CHAPTER – 2

REVIEW OF LITERATURE
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A thorough review of existing literature was conducted and presented in two different parts: literature dealing with library and information networks in some of the advanced foreign countries like U.S.A., Canada, U.K., Australia, Spain, Japan, etc. and the overall scene in India, which constitutes the second part.

2.1 Library networks in U.S.A.

The library networks in USA are in a most advanced stage of development. The three foremost library and information networks in USA are the On-line Computer Library Centre, (OCLC), Dublin, Ohio, Research Libraries and Information Network, (RLIN), Stanford, California and Washington Library Network (WLN), Olympia, Washington. The library networking is based on three major areas of technology, viz, creation of bibliographic information in machine readable format for storage and retrieval, hardware, and telecommunication mechanism for transmission of information. Success of library network depends critically upon availability of machine readable catalogues in the constituent units. A great leap forward has been taken by USA in this regard.

2.1.1 OCLC (Online Computer Library Center)

The OCLC, Inc. established in 1967, is a non-profit largest leading network and bibliographic utility for libraries in the world, linking more than 37,001 stakeholder libraries (9,000 general members and 28,001 participating libraries) in 76 countries and territories in the world. OCLC offers services like inter-library loan (ILL), union catalogue search,
etc. First search is an economically priced online bibliographic service that offers access to 75 databases and includes links to WWW. It also offers online full text, document delivery, and inter-library loan services. Its union catalogue database contains 43 million records. Some 36,000 records are added every week. Today, approximately 99.9 percent of all libraries participating in OCLC in the United States do so through a regional network.

2.1.2 OCLC Pacific

OCLC Pacific, a division of OCLC, was formed in 1976 to provide training and support to west coast OCLC members. Today, OCLC Pacific serves over 729 libraries in California, Oregon, Washington, Montana, Idaho, Hawaii and Alaska.

2.1.3 OCLC/WLN Pacific Northwest Service Centre

The WLN, established in 1972, was providing more than 2250 libraries in seven states of USA, on-line computerised services to promote resource sharing and automated library functions but in 1999 OCLC and WLN merged and WLN became the OCLC/WLN Pacific Service Centre. OCLC will remain in Lacey, Washington, to provide support and training for libraries in the Pacific Northwest.

The OCLC/WLN Pacific's northwest service centre brings to the OCLC memberships community a unique combination of dedicated worldCat users and innovative, creative libraries-moulding and supporting the MARS Authority Control, Automated Collection Analysis and LaserCat/FastCat CD-ROM product and service offerings. OCLC/WLN cooperates with ACLIN (Access Colorado Library and Information Network) and supports...
libraries' efforts to maintain high-quality databases, as well as reduce costs and streamline processes⁶.

ACLIN is a statewide network providing access to over 230 library catalogues and information resources on business, health, government, the arts, etc. in Colorado state of U.S.A. This web site was developed under grants from the U.S. Department of Education and the U.S. Department of Commerce, National Communications and Information Administration ⁷.

2.1.4 Amigos

The mission of Amigos is to provide innovative information services to libraries, promote regional library cooperation and resource sharing, and support libraries as leaders in education and information services. It is based in Dallas, Texas. U.S.A⁸.

2.1.5 BCR (Bibliographical Center for Research)

In August 1995, the Bibliographical Center for Research (BCR) joined forces with the Colorado Coalition for Database Networking (CCDN) and representatives from libraries throughout the state to negotiate a major libraries breakthrough in library resource sharing. With the assistance of BCR, the Colorado group concluded a statewide agreement with OCLC allowing libraries to access the basic databases on the OCLC FirstSearch service. BCR, based in Aurora, Colorado, serves more than 523 voting-member libraries throughout its seven member states of Colorado, Iowa, Kansas, Montana, Nevada, Utah and Wyoming ⁹.
2.1.6 CALNET


2.1.7 FEDLINK and CORC

FEDLINK (the Federal Library and Information Network) a cooperative program of FLICC (Federal Library and Information Center Committee) based in Washington, D.C., was established in 1976 to allow federal libraries to participate in OCLC service. The network offers any U.S. federal agency, through its library, information centre, or other information-oriented office, the opportunity to enhance the resources available to meet the requirements of its personnel.

2.1.8 CAPCON

CAPCON has been a valued resource for OCLC and its technical services training since 1974, which provides training, support and administrative services to more than 300 OCLC users in Maryland, Virginia and the District of Columbia (which is based in Washington, D.C.). The CAPCON Library Network’s Internet Training Program provides both librarians and support staff from member libraries opportunities to develop and enhance the technology skills they need in the 21st Century.
2.1.9 ILLINET (Illinois Library and Information Network)

ILLINET is a source of information about the Illinois state library, Illinois Library Systems, and the more than 3,300 ILLINET libraries in the State of Illinois. ILLINET Web is sponsored by the Illinois State Library, a division of the office of Secretary of State. The goal of ILLINET/OCLC services is to provide excellent library service for all residents of Illinois with a view to meeting the needs for cultural, educational, informational & recreational resources and fostering the governmental and economic development of the state. ILLINET is based in the Illinois State Library in Springfield, Illinois\textsuperscript{13,14}.

2.1.10 INCOLSA

INCOLSA assures that all Indiana residents receive the best possible library and information services by providing a cooperative, statewide structure for information and resource sharing through library network. INCOLSA is based in Indianapolis, Indiana\textsuperscript{15}.

2.1.11 KICNET (Kansas Interlibrary Communication Network)

The KICNET is private electronic-mail Wide Area Network (WAN) developed by the Kansas State Library in October 1989. At the end of the year, there were 77 participating libraries in the network programme ranging from high school libraries, community college libraries, university libraries, etc. KICNET operates a network file server which is a microcomputer/modem workstation that acts as a central hub for the network which is currently handling an average of 1600 transmitted messages daily for 150 libraries\textsuperscript{16}.
2.1.12 MLIN (Massachusetts Library and Information Network)

MLIN is a library “network of networks” spanning the state of Massachusetts since October 1997. Through 10 automated library networks, every public library throughout the state is connected to each other and to the broader universe of Internet. Currently, approximately 290 of the state’s 370 public libraries are members of an automated library network, and 62 other public libraries participate in a dial-up program to MALIN. Each automated library network offers cataloguing, circulation and usually some additional functionality to its members, online affiliates while dial-up libraries have more limited capabilities 17.

2.1.13 Michigan library consortium

The Michigan Library Consortium, based in Lansing, serves Michigan’s libraries, of all types and sizes, by providing cost-effective quality products and services to maximise sharing of information among its members 18.

2.1.14 MINITEX

The mission of the MINITEX Library Information Network is to enhance the effectiveness and efficiency of participating libraries by expanding their access to local, state, regional, national and international information resources. MINITEX is based in Minneapolis, Minnesota 19.
2.1.15 MLNC (Missouri Library Network Corporation)

The Missouri Library Network Corporation (MLNC), based in St. Louis, was founded in October 1981 by the representatives of 31 Missouri libraries. MLNC's mission is to organise delivery to its member libraries and other contracting entities OCLC-based information services, related electronic services and content and training in the management and use of information.

2.1.16 NEBASE

NEBASE promotes and supports Nebraska libraries in their cooperative efforts in sharing resources and information. NEBASE is based in Lincoln, Nebraska.

2.1.17 NELINET

NELINET's mission is to enable New England libraries of all types and sizes in participating meaningfully in the evolving information environment. It is based in Newton, Massachusetts.

2.1.18 Nylink

Nylink, established at Albany, New York, in 1973 as the SUNY/OCLC Network, is a not-for-profit making membership organisation providing services for libraries throughout New York State and beyond.
2.1.19 OHIONET

OHIONET, the Information Network of Ohio School based in Columbus, like Nylink, is a not-for-profit making membership organisation that serves more than 370 libraries. Through its cooperative programs with OCLC., other organisations, and regional consortia, OHIONET is able to provide outstanding support and training for INTERNET and OCLC services.

2.1.20 OLTN (Oklahoma Library Technology Network)

OLTN, a regional network of the United States, has been fully operational since its inception in 1974. OLTN features searchable databases, one among them allows for online access to the statewide catalogue of participating institutions.

2.1.21 PALINET

PALINET, serving libraries in Pennsylvania, New Jersey, Maryland, Delaware and West Virginia, was developed in 1936 to promote library cooperation and resource sharing which collects, preserves and provides access to the records available.

2.1.22 RLIN

The RLIN, established in 1978, supports cooperative programmes of Research Libraries groups, comprising 36 major libraries and other research institutions. It maintains 6 databases on-line. The catalogue database holds more than 20 million records.
2.1.23 SOLINET (Southeastern Library Network)

The Southeastern Library Network is a not-for-profit library cooperative organisation providing resource sharing for the educational, cultural and economic advancement of the southeastern United States. Founded in 1973 by 99 libraries, SOLINET now has a membership of more than 800 libraries of all sizes and types; academic, research, public, school, corporate, medical, law and special. SOLINET is the largest regional library network in the United States.\textsuperscript{28,29,30}

2.1.24 INTERNET

INTERNET, known as a window to global information, is a worldwide network of networks, was developed by the Internet Society (or ISOC), a voluntary membership organisation with major networks of the world, such as UUNET, USENET, Bitnet, Ascent (Australia), Eunet (Europe), IUnet (Italy), UKnt (United Kingdom), Junet (Japan), etc.\textsuperscript{31} It’s purpose is to promote global information exchange through Internet technology, whose users can pass along information and share files, no matter which type of computers they are using.\textsuperscript{32} The number of websites of the Internet has been increasing phenomenally from 30 when the Web was introduced in 1993 to 3,25,000 in 1996 and an estimated 12 million today. Internet usage has also expanded rapidly beyond the United States. In 1990 only 20 countries were connected to the global network. This has expanded to more than 200, with an estimated 200 million internet users. The total number of Internet users in India, for example, is only 7,00,000 which is less than half percent of internet users world wide.\textsuperscript{33}
In India a library can access INTERNET through networks like BSNL, NICNET, ERNET, CSIRNET, etc. BSNL operates six Internet nodes on its own and offers support to over 40 other nodes in the country operated by DOT and MTNL. NICNET users can send or receive e-mail via INTERNET using any of its more than 600 nodes spread all over India. Recently, National Informatics Centre (NIC) has started a programme called Research and Education Network of National Informatic Centre (RENNIC) providing educational and research institutes Gateway Internet Access Services such as:

1. e-mail service,
2. USENET News—the world’s largest bulletin board service,
3. TELNET service for logging onto other computer,
4. FTP (File Transfer Protocol) for moving files back and forth and is also useful for retrieving files from public archives,
5. Archie service lets the users to locate files on INTERNET,
6. Gopher service lets the users to prowl through the INTERNET,
7. WAIS (Wide Area Network Server) searches and provides access to resources on INTERNET,
8. WWW (World Wide Web) service provides information through hyper text technology.

2.2 Library networks in United Kingdom (UK)

Over the last two and half decades several databases and networks have been formed in United Kingdom. The most important one is the UKnet which has influenced existing databases to work under one umbrella. National databases have been created, merging the databases of libraries resulting in the creation of union catalogues. Mostly research libraries,
public libraries and more than 90% of the university libraries have cooperated in the creation, exchange and use of databases.

The British Library has been working on its automation programme since the late 1960's. It has now produced the British National Bibliography (BNB) since 1950 on CD-ROM. In it more than one million records of high standard have been entered by professional cataloguers, and now, between 6000-7000 records are added each month. The library has developed Online Public Access Catalogues (OPACs) providing valuable information. The British Library has also created, over the years, British Library Automated Information Service (BLAISE). This service provides mainframe facilities for catalogue record, processing of current acquisitions and online transmission of bibliographic records and information to the library community. It provides access to 10 million items. This project was followed by the Monograph Record System (MARS) and Automated Request Transmission (ART). On-line access is provided by the library to more than 300 external databases and databanks in science and technology, business, patents and trademarks, and Japanese information.

2.2.1 BLCMP

The BLCMP was established in 1959 by the University of Aston and Birmingham together with Birmingham Public libraries. Financial support was provided by the Office of Technical and Scientific Information as the NISSAT of India is providing to ADINET, CALIBNET, DELNET, MALIBNET, MYLIBNET, PUNENET, etc. BLCMP offers a range of computerised library applications and services and maintains an extensive database and telecommunication network. It was started as a metropolitan
network (MAN) but now it provides services nation-wide. Within 30 years of its existence, it has upgraded itself and offers the following services:\(^\text{35}\)

i) acquisition and fund accounting,
ii) serial control,
iii) cataloguing,
iv) user services,
v) union-catalogue,
vii) retrospective conversion of catalogues,
viii) BLCMP Library System (BLS),
ix) access to national and international databases.

In addition to this, BLCMP:

i) maintains an electronic office that provides an automated office environment for libraries,
ii) offers a range of training courses,
iii) produces documentation on each module and offers it to the participating libraries,
iv) maintains a customer service section for helping new members,
v) offers the BLCMP Library System (BLS) which is an integrated set of software modules designed to cater for all services including library reader's services and technical services functions,
vi) provides hardware to participating libraries.
2.2.2 JANET (Joint Academic Libraries Network)

The JANET, a distributed Wide Area Network (WAN) in the United Kingdom established in 1984 was originally planned to interlink institutions of higher learning (Universities as well as polytechnics) and research organisations to enable researchers to share computing and communication resources. Of late, the range of services offered by JANET also include library and information oriented services. It enables the participant libraries to search 20 catalogues available on JANET, as also access to electronic-mail and inter-library loans.

2.2.3 KLNET (Kentucky Library Network)

KLNET promotes equitable timely and accurate access to information and materials that meet the information needs of the citizens of the Commonwealth.

2.2.4 Digital education network

Academia of the 21st Century is welcome to the Digital Education Network. Indiscriminate access is the hallmark of this database irrespective of whether the user is a student, a teacher, or just one interested in education and learning. There is a huge database atlas on all the disciplines available at a global level.
2.2.5 UKOLN (U.K. Office for Library and Information Networking)

UKOLN supports the United Kingdom library and information communities through research, network services and awareness raising in the area of network information management\(^40\).

2.3 Library networks in Canada

The best known library network in Canada is UTLAS International Canada, formerly University of Toronto Library Automation System. UTLAS was the first library network utility in North America to go private by becoming a subsidiary of International Thomas Library Services (ITIS). UTLAS, established in 1971 has a staff of 215. UTLAS is a computer based service organisation for libraries and information industries.

2.3.1 UOTTAWA (University of Ottawa Library Network)

The mission of the UOTTAWA library information network is to enhance effectiveness and efficiency of participating libraries by expanding their access to local, state, regional, national and international information resources. It uses different methods for accessing electronic resources available through the university of Ottawa library network\(^41\).

2.4 Library networks in Australia

ACnet and Australian Bibliographic Network (ABN) are the most important library networks which have influenced most of the library networks, particularly the research as well as academic libraries in Australia. No
national database has so far been created. Mostly, research libraries, public libraries and more than 65% of the university libraries have cooperated in the creation, exchange and use of their databases. The library networks in Australia are not still in an advanced stage of their development.

2.4.1 FLINET (Federal Libraries Information Network)

FLINET represents Australian government libraries in a range of areas such as purchasing, networks, databases, information management and use of new technology. 42

2.4.2 VICNET-Victoria’s Network

Network in Melbourne, Australia is a forum for entire Victoria for publishing information on the Web, and to allow access to this information 43.

2.5 Bibliographic network in Spain

Library networking in Spain could be discussed under the following heads: 44:

1. ministry of culture and the role of the national library,
2. public libraries,
3. university libraries,
4. specialised libraries.

Ministry of Culture in Spain is responsible for promoting automation in National Library and Public Libraries. The National Library in Madrid began automation work in 1986 on a software called SABINA, which later
proved slow and had to be abandoned after three years. The library was till recently using the computer of the Ministry of Culture through online terminals. But now the library has acquired FUJITSU 760 mainframe and has established a computer division of its own. The library has played an important role in the creation of bibliographic databases. Since 1979 it has produced Bibliographic Espomnol (National Bibliography) in a machine-readable form. Besides the National Bibliography, the Bibliotheca National took up the work of compiling a database on the bibliographic heritage of Spanish books comprising a union catalogue of incunabula, and 16th, 17th, and 19th century publications available in 1700 Spanish libraries.

Among the public libraries, Catalanian public libraries have developed a network and thus created a catalogue of over 70,000 records in a machine-readable form with OPAC facility.

Twenty six universities have their own softwares for library management but only 20 have trained staff. One university library has over 2,00,000 records computerised. Two have more than 60,000 records and one has about 15,000. The remaining have less than 15,000 computerised records. Nevertheless, the universities are moving very fast towards automation and networking.

In the fields of science and technology, humanities and social sciences, Consejo Superior Investigations Cientificas (Higher Council of Scientific Research) (CSIC) has developed an online network of 85 institutions, from more than 20 Spanish cities where each institution is assigned an area of specialisation. It has created five databases, one for medicine, one for humanities and social sciences, one for science and technology and two for the catalogues of CSIC.
2.6 Library networks in Japan

In order to promote the flow and exchange of information among researchers in universities and research institutes all over Japan, the National Center for Science Information Systems (NACSIS) operates the Science Information Network interconnecting Local Area Networks (LANs) to which the researcher's terminals are connected. The network consisting of nodes, i.e. Asynchronous Transfer Mode (ATM) switches or Internet Protocol (IP) routers located at universities and are interconnected with high-speed digital links, forms an information communication network dedicated to the academic research activities. 735 universities and institutions are connected to the network as of May, 1998.

The information retrieval service and the electronic mail service provided by NACSIS for the researchers are also available through the Science Information Network.

The network is interconnected with research network in the U.S.A., Thailand and U.K. to promote international exchange of research information among the industry, government and academic sectors. Science Information Network is also interconnected with the Inter-Ministry Research Information Network (IMnet) and other networks.

Further improvement of ATM switches and high-speed digital links is planned to manage the increasing data of multimedia communications.
2.7 Networks in India

They can be grouped into:

(a) general networks: NICNET, INDONET, INET, VIKRAM.

(b) subject networks: BTISNET, ERNET, INFLIBNET, IPSNET, CSIRNET, VIDYANET.

(c) library networks: ADINET, BONET, CALIBNET, DELNET, MALIBNET, MYLIBNET, PUNENET, HYLIBNET, BALNET, etc.

(d) joint project between India and U.S.A.: IUNet (Inter-University Data Network, popularly known as Sankhya Vahini)

(e) specialised/business networks: BANKNET, BOINET, COALNET, IANET, ISONET, OILCOMNET, PORTNET, RAILNET, SAILNET, SBINET, TOURNET, etc.

2.7.1 General networks

2.7.1.1 NICNET (Network of National Information Centre)

The NICNET, the first network, probably is the oldest in the country, is a satellite-based government information network established by the National Informatics Centre (NIC, New Delhi), Planning Commission, Govt. of India (GOI) in 1977 with view to providing computing and communication
infrastructure, help planning and monitoring the scheme and support management information system (MIS) for government decision-making activities providing various information technology based services such as:

i) electronic data interchange (EDI) networking;
ii) geographic data interchange (GDI);
iii) development of application software packages and systems support.

At present a very high speed satellite channel links the master and micro earth station which are installed in all the 32 states and 450 district node centres connected with all the four national as well as regional nodes- New Delhi (H.Q.), Pune, Hyderabad and Bhubaneswar. NIC has recently collaborated with the Regional Information Network for the South and Central Asia (RINSCA/UNESCO), an international information system which will be providing a wide range of network services including - bulk file transfer, teleconferencing, floritst and bibliographic retrieval services at a speed of 2.2 millions bit per second (#). This means that a 100 page document can be sent in a mere second at a very low cost. At present NICNET has about 15,000 users/terminals.

2.7.1.2 INDONET

INDONET, an integrated information management and distributed data processing facility, is the first commercial computer network which is in operation since March 1986. It has been established with individual nodes developed in Calcutta, Mumbai, Ahmedabad, Bangalore, Delhi and Pune through MUXs/cluster controllers and now there are 35 cities in the country which can have easy access to this network. The network uses an IBM
compatible PC/XT with RS-232 interface and using MS-DOS operating system. It operates as a star network architecture with control point at Delhi using packet switching technology such as multitech Modem Model 212E (1200 baud) or 224E (2400 baud) for dial up or dedicated connectivity for routing data from the central station to other centres. The network:

i) helps in the export of softwares,
ii) has a distributed data processing system. Local queries are answered after scanning locally available databases. Global queries are routed to their destinations and answered after the response is received,
iii) processes large amount of scientific and industrial data centrally and efficiently,
iv) provides access to remote user terminals,
v) maintains common interest databases like stock-exchange and foreign currency conversion rates centrally,
vi) helps promote key computer-related technologies like database management programming techniques, computer graphics, and the like, and
vii) provides an international gateway for INDONET users with connections to other networks abroad via a Gateway Switch (GPSS) installed at Bharat Sanchar Nigam Ltd. (BSNL), Mumbai, connected with Mumbai node of INDONET, thereby facilitating entry to the public data network of other countries.

Some of the prominent networks accessible are GTE-Telnet and TYMNET computer networks of U.S.A, Datex-P of West Germany and Telepac of Singapore. A member library may access database services like DIALOG,
COMPUERVE, IP and SHARP through INDONET. e-mail service is also available in INDONET.

2.7.1.3 I-NET

I-NET, India's popular X.25 based packet Switched Public Data Network provides leased access in 8 cities, viz., Delhi, Mumbai, Calcutta, Chennai, Bangalore, Hyderabad, Pune, and Ahmedabad. Within a short period it extended leased to 89 cities. I-NET customers having STD access to any of the above 8 cities can access I-Net and Remote Area Business Message Network (RABMN). Any customer having international password can access international networks through BSNL’s gateway packet switching system.

Any I-Net user can interchange information through e-mail or using file transfer protocol (FTP). I-Net is the cheapest and reliable communication medium to access numerous foreign bibliographical databases through different vendors.

2.7.1.4 VIKRAM

VIKRAM, is packed (or packet) switched public data network piloted by the Department of Telecommunication (DOT), Government of India (GOI), and consists of 8 switching nodes and 12 remote access points with its Network Management Centre (NMC) in Delhi. The nodes at Mumbai, Calcutta, Delhi and Chennai and other nodes and access points are connected by telecommunication system. This network’s transmission lines would have telecommunication channels and switching nodes or exchanges performing
the function of providing communication connection between calling subscriber and called subscriber.

This network has potential for several applications for independent corporate bodies, banking industry, airlines and the transport sector. It is also planned to load NUSSI database on INDONET and NICNET for online search and retrieval services. VIKRAM has already offered its infrastructure to NISSAT for pilot experimentation on library networking.

2.7.2 Subject networks

2.7.2.1 BTISNET (Biotechnology Information System Network)

The BTISNET has been established by the Department of Biotechnology (DoB), Ministry of Science and Technology, Government of India (GOI) and has emerged as one of the major network on scientific and technical information in Biotechnology which covers 10 specialised centres which constitute the main repository of information and 21 distributed information sub-centres, helping in the diffusion of information across the network to scientists working at various R&D institutions and laboratories such as CSIR, ICMR, ICAR, UGC, Biotechnological Industries, Planning Commission, Department of Electronic (DOE) in the country.

The apex BISNET at the Department of Biotechnology coordinates the activities of the network and provides mechanism for networking and access to national and international network resources in Biotechnology. The network has geared up to promote rapid sharing of information and collaboration among the scientists through the computer link, electronic bulletin boards, e-mail services and a host of freely available VMS and PC-
The BISNET centres provide computerised assistance to scientists working in the frontier areas of biotechnology and biology in planning experiments as well as analysing protein and nucleic acid sequence and provide online access for the major bibliographic databases e.g. DIALOG, MEDLAR and off-line information retrieval through CD-ROM databases. Access to EMBL nucleic acid sequence data bank which is updated on daily basis is available on BTISNET through ICGEBnet, Trieste, Italy. The network, thus, facilitates the use of and shareability of available accessible resources such as research articles, reports, books, patents covered by Biotechnology Abstracts in specialised centres under BISNET.

2.7.2.2 CSIRNET (Council for Scientific and Industrial Research Network)

CSIRNET, a computer communication network for dissemination of information among its (CSIR) laboratories and other premier organisations in India has been established by the common efforts of the Indian Scientific Documentation Centre (INSDOC) and Department of Science and Technology (DST), whose headquarter is located in INSDOC, New Delhi. CSIRNET has a gateway connection to a larger network ERNET, set up of DOE, (GOI) and in turn to the international network UUNET in the United States through which other international networks are accessible so that the entire academic community can interact with those people in the CSIR labs and those industries which are connected to SIRNET. Apart from accessing international database through NACTIIs, efforts are also underway to develop database on the expertise and sophisticated instruments available in various CSIR units which would be of interest to users outside.
CSIRNET helps in organising indigenous on-line database services on subjects such as leather technology, food technology, natural products, chemistry, radio physics and medical plants. The e-mail service of CSIRNET enables scientists and engineers to exchange electronically created messages over computer communication network. The other important services which the network provides are - bulletin board and teleconferencing facilities through the network apart from facilitating flow of routine administrative and financial information and exchange of library resources.

2.7.2.3 ERNET (Education and Research Network)

ERNET has been spearheaded by the Department of Electronics (DOE) and funded jointly by the United Nations Development Programme (UNDP) and the Government of India which was implemented by the Govt. of India (GOI) in 1986 in a phased manner, beginning with the participation of eight premier institutions-five IITs, IISc, Bangalore, NCST, Mumbai and DOE, Delhi. The basic aim of ERNET was to build capacity in the country in the area of computer networking. As a result of sustained efforts, net provides the most extensive co-operative computer network for the academic and research community of more than 300 institutions in the country representing a cross-section of universities, government societies, R&D organisations, and research laboratories. The network has got international connectivity and reaches about 120 networks abroad, which including BITNET, IUNET, JANET, etc.

The ERNET is based on the seven OSI, international standards, national capabilities in the field of computer networking and telematic services access Protocol/WAN X.25 and with other networks through X.75 protocol.
ERNET addresses data communication at Local Area Network (LAN), conforming to IEEE 802.3 standards and satellite-based Wide Area Network (WAN), Metropolitan Area Network (MAN) and Rural Area Network (RAN), levels with the capabilities and involvement of the selected academic research institutions (mentioned above).

The services available and offered by ERNET include:

i) database access,
ii) remote log-in,
iii) document and graphic exchange,
iv) electronic-mail (e-mail),
v) file transfer,
vi) bulletin board, mailing lists, and newsgroups,
vii) voice/computer video conferencing activities,
viii) information retrieval tools (e.g. Gopher, WAIS, WWW).

2.7.2.4 INFLIBNET (Information and Library Network)

UGC has promoted Information and Library Network (INFLIBENT) programme for the establishment of a National Network of libraries of universities, information centres, R&D institutions and national organisations such as CSIR, ICAR, DRDO, ICMR, ICHR, AICTE, DOT, DOE, ICSSR, etc. The programme will contribute to pooling, sharing and optimisation of library information resources in the country. It is a cooperative endeavour in resource development and utilisation with a view to organising a library service at macro-level at affordable cost. It is expected to support 500 libraries and information centres. This will be done with the help of a computer communication network making use of satellite as well
as terrestrial means of communication. The ultimate aim is to offer speedy and efficient services to users through a well-articulated and versatile library and information network.

The INFLIBNET will have one national centre, 2 regional centres, 170 university libraries, 3 UGC information centres, 65 document resource centres and 160 R&D/sectional centres interconnected through computer networks. The INFLIBNET will provide following services $^{57, 58, 59}$:

i) cataloguing,
ii) bibliographic data base service,
iii) document supply service,
iv) e-mail services,
v) automation of local library functions,
vi) inter library service, etc.

The activities at the headquarter of INFLIBNET centre, currently located in Ahmedabad, include online database access, discussion forum, and information about universities. It will implement the project in two phases. During the first phase of three years it will identify the locations, acquire hardware, communication links and implement automation in national as well as regional centres linking about 150 universities, 15 sectoral centres and 15 document resource centres. If implemented successfully, the capability of the network will be enhanced to cover the entire nation in the ninth plan period (1997-2002).
2.7.2.5 IPSNET

IPSNET, an informal library network, is the result of the initiative of the Institute for Plasma Research (IPR), Ahmedabad, Physical Research Laboratory (PRL), Ahmedabad and Space Applications Centre (SAC/ISRO), Ahmedabad. This has effected a saving of Rs. 10 lakh per year in PRL alone. Due to this saving, the purchase of a PC was sanctioned for the library and an additional telephone with direct dialing facility was provided in order to access database via a modem.

2.7.2.6 MANLIBNET (MANagement Libraries and Information Centres NET work)

Covering all the six national level management schools in India (IIMs), viz. Indian Institute of Management (IIM), Ahmedabad, Bangalore, Calcutta, Indore, Lucknow and Kozhikode, MANLIBNET has been conceived as a network of management libraries and information centres. The main objectives of MANLIBNET is sharing in the areas of:

i) catalogue-based services,
ii) database services,
iii) inter-library loan requests,
iv) document delivery, acquisition, serial control, online services, and
v) budget control.
2.7.2.7 MSSLIBNET (Networking of Manuscript Libraries)

In order to overcome the problems of authentic bibliographical information, access to document and the cost, networking of the manuscript libraries in Indian subcontinent is essential. MSSLIBNET is proposed as a multiple function/service network, functioning at three different levels 61:

i) Local Resource Centre (LRCs) at various important manuscript libraries scattered all over the country,

ii) Regional Centre (RCs) may be set up at the five important libraries-
    North Region: BHU Manuscript Library, Allahabad
    East Region: Asiatic Society Library, Calcutta
    South Region: Adyar Library, Adyar, Chennai
    West Region: Bhandarkar Oriental Research Institute, Pune
    Central Region: Rajasthan Oriental Research Institute, Jodhpur,

iii) National centre in New Delhi will coordinate the network and look after the financial and international networking for similar databases.

2.7.2.8 OPENET (Open Universities Network)

OPENET is a network of physical, intellectual and academic resources organised under the aegis of the Distance Education Council (DEC), an independent arm of Indira Gandhi National Open University (IGNOU), New Delhi that deals with the coordination and promotion of open and distance education in India. IGNOU, New Delhi, an apex body for open and distance education, is engaged in the task of developing OPENET. All the open universities are partners in the OPENET. The resources that are pooled together include academic programmes, norms for sharing the programmes, delivery mechanisms and interactive software for student services, etc. This
is a collaborative endeavour for sharing and working together for offering wider access to information and better quality education to students.

The national backbone of OPENET consists of a hub with network management system at the Headquarters of IGNOU in New Delhi and uses an extended C-band transponder offered by ISRO. Its imprint is all over India. The present teleconferencing facility used by IGNOU is based on analog technology and allows only interactive television with one-way video and two-way audio communication by using telephone lines. The OPENET will be using for its national backbone and network of VSATs, the modern digital and compression technology consistent with the standards adopted by the DOT. Thus the network of hub and VSATs extends access to the physical, intellectual and academic resources stored in the network at various resource centres of the university to a large numbers of learners. Besides IGNOU’s OPENET, every state open university is encouraged to have its own hub and VSATs located at different places in the state and can have their own state network as well- a subnet of OPENET. The Yaswantrao Chavan Maharashtra Open University (YCMOU) has proposed OPENET with a hub at Nashik and VSATs of different types to cover about 80 locations in Maharashtra.

2.7.2.9 SELICINET (Networking for the Stock-Exchange Libraries and Information Centres in India)

SELICINET is a proposed Network for the Stock - Exchange Libraries and Information Centres in India which will include all 22 stock - exchanges, scattered all over in the country. This will provide the necessary information to their members and investors because the delay in getting sufficient
information may cause heavy loss to the brokers as well as the investors. So the main objective of SELICINET is:
to match the speed of flow of information with the speed of speculative ability of the investors as well as the stock brokers.

SELICINET may have three levels:
  i) central storage,
  ii) regional storage, and
  iii) local storage.

The Local Storage Centre will be responsible for collecting the information from the Local Stock Exchanges and delivering the same to the Regional Centre and the Regional Centre will be responsible for passing the same to the Central Storage Centre. The Central Storage Centre will be the main authority to supply the required information to all the stock-exchanges according to their needs. The network system should be fully automated screen-based trading system adopting the principle of an order driven market. In this system the stock exchanges will have their own computers which will be linked to the central computer at the main storage centre through dedicated high speed telephone lines. The trading members of the capital market will be connected by satellite link enveloping the entire nation.

2.7.2.10 VIDYANET

Scientific and research workers during 1980s expressed the need for a dedicated system of communication amongst the leading laboratories and research institutions of our country. This network was formed in 1988 with the initiative of the scientists of the Tata Institute of Fundamental Research
(TIFR), Mumbai. It aims at providing rapid means of communication by linking computers at various institutes in India and with a gateway to similar network like European Academic Research Network (EARN). It's Time Network (BITNET) abroad, a phased programme of linking about 30 institutes situated in ten major cities in the country has also been envisaged.

In the first phase institutes like Indian Agricultural Research Institute (IARI), New Delhi, All India Institute of Medical Sciences (AIIMS), New Delhi, Indian Institute of Technology (IIT), New Delhi, National Physical Laboratory (PRL), Ahmedabad, Indian Statistical Institute (ISI), Calcutta, Tata Institute of Fundamental Research (TIFR), Mumbai, National Centre for Software Technology (NCST), Mumbai, Bhaba Atomic Research Centre (BARC), Mumbai, Indian Institute of Geomagnetism (IIG), Mumbai have been included. In the subsequent phases, leading research institutions from Bangalore, Chennai, Ahmedabad, Bhopal and Calcutta were linked together. The network will be further extended in future to other academic and research institutions in our country. Presently, VIDYANET provides services like:

i) transfer files of any type: data, programs, documents,
ii) receive and send electronic mail to one or more users,
iii) exchange immediate messages,
iv) share computer resources,
v) access remote applications, databases, libraries.
2.7.3 Library networks

2.7.3.1 ADINET (Ahmedabad Library Network)

ADINET, is a Local Area Network (LAN), sponsored by National Information System for Science and Technology (NISSAT), Dept. of Scientific and Industrial Research (DSIR), Government of India, aiming at establishing a cooperative mode of working amongst the libraries and information centres in and around Ahmedabad. The main objective of ADINET is to promote sharing of resources and disseminate information among member libraries by networking them and creating a centralised union catalogue of their holdings. It plans to coordinate efforts for suitable collection development and reduce unnecessary duplication wherever possible. AIDNET will not only help library users but will be of help to individuals too who practice different professions in getting specialised information of their interest.

A centralised database of periodicals, books and non-book material available in libraries of Ahmedabad is being created by ADINET. Records collected from participating libraries are being suitably formatted and merged to generate a union-catalogue of Ahmedabad libraries. With cooperation of participating libraries, this database is being regularly updated. At present this database includes only the present/current holdings of 100 libraries. Conversion of database pertaining to back volumes into the union-Catalogue i.e. retrospective conversion will be taken up later. It is planned to procure some databases on special subjects and mount them in the host computer.
This centralised database can be accessed by all the member libraries of ADINET using Modems and PSTN lines. As INFLIBNET already has e-mail software, mailboxes for ADINET can be opened into INFLIBNET e-mail number, members can post and retrieve messages. It is also proposed to subscribe to ‘Erner’ so that members can exchange e-mail with other within the country and abroad. The library services currently under operation using ADINET systems are:

i) online information search,
ii) inter-library loan (ILL),
iii) current awareness service (CAS),
iv) information service,
v) e-mail service,
vi) bulletin board service,
vii) internet service.

2.7.3.2 BONET (Bombay Library Network)

The BONET-India’s first computer network for libraries has been established by the National Centre for Software Technology (NCST), Mumbai with the financial support of NISSAT (Mumbai). The basic aim of BONET is to make information available on-line to researchers, at a very low cost, and using computer networking facilities for inter-library cooperation. BONET makes available its resources by offering links to all libraries in and around Mumbai. BONET offers services such as:

i) consultation on standards,
ii) organised training for selected staff of participating libraries,
iii) on-line catalogues of periodicals for the region,
iv) on-line catalogues of book for the region,
v) on-line catalogues of preprints/reprints,
vi) inter-library landing of books and periodicals,
vii) inter-library requests for photocopying,
viii) computer network support for book ordering,
ix) information retrieval service,
x) on-line document delivery of limits (such as technical reports) made available by participating libraries in machine readable form,
xii) on-line access to foreign databases subject to the user’s willingness to pay the costs incurred,
xii) e-mail interface for the inter-library queries and
xiii) e-mail facilities for ordering reprints from abroad, when necessary,
xiv) dissemination of information, on new books etc, using e-mail, bulletin boards, and SDI techniques and
xv) courier service for inter-library exchange of materials.

2.7.3.3 CALIBNET (Calcutta Libraries Network)

CALIBNET, which was initiated during 1980s is a metropolitan area network (MAN), includes 32 libraries and also includes the Satyam Bose Institute of Nuclear Physics and Bose Institute and Radio-Physics Library of Rajabazar, all in Calcutta—as its members and is divided into two clusters (South and North Zone), while INSDOC Regional Centre at Calcutta is the operating agency. Local computers are connected through X.25 packet switching network. Hardware requirements for the participating libraries, depending upon their collection, size are discussed and taken into consideration. However, initially the system uses the computer at the
regional computer centre at Jadavpur as the Central Host. The network could be expanded from phase I to phase II by putting X.25 switches and establishing connection to gateways and stand-alone machine. The TCP/IP software is recommended to start with and then a change over to ISO/OSI when it is fully operational.

The job was proposed for completion in two phases. In the first phase, the use of postal and telegraph (P&T) lines were recommended as transmission media. In the second phase, appropriate choice will be made regarding transmission media for Wide Area Network (WAN) for inter-city and International links.

CALIBNET has made significant strides towards fulfilling its dual objectives, i.e.,

a) launching its library network programs, facilitating remote online access to the holding data of Calcutta libraries, and other specialised databases as well - a significant step towards bibliographic resources sharing amongst Calcutta libraries, and
b) providing electronic access to globally available information, imbibing its "information centre approach".

Some of the key institutional resources development services offered are:

a) retrospective conversion of existing card catalogue in libraries into computerised local databases via electronic mode by downloading from international databases,
b) consultative services on LIS automation,
c) manpower development for operating and manning automated LIS environment through a wide range of graded training programmes, and customised courses for individuals or groups at client’s site.

The design of CALIBNET web page is almost complete and will be available on the net very shortly. The web page will facilitate access to bibliographic information resources available through hosting of CALIBNET’s Centralised Databases. This apart, the CALIBNET web site would provide:

a) active links to access
   i) Indian library and network resources,
   ii) overseas library resources on India, including rare documents-printed and manuscripts,
   iii) worldwide library catalogues,
   iv) National libraries of the world,
   v) newspapers and journals,
   vi) electronic reference tools,
   vii) factual information sources, and
   viii) book-trade databases, and

b) varied CALIBNET programs for
   i) on-demand information services,
   ii) electronic-mail connections,
   iii) consultative services for library automation,
   iv) manpower development,
   v) R&D in IT applications.
2.7.3.4 DELNET (Delhi Libraries Network)

DELNET is a local area network (LAN) of Delhi libraries established by the common efforts of National Information System for Science and Technology (NISSAT) and India International Centre (IIC), New Delhi which is financially supported by NISSAT, Dept. of Scientific and Industrial Research (DSIR), Government of India (GOI) has 67 institutional libraries as its members. This is the only functional library network in our country. The main objective of DELNET is to promote sharing of resources among the libraries in Delhi by developing a network of libraries, by collecting, sharing and disseminating information by offering computerised services to the users. 

In order to promote resource sharing among DELNET libraries, DELNET has created:

i) union catalogue of books (1.68 lakh records),
ii) union list of science periodicals (16 libraries),
   a) union list of science periodicals (7811 records),
   b) union list of social science periodicals (6919 records),
   c) union list of humanities periodicals (1178 records),
iii) specialists’ database (1200 specialists),
iv) database of articles (50,000 records),
v) union catalogue of periodicals (2391 records),
vi) database of language publications (sample database).

DELNET provides an array of facilities including e-mail and access to national and international databases to member libraries only. Its main purpose is to help libraries in the creation of electronic bibliographic databases. DELNET offers services to nearly 150 Indian and foreign
libraries. It has more than 25 best databases of Indian library resources. DELNET is accessible through INTERNET.

2.7.3.5 MALIBNET (Madras Library Network)

Madras Library Network has been installed and made operational with the financial support of National Information System for Science and Technology (NISSAT) in May, 1993 in Chennai which links all libraries for data exchange and transmission of information. For promoting resource sharing MALIBNET has created:

i) database of current serials in 50 libraries,
ii) journals holdings database (15 member libraries, 500 journals),
iii) journal contents database (1,00,000 records for member-libraries),
iv) All INSDOC database ported on MALIBNET,
v) automative Eunice database (4,500 records besides CD-ROM search facilities, access to INTERNET) 79.

2.7.3.6 MYLIBNET (Mysore Library Network)

MYLIBNET was established with the financial as well as technical support of National Information System for Science and Technology (NISSAT) in the year 1995 to provide speedy communication between libraries and other services such as bulletin board service; forum; article and database search 80.

The computer server has been installed at CFTRI, Mysore, which conducts and organises various programmes for the benefit of library professionals at the national, regional and local levels in the whole country.
2.7.3.7 PUNENET (Pune Library Network)

PUNENET is a joint project of the University of Pune, Poona, Centre for Development of Advanced Computing (C-DAC), Poona and National Chemical Laboratory (NCL), Poona. NISSAT, New Delhi has taken up networking of around 52 libraries in Poona metropolitan area with the basic objective of better utilisation of funds through sharing of resources by creating a commonly usable database and communication channels between libraries and automating the functions of individual libraries at a local level for effective and efficient services to the users. Any library with PC and Modem can access the PUNENET and thus the INTERNET. PUNENET has been linked partially through X.25 PSE control switch and partially I-NET.

Network Services to be offered are:

i) union-catalogue,

ii) current awareness service (CAS),

iii) selective dissemination of information (SDI),

iv) authority data library automation,
   a) acquisition and fund accounting,
   b) serial control,
   c) book and journals maintenance,
   d) circulation-issue, return, reservation,
   e) user-services,
   f) creation and maintenance of bibliographic databases,
   g) inter-library user service,
   h) document transfer/copy,
   i) access to national/international databases.
2.7.3.8 PAMINET

An informal Forum or Discussion Group called PAMINET for Physics, Astronomy and Maths Librarians in India was started in 1987. It was used for inter-library lending and about 100 journals received by air-mail in the PAMINET Libraries were identified for resource sharing. Now that the LISFORUM has been started, PAMINET has ceased to function ⁸⁴.

2.7.3.9 IUNet (Inter-University Data Network)

The National High Speed Inter-University Data Network (IUNet), popularly known as the ‘Sankhya Vahini,’ is a proposed joint venture of IUNet Inc., a wholly owned subsidiary of the Carnegie Melon University (CMU), Pittsburg, United States, and the Department of Telecommunication (DOT)/the Department of Telecommunication Services (DTS) of the Government of India (GOI) to set up a high-speed data transmission, as the country’s high bandwidth internet backbone.

The Sankhya Vahini project was conceived as the Information Technology (IT) Task Force in September 1998 with the objective of establishing a high-speed data network in India for the benefit of teaching community, service providers, individuals, etc. High-speed link-up will initially be given to educational and research institutions, and subsequently to government departments, corporate houses, software companies, banks and financial institutions and internet service providers (ISPs). This network will be linked to the International University Network (IUNet) being established by the Carnage Mellon University in the U.S.A. With these linkages, the educational content from leading American universities and global scientific institutions can be easily accessed ⁸⁵, ⁸⁶, ⁸⁷, ⁸⁸, ⁸⁹.
The IUNet, popularly known as the Sankhya Vahini will be operational next year (2001). In the first year of its establishment SVIL will provide 10,000 km of high speed connectivity, with the bandwidth extending between 2.5 gigabits per second (Gbps) and 40 Gbps. The existing network can take only 34 megabits per second (Mbps)-(1000 Mbps make a gigabit). Within three years, it will cover the entire country, providing approximately 25,000 km of backbone network.

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