routing information. Most E-mail programmes offer convenient utilities for managing in coming and outgoing mail messages. E-mail is a basic service of a computer network. Due to the world-wide connection of computer networks, E-mail service is heavily based on the Internet. E-mail has an advantage on rapidity, paperless and low cost for long distance communication.
3.5.5 FTP (File Transfer Protocol)

File Transfer, a programme called FTP (File Transfer Protocol), provides users to copy any file from one Internet host computer to another. An account name on a host and account’s password is all needed to perform FTP. There exist a public archive from which anybody on the Internet can access through the use of anonymous FTP. FTP is an acronym for ‘file transfer protocol’, which is relatively self-explanatory: it is a technique for transferring files from one computer to another computer on a network. The method used by ftp is to enable a user to connect to another computer, ‘browse’ through its file system and to send or retrieve files to/from that computer. Although ‘connected’ to the remote computer, the ftp user’s capabilities are limited to moving through directories, listing directories and transferring files; for instance it is not possible, to execute a programme on the remote machine. Even so, in the interests of security, ftp normally requires the user to have a valid login name and password for the remote system.  

Although fax and e-mail services are convenient for short communication, an Internet service known as ftp is better for large data transfers. Most users access ftp through a Web browser. When the user supplies a URL that begins with the string ftp:// the web browser becomes an ftp client. The browser can display a list of the files in a folder or can retrieve a specified file.

3.5.6 Telnet

Telnet is a service that allows a user connecting to remote machines via the Internet network. Telnet programme manages an Internet host computer to become a terminal of another host computer on the Internet. A user on a remote machine can thus run the Internet computer programmes that the machine provides. Telnet provides direct access to various Internet services, for example, card catalogue libraries, address and telephone book of a specific individual on the Internet and so on. Users can use telnet to get to services, such as Gopher, line-mode Web servers, and libraries, even if users do not have clients for those servers on users own host system.  

Telnet is an Internet utility which allows user to control and operate on a remote system. Many Internet suites have a telnet application. It is a client-server programme. It usually requires an account and password on the remote host to permit
access. Users can use programmes and resources on other hosts around the Internet. It is a simple activity but allows access to a broad variety of specialized applications and databases around the world in places like the Library of Congress or local public library for research and catalogue information, to the National Weather service for global and local weather maps and reports, etc.\textsuperscript{54}

### 3.5.7 Mailing List or Newsletter

Mailing lists are e-mail based discussion group. There are countless mailing lists, from open discussion to highly moderated. Each mailing list is usually concentrated on a single topic or subject. It can be a regular synopsis of all submitted information or an avalanche of messages. Most mailing lists are handled by standardized mailing list protocols. Each protocol has a set of controls or command words which are used to operate within the list.\textsuperscript{55} The service is LISTSERV which is under control of BITNET network. Service centre keeps only one name list when a member want to send news to others can leave message to service centre who will inform news immediately. It is a way to share information through electronic mail with many people. Users choose to be part of a mailing list by subscribing to the list. Users will receive regular information by e-mails that are automatically delivered by mailing list management software.

### 3.5.8 Usenet Newsgroup

UsenetNewsgroup or NetNews is an electronic bulletin board that supports discussion on topics and information distribution.\textsuperscript{56} Usenet provides a major way to meet people and share information on the Internet. Usenet newsgroups are special groups set up by people who share common interests. Usenet is in fact another global network of computers, but locations in the Internet provide access to a Usenet computer, making Usenet news accessible to most people on the Internet. Users need a special programme call a news reader to retrieve only the desired news from a local Usenet storage site and display it on their computers.

Usenet Newsgroups are made up by computers and people agree to exchange or pass on collections of messages. Each message is called an article and belongs to one or more newsgroups. People can read the articles, ignore, save or print, response to an article’s author through e-mail or post their own articles.\textsuperscript{57} It is a community of
users who never meet face to face but help each other and have a free and fair exchange of opinions. The term Usenet now refers collectively to all sites that participate in the exchange of network news, regardless of the type of network they use.

3.5.9 Games

The Internet provides a treasure house of gaming resources – new game to explore, advanced commercial games, newsgroups and web sites full of useful tips, hints and cheats for favorite games. But the most exiting feature of Internet games is the opportunity to play against another player on-line. User might be playing against a person in another state, country or even a different continent. A type of multi-user game called a MUD (multi-user dimension or multi-user Dungeon) can easily adsorb all working hours or an alarming number of sleeping hours. In a MUD, user can challenge any other players around the world. Lots of multi-user games are available on the web too, including such traditionally addictive games such as bridge, hearts, chess, checkers and go.

3.5.10 Electronic Publisher or, in short, ‘E-Book’ and ‘E-Text’

Electronic publisher is the service contained context and graphic published in press as newspaper, journal and magazine in website in order to offer the user, reading various stories, similar to read a book. They are basically high-tech reading tablets with thousands of paper pages. These are electronic devices and people can download text into e-books from the server and display on the screen. Authors or publishers use this technology for publication of books and their promotion.

3.5.11 Address Book

Address Book is the service of searching name and address of person we want to communicate in Internet. This is one of the features available in mail client programmes. It enables users to store e-mail address and other details of their contacts. The programmes frequently used are Whois and Finges, in which, Whois an address book that the user can search the location of the e-mail address and telephone number including other information related; whereas, Fingers is used to
search the user’s name list or the real name including personal data or status and also is used to check if the user still is available the system or not.

3.5.12 Real Audio

One audio plug-in technology stands out as especially popular. Known as Real Audio, the technology offers a plug-in for most browsers that enable the browser to receive and play audio encoded in the Real Audio format. Real audio is the service is similar to the radio station on the Internet with full audio service since audio server: audio record and play, Real audio and the server as the audio station.

3.5.13 Teleconferences

Teleconferences and videoconferences are multimedia communication systems or programmes real played on network, two-way communication that makes communication more effective.

3.5.14 Data Search

Data search or data file is the service compared with cabinet of list card in library can be searched for author’s name, title, related keyword, etc. Due to Internet, a large system covered various data files to let users search for their works, it is necessary to have system or programme helping users to search easily and quickly.

Conclusion:

This section was meant to elaborate on the basics of the Internet service, including the various reference terms which users frequently come across, e.g. WWW or World Wide Web. The various on-line services available are each discussed in detail for simple understanding. The researcher has devoted sufficient details in length on each term. This section began with the commonest services such as on-line chat and chatroom, search engine, electronic mail which most users are very familiar with; and detail services like File Transfer Protocol (FTP), Telnet and newsletters. The researcher, included also a discussion on games, although games are not considered educational or productive. However, games are at a primary level, which are available to children and families who own a personal computer. The advanced
uses of a Internet such as teleconference or data search have been discussed as well. The researcher has explained the most familiar uses of the Internet.

3.6 Locations in Cyberspace

3.6.1 IP Address (Internet Protocol Address)

Every computer connected to the Internet has an address that can be viewed in two ways. The domain name is the text version of the name. The IP Address is a computer address that the computers on the Internet can deal with directly. An IP Address has four digits separated by periods or dots, such as 158.108.2.71 or 192.150.251.31. The numbers can range from 0 to 255. IP Addresses contain four sets of numbers. These combined parts are unique on the network and allow it to know specifically which computer is to receive which electronic packet as well as from which specific computer the electronic packet came.

The computer or server is known as a host, and the IP Address, which identifies its physical network connection, is known as the host address. The IP address can be difficult to remember and is easy to enter incorrectly, and will not necessarily remain the same if someone needs to recognize his or her networks. The difficult with these addresses is what led to the creation of DNS names, which map IP address to a set of more remembered words. To obtain an IP Address to operate on the Internet, it is necessary to contact the IP address registry managed by the Internet Assigned Numbers Authority (IANA). This authority is part of the Internet Network Information Centre, known as the InterNIC, which operates out of Chantilly, Virginia. The InterNIC operates on behalf of the Internet Activities Board (IAB), which is the governing body of the entire Internet, including IP Address management, TCP/IP protocol and standards.

3.6.2 Domain Name

Domain name is an unique name that identifies an Internet site. Domain names always have two or more parts, separated by dots. The part on the left is the most specific, and the part on the right is the most general. It is possible for a domain name to exist without being connected to an actual machine. This is often done so that a group or business can have an Internet e-mail address without having to establish a
real Internet site. The names of the domains describes the organizational or geographic realities. They indicate what country the network connection is in and what kind of organization owns it. In the complete (fully qualified) domain name, the part furthest to the right is the top-level domain, representing either a type of organization or a country. As users read the information from the right, the name gets more specific until user reach the name of the individual host computer. For example: pyo.nu.ac.th is the name of a computer. It is in Thailand (the geographically based domain is th), in the academic area (ac), at Naresuan University (nu), and the host computer is named Phayao Campus (pyo).

The Internet Engineering Task Force (IETF) designed an address system. This addressing scheme assigns names and numbers to identify the computer on the Internet. The Internet uses the numeric IP address to send data. For example, user may be connecting to the WWW server with the domain name “www.unipune.ernet.in” but as far as the network is concerned, users are connecting to the web server with the IP address associated with that domain name. The Domain Name System (DNS) completes the task of matching domain names to IP addresses. Domain Names, and their corresponding IP address, must be unique. DNS is a collection of databases that contain information about domain names and their corresponding IP addresses. DNS servers are computers that translate domain names to IP addresses. This system allows Internet users to deal with the more intuitive domain names, rather than having to remember a series of numbers.

**Examples for geographical domains**

<table>
<thead>
<tr>
<th>Code</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>at</td>
<td>Austria</td>
</tr>
<tr>
<td>au</td>
<td>Australia</td>
</tr>
<tr>
<td>be</td>
<td>Belgium</td>
</tr>
<tr>
<td>ca</td>
<td>Canada</td>
</tr>
<tr>
<td>ch</td>
<td>Switzerland (Confederatio Helvetica)</td>
</tr>
<tr>
<td>cn</td>
<td>China</td>
</tr>
<tr>
<td>de</td>
<td>Germany (Deutschland)</td>
</tr>
<tr>
<td>dk</td>
<td>Denmark</td>
</tr>
<tr>
<td>es</td>
<td>Spain (Espana)</td>
</tr>
<tr>
<td>fr</td>
<td>France</td>
</tr>
<tr>
<td>gr</td>
<td>Greece</td>
</tr>
<tr>
<td>ie</td>
<td>Republic of Ireland</td>
</tr>
<tr>
<td>in</td>
<td>India</td>
</tr>
<tr>
<td>it</td>
<td>Italy</td>
</tr>
<tr>
<td>jp</td>
<td>Japan</td>
</tr>
<tr>
<td>nz</td>
<td>New Zealand</td>
</tr>
<tr>
<td>th</td>
<td>Thailand</td>
</tr>
<tr>
<td>uk</td>
<td>United Kingdom</td>
</tr>
</tbody>
</table>
Organizational sub domains

<table>
<thead>
<tr>
<th>Code</th>
<th>Prefix</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>com</td>
<td>Commercial</td>
<td></td>
</tr>
<tr>
<td>go</td>
<td>Government</td>
<td></td>
</tr>
<tr>
<td>net</td>
<td>Networking</td>
<td></td>
</tr>
<tr>
<td>edu</td>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>mil</td>
<td>Military</td>
<td></td>
</tr>
<tr>
<td>org</td>
<td>Non-commercial organization</td>
<td></td>
</tr>
</tbody>
</table>

Organizational sub domains in Thailand

<table>
<thead>
<tr>
<th>Code</th>
<th>Prefix</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>ac</td>
<td>Academic</td>
<td></td>
</tr>
<tr>
<td>co</td>
<td>Commercial</td>
<td></td>
</tr>
<tr>
<td>go</td>
<td>Government</td>
<td></td>
</tr>
<tr>
<td>net</td>
<td>Networking</td>
<td></td>
</tr>
<tr>
<td>or</td>
<td>Non-commercial organization</td>
<td></td>
</tr>
</tbody>
</table>

New organizational sub domains in 1997 and 2001

<table>
<thead>
<tr>
<th>Code</th>
<th>Prefix</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>arts</td>
<td>Cultural and entertainment activities</td>
<td></td>
</tr>
<tr>
<td>firm</td>
<td>Firm and business</td>
<td></td>
</tr>
<tr>
<td>info</td>
<td>Information service provider</td>
<td></td>
</tr>
<tr>
<td>nom</td>
<td>Individual</td>
<td></td>
</tr>
<tr>
<td>rec</td>
<td>Recreational activities</td>
<td></td>
</tr>
<tr>
<td>store</td>
<td>Business offering good for purchase</td>
<td></td>
</tr>
<tr>
<td>web</td>
<td>Web activities</td>
<td></td>
</tr>
</tbody>
</table>

3.6.3 E-Mail Address

Mailbox address used to send e-mail across the Internet, consisting of a text string separated into two parts by an ‘at’ sign (@). The prefix of the address specifies a particular user; the suffix gives the domain name of the computer on which the user’s mailbox resides.\(^{68}\)

Form of an e-mail address: \textit{username@domain name}

Example of an e-mail address: \textit{pornpans@pyo.nu.ac.th}

This is the e-mail address for user Pornpans, on the server called pyo. This server is the organizational sub-domain nu of network ac. This organization is located in the national domain th (Thailand).

Anyone on the Internet can send mail without knowing where the computer is physically located, and what kind of computer it is. All account names are different and all names on each level of the domain tree are unique.\(^{69}\) Users mailbox usually lives on their ISP’s mail server, because when the users sign up for an Internet account, users usually get mailboxes as part of the deal. But if user do not have an
ISP, there are many web sites which provide free mailboxes such as hotmail, yahoo mail, 123India, rediffmail, lemonon-line, indiainfo, etc.

**Conclusion:**

In section six of this chapter, the researcher discussed about cyberspace locations which are basically in two forms or viewed in two ways: domain name - the textual form and Internet Protocol (IP) - address used by the computer on the Internet directly. Domain names are used by users of the Internet in contrast to this. In the beginning of this section, the researcher has defined “domain name” for the initiated reader and listed various domains clearly. Following domain name is the electronic mail address. It works more like the postal address to direct the mail over the Internet. These three forms of address are commonly used but e-mail address are easily the commonest and simplest to use. The researcher has described each type clearly for the reader to understand.

3.7 **Internet Connections**

There are many types of connections to the Internet consist of: through the local area networks, dial-up Internet accounts, dedicated Internet accounts, cable television networks and wireless methods.\(^{70}\)

3.7.1 **Through Local Area Networks**

This connection is common in big organization, where there are a large number of departments. Here computers are connected to each other to form a network. This network is connected to the Internet.

3.7.2 **Through Dial-Up Internet Account**

This is the simplest and the most widely used method of getting connected to the Internet. This type of connection is suitable for single users. Internet Service Providers (ISPs) are provided by dial-up Internet connections. In this the computers are connected to the Internet and is obtained by dialing the given telephone number using the modem fitted to the computer. Once the connection is established, the users
log into the Internet with their user name and the password. The server computer verifies these details before giving permission to login to the Internet.

3.7.3 Through Dedicated Internet Accounts
This type of Internet account is very expensive. Large organizations and governmental agencies mainly use this type of account, as they require transferring a lot of data and files through the Internet regularly. It is also known as IP account. The user is allotted to a separate IP account and it is through this account that the connection is made. This is always connected dialing is not always needed to get connected to the Internet.

3.7.4 Through Cable Television Networks
Users can use either television sets or computers to access the Internet. To access the Internet through computers, the computer must be connected to a special modems called cable modems which may simultaneously be connected to the television. The incoming cable of the television network is split into two. One is connected to the television and the other is connected to the computer using the cable modem. It is expensive and has less speed.

3.7.5 Through ISDN Lines
ISDN or Integrated Service Digital Network, is a powerful tool for providing different services such as data, voice and image transmission over telephone lines. It is very fast with a connection speed of 128 Kbps so it is ideal for small and medium business organizations. High quality video and data can also be transmitted over this line at a quick pace. Also video conferencing can be conducted.

3.7.6 Through On-line Services
It is possible to get Internet connection without ISPs, through on-line services such as America On-line, CompuServe, Prodigy or MSN. The service provides a variety of interactive features, including e-mail, news, sports, weather and e-shopping. Each on-line service is responsible for the way this process is handled. The main drawback in on-line service is that the dial-up telephone number provided may not be a local call.

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3.7.7 Digital Subscriber Lines and Satellites

Digital Subscriber Line or DSL uses the existing telephone lines to access the Internet. This is a permanent connection and there is no need for dialing every time to connect to the Internet. The main drawback is that the user must be within a certain distance from the telephone exchange to make use of this service. When high bandwidths are required, satellite connection is used. The use of satellites helps to overcome the limitations in landline networks.

3.7.8 Wireless Method of Accessing the Internet

It is possible to get connected to the Internet using cellular phones, pagers or Personal Digital Assistants (PDAs). The technology used is called Wireless Application Protocol or WAP, in short. This accessing method is cheaper as no cabling is required. It is predicted that in future, the number of wireless connections will far exceed the number of fixed line connections. As wireless terminals become more affordable, more and more people opt for the wireless method of accessing the Internet. This helps to access Internet through mobile devices and as a result, people can access Internet from anywhere and anytime.

Conclusion:

The different connections to the Internet changed and expanded as it developed, however the commonest and most frequent access and connection is LAN (Local Area Network). LAN is frequently viewed during when new member signs-up, message transmission outside an account through other server and so on.

Dial-up accounts are the second type and are more common among private users and home stations and cyber café. A modem, which is fixed to a telephone cable, is required. A proper standard cable such as a common table phone is better and provides faster service. Other types of account or connection are given attention but are less frequently used or requires special external connection to perform. Henceforth, the LAN and dial-up remain the simplest and most accessible connection for most users.
3.8 Internet Resources Requirements

To get proper internet connection: hardware, software and Internet Service Provider (ISP) is required.

3.8.1 Hardware: Computer, Line, and Modem

Computer: Internet can be accessed using almost all types of computers (personal computer, macintosh, workstation, mini computer and mainframe computer) and all operating systems (UNIX, Windows). Telephone line: Leased line is that phone line connection which has been hired for a particular use. It is used for communication from one computer or network to another or for regular Internet services. It is a dedicated connection between ISP computer procedure and the user’s computer. The user does not need its ISP, instead they are permanently connected with their ISP. For lease line connection, initially a high payment and a monthly payment is required to be paid. Normally a single person or a small businessman cannot bear the expenses of direct leased line connections. [71]

Modem: A device used to transmit digital data to a long distance across an analog transmission path. The part can consist of a long wire or a connection through the dial-up telephone system. Modems are used in pair – one modem attaches to each end of the connection. The modem contains a modulator (use to send data) and a demodulator (used to receive data). [72]

3.8.2 Software: Operating System, Communication Programme, and Applications

Operating system: Almost all computers that provide Internet services work on UNIX system. Unix is a family of operating systems which can work in any type of computers. This is a multi-user and multi-tasking system. Since it is widely used for Internet, many of the conventions followed in the Internet world are based on this system. [73] A number of application programmes for use in the Internet have become a part of operating systems. Majority of utilities is working on Windows platform or on Macintosh system. Therefore for PCs, the operating systems must be at least Window 95 or higher versions; and for Mac systems, the operating system must be at least Mac OS system 7.5.
Browsers: Users primarily access the web through software applications called browsers. At a minimum, a browser is capable of communicating via HTTP, managing HTML, and displaying certain data types, such as GIF and JPEG for graphics and Microsoft Windows WAV for sound. There are many browsers available for free on the Internet. However, the two most popular browsers are Internet Explorer, created by Microsoft and Netscape, created by Netscape Communications.

Communication Software: It is commonly used in combination with a modem. The software offers a way to give commands to the modem, to dial the other computer's modem and to issue commands and receive responses from the remote computer. There are many packages available. They fall into two categories: terminal and TCP/IP-based. The kinds of software depend upon how users want to use their computers and the services available from their service provider. Communication software is available from commercial sources and from the public domain archives.

3.8.3 Internet Services Providers (ISPs)

Users can access Internet directly from their home or office computers through normal telephone lines via an ISP. It can refer to any company that provides Internet services or it can refer to Internet access provider. The ISP generally charges a flat rate per month which covers a minimum "connect-time", a per-time rate, which is charged once the minimum connect time is used. The ISP sells a method of getting computer connected to the rest of the Internet. These companies have computers that are permanently open. When the user wants to get connected to the Internet, they call their computer on a special telephone number and connect to the Internet through their permanent telephone line. The ISP can make the dial-up services, DSL, leased lines or the Internet available through cable connections.

Conclusion:

Quite summarily, an Internet user needs to be aware as well as in procession of various types of hardware and software prior to accessing the Internet. The researcher has devoted the aforesaid section to introducing each unit for the reader. Concerning hardware, there are chiefly three items. Obviously a personal computer of any
workable type is foremost, followed by a telephone line and a modem. A standard telephone line and phone connection are the most confident.

Software consists of OS (Operating System) such as UNIX, DOS, Window, etc. a communications programme and various applications. Currently, Internet serving computers work on UNIX system. Windows (Microsoft) is also common. Beside this, a browser is required. The researcher described the most important browser data briefly in this section. Finally, a service provider (ISP) is attached to a telephone line and has a standard flat rate for monthly access. It is usually a small firm supplying the Internet services. These are the principle requirements for Internet access.

3.9 Usefulness of Internet

In the present era of information technology, Internet is the most useful media in finding the information on any imaginative subject as following:

3.9.1 Communication

The biggest advantage of Internet is convenient to communicate through e-mail. In comparison to other forms of telecommunication, e-mail travels much more quickly than traditional paper mail (conventional mail, fax, telex, telegram, etc.) It is also relatively cheap. Moreover, for people with microphones or video cameras plugged into their computers, there are all kinds of new variations on the IRC model for multimedia communication, including Internet Phone (for voice) and CU-SeeMe (for video). It is very fast, convenient and cheap for user to communicate through Internet.

3.9.2 Education

Internet as a tool can support students' learning by eliminating the barriers to access information. With Internet and good teacher, students can locate information and communicate with others, allowing them to connect with relevant real world resources. One strength of the Internet is its timeliness. Internet surpasses most other media in its ability to bring current information into classroom. Any curriculum that relies upon news of current events, government actions and policies, environmental or
scientific developments will find riches on the Internet. One big difference between reading the news in a periodical and going to eyewitness accounts on the Internet is that instead of the news coming to them they go right to the source. In the classroom, students generally spend less than a quarter of their time actually using the Internet but the wealth of information and the contact with the real world cannot be replaced.

Internet is also able to be a resource for new roles of syllabus, materials and activities. Teachers plan their lessons by adopting or adapting or using applications on the Internet as resources or ready materials for their lessons. Teachers may use web sites as models for creating their own class web page. There are some principles for designing a web page course presentation as follows:

- Be clear to ensure readability
- Be brief for ease of message interpretation
- Establish the right tone for the intended audience
- Increase active engagement
- Use journalist tricks of the trade
- Arrange a trail of words or icons to focus attention on important areas.

Content and details of the course including teacher contact should be provided. Details of general content contained in a class web page for teaching can be studied from numerous teaching on-line websites. There are some important topics teachers should not forget to put in their class web pages. These include course guidelines, tutorials, practice, supplementary materials and self-test or tasks for students to evaluate their progression. Class web boards, chat lines, course listserves or student conference centre should be provided to help promote interaction through communication. Links to other web sites and on-line libraries should be included in the class web page as well.

Frequent participation of teachers is also another crucial factor to make use of the Internet to help develop learning and teaching. McCabe suggests teachers log on to the Internet daily and spend one to two hours reading students’ comments, responding to them, checking assignments and reviewing course work. He presented guidelines for teachers to use the Internet in the classroom as a curriculum supplement to make when they have free time from their workload. Teachers need to organize the use of the Internet on a regular basis to be most effective.
3.9.3 Entertainment

Users can play all kinds of active games, and can discuss about sport, hobby, movie, music, etc. They can enter virtual realities and get three-dimensional and meet people from all over the globe. They can check the show time of cinema and even buy tickets on-line. Moreover, there are plenty of free movies and song available on-line.

3.9.4 Commerce

Internet can be a useful addition to many existing traditional businesses. Internet primarily provides an additional vehicle to communicate with customers. Internet can also be used to improve the competitiveness of an existing business by streamlining the flow of information within the business. Some companies use the Internet for on-line ordering and delivery direct to the customers. It includes direct sale also. Internet can be used for on-line advertising and marketing to promote the sales of good and services.

Conclusion:

Section nine has been written to enumerate the principle uses of the Internet in any society. These uses range from business and data searching to education and entertainment. Communication is mostly through electronic mail. As mentioned earlier, e-mail is obviously faster and cheaper than ordinary postal services and there is no stamp fee either. As Internet can provide the user with educational service, subsection two outlines the advantages of Internet in this respect. But faculty need to take an active role. The second most obvious advantage of the Internet is entertainment, as it includes games, discussion panels and on-line chat about many subjects, polls, etc. Altogether, the wide varieties of uses of the Internet have made it the most popular medium of the times.

3.10 The World Wide Web (WWW)

The World Wide Web (also called WWW or W3 or simply the Web) is the name given to a large collection of information, pictures and other data, which can be accessed through the Internet. It is the most active and the fastest growing part of the Internet. The Web is commonly known as a set of protocols that give Internet users
interactive access to a huge variety of content on the Internet. The WWW was initially conceived at CERN, the famous particle physics laboratory at Switzerland. In early 1980s, Tim Berners-Lee, a scientist at CERN was working in the area of linked data. In 1989 he associated with Robert Cailiau on a project to access information through computer networks. Lee described the network links as Web. The name began to be accepted, and in May 1991 the WWW was released for use at CERN. In 1992 programmes were developed to access the Web and it was made available to the public. Gradually the Web became complex.

The WWW is a graphical Internet service that provides a network of interactive documents and the software to access them. It is based on documents called pages that combine text, pictures, forms, sound, animation and hypertext link called hyperlinks. To navigate the WWW, use “surf” from one page to another by pointing and clicking on the hyperlinks in text or graphics.\(^8^0\) The Web is based on a standard hypertext language called Hypertext Markup Language (HTML), which formats documents and incorporates dynamic hypertext links to other documents stored on the same or different computers. HTML was derived from the more complex Standard Generalized Markup Language (SGML), a text-base language for describing the content and structure of digital documents. HTML is a simpler subset of SGML and incorporates tables, applets, text flow around images, superscripts and subscripts. Using these hypertext links (which are typically blue, bold and underline) the users points at a highlighted word, clicks on it, and is transported to another document. Users are able to navigate around the Web freely with no restrictions, following their own logic, needs or interest.\(^8^1\)

A file in HTML format is available for retrieval by a browser on a WWW server is known as a page. A document may contain in one page or consist of a number of linked pages. The collection of pages stored on a particular server is known as a site (or Web site).\(^8^2\) While a homepage is a text and graphical screen display that usually welcomes the user and explains the organization that has established the page. In most case, the homepage will lead users to other pages. Most Web pages provide a way to contact the organization’s Web site called a Webmaster. WWW is based on client/server architecture. Web client programmes are called browsers. In the beginning, browsers were text-based and were difficult to use. So the web could not become popular. Later graphic-based browsers were developed. These were simple
and easy to use and the Web began to grow and get popular. The WWW divides its functionality into two classes of software, servers and clients, although WWW clients are more commonly known as browsers.

### 3.10.1 Browser

The communication software speaks the language of the Internet, making it possible for the computer to communicate with other computers. The application software handles all interaction with the user. When the user makes a request for information, the application software uses the Internet to access the requested information, and then displays the results on the screen for the user to see. An application programme used to access the WWW is known as a Web browser, and someone who uses such a programme is said to be browsing the Web. The browser is the programme that essentially does two things. Firstly, it is the software which enables the user to commute to different web sites throughout the world. Secondly, it displays the pages of information from the web sites. Earlier browsers were text-based programmes but now absolute. Text-based browsers work faster than graphical-based ones and load files faster since they do not load pictures. Lynx is an example of a text-based browser and was developed in 1992.

The first graphical-based browser is the Mosaic programme released in 1993 by the researchers at the National Centre for Supercomputing Applications at the University of Illinois. It was designed for Unix System. The Mosaic browser provided a graphical front end that enabled users to point-and-click their way across the web and that process is called surfing. Web browser became a means of universal access because they deliver the same interface on any operating system. There are more than 30 browsers available for searching the Internet, the two main browsers being Netscape’s Navigator and Microsoft Internet Explorer. More recently, some alternate browsers have begun to make their presence felt – Opera.

### 3.10.2 Microsoft Internet Explorer – IE

In 1995, Microsoft released the Internet Explorer, a web browser that designed for Windows95. Internet Explorer is an easy Internet browser to set up and use with the Windows95 operating system, and it supports all major WWW Standards. Nowadays, it is faced with a tremendous lead in the browser marketplace. Microsoft
gave Internet Explorer away for free and bundled it with the Windows operating systems. Microsoft maintained Internet Explorer was an enhancement of Windows (not separate). This approach was successful. It has five functions:

1. Internet Explorer: It is a programme for access to the Web. It has a variety of features, including the ability to customize searching; rating system for sites, multilanguage support; communication functions and multimedia capabilities.

2. Outlook Express: It is the application used as the mail client or the news client. This programme helps users to exchange e-mail as well as join newsgroups. The capability of the software makes it easier to keep personal mails separate from official mails and also communications between users. It helps to download messages or newsgroups or headers.

3. Front-Page Express: It is easy to use this application for the creation of Web page. This User-interface is similar to that of the Microsoft Word. The screen is made up of menu bar, tool bar, status bar and contains buttons and drop down lists. Contents can be entered on the page as in the Word application and can do format.

4. Microsoft Chat: It is an on-line interactive communication mechanism that lets people to make a real time discussion with one or more people through the Internet. Previously, chatting was purely text-based. As the technology improved, now it has multimedia chat. It is possible to have a live conversation through the Internet using Web cameras and audio equipment.

5. Microsoft NetMeeting: It is a programme that allows people to make on-line conversation with others through the Internet. This helps people to see others taking part in the meeting, talk to them and also to hear what they are saying. The user's computer must have multimedia facilities to hear others talk and take part in the meeting.

3.10.3 Netscape Navigator – Netscape

Netscape exploded onto the scene early in 1995. It was designed by some of the folks who did the early work on the Mosaic browser, but they wanted to improve on that design to create a successful business built around their ideas. Netscape is a full-featured, forms-capable browser, and many users like the way it handles inline graphics and other media. Some of the features currently offered by Netscape include:
(1) ability to bookmark, including the ability to hierarchically arrange bookmarks through the use of headers;
(2) support for sound formats;
(3) ability to access video formats;
(4) Virtual Reality Modeling Language (VRML) viewer that allows users to run three-dimensional applications
(5) integrated e-mail access;
(6) directs access to newsgroup;
(7) CoolTalk, an Internet telephone tool;
(8) supports FTP uploads and downloads;
(9) supports a variety of graphics, including JPEG (a format for compressing colour or gray scale digital images) and GIF (a standard for compressing digitized images);
(10) support for Java applets (programmes written in the Java programming language which can be distributed as an attachment to a Web document) and programme on a number of platforms.85

3.10.4 Opera
Opera demands for smaller hard disk space and memory. It is less than half the size of a typical installation of Navigator or Internet Explorer. Built by a Norwegian Company, it is shareware for a trial period of a month after which a small fee is required. It is limited in many ways but its special features include ability to:
(1) open multiple windows without running out of memory;
(2) open documents in the background without destroying the search engine result listing;
(3) redirect the output from one window to another;
(4) undertake secure on-line ordering of goods and services, on-line banking;
(5) navigate entirely with the keyboard; and
(6) be customizable.86
Conclusion:

In this section, the researcher has outlined the history and the principle parts of the World Wide Web, or as most users know it as “WWW”. Following a brief introduction, researcher discussed each principle aspect, such as the browser software like Internet Explore, Netscape Navigator, Outlook Express for e-mail, and so on. Other highlights were given equal attention, like Net meeting and Chat. The World Wide Web which is also called WWW or W3 or simply the Web is the most active and the fastest growing part of the Internet. The web was made available to the public in 1992 when a programme was developed to access the web. The web is based on a standard hypertext language called Hypertext Markup Language (HTML). A file in HTML format available for retrieval by a browser on a WWW server is known as a page. Most web pages provide a way to contact the organization’s web site which is called webmaster. The WWW divides its function into two classes of software, server and client, although WWW clients are more commonly known as browsers.

An application programme used to access the WWW is known as a web browser. There are more than 30 browser available for searching the Internet, the two main browsers being Netscape Navigator and Microsoft Internet Explorer. Opera has begun recently. The Microsoft Internet Explorer has five functions: Internet Explorer, Outlook Express, FrontPage Express, Microsoft chat and Microsoft NetMeeting. The Netscape Navigator – Netscape is a full featured, forum – capable browser, and many users like the way it handles in line graphics and other media. Opera is less than half the size of a typical installation of Navigator and Internet Explorer. It is limited in many ways being new but it has special features of ability.

3.11 Search Engines

There are four generations of information retrieval tools that assist people in searching the WWW. The first generation was designed for use with bibliographic databases. It provided access to references to end documents rather than the documents themselves. These tools require considerable human effort to collect, arrange, code and annotate the various resources. The second generation of tools attempts to collect and index resources as an automated function. It reduces the amount of human effort. The third generation deals with WWW meta-search engines.
The fourth generation involves new ideas such as search agent technology currently being developed to search information on the web. Internet is changing daily, which means, no one can provide an absolutely accurate list of sites and resources available. Internet does not have a uniform way of tracking and indexing information unlike a library for searching the information. The good news is that the Internet itself provides tools for finding new resources or locating old ones. Search engines help users locate information by keywords or subjects which are freely available to Internet.

A search engine is a computer software that searches a collection of electronic materials to retrieve citations, documents, or information that match or answer a user’s query. The retrieved materials may be text documents, facts that have been extracted from text, images or sounds. A query is a question phrased so that it can be interpreted properly by a search engine. Depending on the type of software, it may be a collection of commands, a statement in either full or partial sentences, one or more keywords, or in the case of context searching, an image or sequence of sounds to be matched. Search engines behave like the search utility in a typical desktop productivity tool. Most search engines support Boolean queries through an interface that is built around a GUI form.

To enable users to find suitable content on remote sites, two generic types of search service have evolved for WWW. The first use helps individuals to keep track of pages on web sites. They do this by creating browsable subject-based directories of links to pages. The second type uses robot indexing software to create a searchable database of text extracted from pages at many sites. Search engines select pages for inclusion in their databases in two primary ways: Web crawlers and registrations. Web crawlers traverse the web automatically, collecting index data on one of the two search principles: depth first, which follows only the links that are deemed relevant to a topic, or breadth first, which collects the entire network of links from a given starting point regardless of the page contents. Web crawlers are called in various names such as spiders, ants, robots, bots and agents.

Registration is allowed by most search sites. Web developers can register their sites or pages by submitting a form. This process enables developers to ensure that their sites eventually will be included in the search index. When a user enters a search query, the engine searches its databases for relevant web pages. It assembles a
list of pages sorted by relevant or other user-specified weighting factors. Some sites also remove redundant references to pages from the list. Search results are returned as a list of relevant pages that then can be retrieved via hyperlinks.

Web search engines have two components: collection and search. The collection part roams the Internet, primarily visiting Web sites and file servers. It brings back the resources, indexes the materials it brought back and creates a database. The search component is concerned with the provision of information to the end user and the indexed database of resources. There is no standard keyword categories approach; the challenge for the researchers is to determine which keywords should be used in order to find the proper sites. There are many different kinds of search engines, including the following:

1. Some search engines accept phrases and logical AND OR combinations or look in the web site address (URL) for such things as search words.
2. Some will search with the keyword and the context (e.g., Windows as referred to house window or Microsoft Windows).
3. Search engines of more complexity are arriving. For example, WebCompass (www.quarterback.com) purports to use language processing technology to better classify data into logical categories. In addition, it can perform this task automatically at given intervals to continuously monitor the Internet for specific topics.
4. Some search engines will submit the search parameters to many search engines and rank the results.
5. Meta-engines will search not only Web sites but Usenet and published content sites also.92

Among the various strategies that are currently used for Web search, four important ones are: Web search tools, subject directories, Meta-search engines and directories of subject guide.

3.11.1 Web Search Tools

Search tools have emerged on the Internet, which attempt to index the universe of Web-based information. There are several web search tools today. They have two components; the index engine and search engine. They automate the indexing process by using spider programme (software robots), which periodically
visits the web sites around world, gather and index these web pages and builds databases of information from these pages.

**Example of Web Search Tools**
- AltaVista (www.altavista.digital.com)
- HotBot (www.hotbot.com)
- InfoSeek Guide (www.infoseek.com)
- Lycos (www.lycos.com)

### 3.11.2 Subject Directories

Internet resource directories, which are also called as “meta sources”, “virtual libraries” and “resource guide”, catalogue Internet resources, organize these into hierarchical subject groups and sub-groups and provide hypertext links to individual sites. Many directories categorize these resources both by subject and resources type. Many of these use human experts in sources selection, indexing and classification. Some include reviews and/or rating of the individual sites listed in the directory. They are excellent as starting points for resource identification and navigation. Subject or resource-specific directories are usually maintained by science and engineering societies and organizations, department of libraries in universities and research institutes.

**Example of Web Directory**
- Google (www.google.com)
- Yahoo (www.yahoo.com)
- Magellan (www.mckinley.com)
- WWW Virtue Library (www.vlib.org)
- Galexey (galaxy.einet.net)

### 3.11.3 Meta Search Engines

They provide a uniform interface, where a query can be conducted in several search engines and directories. They do not have their own databases; they do not collect web pages, accept URL additions or classify or review web sites. Instead, they send queries simultaneously. There are now several meta search engines. They differ in the number of search engines used simultaneously. There are variations in weather they allow only simple searches or permit the use of Boolean operators. Many meta-
search engines integrate search results, eliminate duplications, and rank the result through their own criteria. They are not designed for exhaustive searches. Most of them only make use of the top ten to 100 hits from each of the search engines they contact. The Internet users should use meta-search engines when they are looking for a particular resource or a specific answer to a question.  

**Example of Web Meta-Search**

- Dogpile (www.dogpile.com)
- Meta Crawler (www.metacrawler.com)
- MetaFind (www.metafind.com)
- SavvySearch (www.cs.colostate.edu/~dreiling/smartfom.html)
- Sleuth (www.isleuth.com)

### 3.11.4 Directories of Subject Guide

They collect only special subjects or special topics. They were developed by subject specialists in each subject. It is useful for searching academic information.

**Example of Web Directories of Subject Guide**

- Achoo-Health On-line (www.achoo.com)
- MedHunt (www.hon.ch/MedHunt)
- FindLaw (http://findlaw.com)
- ILRG (The Internet Legal Research Guide) (www.ilrg.com)
- SciSeek: Science and Nature Resources (www.sciseek.com)
- Score Scour (www.scour.net)
- Deja News (www.dejanews.com)
- SearchEdu (www.searchedu.com)

### 3.11.5 Web search Strategies

Several practical hints have been developed by experienced searchers for effective web search. Following are few important and useful ones:

1. For broad or general concept searches start with the directory-based services so that it can see the range of what’s available and take advantage of subject heading structure to move towards more relevant document.
(2) For highly specific or obscure topics, use the search tools. Often it can take a long time to figure out where in a subject hierarchy a particular term belongs, a large keyword searchable database can come in on the term quickly.

(3) Look for a help page — search tools handle combining terms and search for phrases in different ways; the help page will describe the correct way to start search from that search tool.

(4) Have sufficient information on the search topic before starting the search and should be aware of the spelling variations, synonyms, broader and narrower terms that can be used in the search.

(5) Select the search tool with a large database, to start with.

(6) Use specific keywords. Rare or unusual words are better than common ones.

(7) Use many synonyms to describe the question — statistical retrieval technique used by search tools produce better and relevancy ranking if they work with more query words.

(8) Avoid using very common words like “computer” they will retrieve too many hits.

(9) Enter the search terms in lower case. If user wants to force exact match then use upper case letters.

(10) Use “More like this” queries. Many search tools offer this feature. This is, query be example (QBE), searching and a variation on using a lot of words in the query. Rather than user selecting all possible terms, let the system use the document terminology to expand the query.

(11) Many top-ranking documents will not be relevant. Before giving up scan through at least 5 pages of search results.

(12) Avoid getting side tracked while viewing the search results.

(13) Bookmark the useful documents and list of links.

(14) Select two or three search tools and master the search techniques.96

(15) Use Boolean operators

(15.1) AND: The document found in the search must contain all words that are connected with AND operator.

(15.2) OR: The document found in the search must contain at least one of the words that is linked with OR operator.
(15.3) NOT: The document found in the search must not contain the word after ‘NOT’ operator.

(15.4) NEAR: The document found in the search must contain the words, that are connected with the NEAR operator within a specified number of words (maximum ten in number).

(16) Use plus (+) and minus (-) mark

(16.1) Plus (+): Typing a plus (+) mark immediately in front of word (do not give space between word and + mark) means that all the searched documents must have that word.

(16.2) Minus (-): Placing a minus (-) mark immediately against that word, that is not required in web searches. It means that this word will not be available in the search documents.

(17) Use Wildcard and asterisk for searching similar words. For example: to search mon*, it may be the word of Monday, monkey, money…. , etc.

(18) Use the bracket symbol ( ) for separating groups of words e.g. (animal +tiger) +lion.

(19) Use the speech marks (“ ”) for combining words or phrases. For example, “Local Area Network” it means a user wants to knows about the Local Area Network, otherwise, the user will find only particular words such as Local, Area or Network which do not concern the topic.

(20) Limited scope of searching to get exact information that a user wants to know. For example, scope by area, year and so on.

Conclusion:

In Chapter III, the researcher discussed in detail about the search engine, such as google.com which is an important and necessary tool for data search. Quite simply, the user gains access by typing www.google.com or other name on the search line. Then they may press ‘enter’ and the web locates the engine. The Internet does not have a uniform way of tracking and indexing information unlike a library for searching the information but it provides tools for finding new resources or locating old ones and this is done with the help of search engines using keywords or subject, which are freely available. It behaves like the search utility in a typical desktop productivity tool. It also enables users to find suitable content on remote sites, two
generic types of search services have evolved for WWW. The first uses individuals to keep track of pages on web sites. The second type uses robot indexing software.

There are two primary ways the search engines select pages for inclusion in their databases: Web crawlers, which travel the web automatically. It is also called spiders, ants, robots and agents. Then we take the registration which is allowed by most search sites. The web search engines have two components: collections and search. Among the various strategies that are currently used for web searching, four important ones are: web search tools, subject directories, meta-search engines and directories of subject guide. There are many varieties and each of them has their own functions.

3.12 The Internet and Education

It is an exciting time in education. Because of new technologies, the world is becoming smaller. The Internet offers new opportunities for students and teachers and a link to learn in interesting ways. This technology needs to be integrated into daily lives for students in order for them to be prepared to keep pace with the society. It is a vast computer-based network of networks that includes list servers and newsgroups – discussion forums on specific topics – as well as electronic mails and electronic journals. It is used in education and students must be asked to navigate it to become prepared citizens.

3.12.1 Information and Communication Technology (ICT)

The Information and Communication Technology (ICT) provides students with a broad perspective on the nature of technology, how to use and apply a variety of technologies, and the impact of Information and Communication Technologies on themselves and on the society. Technology is part of every student’s basic education. It’s vital that learners are able to gain high-tech skills and knowledge for the future. No technology has ever had a greater influence on philosophy than modern Information and Communication Technology. This technology has profoundly altered the ways in which philosophers carry out their daily work. Philosophers use computer to write their papers and books, they use e-mail to keep in contact with their colleagues, they use the Intranet to borrow books from the university library and to
consult invaluable resources such as the Philosophers Index. Moreover, they have not
lagged behind the rest of the educated world in discovering the WWW as a rich
sources of information.

Information and Communication Technology (ICT) prepares students to
participate in a rapidly changing world in which work and other activities are
increasingly transformed by access to vary and developing technology. Students use
Information and Communication Technology tools to find, explore, analyze, exchange
and present information responsibly, creatively and with discrimination. They learn
how to employ ICT to enable rapid access to ideas and experiences from a wide range
of people, communities and cultures. Increased capability in the use of ICT promotes
initiative and independent learning, with pupils being able to make informed
judgements about when and where to use this technology to the best effect, and to
consider its implication and work both now and in the future.

Schooling should develop fully the talents and capacities of all students. In
particular, when students leave universities they should have the capacity for, and the
skills in; analysis and problem solving; and the ability to communicate ideas and
information; to plan, organize activities and to collaborate with others; to be
confident, creative and productive users of new technologies; particularly information
and communication technologies, and understand the impact of technology on society.
Integrating Information and Communication Technology into the curriculum offers a
path to develop these capacities and skills.98

3.12.2 Networking Technology for Education

Internet access makes contact with people over the world possible, bringing
into the classroom every content area, new and old friends and colleges in education.
With access to the Internet, websites become a valuable sources of information.
Consider the expertise in the university, which could be shared with others around the
world. The sources of information on the Internet can be linked to graphic images,
sound and animation, all enriching the student’s exposure to various concepts. The
access to these types of information will encourage students to synthesize what they
have experienced and use this information in their class work. With access to Internet,
there exists the possibility of students interacting with their peers and others members
of the community on a more intellectual level than before.
Through the use of the Internet, there is the opportunity for all students to have access to quality information. There is also the possibility the students will begin to interact with the community. As students become more involved in the learning process, they are more prepared to explore subjects in more departments. According to Burke (1996) computer software can be used as a cognitive enhancer, permitting students to focus on complex concepts. However, while attempting to use the computer as a tool, it is important to realize that students require some basis knowledge of the subject they are exploring, in order to effectively use the computer to enhance their learning.

3.12.3 Internet Distance Education

Education and training are primary determinants of a country’s prospect for economic, human development and international competitiveness. One of the valuable lessons derived from the Asian economic miracle is the level of the single most important factors to explain high economic growth in the past decades. Distance education provides learning opportunities to students for a number of reasons – geographical distance, to the centres of education, work schedule, limited financial resources, etc. For the overall view the educational system of a nation, distance education promised to increase economics of scale and reduce infrastructure costs through Internet.

Internet Distance Education is a form of distance education in which the course contents are delivered and the interactions are provided by technology and methodologies of the Internet. It is on-line environment that allows people to interact with others, asynchronously or synchronously in collaborative environments; to gain access to remote multimedia databases for active, resource-based learning; and to manage self-paced, individual learning in a flexible way. Moreover, the Internet allows students to enroll in a course from anywhere in the world, at any time.

(1) Distance Education in Thailand

In Thailand, distance education has played a role in the Thai education context for decades. It has been distributed at two levels of the Thai educational context: at the school level and at the university level. At the school level, distance education has been introduced to strengthen education by developing educational standards of school subjects. Since there is a shortage of instructors, such as for mathematics,
science and foreign language subjects. Distant education has been organized via satellite for children and young people who lack educational opportunities. Non-formal educational schools and the Klaikangwol Distance Education Project are examples of distance learning at the secondary school level of Thailand.

At the university level, open universities such as Sukhothai Thammathirat and Ramkamhang University have conducted distance education for decades. According to the National Educational Act of 1999, Thai Public universities, which have the responsibility for higher education for people in the country, responded to the New Act by launching various projects. The distance education for new expanded campuses, using various kinds of information technology, includes the Internet, allows two-way communication which has been set up since 1997 (Ministry of University Affairs’ annual report, 1999). More information about the project of distance learning of Thai public universities can be found at “www.uni.net.th”.

(2) Distance education with new focus

The increase of technological power in the late 1980s led to the new definition of distance education. The evolution of distance education mode has shifted from the institution-directed learning of correspondence courses or knowledge-centred learning to student-centred learning of present day global telecommunications. Interaction between teachers and learners has increased its role with the capacity of new technologies to create interactive learning environments, which become another essential factor added in the new definition of distance education.

The increasing interaction between learners and teachers with the use of technology is an accepted issue among educators. The interactions mean not only academic content but also social interactivities among related participants. Asynchronous interaction (occurred before or after the class period) and synchronous (real-time conversation during the distance education class period) are two-way communication that lead to creating and increasing effective interactive learning environment. Both types of interactions have been emphasized in recent distance learning theories. Besides, the theory of distance education, the learner-centred approach can be possibly used with distant education on the Internet. The Internet seems to be set not only to lose traditional education services around world, but also to transform the way in which we understand and experience the learning process.
Distance education faced problems largely due to: (a) inadequate learner support; (b) a sense of isolation due to the lack of interaction with other students; (c) a focus on correspondence-type programmes; and (d) long delays in feedback to students’ needs. With the rise of the Internet, the distance education experience has been completely transformed and many of these barriers are overcome. It constitutes a virtual classroom in which intense interactivity, the sharing of resources and information constitutes its essence.\textsuperscript{103} The Internet has been around since the mid-seventies and even back then it was being used as an educational tool. Mainly the Internet at that time was only being used for bulletin boards and e-mails as a mean of communication and learning. Today it is a good tool to be used in the classroom for many other reasons. It gives students, who come from different economic backgrounds, equal advantages in the world of education.

3.12.4 Computer-Mediated Distance Education

In Computer-Mediated Distance learning, an instructor or facilitator delivers courses by communicating with students through the use of a computer network or the Internet. This method is relatively a newcomer to education. The explosive growth of the Internet has contributed to the increasing popularity of this type of learning and has brought with it a set of issues and problems. Not all distance education programmes include computer-mediated courses; they may includes video conferencing and other means of distance learning.

Many educational institutions are turning to the Internet to deliver courses to students from a distance, as well as to enhance educational programmes that are taught on campus. This is one of the ways to attract students who might not attend classes, others use it as a way to begin meeting the needs of a new generation of students. Educational institutions are feeling the pressure to control cost, improve quality, focus directly on customer needs, and respond to competitive pressures. Information Technology (IT) has the potential to solve many of these problems. It can change the role of students and faculty, facilitate more learner-centred, personalized education, save money through improved distance education, and expand the scope and content of the curriculum.

As technology comes into greater use, courses and degree programme are being offered over the Internet. Many educational programmes have been developed
that involve students interacting with a piece of software on a computer, with no interaction among groups of learners. This is known as computer-assisted education or computer-based training. Regardless of instructional method used, a transition must be made from the typical campus classroom in cyberspace. Instructors and students behave differently in these two types of classrooms. The outcome of learning is different as well. Computer and Internet have opened up some interesting lines for the development of educational activities. The variety of uses for computers in education multiples rapidly, as do the number of computers in schools and the frequency with which they are used. Now, almost every university it is noticed that students are doing computer-based activities on a regular basis. The nature of educational software is in a rapid and continuous process of development.

3.12.5 Powerful of Internet on teaching and learning systems

In recent years, educators have witnessed a rapid development of using the Internet for educational purposes. It can provide a new and interactive means of overcoming time and distance to reach learners. With careful planning to use the applications existing on the Internet, the more effective teaching occurs. Method of teaching, learning and communication using computer-mediated communication (CMC) on the Internet include investigation of information and interactive collaborative learning groups. Learners can do activities provided by the teacher, based on website information. CMC such as e-mail, bulletin boards and chat rooms on the Internet helps create interactions between participants in the field of distance and other learning settings.

The kinds of learning with computer applications are popular nowadays. The evidence can be seen from the number of homepages found in a search engine website (www.google.com). There are more than 800,000 pages that match on distance or similar learning programme topic. Many of them are learning programmes provided by higher education institutes in developed countries, such as, the United States of America, Canada, Australia and England. They are constructed on the concept that everyone have equal opportunities to select their preferences in long life education.
3.12.6 Type of CMC on the Internet

According to Harring, M. & Smaldino, there are five basic types of computer-mediated communication (CMC) information exchange possible on the Internet:

(1) Learner-to-learner connections: this CMC type allows personal-communication on the Internet, such as, electronic mail, software programmes for chatting such as IRC, MIRC or ICQ.

(2) Learner-to-group connections: list-serves, computer conference with face to face, audio and video.

(3) Learner-to-computer connections: an example of this, a connection of learner directly to the Internet via an Internet Service Providing (ISP), which a modem is needed. Another type, is a high-speed dedicated connection from universities of education institutes where computers are permanently connected to the Internet, 24 hours a day, without a modem.

(4) Learner-to-information archive connections: there are varieties of Web sites on the Internet or WWW or learner to access, as information resources to their needs. Search tools are also an example of this connection. They are connections that provide locations for students’ information requirements.

(5) Learner-to-any of the above connections: a learners may connect to web sites and send mail or perform any connections as they wish to do or are assigned to do so.\textsuperscript{108}

According to the types of CMC, teachers can employ several of the connections on the Internet to enhance their teaching. A variety of information on web sites allow teachers, learners and other users to retrieve and access sources of information in authentic settings. Some web sites on the Internet contain search tools or search engines in which connections for students are provided. Learning activities on numerous on-line courses and suggestions for employing Internet options to be adopted or adapted with the traditional classrooms are easily accessed with search engines on the Internet.

3.12.7 Benefits of using the Internet for teaching

The benefits of using the Internet enhance more effective learning settings, including traditional classrooms and other learning settings. It suits the system of distance learning and teaching on-line. The capacity of the Internet can fit the new
paradigm in teaching, especially the learner-centred approach quite well. The benefits of the Internet are described as the following in two aspects facilitating lifelong learners and allowing shifting roles of the teachers.

(1) Facilitating lifelong learners

Teaching students through the Internet is a shift from a teaching environment to a learning environment. Teaching students with the Internet can prepare them for life outside the classroom. Students, who are coached and facilitated by the teachers to gain access to the Internet from which they will be able to teach themselves to develop their learning. With this way, they gradually become lifelong learners. Teachers design activities or assignments for them to continue learning outside classroom as well as fostering them to gain autonomy, equality, learning and social skills. Moreover, tasks the teachers assigned to learners enable their capacity of seeking for required information for performing assignments. Ability to evaluate and select suitable information from overwhelming sources for their tasks is also developed. Teachers carefully provide activities to have student’s practice using the Internet to help develop self-confidence in their learning.\(^{109}\)

(2) Allowing communications, collaborative and cooperative learning

The use of the Internet is to communicate to people all over the world to share information, experiences and opinions in wide areas including business and economics. Communication via the Internet has been labeled computer-mediated communications (CMC). The Internet is a single computer application to date with the greatest impact on learning and teaching. It also provides opportunities for cooperative and collaborative learning, where two or more students get together to work and to learn.\(^{110}\) Projects that need information about communications between students from different cultures are cooperative work which is done by making use of the Internet. Collaborative learning can take place from peer to peer, teaching each other on how to find required sites or how to use the Internet programmes. Students share their learning experience with each other using the Internet as a mean to do so.

3.12.8 Virtual Education

Virtual education is a teaching-learning process based on the principles of active pedagogy with the characteristics of distance education and with the possibility of synchronous or asynchronous interaction. The emergence of virtual education, or
web-based instruction, presents extraordinary opportunities to access information and learning, both within and outside the walls of schools.

Virtual education or on-line instruction is a form of distance education instruction offered from a distance using technology. A decade ago, distance education meant, primarily, satellite-based television and audio conferencing. Over the past decade, almost 40 operating full-motion video distance education networks have formed in America. The establishment of virtual universities and virtual schools in the Internet now has become a treat to the existence of real universities and schools in the world. Virtual educational institutions help students to select convenient training programmes and subjects of study. Students can plan their study according to their convenience. Using teleconferencing method, a teacher from a distance place can teach students in another place. With this facility on-line discussions between persons can be also arranged. Also possible are submission of applications and payment of fees. Virtual Reality modeling language helps viewers to have a three-dimensional view of different objects in web sites. It also helps viewers to move through virtual objects, work on them in virtual environments.11

In the international arena, virtual education grows every day, offering programmes in basic and secondary education, as well as undergraduate and postgraduate degrees. Today it’s possible to take virtual courses at some of the most popular universities in the world, which certifies the credits that the student acquires at the end of their study. Many other universities, sensitive about the distance problem of many of their candidates, and of the schedule difficulties in others, have begun to implement virtual programmes with the purpose of reaching those students that can not be assisted on campus.

(1) Virtual University

The notion of a virtual university is a potent vision of the future of higher education. This virtual university or a university without walls is seen as an institution that has torn itself free from the geographical confines of the campus, using the new communications technologies to connect learners, teachers, researchers, alumni, employers and administrators in the flexible ever-changing network organization. The virtual university is emerging in response to the needs of the knowledge society and is enabled by the Internet, the communication tool of globalization. The infrastructure of the virtual university through the Internet, is the technology that makes possible
telelearning, telebanking, teleworking, teleshopping and telemedicine without leaving the confines of home. Distance from any place is no longer a limiting factor. It does not matter where the university is physically located and learners in any country can easily access courses from the global virtual university as they can from their neighborhood university.

Courses designed for distance education in this century were based on print technology and conventional postal systems. They have the same faculties, curricula and value systems as a virtual university as they have as a conventional university. The virtual class is the core system of a virtual university where teachers and learners communicate using ICTs to replicate the communications functions of a conventional class. Developments in computer and networking technologies have made it possible to customize curricula and offer flexible alternatives to classroom teaching. The net as a delivery mechanism for educational programs is being successfully experimented with. The best known example of this is the concept of the African Virtual University (AVU) being promoted by the World Bank. Web-based courses offered by AUV are used by several traditional African universities to enhance the quality of their teaching. Network technology is putting an end to campus-centric learning centers and the geographical boundaries of a university are fast disappearing.

(2) African Virtual University (Africa)

In 1995, the World Bank initiated the preparation of the African Virtual University, a satellite based distance education project, whose objectives were to deliver to countries of Sub-Saharan Africa (SSA), university education in the discipline of science and engineering, non-credit continuing education programs and remedial instruction. AVU links 30 learning centers in 15 African countries via the Internet to universities in Europe, Canada, and the United States. Headquarters of AVU is situated in Nairobi, Kenya. Currently, the countries participating in AVU's program include Kenya, Tanzania, Zimbabwe, Uganda, Namibia, South Africa, Rwanda, Burundi, Ghana, Benin, Burkina Faso, Mauritania, Niger, Senegal and Ethiopia.

The AVU infrastructure currently consists of a broadcast network with the uplink at COMSAT Tele-port in Clarksburg, Maryland, USA and multiple receive-only sites (AVU learning centers). This network utilizes digital video and audio broadcast over the New Skies Satellite (NSS). Full interaction is achieved through two way
audio utilizing telephone land lines as return links and also through the use of Internet technologies like, e-mail, forums and chat boards. During class, the students have real-time interaction with their instructors, via, talkback or e-mail. Tutors guide students through the course and act as liaison with course instructors. Class preparation material and research are distributed over the Internet. AVU also provides students, access to an on-line digital library with over 1,000 full-text journals and over 10,000 free e-mail accounts have been opened and can be accessed through the AVU Web site.

The typical AVU classroom has between 25-30 students, sitting at their desks watching the broadcast on large screen projectors, television monitors or computers. During the class, students have the opportunity for real-time interaction with the instructor using phone lines or e-mail. At each participating AVU learning centre, on-site moderators guide the students through the materials and act as liaison with course instructors. Each AVU learning centre is equipped with at least 50 computers and Internet access.

3.12.9 E-Learning

Previously the teacher has been considered the primary source of knowledge. Communications originated from the teacher, which took place in the classroom: the environment was teacher-centred. In this scenario the class is the only means of disseminating learning. Now we look to transform the classroom into a learner-centred environment, in which the teacher acts more like a coach. The teacher encourages and guides students to actively engage in various activities. Though the teacher’s role is just as vital now as it was then, it has become one of many sources for the student to access learning.

If accepted that learning is the interaction for educational purposes of individuals and materials in particular environments, then it is necessary to expand the current paradigm of the learner-centred environment to include various media outside of the traditional classroom. Cyberspace has become a new learning environment in which over 500 million people interact. Universities and households across the world are now able to send, receive, view, and listen to a complex mix of media. People on other sides of the world can have voice conversation with accompanying video conference, communicating nearly instantaneously. They also can simultaneously
view an on-line slide show that guides the discussion. E-mail, websites, webcams and chatrooms are common places of interest for those born during the revolution of the Digital Age of computers.

E-Learning means the delivery of learning with the assistance of interactive electronic technology. Though in its broadest sense the medium of E-Learning can be any form of media that is electronic and has the ability to engage the student in learning, e.g. a videotape, we have understood it to mean computer driven media distributed over local or wide area networks. That can be a small business or home network or the Internet, which is a vast collection of smaller and larger networks. Individuals have access to an unprecedented amount of information. Learning can take place anywhere, at any time.

E-learning (technology-based education) will improve things in higher education. It will bring about many changes in higher education. It will open a wider range of student choices, resulting in a transformation from an institutional-centred context for the delivery of instruction to a learner-centred emphasis. Students participate at locations remote from the campus and the instructor. They associate concurrently with multiple providers and modes of instruction. Educational services become unbundled, with different providers carrying out various functions.

Table 3.1 Conventional Instructional Delivery versus E-Learning

<table>
<thead>
<tr>
<th>Conventional Instructional Delivery</th>
<th>E-Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Students physically come to learning sites (campuses).</td>
<td>• Students participate at remote locations from the instructor.</td>
</tr>
<tr>
<td>• Students take classes at particular timing predetermined by the institutions.</td>
<td>• Learner determines when to access instruction, based on individual needs.</td>
</tr>
<tr>
<td>• Single college or university provides all instructional and student services needed by students.</td>
<td>• Educational services are unbundled, with different providers developing course materials, delivering instruction, evaluating students, awarding credentials, providing</td>
</tr>
</tbody>
</table>
access to information and offering various student services.

- Student is affiliated with one institution at a time.
- Learners are concurrently associated with multiple providers and modes of instruction.
- Learning objectives are specified by the institution.
- Learners shop for opportunities that fit their specific needs.
- Terms of the relationship with students are determined by the institution (for example, time and place of instruction, sequences of courses, terms of admission).
- Students design their own programme with regard to content, length, structure, and so forth.
- Programme completion is defined by the institution in terms of credit hours earned
- Programme completion is defined by knowledge gained and skills mastered.


3.12.10 Web TV

The Internet is now available in some homes though a subscription with the local cable TV company. These connections can be hundreds of times faster than a phone line and a modem. Using one of these connections requires a special device called a cable modem. With a cable connection, multimedia and video are displayed as big, bright, fast moving pictures. On the Internet anyone can open a TV studio at home and put videos on a hard disk or feed live broadcasts to the network through a computer. Anyone who points a browser at the “station’s” Web address can watch the broadcast. As this technology matures, schools, clubs, churches, and entrepreneurs can all become broadcasters at a small fraction of what it costs today. Web TV is not only cheap, it requires no license, and it can be accessed by anyone, anywhere in the world. Users will be able to turn college courses from around the country, which
narrows special interest programming that cannot be supported on more expensive broadcast or cable TV.

Intel’s Intercast technology shows one possible future for television. It brings together broadcast TV and the Internet. As users change channels, background information can be fed from an Internet site and displayed on the screen along with the programme.113

3.12.11 Problems, suggestions and guidelines of the Internet in Education

Although a lot of advantages of the use of the Internet in aiming at effective learning and teaching, there are also some problems which occur from their use. The problems vary from teacher’s side such as time requirement, overwhelming amount of information, lack of training and familiarity on some software using skills and even of specious information. Problems on too much time consumed to access or manage activities related to the Internet lead to frustration. Problems on areas of learners include their limitations to access the Internet and lack of participation in activities was also reported.114

Educators provided some suggestions and guidelines for teachers who use or plan to use the Internet for their courses. They are as the follows: The first and important point is to clarify their goals of teaching. The second is trying to integrate activities and projects with various types of information on the Internet that allow to do so with the goals of the course curriculum as a whole. The third point is to prepare for problems that may occur, i.e. hardware and software problems, slow speed or computer malfunction. Preparation of other activities in case of unexpected problems occurring can maintain a lesson comes as the fourth point. The last point is providing necessary support and trying to involve students in decisions concerned with learning. These are important points for maximizing the technology with teaching aims.115

Conclusion:

Section 12 details the connection between the Internet and education. This section discussed at length about the manifold Internet facilities for classroom and extra-curricular education. Like e-conferencing, the Internet can enable long-distance learning. The researcher has mentioned each type of new learning knowledge available in adequate detail and ends with an analysis of the topic including problems.
which may occur and possible solutions. Understandably, as e-learning confronts a long-term traditional and conservative occupation such as teaching, problems and arguments will certainly crop up at one time or another. However, as it became more popular, the idea caught on and transformed into “open universities” which feature distance learning.

3.13 Wireless Networks

3.13.1 History of wireless communications

Wireless technology dates back to 1895 when Guglielmo Marconi (1874-1937) pioneered radio frequencies and wireless telegraphy, a discovery for which he received the 1909 Nobel Prize in physics. However, the Father of Modern Day Wireless Technology is Toronto born Al Gross (1920-2001). Trained as an electrical engineer, Al Gross developed the walkie-talkie that was used in World War II. This device was ground-to-air, battery-operated and could transmit up to thirty miles. In 1949 he devised the first wireless pager and the first wireless telephone in 1951. After visiting Al Gross' workshop in the late 1940s, Cartoonist Chester Gould drew his inspiration for popular culture icon Dick Tracy's watch, which featured a built-in beeper and wireless microphone. The system required for wireless access are as follows:

(1) Hardware: If users have laptop/handheld devices which does not come with built-in wireless capabilities, then they need a wireless card and an available PCMCIA slot.

(2) Software: All user need to access the wireless network which is a web browser.

(3) Drivers: Wireless card driver requirements will vary depending on their operating system and the manufacturer of their laptop/handheld and/or wireless card.

To use the technology also requires that the person be in a building or area that supports wireless connectivity.

3.13.2 Wireless technology system

Wireless connectivity is a technology for "connecting" a device to a network connection through "the air" using radio frequency signals. Hence, a device such as a
laptop that would otherwise require a cable for a network connection can be connected through "the air" by use of a low-power radio signal. Using the new technology cancels cable that was previously necessary for a network connection. When a person uses a wireless devise (laptop, cell phone), the device transmits a low-energy radio frequency signal that is picked-up by a receiver antenna. This signal is then transmitted to its final destination either by telephone lines or radio signals to another wireless device. The service area covered is generally separated into geographic zones, or cells. A cell can be a small space (arena, auditorium, building) or a region that is miles in diameter. Each cell receives low-frequency radio signals from the wireless devices that operate within by means of its own radio transmitter/receiver antenna. If a person leaves a particular service area, either the connection is lost or the a cell in the new service area receives the radio signal and completes the connection. This is called roaming. In the case of cell phones, each cellular antenna is linked to a mobile switching centre (MSC). This centre receives and connects a person's call to a local "wired" telephone network.

Wireless connectivity allows a person in a service area to log-in to the campus computer network and to establish a high-speed connection to computers. No cables, plugs, or jacks are required. Wireless technology allows the person to use their laptop more effectively in a wide variety of learning, teaching, and research applications. These include Internet access, document preparation using any of the Microsoft Suite products such as Word-PowerPoint-Excel-Access, e-mail client access through webmail, e-Reserve from the University Library, file transfers, printing, and other applications.

Wireless technologies are changing the way people and businesses communicate. Examples of digital and wireless devices include cell phones, hand-held devices, such as web-pagers, high-definition television, instant messaging devices, laptop and desktop computers equipped with a wireless network card, mobile computers and peripherals, and connections to GeoSynchronous and low earth orbit (LEO) satellite systems that orbit earth. The advantage of wireless technology is that, all of these devices provide a person with connectivity anywhere anytime. The types of information and data accessible is virtually unlimited, such as one's own calendar, e-mail, emergency location, horoscope, library resources, map or driving directions,
music, news, radio (AM/FM), stock quotes, voice contact, and weather reports, among other information and data.\textsuperscript{116}

\textbf{Figure 3.1 Wireless Connection Diagram}


\subsection*{3.13.3 Wireless LAN's Infrastructure}

There are two basic infrastructure models for wireless set-ups. The first is known as an ad-hoc network. Every station has a wireless connection to provide a self contained network. The second type of infrastructure involves what is known as an "Access Point" to provide connectivity to an existing distribution network. An access point is typically a simple bridge between the wireless "Basic Servic Sets (BSS)" and the wired network (labeled "Distribution System"). Each BSS acts as a single ethernet collision domain. A BSS can overlap with another BSS to provide a greater coverage area. Each BSS can be on it's own channel to provide separate collision domains.\textsuperscript{117}

1. Basic wireless connection

Basic wireless connection is as follows: the wireless information pages, the university's secure web mail service, secure access to learn-on-line (WebCT), access to web pages which do not contain fancy javascript include: the library site and
catalogue and the university homepage, faculty and school web sites, on-campus ftp sites and https sites.

(2) Wireless access with VPN

VPN with wireless access provides: a way of accessing web pages which are not accessible or not readable through the wormhole, off campus access, access to other mail servers, shares to servers and printing. VPN requires installation of a compatible VPN client. Clients are available for Windows, Linux and MacOSX environments.

3.13.4 Wireless local area networks (LANs) and libraries.

Wireless technology is now fast and reliable. Wireless LANs offer new solutions for providing cost-effective access to digital information in a variety of environments, including libraries, classrooms and other learning environments. The University Library with Wireless Local Area Network (WLAN) will allow users to roam about the University Library and the University College buildings with a laptop or handheld computer while maintaining a connection to the Internet, E-mail, library databases, etc. This will support the use of technology for personal study and group studies. Library databases, library on-line resources will be available to use within centralized public study areas of the library. Freedom to move around within range of the Wireless service without being connected to a hard-wired ethernet port.

Some libraries implemented a wireless computer classroom using battery-operated notebook computers and a wireless LAN. Because there was no need to outfit the room with hard-wired network ports and additional electrical service, room preparation costs were greatly reduced. In addition, the rooms can be utilized for multiple purposes, since the wireless, portable computer workstations can be easily setup or removed.

Based on its positive experience with this initial application of wireless technology, the library should create a wireless zone throughout the library. Library users and staff can access networked resources (digital library collection, e-mail, Internet, etc.) from anywhere in the building. Increasingly, libraries and universities are using wireless LANs to provide more convenient, cost-effective access to information resources and to create environments that support new learning modalities. Wireless allows library users to bring their own computers to the library.
and to get access to the Internet. Wireless enables the library system to offer this service without having to go through the great expense of upgrading and installing new wiring. Library users can use their wireless laptop computers to get Internet access at any table or chair in the library and are not limited to the normal computer areas of the library. The setup of connecting to the wireless networks are as follows:

1. To connect, the users need to be in reasonable proximity to a university wireless network access point. Wireless signal strength can vary up and down over time and from spot to spot. If possible move to where user are getting a strong signal.
2. The users may get a message such as connected to university.
3. The users are able to check the IP address that has been assigned.
4. If the users have been assigned an address, then user have successfully established a basic wireless connection.
5. If the users can see the access point but do not get a valid IP address, he/she can try disabling their wireless "card", and then disabling the wireless network connection on their computer and then re-enabling them in the same order.

**Conclusion:**
The wired network on campus is the primary connection for the end user. The wireless network is an extension of the wired network to be used for mobility. A VPN connection is significantly slower than a typical connection. Further, a VPN connection over a wireless network may not be as stable as a typical connection, as wireless networks are prone to interference. It is also important to remember that the VPN connection is an addition - not a replacement - to the typical network connection.

### 3.14 Intranet

An Intranet is a computer network within a company, university, or organization that can only be accessed from within the local network. An Intranet has made internal communication much easier and less expensive. It uses the following reliable technologies: TCP/IP, HTTP, HTML, Java, etc. to corporate information and is made accessible across local and wide area networks (LAN/WAN) from any desktop, regardless whether it is a PC, UNIX workstation, or Macintosh. An Intranet
can be used to store and share data and information from one computer to another. This Intranet network can be password-protected in part or in whole, enabling specific groups within the organization to be able to access information only relevant to them, or it means the information that the users sees is internal organization information which is secured from the outside (Internet) by a firewall or other security system. Consequently, the Intranet forms an entire "knowledge bank" for the organization. The aims and objectives of establishing the Intranet network are as follow:

1. To establish the basic network infrastructure which would allow all present and future university departments to have access to university-wide computer resources.
2. To allow the modular, flexible and cost effective growth when required.
3. To promote closer interaction in the university campus by giving access to e-mail and other world wide information resources and other facilities to its users.
4. To be able to withstand changes in technologies.

Figure 3.2 An Intranet in Action

3.14.1 Preparing to build an Intranet in library

There are eight key issues to consider when preparing to build an Intranet in library:

(1) **Determining infrastructure requirements**

The network infrastructure means a TCP/IP protocol suite running on a local area network or used as a gateway to the Internet as the Intranet's logical infrastructure. The physical infrastructure probably will be made up of a combination of token-ring networks, 10 megabit-per-second (Mbps) Ethernet, 100-Mbps Ethernet, FDDI and ATM networks, associated hubs and routers, and T-1 and T-3 lines linked directly to the Internet or to an Internet service provider.

The existing bandwidth that a library has is essentially free, since the network is already installed and paid for, and a library will add applications that take advantage of this existing bandwidth. The additional cost would apply only when the library need to add significant network legs, upgrade to T-1 lines, add more network segments, or upgrade the existing infrastructure from traditional 10-Mbps Ethernet to Fast Ethernet or FDDI. The most important aspect of Intranet development is to consider upgrading the network infrastructure to support the Intranet in organization.

(2) **Choosing Web server**

There are a wide variety of hardware servers that can be used, ranging from Compaq PCs running Windows NT to high-end Unix- or proprietary-based servers. Sun itself offers servers ranging from SPARCstations to Enterprise servers; it also offers the Netra, which Sun markets as being specially designed for this application. Netra servers are essentially SPARCstations that have been tweaked to enable them to run over the Internet or within an Intranet. The Netra servers use Sun's NFS or run over TCP/IP, using the FTP capabilities provided to connect to the TCP/IP-based Internet. When selecting Web servers, consider the hardware and software platforms supported, kind of performance require, and amount of support is available from the vendor. Intranet content could even be placed on a desktop unit, unless the traffic becomes so heavy that the desktop machine is getting hammered, whereby, the content could then be moved onto a dedicated Web server.

(3) **Making a browser choice**

Each desktop needs a browser; site licenses are available from the major vendors, enabling a gracious upgrade for the number of total users on Intranet. Not all
browsers implement elements of the HTTP protocol and HTML. Users want to inquire about how the browsers implement graphics, support style sheets, and so on, when deciding the kind of content provide and how to it is displayed.

(4) How to use library Intranet

The library executives, department heads, and staff will decide how the corporate Intranet will be used. However, it is the job of the systems administrator to implement these decisions. Part of the value an IS librarian or systems librarian can add is to recommend to management which end-user Intranet applications is more useful at present, based on its function and technical aspects of the application, and which ones are capable of expansion in the future. Common uses of library Intranets include numerous information resource applications, i.e. multimedia, CD-ROMs, Online databases, E-journals, E-books, etc.

(5) Determining the application development software library need

After selecting servers, browsers and decide the types of applications to run, the librarian will want to consider Web server interface tools. Some of these tools include:

(5.1) An HTML (HyperText Markup Language) editor is used to make up and code information to be published on the Intranet

(5.2) Common Gateway Interface (CGI) scripting tools for forms handling and image maps; GIF (graphics image file), JPEG (Joint Photographic Experts Group), and MPEG (Motion Picture Experts Group) file format tools.

(5.3) For resource-intensive database applications, especially online transaction processing (OLTP) need message-passing architectures that enable Web pages to incorporate interfaces to databases and other applications.

(5.4) If the librarian opts for an NT-based approach, he/she can select application development tools such as Microsoft's Front Page; Adobe's Page Mill, HoTMetal, and Hotdog; as well as HTML text editors and file format converters. Unix-based tools with similar functions also are available. Many HTML authoring tools use, or are part of, a text editor that can be used to write HTML code. In fact, they are not a requirement and often are an added and unnecessary expense.

(6) Weeding through the pros and cons for firewall

When it comes to protecting library Intranet from the outside world, the librarian’s attention turns to firewall. The firewall is the key element by which all
users will gain or be denied access to information on library Intranet. Though the primary purpose of the firewall is to block the public from accessing Intranet, it may also be used as a one-way service for library member to go from the Intranet directly to the Internet. It needs to be able to perform numerous auditing and logging tasks at the application layer rather than at the network layer.

(7) **The changing role of the Webmasters**

With increased Intranet development, the role of the traditional Webmaster will be cleaved into smaller roles, often one per department. The chief Webmaster might oversee all functions of the Web connection, including technical functions, while departmental Webmasters would oversee content development and HTML tooling for the needs of that particular department. The changing Webmaster’s role means that traditional network monitoring and security checking, network deployment, and such is still done by an IT librarian, whereas HTML authoring, content brokering, displaying content, and maintaining content on Web pages within the Intranet itself is being managed by many departments contributing to the Intranet.

(8) **Training**

The librarian is already skilled in Web access; many are being trained in Web page design; and some are rapidly progressing to a point in which they need only initial training in their library Intranet applications and interim follow-up sessions. They do need to be assured, however, that they will be able to find technical troubleshooters easily if they experience difficulties.\textsuperscript{120}

**3.14.2 Library Intranet Infrastructure**

The Library Intranet Infrastructure should be linked to the main backbone network of the university via a fiber optic cable between the Library and University Computer Center. This means that the library will become an active network node, i.e. all the library users defined for that node can access the integrated network resources such as the mainframe, the UNIX servers inside and outside University Computer Center, departmental file servers and the file servers of different PC labs, in addition to all the library local resources. This is the basic infrastructure that links the library to the university network. The university library Intranet will be an integrated part of the university plan for the support of library automation activities.
An ethernet LAN should be installed within the library to link all PCs located in different departments. The design for this LAN will give flexibility in the expansion of the network and easy way for wiring and operation. All equipment will be installed for the smooth operation of this network, including the necessary hubs, cabling, networks cards, and conduits. The necessary software for network operations will be installed and will be functioning. The following components should be formed as part of the library package in the Intranet environment: Media Booking, Z 39.50 compatible, Thesaurus, Full text searchable, MARC format – Input & Output full MARC, OODBMS, FEDARATED DBMS, XML (eXtensible Markup Language) and Electronic data interchange. The application and usage of library software packages in an Intranet environment can be specified in levels and stages. Project phases for developing the integrated library Intranet infrastructure will be as follows:

**Phase I:** linking the library to the university network via a fiber optic line and installing internal structured cabling for the library building;

**Phase II:** upgrading the library Intranet infrastructure by adding CD-Servers for abstracts databases and search workstation;

**Phase III:** upgrading the library network to include all library offices and additional user labs (Internet lab, faculty lab, abstracts database search workstations, electronic journals, etc.). A detailed article about the Internet lab will be published in the forthcoming issue;

**Phase IV:** developing of the library homepage;

**Phase V:** developing and/or converting all applications to be accessed through the Web and replacing access to the legacy system (mainframe) by a web-based interface.

(1) **Establish Requirement for Intranet**

(1.1) A network of computers.

(1.2) A Web browser such as Netscape Navigator, Microsoft Explorer etc.

(1.3) Each computer must be allocated an IP number.

(1.4) Web server software such as Quid Pro Quo or Macintosh Personal Web Server. Mac OS 8 includes a Personal Web Sharing control panel so no additional Web serving software is required.
(1.5) Some HTML documents are ready to put on Web Server (home page). A little knowledge of how to create a home page and construct links between documents is necessary to expand Intranet at any stage.

(1.6) At least one computer to act as a Web server with minimum 16MB of RAM. Computer chosen to be server must also have enough storage capacity to house documents and files for planned Intranet. Minimum of 1.2 GB is recommended.

(2) **Utilizing of Intranet Technologies**

(2.1) Ensure that relevant information can be held at a single source.

(2.2) Deliver that information on demand as and when needed.

(2.3) Guarantees that the information is the latest and most accurate available.

(2.4) Allows the information to be maintained by the people who would normally prepare and maintain it.

(2.5) Sharing documents with any one authorized organization.

(2.6) Scheduling meetings and sharing calendars with colleagues and remote users.

(2.7) Conducting discussions on everything from user ideas to organization suggestions.

(2.8) Creating and sharing access to information databases, or even building own database-driven applications.

(2.9) Managing and delegating action items and project tasks.

(2.10) Maintaining standard contact directories of all member.

(2.11) Conducting opinion polls among members in organization.

Posting announcements and sharing web links among all members. 123

3.14.3 **Intranet in information provision**

Intranet is a tool available to information professionals for moving forward and increasing service provision. The most practical benefit is the ability to increase information efficiency when implementing library and information services across an Intranet and thereby, offer quality service. Information professionals can utilize Intranets and change the way they disseminate and provide information.

(1) Information dissemination: Providing access to an archive of the most frequently requested information, delivery mechanisms of tailored information
services set up from personal profiles and deployment of sophisticated information resources are some of the areas where Intranet can be applied.

(2) Storing and searching: The electronic nature of the information, index servers and search engines facilitate data mining and the location of information. An index server would enable that search of library Intranet for required information.

(3) Internally generated information: Internally generated information sources in an organization that appeal to the whole organization rather than the traditional provision and management of externally published information sources can also be deployed on the Intranet.

(4) Electronic purchasing: Online purchasing system has reportedly increased the level of automation and efficiency of this service.\textsuperscript{124}

**Conclusion:**

With the increasing use of Intranet, particularly in libraries and in conjunction with Library and Information Science, the researcher has enumerated various important details, such as, its objectives and requirements for the establishment. Utility of Internet technology follows this and the researcher has paid attention to it. Intranet is a convenient replacement for documented information or hardcopy. It can be accessed quickly, keeps data safe and is neat condition and so on. Furthermore, a multinational company can access or contact branches to main office quickly. It can use the WWW and even allows access to it. It has proved to be invaluable to large organizations.

### 3.15 Advantages and Limitations of the Internet

The Internet is new information technology in which there are both advantage and limitation, they are as follows:

#### 3.15.1 Advantages

(1) To search data in various types such as researches, articles in newspaper, medical advance, etc. from various sources worldwide, for instance, library, academy and research institution by not wasting money and time. Besides, it also services well throughout 24 hours a day.
(2) To quickly update movements worldwide from the news office reported in website including, weather prediction worldwide, in advance.

(3) To quickly receive and send electronic mail worldwide without expense of stamp duty and less payment for overseas mail. Besides, electronic mail can send message with still images, motion and audio at the same time.

(4) To discuss with others in remote area both in message and audio.

(5) To discuss in group or news group to show opinion or discuss on the problems with persons who are interested in the same topic that extends more vision on the stories.

(6) To read free articles, stories published in magazines or journals in both message and illustrations.

(7) To transfer file, message, image and audio from other places including download various programmes from web site that allowed user downloading without charge.

(8) To check the products price and order products, not wasting time to go to department store.

(9) To play games with others worldwide.

(10) To send greeting through e-greeting.

(11) To offer freedom in all kinds of communication to everyone.

### 3.15.2 Limitations

(1) The Internet is a large network without the owner. Everybody can create web sites or announce all kinds of message. Sometimes, the message may be incorrect or inauthentic such as medical information or results of an experiment. Therefore, it depends on the reader to consider if the message is reliable or not.

(2) The Internet contains programmes and working devices such as using Telnet to communicate to remote area or using Gopher to search data, etc. Accordingly, the users have to study how to use first before effective working. Moreover, students or youths may connect to improper website that causes danger to themselves and society.\textsuperscript{125}

**Conclusion:**

In determining the advantages and disadvantages of the Internet, it is worth mentioning that firstly the Internet is designed for people by people and is broad
enough to provide all kinds of data, and secondly, being unwound by any single person there is a tendency for certain types of data to enter the Internet indiscriminately. As intellectual property is hard to guarantee despite new laws concerning the Internet, one should simply choose what he or she wants to see and ignore the rest.
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