ARTICLES

An Introduction to Services Accessible on the Internet

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Abstract

The Internet is an international wide area network linking computers in research and educational institutions in more than thirty countries. Services include access to electronic mail and bulletin board facilities, access to machine-readable texts such as electronic serials, and the capacity to download complex text files and software. As libraries inevitably move toward greater cooperative resource sharing, the Internet will become an increasingly important tool in providing access to these resources.

Libraries suffering from budget cutbacks must look for alternative and creative ways of providing the same level of service with decreasing physical and personnel resources. The Internet, an international telecommunications and computer network, is potentially a tool which can expand a library's access to a vast range of services without increasing costs. For authorized users, generally transmitting on the Internet is free. In addition many of the services accessible on the Internet are also free of charge. The objective of this article is to explain what the Internet is and how it can be used advantageously in libraries. The strength of this network is in the types of services and the range of resources which it makes accessible. The article will provide an overview of the electronic mail service, bulletin boards and electronic publications available, as well as information on accessing online public access catalogs, databases and archives.

WHAT IS THE INTERNET?

"Internet spelled with a capital "I" ... refers specifically to the Internet, a set of largely TCP/IP-based networks found in the United States, Canada, as well as some other continents."[1] The term internet is in fact a derivative of the word internetwork, referring to a number of interconnected networks. The Internet is commonly compared to a superhighway which provides links to a number of locations as well as other highways. Internet refers to the physical hardware and software that links the many participating networks and, as is the case in any such interconnection, there must be some common standards which facilitate communication. "There needs to be an agreed coding scheme for signals transmitted on the cable, and a recognized procedure for taking turns to transmit. The rules that govern computer communications are known as communication *protocols*".[2] On Internet the protocols used are called the Transmission Control Protocol/ Internet Protocol or TCP/IP. In brief, these protocols provide for the exchange of electronic mail, the transfer of large files as well as remote login which is the facility to search online sources much as one does with commercial database providers.

The Internet is, in essence, then a term used to describe a series of interconnected telecommunications and computer networks. The potential use and power of such interconnections is witnessed by the rapid growth and development of the Internet over the past twenty years. Internet evolved from a research network, known as ARPANET developed in 1969 by the U.S. Department of Defense as an experimental project to facilitate communication and resource sharing among several sites. This concept was enlarged in the mid-eighties when the National Science Foundation installed five supercomputers across the U.S. and provided high speed telecommunication links to them through the creation of a wide area network, the NSFnet. This initiative created the necessary infrastructure for an eventual national network. The NSFnet became the backbone of today's Internet, to which a number of smaller regional networks were connected.

The Internet now extends into over thirty countries ranging from Finland to Australia. Its growth and development has been funded both privately and publicly at the federal and regional levels. It is a not-for-profit organization dedicated to the provision of a vast array of resources and the promotion of an increased

level of communication and cooperation among scholars and researchers, especially in the areas of education and research. Normally users are not charged for use because these costs are paid by participating institutions. Estimates vary as to the extent to which the network is used however it links several thousand networks, each one of which may have several hundred or thousand networked computers. The extent and variety of services available will no doubt continue to grow as the U.S. Congress recently approved a five year project to create a National Research and Education Network (NREN) which will enhance the NSFnet (the American backbone of Internet) with much more powerful telecommunications links which will facilitate faster and greater data transmission.

Who can access the Internet? Anyone who has an account on a computer which is linked via a regional or campus-wide local area network to the Internet. Given its vocation to serve primarily the research and education communities, Internet users are generally members of these groups; however, there are commercial organizations which offer access to the Internet to other groups which may qualify if they are involved in research activities. It is important to note that users must first access their institution's computer to establish a connection on the Internet.

WHAT SERVICES ARE AVAILABLE?

Electronic mail

Librarians may be familiar with electronic mail (more commonly known as e-mail) systems using them to send inter-library loan requests, to receive results of online searches or to communicate with colleagues across the country. Electronic mail systems transmit messages over telecommunication lines and they do not require users to communicate in real time; in other words, a message may be left in a user's electronic mailbox until the recipient accesses the system. There exist a number of e-mail systems currently in use and each one has its own particularities in terms of addressing and commands. Internet is no exception.

However, regardless of the system used, one must first ascertain that the person to be contacted is accessible on a particular network and then obtain their address. As E. Delfino notes in his article on e-mail systems, it may be necessary to circumvent high tech systems and simply write or call the person in order to initially establish the above![3] Internet addresses normally consist of the user's name, the name of the system upon which their account is resident and the name of their institution. The user's name is separated by an at sign (@) from the system and institution name. The second part of the Internet address (that which follows the at sign) is defined by the Domain Name System which not only specifies the name of the institution and the computer used at that site but often the nature of that organization. Examples of domains are .com for commercial organizations, .edu for educational institutions, etc. These domain codes apply to institutions within the United States only. For participating organizations outside the U.S. there are geographic domains, such as .au for Australia. For example, a typical address on Internet might be jdoe@vax.univx.ca; the first part is a combination of the first and last name (assuming the user's name is john

doe) and the second part indicates that the account is on a vax computer located at University X in Canada. Estimates vary as to how many million users transmit on the Internet daily. Although there are projects underway to provide comprehensive directory service, at the moment there is no global directory which can provide the names and addresses of this vast user population. However, at the local and regional levels or within a specialized interest group directories may exist. Once a user's address has been established, it is best to contact the local computer services department in order to receive instructions as to how to access Internet through your institution's particular configuration of hardware and software.

Bulletin boards

Within the context of this article, the discussion of electronic mail has been limited to a communication between two users. Bulletin boards are a natural outgrowth of this personalized form of communication extending contact to a wider audience. "Instead of sending messages to many personal mailboxes, suppose they were sent to a public mailbox to which all participants could write, and from which they all could read."[4] Electronic bulletin boards (alternately known as conferences, interest groups, news groups, mailing lists, etc. depending upon the system upon which they reside) serve a similar function to that of the traditional bulletin board where messages can be posted. The advantage of an electronic format is that users can establish a dialogue on a topic of interest.

Bulletin boards may be organized according to particular subject areas or disciplines such as physics, computer science, or library science, however they are by no means limited to professional preoccupations. (There is a proliferation of recreational groups dealing with topics ranging from astrology to zoology.) Many librarians consider library and computer-oriented bulletin boards a form of professional development because of the ongoing discussions of timely issues, descriptions and reactions to new products and services as well as answers to specific inquiries. For example, a user might post an unresolved reference question to the group for possible responses or similarly a request for reactions to a particular software package. Answers could potentially come from subscribers from several countries, depending upon the diversity of that particular board's subscribers.

In terms of library-oriented bulletin boards, one of the most popular is the PACS-L, established in 1989 by Charles Bailey, Jr. at the University of Houston. "PACS-L was set up to allow librarians to discuss issues related to computer systems in libraries that are used by patrons, such as CD-ROM databases, computer-assisted instruction programs, expert systems, hypertext programs, locally mounted databases, and online catalogs."[5] For further information about this particular conference as well as a number of other library-related conferences, consult Bailey's article entitled "Library-Oriented Computer Conferences and Electronic Serials on Bitnet and Internet."[6] This article also provides basic information on how to subscribe to the groups mentioned. It is important to note the success of a given conference or bulletin board is dependent upon the participation of its subscribers. The quality of the messages and the ensuing discus-

sions depends upon the contributors; all of which is carried on a voluntary basis by the bulletin board's subscribers. Many browse the messages from a particular bulletin board without actually participating. However, it is important to know that the vitality of a particular board is entirely dependent upon its subscribers' contributions.

Given the proliferation of networks, it can be confusing to differentiate between them. In terms of e-mail and bulletin boards, librarians may be more familiar with Bitnet (Because It's Time), which is another international network extending into Canada (as Netnorth) and Europe (as EARN) with some connections in Asia and South America. Bitnet and Internet are separate and distinct networks using different protocols. Bitnet is essentially used for electronic mail, access to bulletin boards and for the transfer of relatively short text files. Electronic mail messages can be transmitted from one network to another via gateways, which are transparent to user. On Bitnet, bulletin boards are administered using the LISTSERV software which automatically posts any messages received to all subscribers. (This is the case for unmoderated groups; in moderated groups a moderator or an editor intervenes to group together messages dealing with a similar topic or to delete extraneous material before mailing to subscribers.) On Bitnet, therefore, if you subscribe to a particular group you will normally receive all messages posted to that bulletin board. This is not the case for Internet because messages are not automatically distributed; users access specific bulletin boards or news groups to read messages which have been posted since their last logon. In addition to e-mail and bulletin boards, Internet offers a more sophisticated range of services such as downloading software and large, complex files as well as remote login to online catalogs, databases and computers.

Electronic publishing

Electronic publishing is an area well suited to this online environment. It can be seen in the creation of electronic serials and in the conversion of books into an online format.

Individual bulletin board subscribers or groups who wish to communicate with their readership in a more formalized manner can now distribute newsletters or journals electronically. The PACS-L bulletin board has given rise to two examples: The Public-Access Computer Systems Review and The Public-Access Computer Systems News. This journal and newsletter respectively are available free of charge to PACS-L members who wish to subscribe. Subscribers receive a table of contents furnishing basic information about articles and information in the current issue and they may then request copies of specific items of interest to them. Previous issues are archived and may also be retrieved.

In recognition of the growing importance of this type of material, the journal Online launched its first review in January 1991 of a journal published in an online format only.[7] Titles such as the IRLIST Digest dealing with information retrieval research, and the Newsletter on Serials Pricing Issues devoted to problems related to serials, are other examples of online serials of interest to librarians. (For further information describing these serials and the subscription procedure, consult Charles W. Bailey"s article "Electronic (Online) Publishing in Action...The Public-Access Computer Systems Review and Other Electronic Serials"[8].

Electronic serials are prevalent in many fields. For example, in the area of education titles such as *The Chronicle of Higher Education, New Horizons in Adult Education* and *The Online Journal of Distance Education and Communication* are but some of the serials available online. The Association of Research Libraries (ARL) has compiled a multidisciplinary directory of electronic serials and this directory is available in print, on diskette and online.[9]

In addition to serials, major works such as *The Bible* and Dante's *Divine Comedy* are retrievable in full text on the Internet. An ambitious undertaking known as Project Gutenberg is currently converting many of the classics into computer searchable electronic versions. The project's objective is to have 10,000 electronic texts by year 2000.[10] Publishers are also migrating to the Internet. Meckler now provides Internet access to its catalog of publications, an online newsletter and indexes to the CD-ROM Librarian and Computers in Libraries (for approximately the last five years).

Electronic publishing will challenge many of the traditional concepts of publishing. Its emergence and growth will create repercussions in the way in which information is formatted, disseminated, read, protected, paid for and subsequently archived. The manner in which the PAC-L publications are distributed is but one small example of how concepts such as distribution will be modified. For librarians, one of the most immediate concerns is remaining informed about developments in this rapidly evolving field. A growing body of literature now includes citations to communications from boards or electronic newsletters and journals. It is, therefore, necessary to be familiar with these online sources for both personal professional development and also for retrieval for library patrons.

Online Public Access Catalogs and Databases

With the transition of many university library catalogs from a card format to a computerized one, online public access catalogs are becoming increasingly accessible on the Internet. Once a library catalog is mounted and accessible on a local area network it can usually be linked to a regional network on Internet.

Internet users can now browse university catalogues from major research institutions and libraries such as Harvard, Yale and Oxford. Researchers and students can immediately expand their research beyond their local or institutional library to a more comprehensive search of the existing literature. For collection development purposes, librarians can now consult the best collections in a particular discipline. In addition librarians considering automation of their catalogues can evaluate the major OPAC software systems on the market. By identifying libraries which have adopted OPAC systems of interest to a particular library, one can then access these OPACs, conduct sample searches and evaluate their relative utility.

In order to log on to a specific online catalog available on Internet one must issue a specific Internet command (Telnet) followed by the address of that particular site. Once the connection has been established, the host site usually requests that the

user provide further information such as id, password, etc. This specific information varies from one site to another. In order to provide basic information such as site addresses as well as the type of information which will be required to access each individual catalog, two complementary directories to online catalogs and databases have been created. The first is commonly known as "the St. George directory"; it is created and updated by Dr. Art St. George of the University of New Mexico and Dr. Ron Larsen of the University of Maryland.[11] The second is authored by Billy Barron of the University of North Texas.[12] International in scope and updated regularly, each directory provides a listing of the procedure to follow for individual library systems accessible on Internet.

Many large university and research institutes have supplemented their catalogs with locally produced or commercially leased databases which may be searched using the same search commands as their OPAC system. Although, in the vast majority of cases, access to commercially leased databases is restricted to local, authorized users due to licensing agreements, on occasion specific databases may be available. Of interest to those involved in the field of education is the fact that the University of Saskatchewan, for example, provides access to the Eric database among others.[13] In such cases, access restrictions may involve limiting the number of simultaneous users permitted and/or the time period when searches may be conducted. As a basic courtesy to the host system, users should refrain from searching during peak time periods when the host's operations may be slowed due to external users. Information regarding databases which may be accessed via specific institutions is available in the "St. George directory". In addition to commercially distributed and well known databases, these directories or bulletin board messages can serve to alert users about little known, specialized and non-commercial databases of interest to specific user groups. Finally, access to databases available through the Internet is no longer limited to specific databases available on individual hosts. A number of commercial services such as Dialog, RLIN, and OCLC'c Epic are now also accessible on the Internet.

Downloaded texts and software

Barbara Quint, borrowing from Gertrude Stein, aptly characterized the Internet with the statement "There is no there."[14] In fact, the Internet has developed as a cooperative consortium of organizations and networks with no centrally organized administration. As a consequence much of the system documentation has evolved in a decentralized manner, often created to meet the needs of a particular user group. And given the nature of the medium, much of this material is in a machine-readable format accessible on specific computers. The National Science Foundation's Network Service Center makes available the Internet Resource Guide, a machine-readable document which provides a detailed listing of the services available.[15] Similarly the two directories of OPACs and databases, previously mentioned, as well as other guides to the services and archived bulletin board material are available for downloading from specific computer sites. In addition to the traditional text files, some hosts have dedicated sections to collections of public domain software

which can also be downloaded.

The File Transfer Protocol on Internet is used to obtain text files or software. FTP, as it is more commonly called, is the transfer of files between computers. Most users employ it to receive files from remote sites, however, it can also be used to send files. Using the FTP command, users can log on to a host computer, obtain listings of its directories and transfer files to their site. Organizations which offer this access do not require that users have an authorized ID to gain access. The user signs on as "anonymous" when the system requests an ID; similarly when a password is requested the user enters their address or simply the word "guest". This specific procedure is known as anonymous FTP and it has been designed to facilitate access to sites offering free transfer of texts and software. It is important to note that once a user is logged on some basic understanding of file and directory organization is necessary in order to be able to navigate effectively. Caroline Arms provides a short description of the most important commands to use once logged on to an FTP site.[16] Finally, the local computer services department should be consulted for instructions on how to import a file given your organization's particular configuration.

The objective of this article has been to provide an overview of the services available on the Internet of interest to libraries. The major services have been highlighted but others exist and new ones are created on an ongoing basis. A number of major issues concerning the Internet, such as security, standards, ethics, etc. remain to be resolved. However, the most urgent need is to make the vast amount of information available on the Internet more accessible. Libraries need to monitor developments on the Internet in order to have up-to-date information on the various kinds of services available. Once this is mastered, they will have develop simple and comprehensive tools to assist library patrons in its use.

ENDNOTES

1. International Federation of Library Associations, *Research Networks and Libraries :Applications and Issues for a Global Information Network*, by Gary Cleveland. Ottawa, Ont.: IFLA International Office for Universal Dataflow and Telecommunications, 1991, A-4.
2. Caroline R. Arms, "A New Information Infrastructure," *Online 14* (September 1990) : 16
3. Erik Delfino, "E-Mail Connections : It's Still a Jungle Out There...But It Is Getting Better," *Online 14* (September 1990) : 32.
4. Matthew J. Rapaport, "Computer Conferencing Bulletin Boards, and Information Professionals," *Online 15* (May 1991) : 34.
5. Charles W. Bailey, Jr., "Electronic (Online) Publishing in Action...The Public-Access Computer Systems Review and Serials, "*Online 15* (January 1991) : 28.
6. Idem, "Library-Oriented Computer Conferences and Electronic Serials on Bitnet and Internet," *Database Searcher 7* (February/March 1991) : 22-23.
7. Judith A. Copler, "Reviews of Recent Writings," [A online published journal PACS REVIEW] *Online 15* (January 1991) : 71-72.
8. Charles W. Bailey, Jr., "Electronic (Online) Publishing in Action...The Public-Access Computer Systems Review and Serials, "*Online 15* (January 1991) : 28- 35.
9. Association of Research Libraries, *Directory of Electronic Journals, Newsletters and Academic Discussion List,* edited by Ann Okerson, compiled by Diane Kovacs and Michael Strangelove. Washington, D.C. : The Association, 1992.

10. Reva Basch, "Books Online: Visions and Perspectives for Electronic Text," *Online 15* (July 1991) : 14.

11. St.George, Art, PhD. and Ron Larsen, PhD., *Internet - Accessible Library Catalogs & Databases*, edited by Carlos Robles and Heather Hughes. California Education and Research Federation Network, 1991.

12. Billy Barron, *UNT's Accessing On-Line Bibliographic Databases*, University of North Texas, 1992.

13. Gord Nickerson, "Local Databases," *Computers in Libraries 12* (January 1992) : 38

14. Barbara Quint, "Online Meets the Internet," *Wilson Library Bulletin 66* (March 1992) : 78.

15. NSF Network Service Center, *Internet Resource Guide*, Cambridge, MA. : NSF Network Service Center, 1989.

16. Caroline R. Arms, "Anonymous FTP : Getting Files on the Internet," *Online 14* (September 1990) : 27.