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 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 facili­
tate 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
institutions’s computer to establish a connection on the Internet.

**WHAT SERVICES ARE AVAILABLE?**

*Electronic mail*

Librarians may be familiar with electronic mail (more com­
monly known as e-mail) systems using them to send inter­library
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. Del­fíno
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! 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 organiza­
tion. Examples of domains are .com for commercial organiza­
tions, .edu for educational institutions, etc. These domain codes
apply to institutions within the United States only. For participat­
 ing 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 combina­
tion 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. Al­
though 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. “In­
stead 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.” 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 profes­
 sional 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 ongo­
ing discussions of timely issues, descriptions and reactions to
new products and services as well as answers to specific inquir­
ies. 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, de­
 pending 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 librari­
ies that are used by patrons, such as CD-ROM databases, compu­
ter-assisted instruction programs, expert systems, hypertext pro­
grams, locally mounted databases, and online catalogs.” 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.” This article also
provides basic information on how to subscribe to the groups
mentioned. It is important to note the success of a given confer­
ence or bulletin board is dependent upon the participation of its
subscribers. The quality of the messages and the ensuing discus­
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. 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".)

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.

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. 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. The second is authored by Billy
Barron of the University of North Texas.

Many large university and research institutes have supple-
mented 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. 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's Epic are now also accessible on the Internet.

\textbf{Downloaded texts and software}

Barbara Quint, borrowing from Gertrude Stein, aptly char-
acterized the Internet with the statement "There is no there." In
fact, the Internet has developed as a cooperative consortium of
organizations and networks with no centrally organized admin-
istration. 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 Founda-
tion's Network Service Center makes available the Internet
Resource Guide, a machine-readable document which provides
a detailed listing of the services available. 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. 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.

\textbf{ENDNOTES}

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