

**THE USE OF MODERN COMMUNICATIONS TECHNOLOGY
BY PARLIAMENTS AND PARLIAMENTARIANS**

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August 1997



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THE USE OF MODERN COMMUNICATIONS TECHNOLOGY BY PARLIAMENTS AND PARLIAMENTARIANS*

INTRODUCTION

In the current environment, when the public demands increased access, transparency, accountability, and efficiency from its institutions and its representatives, parliaments and parliamentarians are expected to offer solutions to the ever more complex problems of society. To help fulfil this mandate, parliaments, as well as individual parliamentarians, are relying more and more on communications.

The use of communications technology is expanding world-wide so that in many respects distance and location are no longer obstacles to effective communication. Although many of the developing nations do not have the same level of communications infrastructure as developed nations, the latest technologies, such as satellites and digital wireless cellular systems, are allowing them to overcome this limitation by leapfrogging over some stages of the development cycle. The trend for rapidly evolving and more affordable technology should continue into the foreseeable future and will have wide-ranging consequences.

The types and uses of communications technologies continue to increase. A little over 100 years ago the telegraph and the telephone were the latest in communications technology. In recent decades we have seen the arrival of the now ubiquitous fax machine, the pager and the various versions of cellular telephones, as well as the capability for inexpensive teleconferencing. One of most dramatic communications breakthroughs has been the advent of the “information highway.”

* This paper was originally prepared for the Delegation from the Parliament of Canada to the Parliamentary Conference of the Americas, September 1997, Quebec City.

This paper will describe how many parliaments and parliamentarians are already using communications technology effectively and how this use will expand in the future. The emphasis will be on applications used by parliamentarians to communicate with constituents and the media and the use of the information highway in conducting research.

WHAT IS THE INFORMATION HIGHWAY?

The basic technology that allows the information highway to exist has been with us for some time. Specifically, the term refers to the convergence of separate telecommunications and computing hardware systems into a single global “network of networks” carrying a wide range of information content. An integral part of the information highway is the sophisticated software intelligence that enable users to navigate pathways to a whole universe of information. Though some of the claims made for the highway have been greatly exaggerated, many of the technical problems experienced only a few years ago have been resolved much more quickly than anticipated

Nowadays we still use distinct systems for various services, such as telephone, cable and satellite systems and computer networks; however, this is quickly changing. The advent of two new technologies, “digitization” and “fibre optics” has revolutionized the communication industry. Digitization is the conversion of text, sound, images, video and other content into a common digitized format to permit all communication systems to be connected in a single network. The replacement of copper wires with fibre optic cable and the use of digital telecommunication switches have greatly increased the number of signals that can be squeezed into a wire or cable (bandwidth). This allows applications that move large amounts of information, for example videos or X-ray images for remote medical diagnosis, to become increasingly rapid and cost-effective.

The number of individuals, governments and private businesses using the Internet has grown very rapidly and is now significant. Many of the private global networks, such as America On Line and CompuServe, are now fully connected to the Internet. In the past few years, some key Internet issues, such as effective security for information and secure financial transactions, have been resolved. This success, coupled with the range of digital material flowing through the system, suggests that the Internet may indeed be the forerunner of the global

information highway. (A brief explanation of Internet and of some common terms associated with it is provided in Appendix 1.)

Information technology is changing our world. It is reshaping our economy and affecting the life and work of almost every Canadian. As converging communications technologies bring digital content into the nation's businesses and homes in new ways, Canadians are beginning to sense what it means to travel the Information Highway.⁽¹⁾

Knowledge in the form of an informational commodity indispensable to productive power is already, and will continue to be, a major—perhaps *the* major—stake in the worldwide competition for power. It is conceivable that the nation-states will one day fight for control of information, just as they battled in the past for control over territory, and afterwards for control over access to and exploitation of raw materials and cheap labor.⁽²⁾

ACCESS TO THE INTERNET

The number of Internet users is difficult to estimate but it is expanding very quickly. At the start of the 1990s there were one million people connected to a text-driven computer network choked with e-mail and binary scientific information. As joining the Internet became easier, however, its value increased. The number of Internet users world-wide has grown to an estimated 57 million, according to John S. Quarterman of Matrix Information and Directory Services in Austin, Texas. Quarterman estimates that the number will reach 700 million by the end of the century.⁽³⁾ Currently, the greatest per capita usage is in the developed nations, with Canada and the U.S. having amongst the highest penetration rates. Some sources suggest that by early 1996 over 17% of Canadians had access to the Internet, either from their home or office.⁽⁴⁾

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- (1) *Connection Community Content: The Challenge of the Information Highway*, Final Report of the Information Highway Advisory Council, September 1995, p. vii.
 - (2) Jean François Lyotard. *The Postmodern Condition: A Report on Knowledge*, Les éditions de Minuit, Paris, 1979, Introduction.
 - (3) Joshua Cooper Ramo, "Welcome To The Wired World," TIME, 3 February, Vol. 149 No. 5, 1997.
 - (4) HCSC on Industry, Issue 3, 27 March 1996, p. 3-11 (M. Binder, ADM Spectrum, Information Technologies and Telecommunication, Industry Canada).

The advent of cheaper personal computers and low-cost telecommunication devices such as modems,⁽⁵⁾ increases the likelihood that more people throughout the world will gain access to the Internet. As well, many countries are connecting schools and public libraries to the Internet; universities were amongst the first institutions to be connected to the system. In this respect, Canada is breaking new ground.

These two programs, the community access program and the SchoolNet program, are aimed at trying to build the skill sets on young people so they'll be able to enter the job market, very quickly transfer to employment and become well positioned to be entrepreneurs in this global economy. Second, they're aimed at the communities involved producing jobs and growth.

It (SchoolNet) started in May 1993 with an attempt to link 12 schools and to see whether we could use the information highway....to bring additional resources to schools in a very low-cost manner. The program was successful and went on to a goal of linking 300 schools. Today we're up to about 6,000 of the 16,000 schools in Canada being linked to the information highway.

This morning (26 March, 1996) there was an announcement of a partnership between the provincial governments, the federal government, and the telephone companies to link all schools in Canada by the end of the next school year (1997/98). That will put us about three years ahead of the American goal. In fact, we will have achieved the goal before the U.S. government will actually have got its program very much under way.

The goal of SchoolNet really is to facilitate the linkage of the 16,000 schools and 3,400 libraries in Canada, which are very important to the development of the skill sets we have been talking about, and, in particular, the 447 native communities that fall under the federal government's jurisdiction.

Community access - Its goals and structure are quite a bit different. The aim of this project is to get as many rural and remote communities in Canada onto the information highway as quickly as

(5) Modem - An Abbreviation of MOdulator-DEModulator. A device used in data transmission for converting the computer (digital) signal into a telephone signal (Analogue signal) and vice versa. As of June 1997, modems with a transmission rate of 56 kbps (or 1000s of bits per second) are available commercially at relatively low cost.

possible. ... So the goal of this program was to bring a minimum of a thousand communities onto the information highway by 1998.⁽⁶⁾

Although the developed countries have a particularly extensive telecommunications infrastructure, the increased use of satellite communications, as well as proposed special purpose satellites dedicated to the information highway, should enable access to the Internet from anywhere in the world. An example of this satellite technology is the Teledesic Network proposed by Microsoft and telecommunications pioneer Craig McCaw. This network would be a broad-band mobile communications network relying on a constellation of hundreds of low Earth-orbit satellites. Teledesic is designed for “fibrelite” wireless telecommunications services, including interactive Internet access, voice, data, and video-conferencing. The cost of Internet access will act as a barrier for many, however, particularly in less prosperous nations.

CURRENT USES OF THE INTERNET FOR PARLIAMENTS AND PARLIAMENTARIANS

The use of the Internet by parliaments and parliamentarians is increasing swiftly. The U.S., Canada, and the European countries were amongst the first to provide information on parliamentary activities via the Internet. In Canada, the federal, provincial, territorial and many municipal governments now offer a wide range of information and services through this medium.

Listed below are some of the general applications of the information highway as they relate to Parliament:

- Parliaments are now using Internet technology as part of their “intranet” (whereby information is available only to parliamentarians and their staff but not to the general public) to schedule meetings, and other administrative tasks.
- The public in numerous countries, including Canada, now has access to copies of legislation, parliamentary proceedings, and committee meeting minutes directly on the Internet from the parliamentary WEB sites. The information is normally very up-to-date, although this varies

(6) HCSC on Industry, Issue 2, 26 March 1996, p. 2-21 (Mr. Hull, Industry Canada Official).

greatly among legislatures; in Canada, Hansard is available the day following the proceedings it describes.

- Some parliamentary committees use Internet e-mail addresses at which the committee clerk can receive submissions. Many Canadian parliamentary committees have their own WEB page where they post progress bulletins and other pertinent information.
- Usenet discussion groups can also allow the public to record views on various issues being reviewed or studied by parliamentary committees.
- The Internet can be used to make electronic material more readily available or to post comments in a discussion group; in some cases real-time discussion can take place.

Listed below are some of the ways in which individual parliamentarians use the information highway:

- Parliamentarians provide information to their constituents through individual WEB sites as a supplement to their paper news bulletins.
- E-mail has become a basic communication tool between the parliamentarian and the media and constituents. The newer computer networks, such as that of Canada's parliament, fully integrate internal e-mail with e-mail from the Internet. Thus, the parliamentarian can send an e-mail to the next office or around the world.
- The Internet is an invaluable research tool, providing access to a wide range of useful information from government sources (Canadian and foreign as well as federal, provincial and municipal), academia, electronic journals and magazines, private industry, publications and numerous special interest groups and discussion groups. Unfortunately, sorting the "wheat from the chaff" can be difficult and time-consuming.

- The Internet can also give parliamentarians access to commercial on-line databases covering a wide range of information. These are normally reliable information sources but access can be very expensive and formulating the question that will obtain the best information can be difficult.
- Intranet and extranet technology can permit the full integration of a parliamentarian's offices in Ottawa and in the constituency.
- Many Canadian federal political parties now have their own dedicated WEB sites, accessible only by other party members (another example of intranet communication technology).

INFORMATION ON THE INTERNET

Some say the Internet is as a virtual library, but this is far from being true. Currently, the Internet provides access to a large assortment of information on virtually any subject, mainly through the numerous specialized user groups and WEB Sites. WEB sites cover a huge range, from personal sites for diaries, to pornographic material, to illegal copies of software, to specialized items of personal interest, to large sites from major companies, institutions and governments that carry sales promotion and information items.

One sometimes hears the Internet characterized as the world's library for the digital age. This description does not stand up under even casual examination. The Internet--and particularly its collection of multimedia resources known as the World Wide Web--was not designed to support the organized publication and retrieval of information, as libraries are. It has evolved into what might be thought of as a chaotic repository for the collective output of the world's digital "printing presses." This storehouse of information contains not only books and papers but raw scientific data, menus, meeting minutes, advertisements, video and audio recordings, and transcripts of interactive conversations. The ephemeral mixes everywhere with works of lasting importance.

In short, the Net is not a digital library.⁽⁷⁾

(7) Clifford Lynch, "Searching the Internet," *Scientific American*, March 1997, p. 52.

Special interest groups frequently have WEB sites with one-sided or biased information. Moreover, the information available even from the best sources may be incomplete or inaccurate and can at best only assist in establishing the general parameters of an issue. The accuracy of the information should not be blindly accepted, simply because it was obtained from the information highway. One should apply the same scepticism to it as to material from other sources.

Indeed, professionals using the Internet warn that, without the necessary informed analysis, the vast amount of information available through the Internet can hinder the decision-making process rather than help it.

The modern lawmaker requires a diversity of information sources to assist in analysing the complex issues facing the legislatures legislators need filters to sift through the avalanche of information literally flooding their offices. A combination of improved information systems and more analytical staff capabilities can help to address the perennial problem of finding the right information when it is needed in a form that is useful.⁽⁸⁾

Thus, resources must be dedicated to filtering the available information and preparing analysis and review of related policy issues if the usefulness of the information highway is to be fully realized.

FUTURE USES OF THE INTERNET BY PARLIAMENTARIANS AND PARLIAMENTS

Many future uses of the Internet by parliamentarians and parliaments are already technically possible. For example, the Internet can permit the transmission of real-time images, sound and telephone conversations.

Congress took a step into the 21st century Wednesday, broadcasting a hearing live over the Internet for the first time.

Choosing an appropriate topic to test the waters, the Senate Science, Technology and Space subcommittee sent a live audio feed of its proceedings about on-line commerce and encryption software to hundreds of listeners around the world.

(8) Jan Bortnick, "Overview," *Government Information Quarterly*, Vol. 8, No. 3, 1991, p. 255.

About 40 people also participated in an on-line discussion with congressional staff as the hearing progressed.⁽⁹⁾

In the future, the general availability of very broadband high speed telecommunications services will permit simultaneous multi-media transmission (voice, data, and video) via the Internet at low cost. This could be particularly useful for receiving testimony from remote locations or even direct from constituents' homes. Desktop videophones operating over the Internet should allow virtual conferences with parliamentarians from different legislatures, at all levels of government and in various countries.

Many of the other possible uses of the Internet listed below would be relatively easy to implement in developed countries such as Canada. The general low penetration rate of the Internet in many developing nations, however, makes implementation there a much further off prospect.

- E-mail, teleconferencing and limited discussion forums over the Internet would permit parliamentary associations to operate as if all their members were effectively in the same building.
- Intelligent Internet "agents" are becoming increasingly popular in researching material or keeping informed on developments in specified areas of interest.
- Allowing parliamentarians to vote from a distance (i.e., from outside the legislature) has been discussed as a possibility in several legislatures and has been technically feasible for some time. In the U.S., some envisage a "virtual Washington" in which members of Congress can debate and vote from their homes.⁽¹⁰⁾ It would not be difficult to envisage a day in the not too distant future when this will be a real possibility for parliamentarians in many countries. In principle, voting would be easier for Members who are forced to be absent from the House; however, it also might be more difficult to ensure that they actually vote.

(9) "U.S. Congress Broadcasts Hearing On Internet," Reuters, 26 June 1996.

(10) Kevin Phillipps, "Virtual Washington," *Times* (GTIM), Vol. 145, No. 12, Spring 1995, p. 65-68.

- Electronic voting via the Internet, or its future replacement, is another possibility. Several versions of electronic voting could exist; individuals could vote by telephone or by a video screen. The greater convenience of these methods of voting could potentially increase voter turnout and make it easier for citizens with restricted mobility to exercise their franchise.
- The Internet might also be used to conduct national plebiscites or referendums. Within the next four to six years, a large proportion of the upper and middle classes in developed nations will likely have individual on-line access while the others will probably have access through municipal facilities, particularly public libraries. Now that some of the security issues have been resolved, this is technically possible in the near term. Electronic national plebiscites or referendums providing a form of direct representation are a real possibility. This could raise a number of challenges, such as ensuring equitable access for poorer citizens, possibly redefining some basic civil rights, and enabling citizens to petition their governments.

OTHER MODERN COMMUNICATION TECHNOLOGY

Other communication media vary greatly in appearance and technological complexity; they include conventional paper products and associated transmission methods, such as couriers and fax machines, and computer diskettes, which can be sent through the mail or hand-delivered. The most commonly used (and frequently overlooked) example of information technology is the telephone, the basic tool from which the rest of the telecommunication industry evolved. (A brief explanation of some common general information technology terms is provided in Appendix 2.) Some of the products and services already used or about to be used by parliaments and parliamentarians are described below.

Private Branch Exchanges (PBXs) which enhance the capabilities of the telephone and make possible such features as voice mail, phone forward, and call display;

Cellular phones, digital cellular telephones and advanced pagers - capable of being used virtually anywhere;

Special commercial communication lines, based in part on the use of fibre optics, and capable of transmitting very large quantities of digital data;

Teleconferencing, made possible by high capacity city digital lines, coupled with television technology; (Teleconferencing was used extensively in the last Canadian Parliament.)

Modern fax/modems capable of sending and receiving information, both faxes and digital files, over ordinary telephone lines;

Low cost videoconferencing hardware/software packages (sometimes called videophone) functioning over a wide range of communications; (These packages add a small television camera (both colour and black/white versions), additional hardware and specialized software to a personal computer. Currently the quality and size of the image are acceptable and steady progress is being made. Videoconferencing with several participants can be arranged locally where a high speed network exists or over longer distances with special digital communication lines.)

The “whiteboard,” whereby participants located in various locations can work on a common surface to present information and make changes in real-time, either in conjunction with videoconferencing or on its own;

Mobile communication systems (personal digital assistants) allowing users full access from almost any location to a wide range of information services such as e-mail, their own network resources, telephone calls, videocalls, and the information highway. These are frequently used with digital cellular telephone systems and portable computers.)

The promise of worldwide wireless communication by means of mobile phones and pagers will shortly become a reality when the Iridium project--a worldwide wireless service for voice, data, fax, and paging--begins commercial operation in 1998. Iridium will track the location of subscribers' phones and allow communication between any two points in the world. The hand-held phones will connect to notebooks, personal digital assistants, and “palmtops” (small hand-held palmtop computers).

Thus communications technology will become ever more pervasive in the daily lives of parliamentarians and their constituents. Canadians may well expect, or even insist on, full access

to their elected officials as well as to information and services at all levels of government operations.

THE FUTURE

With the use of communication technology, Members' offices, both in Parliament and in their constituencies, could be better integrated and made more business-like. Having access to more information could help Members to compile information about the interests and concerns of their constituents and thereby respond to constituents' requests more efficiently. The technology could also help political parties in formulating party policies. On the other hand, there is some danger that expanded e-mail communication between legislators and constituents could overburden parliamentarians and their staff.

The technology can provide useful information for those reviewing legislation or working on parliamentary committees and can facilitate communication among parliamentarians and various stakeholders. Even with this additional information and enhanced communication, however, the actual decision-making process in a parliamentary environment will be fundamentally unchanged.

From an institutional viewpoint, communication technology has the potential to streamline the legislative process. Depending on the will of parliamentarians, it could undeniably increase their access to government information and help realize them to fulfil their mandate to oversee and monitor the activities of the executive branch. This technology could also allow citizens to have better access to, and participation in, their Parliament and government, thereby bringing democracy closer to the people.

CONCLUSION

Parliaments and parliamentarians can and do use communication technology, in particular the Internet, to play their roles more effectively. The usefulness of the Internet as a research tool and to facilitate effective communications among parliamentarians and with their constituents, is certain to increase in the foreseeable future. Legislatures can expand their use of this technology to reduce travel costs, boost dialogue with constituents, improve their effectiveness in responding to constituents' requests, inform the public of the activities of elected officials, enhance

the decision-making process within parliaments, and promote dialogue and cooperation among various levels of government and between countries. Some potential pitfalls, however, are information overload, and information that is of poor quality or not analyzed. The uneven availability and affordability of the Internet, particularly in developing countries, also remains an obstacle to its use worldwide.

APPENDIX 1

INTERNET AND INTERNET TERMS

Overview of Internet

What is the Internet? The Internet is a major network made up of smaller networks that agree to communicate using a common set of standards. The Internet currently has world wide coverage with 16 million host computers in January 1997.⁽¹¹⁾ The actual number of users is difficult to determine with any accuracy but one estimate is that there are 57 million world-wide users.

What Kind of Information Is on the Internet? Most information available free on the Internet consists of government documents, works with expired copyrights, works in the public domain, and material that the authors are making available on an experimental basis. As the Internet has grown, so has the interest from commercial concerns. Electronic mail and electronic cash for purchases on the Internet are common and allow on-line retailing with product specs, icons, and photos to help buyers.

What are the Main Uses of the Internet? The Internet makes it possible to use e-mail, conduct on-line conversations, access databases, retrieve files and participate in a variety of discussions all over the world. The most used service remains the e-mail, where every user on Internet has a unique identification. The second most common use is for the world wide web sites: over 1.1 million sites existed in June 1997.⁽¹²⁾

Commonly Used Internet Terms

Asymmetric Digital Subscriber Line (ADSL) --A digital phone-line technology that supports high-speed connections to the Internet using ordinary copper telephone wires. ADSL is "asymmetric" because uplink speeds (64 Kbps) differ markedly from downlink speeds (up to 6 Mbps). ADSL is currently available only in selected markets.

Archie -- A network service that searches File Transfer Protocol (FTP) sites for files based on relatively simple search criteria.

Browser -- Software that provides an interface to the World Wide Web, with Netscape and Microsoft Explorer being the two most popular systems.

(11) 'Hobbes' Internet Timeline v3.0' by Robert H. Zakon, Internet address: info.isoc.org/guest/zakon/Internet/History/HIT.html.

(12) *Ibid.*

CERN -- European Particle Physics Laboratory, a collective of researchers.

Central Services Organization (CSO) -- A service that facilitates searching for users and addresses in databases.

Domain Name Service (DNS) -- The on-line database that correlates Internet IP addresses (for example, 128.10.3.42) to human-readable domain names such as parl.gc.ca. The database isn't stored on any one computer; rather, it is distributed among thousands of name servers spread throughout the Internet.

Extranet -- An extranet is similar to a corporate intranet but extends out over the Internet. It allows selected companies (or organizations) to access the company's system across the Internet, while keeping others out.

Frequently Asked Questions (FAQ) -- A document with answers to frequently asked questions. FAQs are widely available on-line and cover a broad spectrum of topics ranging from gourmet cooking to the inner workings of TCP/IP.

File Transfer Protocol (FTP) -- A common method of transferring files across networks.

Finger -- A service that responds to queries and retrieves user information remotely.

Gopher -- A text-based, menu-driven information service that allows users to retrieve information without having to know the locations of the resources. The use of gophers has greatly diminished with the rapid increase in the use of the WWW.

Hit -- As used in reference to the World Wide Web, "hit" means a single request from a web browser for a single item from a web server; thus in order for a web browser to display a page that contains three graphics, four "hits" would occur at the server: one for the HTML page, and one for each of the three graphics. "hits" are often used as a very rough measure of load on a server.

Home Page (or Homepage) -- Home Page has several meanings. Originally, it meant the web page that a browser is set to use when it starts up. Today, the more common meaning is the main web page for a business, organization, person or simply the main page out of a collection of web pages, e.g. "Check out so-and-so's new Home Page."

Host -- Any computer on a network that is a repository for services available to other computers on the network. It is quite common to have one host machine provide several services, such as WWW and USENET.

Hypertext Markup Language (HTML) -- A text-based page description language that uses tags to describe formatting idioms and allows richly formatted documents to be created using everyday text editors. HTML is the language used to create Web pages.

Internet Network Information Center (InterNIC) --The administrative organization that is responsible for, among other things, allocating domain names and distributing RFCs. The InterNIC is currently run by Network Solutions and AT&T.

Internet Protocol (IP) --The protocol responsible for transmitting packets of data over the Internet and routing them to their destinations. Tagging a packet with an IP address identifying an Internet host and transmitting it using IP is analogous to addressing an envelope and dropping it in the mail. IP plays the role of post office, allowing the networks and routers involved in the delivery process to talk to each other as the packet finds its way to the addressee.

Internet Service Provider (ISP) -- A business or organization which is connected to the Internet and allows access to their clients (users) to the Internet. Typically service providers provide their users with an email site/address, access to usenet, Internet web sites, file transfer facilities, free storage space on the service provider's computer (typically up to 5 Mbytes free of charge), and frequently free creation and use of each client's own web site.

Intranet -- The term intranet was used to describe the first wave of Internet software deployment within companies and organizations such as the Canadian Parliament. Many intranets are built around Web servers delivering HTML. Companies and organizations are seeing that the same benefits apply over the extranet, letting them share information with external partners over the Internet itself.

Network News Transfer Protocol (NNTP) -- A common method of transferring articles over Usenet.

PALS -- A standard library database interface.

Request for Comments (RFC) -- An on-line document containing proposals, standards, and other information regarding Internet technologies. RFCs are available by anonymous FTP from a variety of locations, including InterNIC's own ds.internic.net.

Telnet -- A program that allows users following very standard procedures to use computers located on other networks connected to Internet.

Uniform Resource Locator (URL) -- A standardized way of representing different documents, media, and network services on the World Wide Web. This unique addressing system is critical to locating information sources on the Internet.

Usenet -- The global news-reading network with a very wide range of interests. The range of interest groups increases daily and includes groups in many languages.

Virtual Reality Modeling Language (VRML) --The 3-D counterpart to HTML, VRML is a scriptlike language that permits rich 3-D scenes to be described in simple text files and displayed in VRML-capable Web browsers.

Webmaster -- The administrator responsible for the management (and often design) of a World Wide Web site.

Whois -- A service for tracing the name of a particular user on Internet.

WAIS -- Wide Area Information Servers is a service that allows users to search intelligently for information among the Internet's databases.

World Wide Web -- The initiative created a universal, hypermedia-based method of access to information on Internet. This has quickly become the dominant form of accessing information on the Internet. A www site at its simplest is a small document with links to other documents which can be directly addressed from anywhere on the Internet. This means that almost any small computer located in someone's home or office can be connected (via telephone, cable or satellite) with their service provider who connects the site to the entire Internet. Similarly, one service provider can offer its users their own web site free of charge with very few means of actually knowing what is on the service provider's computer.

APPENDIX 2

GENERAL INFORMATION TECHNOLOGY TERMS

Bandwidth -- A simplified means of describing the quantity of information that can be transmitted. A wider bandwidth implies a higher data transmission rate.

Baud -- A term used to express the number of bits per second of information being transmitted. When very large transfer rates are used, the convention is to use bits per second, abbreviated to bps.

Bit -- An abbreviation for BInary digiT, this is a single character in a binary number; unit of information capacity.

Byte -- A sequence of 8 binary digits. Using ASCII, a byte can represent 256 different characters/symbols.

Computer Network -- A complex consisting of two or more computers capable of interacting and communicating with each other. The amount of data a network can transmit varies greatly depending on the technology used, such as fibre-optics.

Data base -- A collection of computerized data covering a specific domain of knowledge that can be retrieved through an interactive dialogue with a computer system.

Gigabyte -- A representation of 1024 Megabytes or 1,048,576.00 Kilobytes. Often written Gb or Gbytes.

Hardware -- Physical equipment (e.g., the terminal, computer monitor, etc.)

Kilobyte -- A simplified representation of 1024 bytes, often written Kb or Kbytes. A page of text can normally be stored in 2 to 4 Kb while an image of a page of text can take 60 to 120 Kb.

Local Area Network -- A generic term applied to computer networks operating in a relatively small geographic area.

Line -- A channel or conductor capable of transmitting signals.

Megabyte -- A representation of 1024 Kilobytes, often written Mb or Mbytes. To place this term in perspective, large sophisticated computer programs frequently measure their storage needs in 5 to 30 Mb, while a large uncompressed high quality digital photograph can take up to one Mb of storage.

Modem -- An abbreviation of MOdulator-DEModulator. A device used in data transmission for converting the computer (digital) signal into a telephone signal (Analogue signal) and vice versa. In 1997 modems with a transmission rate of 56 Kbps (or 1000s of bits per second) are available commercially for a relatively low cost.

Software -- The internal programs or routines prepared to allow a computer to perform specific tasks. Several different categories of programs exist, operating systems and application programs are two of the main types.

RAM -- An abbreviation for Random Access Memory which is used in all computers for temporary storage of data and instructions to be processed by the computer.

T-1 to T-3 -- These are special categories/standard of commercial telephone lines capable of carrying a large amount of digital data. T1 can carry 1.544 Mbits of data per second (Mbps); T-2 is equivalent to four T-1s, with a bandwidth of 6.3 Mbps; while T-3 is equivalent to 28 T-1, with a bandwidth of 44.3 Mbps. Further, T-3 can be multiplexed into one dedicated high-speed line of up to 560 Mbps; such a stream will usually be transmitted over fibre-optic cable or via a microwave signal.

Teleconferencing -- Two main variations of teleconferencing exist.

Video teleconferencing: A video conference with several users is provided by video cameras and monitors set up in house or in a public conferencing centre. It requires a high-bandwidth (TV capacity) network that uses coaxial cable, optical fibres, microwave or satellite transmission. Conventional computer networks cannot handle video. Video conferencing is slowly being integrated into data networks which in time will all provide this capability.

Audio teleconferencing: A telephone conference with several users is provided internally by an organization's PBX and externally by the telephone companies.

Videoconferencing -- Video and audio communication between two or more people via a videocodec (coder/decoder) at either end and linked by digital circuits. Formerly needing at least T-1 speeds (1.54 megabits per second), systems are now available that offer acceptable quality for general use at 128 Kbit/s.