

INTERNET AND ITS IMPACT ON LIBRARY AND INFORMATION CENTRES

A Lakshmana Moorthy & CR Karisiddappa*

DESIDOC, Ministry of Defence, Delhi-110 054

** Dept of Library & Information Science, Karnatak University, Dharwad-580 003*

ABSTRACT

The paper briefly discusses about some of the various facilities available over Internet. The usefulness of Internet in the library environment is also described. Accessing the Web-based information, electronic journals and scholarly publishing on the Internet and also the status of Internet and other library networks in India are dealt briefly. The concept of electronic commerce and the role of Internet are also dealt.

1. INTRODUCTION

Computers, communication and information access technologies are effecting revolutionary changes in the way the information is stored, retrieved, and disseminated. Internet, a network of more than 30,000 (as of May 1994) networks [Neesham, 1994], also called variously as the Cyberspace, Information Superhighway, the Net, etc has enabled global level inter-connectivity of computers and computer networks. Internet, a traditional avenue for sharing research data and information, has brought in a new era in global communications. It is an open computer communication infrastructure of the world. It has been described as arguably the most complex structure yet discovered in the world.

The growth of Internet has been global and continuous. And it is growing at a rapid pace. In 1991 the Internet was in the reach of only 73 countries; 100 countries accessed it in 1993 and in 1995 it reached 148 countries. The number of host computers/sites and the number of users are almost doubling every year. In 1994, it had a user base of 20-25 millions with over two million connections which was expected to be doubled by the end of 1995. Now, Internet has about five million host computers with a new host added every ten minutes [see Treese, 1994], spread over 160 countries around the world. The Internet Architecture Board, one of the three erstwhile managing bodies of the Internet Society, has estimated a monthly growth rate of 10-15 per cent for computer hosts. It is providing connectivity to over 50 million users. And in North America alone, the Internet has over 37 million users. At present with a base of about 6.8 million subscribers, it is expected to reach 20 million by the turn of the century. It has been estimated that at any point of time two million new users try to browse what Internet can offer them [Eager, 1994].

There have been tremendous developments in the area of transmission speeds at which the information/data files are transmitted over the Net. Initially the transmission speeds used to be 64 kbps; this reached 1.5 Mbps in 1993. However, recently the speeds at which the information transmission is taking place reached 45 to 622 Mbps (in advanced countries) and is leaping towards achieving Gbps rates.

2. INTERNET AND LIBRARY & INFORMATION CENTRES

User applications on Internet cover a whole gamut of variety of subject fields and areas—advertising, business, commerce, culture, education, finance, research, recreation, science and technology and so on. The avenues for exploitation of Internet by library and information centres (L&ICs) are unlimited and endless. Internet provides access to a variety of commercial and non-commercial information sources which include: bibliographic and full-text databases; table of contents

of primary journals; electronic and online journals, books and newsletters; almost all OPACs, graphics databases, multimedia walk through programs, audio clip art databases; e-mail, directories, product and library catalogues, campus information systems, etc. Internet is also a test bed for electronic document delivery, electronic publishing, publicity and marketing of products and services, and integrated access to local and external information.

Internet is also a resource of many varieties of information. For example, free software developed at various academic institutions and research organisations as well as by individuals and is made available through Internet, newspapers, electronic shopping merchandise, product information catalogues of various institutions and organisations, bulletin board discussion forums for exchange of professional views, news and research; shareware/clipware (made available for free trial before actual purchase, albeit with deletion of important routines), research articles and preprints. A lot of free of cost public domain software is available on various Internet sites which can be downloaded for personal and official use (but not for marketing purposes).

Technologies for accessing information sources on Internet are changing rapidly. Starting with provision of basic tools like e-mail, Telnet, and FTP, Internet has shifted emphasis to navigation aids like Wide Area Information Servers (WAIS), Archie, Mosaic, Usenet, Gopher, and the consumer-oriented home pages of the World Wide Web (WWW or simply the Web). Some of the avenues of Internet which the L&ICs can exploit are briefly dealt in the following paragraphs.

3. ACCESSING INFORMATION ON THE WEB

The Web is a subset of the Internet using a high level protocol (HTTP) and supports text, graphics, audio, video and multimedia. On the Internet today, WWW is the largest information resource of easily accessible information. The information sources around the world are getting inter-linked through Web pages and Web servers spread around the globe. Several projects have also been initiated which focus on developing digital libraries to provide remote access over Internet to very large multimedia document collections, stored on distributed servers.

Advertising on the Web is one of the best ways to make the world know about an individual (say, consultant) and the library. This would enable publicity about the various facilities, services and products offered by an L&IC or a consultant to the users. This means operating a home page on the Web. However, there are very few Web servers available. The foreign Web servers charge anywhere between a few thousands to a few lakh rupees for putting up a Web page. Universal resource locators on the Web like Yahoo and Lycos allow one to enter a Web page under an appropriate category. This also enables the users of a particular category to see related home pages. Services like CommerceNet (<http://www.commercenet.com>) allows to add the home pages to the existing indexes as well as spread the information including printed directories.

4. BULLETIN BOARD SERVICES

An off shoot of the e-mail, the Bulletin Board Service (BBS) is essentially a many-to-many e-mail system [Buckland, 1987]. The first BBS Well (Whole Earth Lectronic Link) was set up in mid 1980s by a group of enthusiasts [Neesham, 1994]. Now this service disseminates professional information in an open bulletin board which will be read and commented by users in the field. The views and critical comments are 'posted' (appended) to the bulletin board which in turn will be seen by the moderator of the BBS and other professionals, for further comments, if any. There are two types of bulletin boards, moderated and unmoderated. Discussion groups and forums like PACS-L which discusses the applications of computers in libraries and LIS-FORUM (of IISc) which discusses the topics of interest to the librarians have been set up on the BBS.

The multiplicity of the BBS, discussion groups, newsgroups and others resulted in the development of searching programmes such as Archie, Gopher and Veronica to facilitate locating the required information with ease.

5. ELECTRONIC/ONLINE JOURNALS

An electronic journal is defined [McMillan, 1991] as any serial produced, published and distributed nationally or internationally via electronic networks such as Bitnet and the Internet. Electronic journal is different from online journal [Langschied, 1992]. The latter are the electronic counterparts of journals in print. The uses, impact and implications of electronic publishing and online journals on libraries and information centres has been discussed by Lakshmana Moorthy & Karisiddappa [1996].

Internet developments related to the publishing of scholarly journals and L&ICs include the increase in publishing of electronic and online journals and other primary sources of information like preprints and technical reports, and access to table of contents of journals and by full document delivery. Several journals are already available on the Net. Some journals like the Journal of Universal Computer Science, Electronics Letters Online, Online Journal of Knowledge Synthesis in Nursing, and Current Clinical Trials are available only on the Net. There is a well-established system for distributing and providing access to abstracts and full texts of preprints and technical reports in the areas of physics, mathematics and computer science in the academic community around the world. Services like 'Uncover' of Blackwell and 'Contents First' of OCLC offers Internet access to table of contents of several thousand journals, followed by online ordering of papers. Institutions have begun to take such services into account while planning their acquisitions, particularly journal subscriptions.

Major publishers like American Chemical Society and Elsevier are offering their journals on Internet and OCLC. Professional associations like the Association of Computing Machinery have nodes on Internet which offer mail forwarding accounts for their members at competitive rates. Many organisations maintain an online catalogue of their publications over Internet/WWW which could be searched using navigational tools. The users can select items of interest and click for further processing.

Electronic Letters Online of the Institution of Electrical Engineers (UK) and all the eleven titles of IEE Proceedings are available over Internet along with many other scientific electronic journals through OCLC's Electronic Journals Office (EJO) system. These are accessed through the graphical interface GUIDON of the OCLC and using the NetScape and Mosaic browsers these are also available over WWW.

Starting from 1996, the Institute of Physics Publishing of USA started issuing all its 31 journals in both printed and online (electronic) form. The online journals are available, along with the printed version, to the subscribing institutions on WWW at no extra cost. This has speeded up the dissemination/delivery of the primary journals by three weeks.

Many publishers maintain the contents pages of their journals on Internet/WWW. For example, Elsevier Science Publishers maintain a table of contents (called ESTOC — Elsevier Science Table Of Contents) of about 900 journals published by them. The contents pages appear on the Web at the same time as the printed issue is released. Elsevier also provides this service free of charge on e-mail (on Internet only) two to three weeks in advance for browsing. Blackwell Scientific, Taylor and Francis and Aslib along with eight others are also planning contents of about 250 electronic journals the full text of which will be available online from January 1997. Such services can be effectively used for CAS/SDI services by the libraries which are subscribing the journals.

McGraw-Hill is offering electronic version of its *Business Week* on America Online which has resulted in attracting new readers. It receives over half a million clicks on its pages every week and each 'click' generates revenue. This 'feedback' enabled editors to analyse and feel the pulse of the readers' interest to revise content [The Economic Times, 1995]. Penthouse magazine of USA

on Internet attracts about 2 million 'hits' daily, a record on Web. Readers are allowed to comment through an interactive message board appearing at the end of the feature.

Now there are over 400 daily newspapers, 800 magazines, 1500 newsletters and other products are available, online via communication networks and the Internet. In 1995, the Association of Research Libraries brought out a Directory of electronic journals, magazines, newsletters and academic discussion lists and the updates are being announced in the NewJour on the Internet. This is a useful tool for identifying the electronic publication one is interested. The number of journals available 'online only' are increasing day by day. For example, some of the journals offered by OCLC like *Current Clinical Trials* and *The Online Journal of Knowledge Synthesis in Nursing* have no print equivalent. These are published fast; the peer-reviewed papers are edited and marked up in SGML and sent to OCLC which are made available online within 24 hours.

5.1 Internet and OCLC Online Computer Library Centre

OCLC has been an important agency for providing access to online journals over Internet. Through its EJO service, OCLC offers peer-reviewed journals online over Internet. The electronic publication programme of OCLC started in July 1992 with the introduction of *The Online Journal of Current Clinical Trials* in association with the American Association for the Advancement in Science. This is the first scholarly peer-reviewed journal made available in the online environment [Dykhuis, 1994]. This was followed by *The Online Journal of Knowledge Synthesis in Nursing and Electronics Letters Online* (September 1993).

First Search Information System of OCLC is now available on Internet/WWW. Using Web browsers like Mosaic and Netscape Navigator through FirstSearch, users have access to a world of information on topics including arts and humanities, business and economy, conferences and proceedings, education and training, engineering and technology, general and life sciences, medicine and health, general reference sources, social sciences, and news and current affairs. The member libraries of OCLC are rapidly increasing their use of Internet and the WWW. Approximately 85 per cent of FirstSearch usage is on Internet.

Subscribers can browse the contents of the online journals or search the entire collection by a variety of indexes, Boolean operators and proximity indicators. The Windows-based software Guidon of OCLC provides both colour and graphical images and equations along with the text [OCLC Newsletter, 1995].

Scholarly publishing on WWW and the Internet is on the increase. Though very insignificant portion of the world's publicly available data is contained in the Web and Internet (a fraction of one per cent), it is estimated that in the next five to six years it would be increasing thousand fold and may hold about 80 per cent of the publicly available data [quoted in Cronin & McKim, 1996]. Institute of Scientific Information, USA recently announced the inclusion of some titles available on Internet for indexing and coverage in its databases. However, there are a number of problems associated with electronic scholarly publishing [see Lakshmana Moorthy & Karisiddappa, 1996]. A detailed discussion of the scholarly publishing on WWW can be found else where [OCLC, 1995]. The various problems associated with scholarly publishing over Internet such as cost, conviviality and convenience, novelty, community, and legitimacy are discussed by Cronin & McKim [1996].

6. ELECTRONIC COMMERCE

The Internet has brought about a new concept called electronic commerce, in the marketing and business. Electronic commerce has been, perhaps, one of the most impressive benefits of Internet which made the institutions, industries, individual professionals having expertise in various fields and commercial organisations joining Internet in a big way contributing to the Internet information resources and also gaining by way of increased marketability of their products, services and expertise.

As per a recent report published in the Economic Times, the value of Internet commerce was US\$ 18 million in 1994 and US\$ 436 million in 1995. The report also estimated the 1996 value at US\$ 2.9 billion which is expected to reach US\$ 150 billions by the turn of the century. Another estimated the Web-based revenues for the year 1996 to be US\$ 70 million and by the year 2000 this is expected to reach US\$ 2 billion [Brand Equity, 1996]. With more than 100,000 Web sites doubling every two and half months, 23,540 companies, 370 online shopping malls [O'Kane, 1996] and over 50 million users the Net can make a lot of difference in the business world. Whereas in the conventional commerce the advertiser goes to the consumer, in the Net commerce the latter goes to the former.

This explains the high advertisement tariffs the magazines like Playboy (~800,000 clicks a day with an ad rate of US\$ 50,000 per quarter) and Hotwired Cyberstation (US\$ 30,000 per 8 weeks). An electronic-only news paper on the Web, The Nando Times receives 5.5 million accesses (clicks) daily [Sussman & Pollack, 1995]. It was reported that the electronic products account for 35 per cent of the McGraw-Hill's total revenues [The Economic Times, 1995].

The Internet will probably continue to have an important role in electronic commerce including online ordering by libraries. Books and journals can be ordered through Web-based ordering systems or through EDI on the Internet. Electronic commerce is an exciting area where individuals also have a major role to play. The individuals could be the professionals offering consultancy in their areas of expertise or they could be the public at large who wish to utilise the various resources available on the Internet.

Publishing industry is already exploiting the Internet by way of offering online journals, table of contents of journals, and catalogues of books and products over Internet. Well-known bookstores around the world are offering their holdings over Internet. It is possible to order a book from, say, Blackwell (<http://www.blackwell.co.uk/bookshops>), which maintains a database of over 150,000 active titles. Bookwire (<http://www.bookwire.com>) has links to 150 booksellers and over 200 publishers to select publications and to order. Of particular importance to librarians is the Acqweb, a Web site intended for library acquisitions [see Barber, 1995 for a detailed discussion of Internet book ordering].

These developments have resulted in two types of electronic payments through (a) credit-based payment system with players like MasterCard/NetScape and VISA/MicroSoft and (b) debit-based payments systems. The former include CyberCash (<http://www.cybercash.com>); and First Virtual Holdings (<http://www.fv.com>); and the latter include DigiCash's E-cash (<http://www.digicash.com>) which provides privacy of transactions and Mondex (<http://www.mondex.com>). Many online business organisations accept the electronic payments [Barber, 1995].

7. INDIA AND INTERNET

The 'Internet fever' is slowly spreading in India also. Access to Internet is provided by a few networks which include ERNET, NICNET, VSNL, NICNET, CMC, and I-NET from public sector and SPRINT/RPG, BI Infotech, Datapro, UUNET, etc from private sector. ERNET, funded by UNDP, is facing an uncertain future. At present NICNET is a prime agency providing Internet services. NIC proposes to provide access to about 15,000 medical, academic, R&D institutions and organisations. NICNET established the first WWW server in India allowing users access to browsing tools like Mosaic and Cello, searching, display, publishing, Telnet, FTP, WAIS, Gopher and Hytelnet. The National Informatics Centre was to establish 30 Web servers all over India by July 1995 [Subramaniam & Gupta, 1995]. However, there are only four Web servers available at present (personal communication with NIC). About 35 Indian Web Servers and a number Internet sites of interest to the librarians are listed by Wolinsky [1996].

These developments have major implications in our country related to information access

and supply. We should ensure that all L&ICs have Internet connectivity and that they tune their acquisitions keeping in view what is accessible through international networks. Such a connectivity, once in place, could be used for developing and offering services, both for domestic and international customers.

8. CURRENT STATUS OF NETWORKS IN THE COUNTRY

Since the Internet is generally provided by various networks, it may not be out of place to have an idea of the networking activities in the country. The 1990s have witnessed renewed interest in the planning, development and establishment of library networks. Keen interest has been shown by the library professionals as well as policy and decision makers in the activities of library automation, database development and networking. One major development is the establishment of metropolitan library networks like DELNET, CALIBNET, ADINET, etc.; the national bibliographic information networks like INFLIBNET, BTIS, NICNET and the establishment of computer communications networks like ERNET, NICMAIL/RENNIC which can also be used for transmission of bibliographic information. NISSAT of the Dept of Scientific and Industrial Research has been the backbone and the supporting agency for promoting the metropolitan networks like ADINET, BALNET, BONET, CALIBNET, DELNET, MYLIBNET and PUNUNET, while the University Grants Commission has been promoting the INFLIBNET [see ref 6 for a brief discussion of metropolitan networks like ADINET, BONET, CALIBNET, DELNET, and also the INFLIBNET].

While many libraries in the country have started efforts to create databases of their holdings, networking of these databases is yet to take shape. The library networks in the country are expected to play an increasingly important role in providing access to both indigenous and outside databases. Also, with the e-mail facility they are expected to provide users connectivity to communicate with remotely located people. However, to have Internet linking they are expected to subscribe to NICNET, ERNET or any other such public or private network. The participating L&ICs of the metropolitan networks and the INFLIBNET will be over 600 and when all these access and utilise the Internet resources, it would have a tremendous impact on the document acquisition, resource sharing, document delivery and information dissemination activities in the country.

9. CONCLUSION

The Internet is changing the notion of library from a walled place into a virtual library, i.e., a library without walls. Even public libraries like Atlanta-Fulton Public Library of USA are offering Internet access to the users including electronic reference service and remote log-in by dial-up [Agnew, 1996].

Although the Internet boasts of reaching 160 countries, there is not much to be happy about its impact on developing countries. The balance is heavily tilted towards developed countries; very few nodes with inadequate infrastructure and unreliable telecommunication links are available in the developing countries. It is well established that the telephone infrastructure is synonymous with economic strength; poor infrastructure undoubtedly results in obstructing the economic growth. In a study undertaken in 1994, it was found that the computer nodes were strongly associated with per capita income. Of the 9,10,149 Internet connections in 1992, about 97 per cent were located in developed countries; about 65 per cent in USA alone followed by other wealthy countries of OECD. For her entire population of about 86 million, India had a mere 6 nodes. [Jacobson, 1994]. Currently, the Internet connections in India amply make it clear that it is available in Government and financially strong research institutions only. It will take a few more years before Internet and global network access technologies become easily available to all libraries in the country.

The decentralised nature of the Internet, the WWW, and the lack of direct control of any participating host/network makes it impossible to provide the users with the same end-to-end network support that the users may get when subscribing to a network like NICNET or ERNET etc. However, the rate of progress depends upon several factors such as user acceptance, economics,

commitment to established products and services and also the pace of technological advances. The usage of information networks will have a positive impact on the way the information is generated, communicated, processed, stored, retrieved and disseminated. The availability of e-mail and file transfer capabilities have made the dissemination of the information faster across continents.

The day is not too far when one may be navigating through a favourite magazine or a primary periodical on Internet. The only hindrance to it comes from the computer display resolution technology and the size of the VDU. These make the electronic book reading or viewing a tedious option to the conventional book reading. This calls for development of reader-friendly VDUs for achieving the limitless usage of Internet resources.

ACKNOWLEDGEMENTS

The authors are thankful to Dr SS Murthy, Director, DESIDOC for his kind permission for providing the facilities and for the permission to present this paper. They are also thankful to Dr CK Ramaiah, Scientist, DESIDOC for his valuable suggestions in preparing the paper.

REFERENCES

1. Agnew, Grace B. The Internet initiative at the Atlanta-Fulton Public Library. *DESIDOC Bulletin of Information Technology*, 1996, **16**(1), 25-30.
2. Barber, David. Electronic commerce in library acquisitions with a survey of booksellers and subscriptions agency services. *Library Technology Reports*, 1995, **31**(5), 493-610.
3. Brand Equity. *The Economic Times*, 12-18 June 1996. p. 4.
4. Buckland, Michael H. Combining electronic mail with online retrieval in a library context. *Information Technology and Libraries*, December 1987, 266-271.
5. Cronin, Blaise & McKim, Geoffrey. Science and scholarly publishing on the World Wide Web. *Journal of Documentation*, 1996, **52**(2), 163-171.
6. *DESIDOC Bulletin of Information Technology*, 1996, **16**(2), special issue on Library Networks in India.
7. Dykhuis, Randy. The promising of electronic publishing: OCLC's program. *Computers in Libraries*, 1994, **14**(10), 20-22.
8. Eager, Bill. *Using the Internet*. Indianapolis, Que Corporation, 1994.
9. *The Economic Times*, 29 November 1995, p. 37.
10. Jacobson, Thomas L. The electronic publishing revolution is not 'global'. *Journal of the American Society for Information Science*, 1994, **45**(10), 745-752.
11. Lakshmana Moorthy, & Karisiddappa, CR. Electronic Publishing : Impact and Implications on Library and Information Centres. In *Digital libraries: Dynamic storehouse of digitized information*. Papers presented at the SIS 96: Fifteenth Annual Convention and Conference, 18-20 January 1996, Bangalore, edited by NM Malwad, TB Rajashekar, IK Ravichandra Rao and NV Satyanarayana. New Delhi, New Age International Publishers, 1996. pp 15-35.
12. Langschie, L. Electronic journal forum: Column 1. *Electronic Journal Forum*, 1992 (Spring/Summer), 131-136

13. McMillan, G. Embracing the electronic journal: One library's plan. *The Serials Librarian*, 1991, 21(1), 97-108.
14. Neesham, Claire. Inside Science No 77: Network of information. *New Scientist*, 10 December 1994, 1-4.
15. OCLC. Scholarly publishing on the World Wide Web. OCLC Annual Report 1994. Dublin, OCLC, 1995. PP. 20-24.
16. OCLC Newsletter, 1995, (July/ August), 22.
17. O'Kane, Kevin C. World Wide Web-based information storage and retrieval. *Online and CD-ROM Review*, 1996, 20(1), 11-20.
18. Pande, Manisha. *Asian Age*, 12 December 1995, p. 13
19. Spear, BJ. Preparing pages for World Wide Web. *Online & CD-ROM Review*, 1995, 19(6), 325,327.]
20. Subramanian, L and Gupta, Sharad. Get...set...Internet. *Dataquest*, 16-28 February 1995, 112-120.
21. Sussman, V and Pollack, K. Goldrush in cyberspace. *US News & World Report*, 1995,113(19), 72-80.
22. Treese, Winn. The Internet index. treese@orl.dec.com. 1994 (quoted in Shaw, Debora. Libraries of the future: Glimpses of a networked, distributed, collaborative, hyper, visual world. *Libri*, 1994, 44(3), 206-223.
23. Wolinsky, Judi. Internet sites of librarian's interest. *DESIDOC Bulletin of Information Technology*, 1996, 16(3), 21-28.