
UNIT 7 OVERVIEW OF LIBRARY AND INFORMATION NETWORKS

Structure

- 7.0 Objectives
- 7.1 Introduction
- 7.2 Objectives of Library and Information Networks
- 7.3 Definitions
- 7.4 Brief History of Library and Information Networks
- 7.5 Library Networks at the International Level
 - 7.5.1 OCLC: On-line Computing and Library Center
 - 7.5.2 Research Libraries Group - RLIN
 - 7.5.3 Joint Academy Network (JANET)
 - 7.5.4 CURL: Consortium of University Research Libraries
 - 7.5.5 Chinese Academic Library and Information Systems (CALIS)
 - 7.5.6 AARNET - Australian Academic and Research Library Network
- 7.6 Existing Data Networks in India
 - 7.6.1 INDONET
 - 7.6.2 ERNET
 - 7.6.3 NICNET
 - 7.6.4 VIKRAM
 - 7.6.5 BITSNET
 - 7.6.6 INET
 - 7.6.7 SIRNET
- 7.7 Library and Information Networks: Indian Scenario
 - 7.7.1 INFLIBNET - National Network
 - 7.7.2 Other Important Library Networks
- 7.8 Role of Standards
 - 7.8.1 Cataloguing Standards - MARC-21, UNICODE
 - 7.8.2 Information Retrieval Standard Z39.50
 - 7.8.3 Network Protocols viz. TCP/IP Protocols, Telnet
- 7.9 Summary
- 7.10 Answers to Self Check Exercises
- 7.11 Keywords
- 7.12 References and Further Reading

7.0 OBJECTIVES

After reading this Unit, you will be able to:

- understand the history and development of library and information networks;
- get an overview of library and information networks at international level;

- study the role of library networks in India and their services; and
- understand the role of standards in the networking of libraries.

7.1 INTRODUCTION

The world is in the information age. It is commonly recognized that information and its associated technologies are playing more and more important roles in socio-economic development, and that a nation that does not keep pace with the latest advances in information and communication technologies will be left behind in world development. Like most countries in the world, India is drawing up its own information super-highway programme, trying to make it part of the international super-highway system and has greatly promoted the computerization and networking of library and information services.

Computer application in the library and information field has made phenomenal progress with the development in hardware, software and communication facilities. In view of these technological advancements, many libraries in the western countries are able to computerise their entire library and information system with great success. Besides improving services and operations for a better performance, libraries are also able to evolve effective computer networks towards optimum utilization of resources and facilities. Such efforts are there in many countries, including India.

The collection of a library could broadly be classified into two groups – one satisfying the core interest of the institution to which the library belongs, and the other serving peripheral interests. With the financial crunch, the library could restrict acquisition of materials in the peripheral areas, but tries its best not to shed anything from its core acquisition list. India is spending more than Rs. 5000 million a year on procuring new library resources to meet its users requirement, and in that around Rs. 2,000 million is spent on acquisition of costly periodicals / journals. The annual increase in the price of these resources means that even financially sound organizations experience difficulties in meeting their user requirements. Therefore in a collective development situation, it is logical for a library to look up to other institutions for meeting its peripheral interests. This requires networking of libraries to meet the requirements of users. Apart from supplementing the capacity of individual libraries in providing conventional facilities, the collective effort could bring new generation services like the Bulletin Board and Online Access to remote databases.

The activities concerning library automation, inter-library cooperation, generation of new services naturally demand time and energy of the participating libraries. However it is unlikely that, the libraries would get additional manpower for such activities. One way to handle the situation would be to relieve the librarians of some of the activities such as book processing, cataloguing and classification through the shared efforts, so that they could attend to new services.

A network is developed when a group of libraries and / or information centres decide to exchange information through computer application. UNISIS-II working document defined the term Information Network as ‘ a set of inter-related information systems associated with communication facilities, which are cooperating through more or less formal agreements in order to jointly implement information handling operations with a view to pooling their resources and to offer better services to the users. They generally follow identical or compatible rules and procedures’.

The term 'Network' is used in the present times in place of 'Resource Sharing' or 'Cooperative systems'. Networking and Modernization are becoming very important in all types of libraries as they enable the users to have access to the resources of many other libraries in addition to their own one. The benefits of networking include: Preparation of union catalogues, retrospective conversion, provision of bibliographies, optimum use of resources including rare collections, cooperative acquisition of documents, resource sharing, time saving, minimizing cost of the library services.

With the rapid advancements in the technologies such as telecommunications, satellite communications, computers, etc, several networks are either functional or in the formative stage in India.

7.2 OBJECTIVES OF LIBRARY AND INFORMATION NETWORKS

- Provide reliable access to document collection of libraries, i.e., Union Catalogues etc.
- Provide access to world wide bibliographical information.
- Provide document delivery service.
- Optimise information resources through resource sharing mechanisms.
- Facilitate computerisation of all the libraries.
- Facilitate communication among teachers, students, scientists and others.
- Provide effective access to library resources.
- Encourage resource sharing.
- Train manpower required by participating libraries.
- Evolve standards, uniform guidelines, methods, and procedures, both for data capturing as well as hardware and software.

7.3 DEFINITIONS

One comes across several definitions of library networks. Susan Martin defines a network as a "group of individuals or organizations that are interconnected to form a system to accomplish some specified goal. This linkage must include a communications mechanism, and many networks exist for the express purpose of facilitating certain types of communication among members."

Joseph Becker suggests that, "when two or more libraries engage formally in a common pattern of information exchange, through communications, for some functionally interdependent purpose, we have a library network."

UNISIST II, main working document defines Information Network as "A set of interrelated information systems associated with communication facilities, which are cooperating through more or less formal agreements and institutional agreements, in order to jointly implement information handling operation, with a view to pooling their resources and to offer better services to the user. They generally follow identical or compatible rules and procedures".

Self Check Exercise

1) What do you understand by Library and Information Networks? Discuss the main objectives of library and information networks.

Note: 1) Write your answer in the space given below.

2) Check your answer with the answer given at the end of this unit.

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7.4 BRIEF HISTORY OF LIBRARY AND INFORMATION NETWORKS

Data communication is an integral part of the modern information storage and retrieval systems in terms of their capabilities for online access. In the initial stage, the information networks operated in an off-line mode, wherein a query was loaded into a computer which was later matched with the database for relevant bibliographic records. The search results consisting of such records on the subject of query were generated as output. This process was not satisfactory for effective and efficient retrieval of relevant records. Further progress in computer and communication technology has made it possible to carry out this process in an online interactive mode wherein a user can access an online host via a micro computer from a remote location and can define and redefine his query based on the search results obtained till he is fully satisfied with the final outcome.

The use of communication technology for information retrieval activities gained momentum with the creation of several large databases made available online for shared use through vendors like DIALOG, STN, Datastar, etc. By the mid-1970s, several organizations had started offering online searches from remote terminals on a variety of online databases. The article, before describing data communication and networks and their use in the libraries and information centres, touches upon their basic concepts, and the types of hardware involved which are considered necessary for users to know.

Brief History-International Scenario

- Has its roots in Library co-operation, ILL and shared cataloguing
- Began in true sense with MARC – 1968
- Library of Congress played a vital role
- Ultimately led to large networks such as OCLC, WLN, RLIN, BCLMP, UTLAS, ABN, JANET and many others.

Brief History Library Networking scene in India

- 1958 - Scientific Policy Resolutions

- 1959 - Sinha Committee's Report
- 1965 - Ranganathan Report to UGC
- 1972 - Peter Lazar Committee Report
- 1972 - V A Kamath Report
- 1983 - Technology Policy statements
- 1984 - Planning Commissions Working group headed by Dr. N. Seshagiri (Seventh Five Year plan)
- 1985 - NISSAT efforts (city networks)
- 1988 - UGC effort (Academic Library) DESINET, BTIS, CSIRNET, INFLIBNET, etc.

7.5 LIBRARY NETWORKS AT THE INTERNATIONAL LEVEL

7.5.1 OCLC – Online Computer Library Centre - A Global Library Cooperative

OCLC is a nonprofit membership organization serving 41,000 libraries in 82 countries and territories around the world. Its mission is to further access to the world's information and reduce library costs by offering services for libraries and their users, and to be the leading global library cooperative, helping libraries serve people by providing economical access to knowledge through innovation and collaboration.

History

Founded in 1967 by university presidents to share library resources and reduce library costs, OCLC introduced an online shared cataloging system for libraries in 1971 that today is used by libraries around the world. The Interlibrary Loan Service was introduced in 1979 and since then has been used for more than 114 million loans among 6,700 libraries around the world. The FirstSearch service was introduced as a reference tool in 1991 and is now used by 19,246 libraries.

Membership

Membership in OCLC is a unique cooperative venture, giving your library global access to all services and databases, including WorldCat. Membership comprises the world's largest library consortium.

Services and databases

OCLC offers a full range of services to meet the needs of libraries of all sizes:

- Cataloguing tools
- Reference databases and online searching services
- Resource sharing tools
- Preservation services
- Dewey Decimal Classification

At the center of OCLC services is the **World Cat** database, which:

- Is the most consulted database in higher education
- Holds over 48 million cataloguing records created by libraries around the world, with a new record added every 15 seconds
- Spans over 4,000 years of recorded knowledge with 400 languages represented
- Includes 828,051,538 location listings

Research

- Conducts research internally and externally at universities or other research centers
- Dublin Core Metadata Initiative proposes a global standard composed of 15 metadata elements to facilitate discovery of electronic resources
- Distinguished Seminar Series stimulates the exchange of ideas across the barriers of time, space, and disciplines

Governance

OCLC is governed by its members. OCLC's governance structure consists of General members, the Members Council, and the Board of Trustees.

Services and Databases of OCLC

Collections and technical

OCLC offers an integrated suite of online, batch and contract services. With the OCLC collections and technical services, one can process materials more economically, get them on the shelves for users faster and provide more convenient access options than ever before.

Reference

OCLC Reference Services help libraries to provide affordable electronic access to a rich range of information—abstracts, full text, indexes, and bibliography—whether the user is in a library, office, or home.

Resource sharing

The OCLC Interlibrary Loan (ILL) service helps OCLC libraries create, send, and track ILL requests with access to WorldCat (the OCLC Online Union Catalog)—offering more than over 46 million records in 400 languages—and the resources of over 6,700 libraries, resource centers, and document suppliers. Additionally, a unique link between OCLC ILL and the OCLC FirstSearch service lets library users initiate requests online.

Digitization and Preservation

OCLC Digital and Preservation Resources services provide the technology, infrastructure, resources and services. These new services allow one to create, access and preserve collections; to collaborate to build new collections and a clearinghouse of information about projects, funding and best practices; and to learn about digitization and preservation issues.

Databases

OCLC WorldCat (the OCLC Online Union Catalog)—For nearly three decades, libraries have shared their catalogues electronically to create the world’s largest database of bibliographic information. WorldCat offers over 46 million bibliographic records—representing 400 languages—and holdings information vital for collection development, cataloguing, authority control, and retrospective conversion services.

7.5.2 Research Libraries Group - RLIN

RLG is a not-for-profit membership corporation devoted to the mission of “improving access to information that supports research and learning.” Founded in 1974 and incorporated in 1975 by Columbia, Harvard, and Yale universities and The New York Public Library, RLG became and is today a pioneer in developing cooperative solutions to the problems that research collections and their users face in the acquisition, delivery, and preservation of information.

Today RLG is an international member alliance, including universities and colleges, national libraries, archives, historical societies, museums and independent research collections, and public libraries. To develop, coordinate, and operate their joint initiatives, RLG provides a highly skilled staff, sophisticated technical resources, and a long, successful track record in managing and supporting interactions among its members

Services for RLG Users

- Information discovery: reference and research
- Record supply
- Record sharing through RLG
- Interlibrary loan and information delivery
- Cataloging services
- Library schools
- User support

RLG provides access to millions of records from research collections and information databases around the world. Institutions and individuals turn constantly to RLG’s information resources and searching systems to solve every sort of reference or research question. RLG Citation Resources offer an array of unique databases covering journals, newspapers, conference proceedings, dissertations, and other publications at the individual article level.

RLG Archival Resources provide an online, single-point-of-access service that supports searching both collection-level descriptions and full-text finding aids, with live links between and among descriptive cataloging records, finding aids, and in some cases, images of the collection materials.

RLG Cultural Materials provides access through its own Web interface to rare and unique primary materials that have long been difficult or impossible to obtain.

One can extract MARC records from the RLG Union Catalog and other databases.

- A Z39.50 connection lets you keep the record you retrieve in MARC 21 format.

- Using Eureka MARC Export, you can export MARC 21 records to a file on an FTP server.
- Using RLIN's Pass and Put commands, you can export RLG Union Catalog records—authority records as well as bibliographic descriptions—directly to your local system or to a file on a local FTP server or on RLG's.

Cataloguing Services

Marcadia is an automated cataloguing service provided through MARC Link Corporation that searches for and tailors RLG Union Catalog records to meet your institution's needs.

RLG Union Catalog

- This landmark database is a treasure house of bibliographic descriptions. It grows daily through contributions from a range of institutions and cooperative cataloguing projects.

The RLG Union Catalog's database structure supports a complete record for each item catalogued, with a flexibility that readily accommodates local cataloguing practice. These records can include institutional holdings, notes on contents, notable illustrations, author/owner annotations, the availability of microform service copies or plans for preservation, microfilming, as well as the existence of an electronic version of the material.

7.5.3 Joint Academy Network (JANET)

JANET is the network operated and developed by *UKERNA* under a *Service Level Agreement* from the *Joint Information Systems Committee (JISC)* of the UK Higher and Further Education Funding Councils. JANET is connected to the equivalent academic networks in other countries and to many commercial networks in the UK and abroad forming part of the global Internet.

JANET stands for 'Joint Academic Network'. It interconnects the local computer networks in United Kingdom Research Councils, Universities and most Polytechnics. Most of these sites have several different computers connected to their local network, so in practice JANET provides access to several hundred different computer systems at over one hundred different sites. Usage is free of charge to members of institutions connected to JANET.

JANET is a completely open network in the sense that there are no formalities to be completed before you can use the network. However, most of the systems connected to JANET do impose restrictions; for instance on many systems you will need appropriate privileges before you can use JANET for electronic mail. You are strongly urged to consult your local computing service before attempting to use JANET.

One can use JANET in one of four ways: (i) To provide access to a computer at another site. In this document this is referred to as 'Interactive' use. (ii) To send a mail message from own computer system to another. This will be referred to as 'Mail'. (iii) To transfer a file from one computer system to another, in either direction. This will be referred to as 'File Transfer'. (iv) To submit a job from one computer system to be run on another. This will be referred to as 'Remote Job Entry'.

7.5.4 CURL : Consortium of University Research Libraries 1987

Consortium of University Research Libraries (CURL) was established to promote, maintain and improve library resources for research, learning and teaching in research-led universities.

Objectives

- to develop co-operative and consortial solutions to the challenges faced by members in the acquisition, processing, storage, preservation, exploitation, dissemination and delivery of information and library materials, for the benefit of their institutions;
- and to assist libraries in the Consortium to pursue and achieve their own institutional objectives.

The Consortium of University Research Libraries (CURL) has established a database for bibliographic records. This record retrieval service offers UKMARC records at competitive rates. The service can be accessed using telnet and ftp or via Z39.50. The database currently contains over 24 million records but the number is growing constantly. The records include those from *member libraries* and also from LC (Roman script monograph records 1968- and CJK records) and from the BNB (1985-). As libraries progress with their retrospective conversion programmes, the number of records for older material and for non-book material is increasing. The records are of good quality and CURL has established *Bibliographic Standards* for contributors and records are flagged to indicate standard. The service is open to any non-profit organisation. There is a flat-rate for searching and no other charges. A month's free trial is available if required. Access is subject to signing license agreements.

7.5.5 Chinese Academic Library and Information System (CALIS)

China Academic Library and Information System (CALIS) is a nationwide academic library consortium. Funded primarily by the Chinese government, it is intended to serve multiple resource-sharing functions among the participating libraries - including online searching, inter-library loan, document delivery, and coordinated purchasing and cataloguing - by digitizing resources and developing an information service network. CALIS differs from library consortia in the United States in that it is a national network. It resembles multi-state consortia in the United States with respect to geographic distribution of member libraries, but it is like tightly knit or even centrally funded statewide ones in terms of management.

Funding

The development and operation of CALIS has been funded in large part by the Chinese government. The sources of funding for CALIS at the present time are:

Government grants. Much of the funds for the CALIS project during the first phase of construction came from the government. Because of the demonstrated benefits of the ongoing project, it is expected that the government will provide funds for the second phase of CALIS construction. These government funds have been used for the purchase of software and hardware for the CALIS centers and

commercial databases, for development of service software and databases, for training of staff members, etc.

Local matching funds. According to prior agreements, a province or city that desires to have a regional center is required to provide funds supplement the government funds for the construction of its local center.

Member library funds. These funds, primarily derived from the university budgets, have been used to purchase electronic resources and cover the expenses incurred from the use of the CALIS service software platforms.

Although CALIS is currently funded by the government, the future expansion and operation of the system is expected to rely in large part on other sources of funds. The funding needs for CALIS may be met by operating the system in a commercial mode.

Present Status

When it was first established, CALIS had sixty-one member libraries from major universities participating in the programme. Later, as many other major universities were interested in joining the alliance, the number of CALIS members has climbed to seventy. At present, CALIS serves about 700,000 students.

Construction of CALIS is a long-term, strategic undertaking. The system provides service functions as they become available and is constantly being improved in the process. In the first phase (1998 to 2000) of the project, CALIS successfully started the following information-sharing functions in its member libraries:

- primary and secondary data searching;
- inter-library borrowing and lending;
- document delivery;
- coordinated purchasing; and
- online cataloguing.

The following tasks have been completed:

- purchase of computer hardware (e.g., SUN E3500);
- construction of a CERNet- or Internet-based information-sharing network connecting academic libraries across the country; and
- group purchase of databases, such as UMI, EBSCO, EI Village, INSPEC, Elsevier, and Web of Science, that are shared among member libraries either directly online or indirectly through requested service/document delivery.

CALIS also has completed development of a number of databases, including:

- *Union Catalogues.* These databases currently contain 500,000 bibliographic records
- *Dissertation Abstracts and Conference Proceedings.* These databases now contain abstracts of doctoral dissertations (12,000 bibliographic records) and proceedings of national and international conferences (8,000 records) collected from more than thirty member libraries.
- *Current Chinese Periodicals.* These databases have (5,000 titles, 1.5 million bibliographic records)

- *Key Disciplines Databases.* CALIS has sponsored the development of twenty-five discipline-specific databases by member libraries. Each of these databases contains about 50,000 to 100,000 records.

The first three classes of databases are prepared in the USMARC, UNIMARC, or CCFC format for the ease of use by patrons and cataloguing staff and in data exchange. Clients from member libraries may perform a Web-based search of the above databases. Most of them contain secondary documents and abstracts, and access CALIS resources online using browsers.

Development of software platforms includes the following:

- *Cooperative online cataloguing systems.* The systems include protocol Z39.50-based search and uploading servers and terminal software platforms for cataloguing staff.
- *Systems for database development.* These systems can be used in the development of shared databases containing secondary data information in USMARC, UNIMARC, CCFC, or Dublin Core format. The systems for database development in the USMARC, UNIMARC, or CCFC formats are equipped with a search server based on the Z39.50 protocol to permit use by cataloguing staff and for data exchange.
- *An inter-library loan system.* The system, developed based on the ISO10160/10161 protocol, consists of ILL protocol machines and client terminals. These systems, located in member libraries, are interconnected to form a CALIS interlibrary loan network. Primary document delivery software based on the FTP protocol also has been developed for the delivery of scanned documents between libraries.
- *An OPAC system.* The system has both Web/Z39.50 and Web/ILL gateways. Patrons may visit the system using common browsers, search all CALIS databases, and send search results directly to the CALIS *inter-library* loan service. Patrons also may access an ILL server through Web/ILL, tracking the status of submitted interlibrary loan requests, inquiring about fees, and so on.

The databases that are centrally located and those that are distributed at various locations as well as service platforms in member libraries form a CALIS information service network.

Future Considerations of CALIS

In a period of just over a year, considerable progress has been made in forming a nationwide resource-sharing library consortium in China. However, because member libraries vary in size, available funds, staff quality, and automation level, CALIS has yet to realize its potential. There are a number of problems that remain to be solved. For example, the CALIS union catalogue databases do not work well on some of the old automation systems in member libraries and the CALIS service platforms are incompatible with a dozen automation systems currently in use; as a result, the union catalogues cannot tell the real-time circulation status in all member libraries, affecting interlibrary loan service. In addition, primary resources are not sufficiently abundant. Therefore, the extent to which resources are shared among member libraries remains quite limited.

In the next phase of development, CALIS will improve service systems (including hardware and software platforms) and the distribution of shared databases. At the

same time, CALIS will develop more electronic resource databases and be actively involved in the research and development of digital libraries, expanding the scale and extent of resource sharing.

7.5.6 AARNET-Australian Academic and Research Library Network

AARNet Pty Ltd is the not-for-profit company that operates the AARNet2 network. AARNet2, the second generation of the Australian Academic and Research Network, provides high capacity Internet services between eight state- and territory-based regional network hubs. The regional networks provide Internet service to Australian universities and other research institutions including CSIRO, DSTO, ANSTO and AIMS.

Services

AARNet delivers high-capacity, cost-competitive Internet-based network services to clients in the tertiary education and research sector and provides an incubator for development of advanced network infrastructure and applications with access to the global Research and Education (R&E) networks.

AARNet provides three primary IP services and two other services that add-value to these primary IP Services

The three primary IP services are:

- On-Net - provides IP connectivity between members;
- Off-Net National - provides IP connectivity to the Australian domestic Internet. This is provided Cable and Wireless Optus (CWO) in and;
- International-IP provides access to the global international

AARNet2 is an internetwork of regional networks, one in each State and Territory. The hubs, or Points of Presence (PoPs), of the regional networks provide IP connectivity to AARNet members and associates in that region. Connection from the PoP to customers is by a variety of carrier and privately owned links

Self Check Exercise

1) What are the developments at the international level in networking of libraries?

Note: 1) Write your answer in the space given below.

2) Check your answer with the answer given at the end of this unit.

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7.6 EXISTING DATA NETWORKS IN INDIA

The development of computer communication networks, an important technological advancement of the seventies, uses the telecommunication facilities for data

transmission. Telecommunication networks form an integral part of accessing, communicating, and transforming information. In India, the Department of Electronics, Department of Telecommunications (DOT), Videsh Sanchar Nigam Limited (VSNL), Government of India, are responsible for providing and maintaining national and international telecommunication facilities. These communication networks are:

7.6.1 INDONET

The INDONET, a computer-based network commissioned by Computer Maintenance Corporation (CMC), was the first Indian commercial computer communication network. It came into operation in 1986. It is an integrated information management and distributed data processing facility spanning the entire country. The INDONET aims to provide facility for distributed data processing on an all-India basis to large organizations in the network using the CMC computers for their data processing operations. It also plans for provision of data communications between its users in their respective locations in the network, even if the users are not accessing CMC's nodal computers. Distributed databases in various subjects and access to specialized applications software locally, or in remote locations obviate the need for duplication of software and hardware facilities at each location.

INDONET-CMC's Value Added Services network is a data network, which supports both TCP/IP and X.25 Network Protocols. It is approved by the Department of Telecommunications having:

High speed leased links of 64 kbps connecting 9 locations in India

- Delhi, Mumbai, Calcutta, Chennai, Bangalore, Hyderabad, Ahmedabad, Pune, Vizag.
- Has alternate Data -links at each location, for better reliability and uptime.
- 2 RISC based servers at each location

Present services of INDONET include:

— E-mail/E-mail-fax services

- File Transfer, Credit card Authorization, Database Services

— Hosting User Applications in the Net

- Providing Network-based connectivity solutions, Corporate Intranet
- Network Management, Managed Data Network Services, Help Desk
- EDI Services, Web-based applications
- Students registration in the Net for admission
- Students assignment submission grading over the Net.
- Electronic Reference Library access in the Net
- Data Management and data processing services
- Recruitment Services using Newer Technologies (OMR, OCR) etc.
- ISP Services

Future services planned are:

- Full fledged E-commerce services, ERP/ Application Integration Services
- Voice/Video Conferencing facilities,
- Payment transaction to *Utilities* (Electricity, Water, Telephone etc.)
- Fax-Store & Forward
- Call Centre Services
- VSAT Services

7.6.2 ERNET (Education and Research Network)

In this era of globalization and hyper-competition, the concept of teaching has undergone a sea change. Learning and dissemination of information is becoming more important. Internet-based education and e-learning are the trends of the day. The Department of Electronics had initiated a project “ERNET” with funding from UNDP. The objective was to create expertise, R&D and education in the country in the area of networking and the Internet in the country.

Today ERNET is the largest nationwide terrestrial and satellite network with a presence in the premier educational and research institutions in major cities in the country. The focus of ERNET is providing network connectivity and meeting the entire needs of educational and research institutions by hosting and providing relevant information to their users. Research and Development and training are integral parts of ERNET activities.

ERNET (Education and Research Network) has made a significant contribution to the emergence of networking in the country. It has built up national capabilities in the area of networking, especially in protocol software engineering. It has not only succeeded in building a large network that provides various facilities to the intellectual segment of Indian society, that is the research and education community, it has over the years become a trendsetter in the field of networking. The Govt. of India has committed itself to further strengthen the project by including it in the 9th Plan with the allocation of funds and by creating of a new organisational set-up in the form of a Society.

ERNET was initiated in 1986 by the Department of Electronics (DoE), with funding support from the Government of India and the United Nations Development Programme (UNDP), involving eight premier institutions as participating agencies—NCST (National Centre for Software Technology) Bombay, IISc (Indian Institute of Science) Bangalore, the five IITs (Indian Institutes of Technology) at Delhi, Bombay, Kanpur, Kharagpur and Madras, and the DoE, New Delhi. ERNET began as a multiprotocol network with both the TCP/IP and the OSI-IP protocol stacks running over the leased-line portion of the backbone. Since 1995, however, almost all traffic is carried over TCP/IP.

The Objectives of ERNET include:

- ERNET operations, i.e., providing state-of-the-art communication infrastructure and services to academic and research institutions, Govt. organisations, NGOs, private sector R&D organisations, and various other non-commercial organisations;

- Research and development;
- Training and consultancy;
- Content development.

Achievements

- Foundation of a national capability building in the area of computer networking laid through:
 - Setting up of a chain of core groups as the participating agencies with a minimal set of lab facilities and creation of skilled manpower to carry out R&D
 - Generating manpower at different levels
 - Making the world of standards (TCP/IP, OSI etc.) well understood
 - Providing an insight into emerging issues such as ATM networks, networked multimedia, and information infrastructure
- **Network infrastructure and services set up, including**
 - Installation, maintenance and operation of large campus LANs
 - Design, commissioning and testing of SATWAN hub and the installation of VSATs
 - Seamless interconnection of LAN-WAN segments and multi-protocol capability provided
 - Provision of the whole range of Internet services
 - Deployment of TDM/TDMA based VSAT network for Internet access
- **Research and Development**
 - Research and development in the area of computer networking has been the forte of ERNET.

7.6.3 NICNET: National Informatics Centre Network

The satellite based National Informatics Centre Network (NICNET) (Seshagiri et al, 1987) was set up to provide informatics services to the Central and State Government Departments and then organizations. NICNET provides state of the art solutions and decision support for information management and decision support requirements of the Government of India and the corporate sector. The information technology services provided by NIC range from conducting feasibility studies for developing and implementing computer-based information systems, undertaking large turnkey networks and imparting training. It has developed extensive expertise in integrating IT-based systems with the working of user organizations. NIC continue to provide value added network services, viz., E-mail, database access, Internet etc.

The network consists of Master Earth Station, Remote Micro Earth Stations and a Geosynchronous Satellite. The master earth station is located at CGO Complex, New Delhi. It comprises a 13-metre antenna, a network control centre and a packet switch. The micro earth station connects remotely located district computers with

the State computer, which, in turn, are connected to the regional headquarters. Specialized services such as computer-aided design and computer-aided management are also offered over NICNET. The network supports X.25 switch and operates at 1200 bps transmission speed and 19.2 Kbps receive speed. The present configuration handles 300 packets (128 bytes each) per second. The host computers are connected to this packet switch.

NICNET is currently using the INTELSAT-V satellite which mainly functions as a relay station between the master earth station and the micro earth station. NICNET has used terrestrial communication for distribution of terminals (Local and Remote from NEC-S1000, CEBER-730, CYBER-830, ND-550 or Super AT386 systems) and for development of Local Area Network. Terminals in a building are distributed over RS-232C cable or dedicated lines using line drivers, depending upon the distance involved. The terminals outside the building are connected over data circuits leased from the local telephone authorities. Dial up access using Public Switched Telephone Network (PSTN) is also provided to many users.

The Local Area Network with a gateway to the NICNET has been developed at the NIC Headquarters. A large number of terminals have been distributed from super ATs installed in various buildings. These super ATs are connected to the host machine/packet switch in NIC Headquarters. Initially, it connected 40 interactive local terminals and 11 minicomputer systems to the in-house mainframe CYBER 170/730 system. These are spread out over a radius of 25 km at Delhi. The remote terminals and the minicomputers are connected by point-to-point data circuits in star configuration; 2 concentrators have also been used to support remote terminals. The network facilitates flow of information among 4 national/regional nodes (NEC at Pune, Bhubaneswar and Hyderabad, ND 550's at State capitals), 32 state/union territory nodes and 439 district nodes.

NICNET has expanded as a dedicated network having more than 500 nodes geographically distributed over the country to address the rapidly growing awareness to of computerization in different sectors of the Government. Each district information centre consolidates information for monitoring the socio-economic development of the district. Each district is connected to its State's information centre for flow of information from district level to State level. The State centre in turn sends processed information to the regional and the national centres and is also connected to other States. Hence, any user connected to a remote or master earth station can link to any other remote micro earth station. The national centre at New Delhi is the repository of all information systems and conducts research and development of relevant software and hardware tools.

The various facilities and services of NICNET include:

- Gateway to Internet by providing Internet connectivity
- Electronic mail service
- USENET bulletin board service
- Telnet facility to login to remote host
- File transfer protocol facility
- Research and Education Network of NIC (RENNIC) service to research, education and medical institutions

- Electronic Data Interchange service
- Bibliographic information service
- Geographical Information Systems
- General information Services terminal(GISTNIC) for common public
- Training facilities

7.6.4 VIKRAM

Vikram (Lahiri, 1991, pp. 13-14) is the packet switched public data network under development by the Department of Telecommunications. This network will initially have 8 switching nodes in Delhi, Bombay, Calcutta, Madras, Bangalore, Hyderabad, Ahmedabad and Pune and 12 remote access nodes with its network management centre located at Delhi. It will support packet switching interface to CCITTs X.25, X.28, X.29 and X.75 recommendations

Bibliographic Applications:

Like NICNET and INDONET, **Vikram** also has bibliographical applications. It has offered its infrastructure to NISSAT for pilot experimentation on library networking in the country.

7.6.5 BITSNET

Recognizing the importance of information technology for pursuing advanced research in modern biology and biotechnology, a bio-informatics programme, envisaged as a distributed database and network organisation, was launched during 1986-87. The programme has become a very successful vehicle for transfer and exchange of information, scientific knowledge, technology packages, and references in the country involving 10-12 thousand scientific personnel. Ten Distributed Information Centres and an Apex Centre at the Department of Biotechnology, and 44 Sub-Distributed Information Centres, located in universities and research institutes of national importance, are fully engaged in this task. Six national facilities have been set up for interactive graphics-based molecular modeling and other bio-computational needs. Four long-term courses at the level of post MSc Diploma in Bio-informatics, at Poona University, Jawaharlal Nehru University, Calcutta University and Madurai Kamaraj University, are fulfilling the long outstanding need for trained human resources in this inter-disciplinary area.

7.6.6 INET

INET is India's X.25-based packet switched public data network; it was commissioned by DOT and paved the way for highly reliable, cost effective and flexible ways of national data transfer and information access. Packet switching enables error-free transmission with dynamic rerouting of calls and provides interconnection between computers/terminals at different speeds and protocols. In its first phase, INET had nodes at New Delhi, Mumbai, Calcutta, Chennai, Bangalore, Hyderabad, Pune, Kanpur and Ahmedabad; and connected through 9.6 kbps and 64 kbps links. In subsequent phases, this facility was extended to 88 other cities throughout the country. It supports CCITT interfaces / protocols X.25, X.28, X.29, X.3 and X.75. Access is through dedicated leased lines for asynchronous (X.28) or synchronous (X.25) and dial-up mode (X.28).

The facilities offered by INET include: reverse charging, closed user groups, fast selects, charge information indication, call redirection, call deflection, abbreviated address calling, hunt groups, multiple packet sizes and network user identification. The typical applications are e-mail services, corporate communications, information retrieval, database services, remote job applications, credit card verifications, travel reservations and electronic fund transfers (DOT, 1999b).

7.6.7 SIRNET

The SIRNET (Scientific and Industrial Network) (SIRNET NETletter., 1990-), a project of INSDOC aims at networking all 40 CSIR laboratories under SIRNET. It was made operational in December 1989. At present, SIRNET provides electronic mail facility as its first application service from the SIRNET servers with a number of user nodes. For transmitting a message, a user has to deposit the message to one of the SIRNET mail service nodes situated at INSDOC, Delhi and at its regional centre at Bangalore from where it can be transmitted to its destination which may be any of the CSIR laboratories at present linked to the mail node. The SIRNET, in turn, is connected to a large network-ERNET (Educational and Research Network) which is connected to the international network UUNET (Unix User Network) through which other international networks like BITNET, CSNET and JANET are accessible. The SIRNET's mail node at the INSDOC also acts as a gateway to ERNET and through ERNET to other networks. Connections between various laboratories of CSIR are established using dial-up telephone lines, while SIRNET is directly connected to DoE mail server VIKRAM which acts as the clearing node in Delhi ERNET.

7.7 LIBRARY AND INFORMATION NETWORKS: INDIAN SCENARIO

Libraries are committed to providing and making accessible the best possible informational, educational, cultural, and recreational materials and services to the citizens of the service area. The library's most important technology goal is to give all citizens access to information regardless of format, and regardless of where the information is stored. The secondary goal is to make that access available from anywhere in the community as far as possible.

A network is an essential partner in this exercise because it facilitates access to vast information services. Networks have a potential to improve library services in several ways. Libraries and their users get benefit from accessing databases, discussion groups, full text access, document delivery through resource sharing. The continuous improvement in networking technologies reduces the cost of information provision, thus creating new opportunities for the library networks to play their role in information provision to end users.

A beginning has been made by the Ministry of Human Resources Development, through the University Grants Commission by establishing the Information & Library Network Centre to cater to the needs of academicians and research community by connecting the higher education institutions in the country at the national level. The base created by INFLIBNET in terms of infrastructure at different universities, awareness of the technologies available to them will play a major role in the success of any further programmes in this direction. The UGC-NET being established in

collaboration with ERNET-India is to set up a state-of-the-art nationwide network for its universities to effect a virtual enhancement of academic infrastructure in the country. This network will connect more than 172 universities in the country with proper bandwidth to access its own resources as well as resources available elsewhere. Considerable progress has been made by other library networks in the country viz., DELNET, CALIBNET, ADINET etc. Though initially DELNET was established for libraries in Delhi, it has increased its scope with membership from other parts as well and also a few international memberships.

7.7.1 INFLIBNET - National Network

The Information and Library Network Centre (INFLIBNET) is an Autonomous Inter-University Centre, established by the University Grants Commission (UGC), with its Headquarters at Ahmedabad.

Information and Library Network (INFLIBNET) is a major programme of the University Grants Commission (UGC) initiated in 1991. The programme is directed towards modernization of libraries and information centres, and establishment of a mechanism for information transfer and access, to support scholarship, learning and academic pursuits. It is also aimed at establishing a national network of libraries and information centres in universities, institutions of higher learning and R and D institutions in India. It is basically a cooperative endeavour in resource development, sharing and its utilization at the national level.

Over the years, the programme has progressed steadily and since May 1996 it is an independent autonomous Inter-University Centre under the UGC to coordinate and implement nationwide high-speed data network using state-of-the-art technologies for connecting all the university libraries in the country. INFLIBNET is set out to be a major player in promoting scholarly communication among academicians and researchers in India.

The broad objectives of INFLIBNET are:

- a) To promote and establish communication facilities to improve capability in information transfer and access, providing support to scholarship, learning, research and academic pursuits through the cooperation and involvement of the agencies concerned;
- b) To establish **Information and Library Network** "INFLIBNET" – a computer communication network for linking libraries and information centres in universities, deemed universities, colleges, UGC information centres, institutions of national importance and R&D institutions, etc., avoiding duplication of efforts.

Main Activities include:

- Provided financial support to the tune of Rs. 6.5 lakhs each to 142 university libraries for the purpose of automation and networking.
- More than 75% libraries have become operational and started availing the recurring grant.
- Provided core facility grant of Rs. 1 lakh each to 65 libraries to establish core facilities and get connected to the network for accessing the information.
- Provided training to the staff members working in these libraries, conducted 20 such courses to help the operational staff of these libraries to implement the IT

in their libraries. Similarly one-week workshops were also conducted for the executives working for the libraries at INFLIBNET.

- Onsite training has been provided at more than 35 places.
- INFLIBNET also has started providing regional level training to help the librarians from college libraries and provides necessary support.
- Software to run the library operation is developed and has been installed at more than 50 libraries.
- Union databases development is another activity to provide access to holdings of libraries of different materials, viz., serials, theses, books, experts, projects, etc, and are kept online for access at <http://www.inflibnet.ac.in>. User friendly search engines have been developed to provide access to these databases.
- Implementing the MARC-21 interface to SOUL software and vice versa
- Providing various kinds of information services such as CD-ROM based services, access to OCLC first search, Contents page service
- INFLIBNET Conducts annual convention to provide a platform for librarians and IT professionals in the form of CALIBER
- Brings out a series of publications to promote the cause of INFLIBNET.
- INFLIBNET has also initiated two major projects, viz., Retrospective Conversion of collection of five major libraries and Six Document Delivery Service Centres.

More importantly INFLIBNET has been able to create an IT-conscious environment in university libraries. Librarians have now accepted and are eagerly working to bring these changes to their libraries.

Future Programmes:

The INFLIBNET Centre, in its initial phase has focussed on the building up of the infrastructure at the participating libraries, and preparing them to accept the changes brought about by the information technology. INFLIBNET, as a major library network in the country, sees the future full of opportunities to enter the fast track of information superhighway of this millennium.

Major priorities listed are:

- Providing network connectivity through UGC NET to more than 170 university libraries
- Financial support to remaining universities and recurring grants to funded universities
- Delivering the software (SOUL) to participating libraries
- Increase participation in the network by expanding the membership
- Collaboration with existing national information centres for enhancing the information base
- Develop manpower through continuous training activities to provide services in the networked environment.
- Development of union databases - updating

- Shared cataloguing
- Networked information services
- Access to full text of publications
- Organization and providing access to Internet resources
- Promoting Indian academic information
- Promotion of discussion fora in different areas

7.7.2 Other Important Library Networks

7.7.2.1 DELNET : Developing Library Network

DELNET has been in operation since January 1988 and was registered as a society in 1992. It was initially sponsored by the National Information System for Science and Technology (NISSAT), Department of Scientific and Industrial Research, Government of India and is currently being promoted by the National Informatics Centre, Ministry of Information Technology, Government of India, and India International Centre, New Delhi.

DELNET has been established with the prime objective of promoting *resource sharing* among libraries through the development of a network of libraries. It aims to collect, store, and disseminate information besides offering computerised services to users, to coordinate efforts for suitable collection development and also to reduce unnecessary duplication wherever possible.

DELNET has been actively engaged in the compilation of various Union Catalogues of the resources available in member-libraries. It has created a number of databases listed in the services. All the DELNET databases have been resident on DELSIS, an in-house software developed on BASISPlus, an RDBMS, the product of Information Dimensions Inc. of USA which has been provided to DELNET courtesy National Informatics Centre, New Delhi.

DELNET provides an array of facilities including E-mail to its 243 member-libraries including both institutional and associate institutional members. DELNET'S relentless efforts in resource sharing have proved extremely effective. It has indeed been a big leap towards the modernisation of libraries in India.

Delnet – Service

Electronic Mail

DELNET provides RENNIC E-mail facility to its member-libraries which was introduced by the National Informatics Centre. This gives the members access to both national and international E-mail users and also to INTERNET users.

Online Access to different Databases:

- Union Catalogue of Books of 8,77,772 bibliographic records.
- Union Catalogue of Books : MARC Format has presently 27,231 records.
- Union List of Current Periodicals with 16,497 periodicals and is regularly updated. Union Catalogue of Periodicals contains 10,623 records.
- Database of Periodical Articles has around 2,00,410 records.

- Indian Specialist's Database has 2,000 records of eminent scientists, educationists and writers from all over the country.
- CD-ROM Database has 1,214 Records
- Union List of Video Recordings has about 2,278 listings.
- Union List of Sound Recordings consists of 708 audio cassette records
- Union Catalogue of Hindi has Books nearly 3,000 records in Hindi and can be retrieved through the GIST compatible system.
- Urdu Manuscripts' Database contains 210 manuscripts.
- Database of Theses and Dissertations has 16,587 records.
- Retro-Conversion facilities provided to the libraries through specialised agencies and also facilitates the use of modern tools such as CD-ROMs and online facilities for retro-conversion.
- Referral Services to participating libraries.
- Document Transfer/Copy Facilities for transferring or copying of the documents to its users.
- DELNET conducts training programmes in the use of DELNET services, software, E-mail, AACR2 and LC Subject Headings, Internet, etc. from time to time.

7.7.2.2 CALIBNET: Calcutta Library Network

CALIBNET, a Government of India project, has been launched by the National Information Systems for Science and Technology (NISSAT), Department of Scientific & Industrial Research (DSIR); and managed by the CALIBNET Society established under the West Bengal Government's Societies Registration Act 1961. CALIBNET aims to provide individual libraries and their reading members with cost-effective solutions to their information problems.

CALIBNET was planned to link 38 science and technology libraries of various sizes located in the Kolkatta Metropolitan Area in two phases (eight in the first and thirty in the second phase). All these libraries as a pre-requisite, are first to be computerised and then linked to the network. The main features of the network include online/offline output, editing and retrieval of records. Eventually CALIBNET will be connected to other metropolitan networks, viz., DELNET, BONET, MALIBNET, ADINET, etc, through packet-switched data network.

Services

The network is intended to provide current awareness services, SDI, union catalogue, partial databases and access to national and international networks. Services also include:

- Access to CD-ROM databases
- LCMARC
- Biblio file
- Inside information
- Email service

7.7.2.3 ADINET: Ahmedabad Library Network

ADINET is a network of libraries in and around Ahmedabad. ADINET was registered as a society in October 1994. It is sponsored by the National Information System for Science and Technology (NISSAT), Department of Scientific and Industrial Research, Government of India.

ADINET aims to bring about a cooperative mode of working amongst the libraries and information centers in and around Ahmedabad. The main objective of ADINET is to promote sharing of resources and disseminate in of information among member libraries by networking them and creating a centralized Union catalogue of their holdings. It plans to coordinate efforts for suitable collection development and reduce unnecessary duplication wherever possible.

A centralized database of periodicals, books and non-book materials available in the 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 the cooperation of participating libraries, this database is being regularly updated.

Services:

- On-line information - accessing the Union Catalogue.
- Inter-Library Loan - enables a user to find the location of periodical/book/report of his/her interest Books, reports, theses and borrowed on an inter-library loan basis. Inter- Library document delivery service is available.
- Photocopying services
- Current Awareness Services
- Information Service
- *Internet* Services

7.7.2.4 MYLIBNET: Mysore Library Network

The National Information System for Science and Technology (NISSAT), Dept. of Scientific and Industrial Research (*DSIR*), took the initiatives design and develop library networks in India in 1985 in order to share the resources available in the libraries located in various parts of the country. The Mysore Library Network was set up during May 1995 in the city of Mysore with financial assistance from NISSAT. The Mysore Library Network is housed inside the Central Food Technological Research Institute (*CFTRI*) campus.

Objectives of MYLIBNET

- To share the resources available with all the libraries.
- To provide faster communication to all the libraries through electronic mail facility
- To develop software tools for better library management
- To create awareness in the field of latest information technology by conducting seminars/workshops/training programmes
- To set up an information base in collaboration with industries
- To conduct surveys

- To flash the arrival of new books/journals, announcement of events like seminars/workshops/training programmes.

Services

- Training for trainers in the field of Information technology.
- Technical assistance in the area of library & information science
- Web access to union catalogue

7.7.2.5 PUNENET: Pune Library Network

Punenet is planned for implementation in four phases with the objectives of better utilization of funds through sharing of resources by the creation of commonly usable databases and communication between libraries and automating the functions of the individual libraries.

Services

The network services to be offered are union catalogue, current awareness, SDI, authority data, acquisition and fund accounting, serials control, books and journals maintenance, circulation, user services, interlibrary loan services, document transfer/copy, access to national/international databases.

7.7.2.6 MALIBNET: Madras Library Network

- Initiated in 1991 by INSDOC
- Feasibility study 1992
- Registered as society in 1993
- Facilities : Computers, Sybase RDBMS, UNIX
- Databases : serials, books, other INSDOC databases
- Membership : Multi type, 15 members
- Services : e-mail , MALIBNET card, CC, DDS, Training
- Location : INSDOC Regional Centre, Chennai

7.7.2.7 BONET: Bombay Library Network

- Started in 1994
- Supported by NISSAT
- Membership : 25 Libraries as members
- Facilities : large number of computers and softwares
- Services : Access to databases, email, CD-ROM etc.
- Professional Developments : Seminars, training programmes
- Located at NCST.

There are several other city level networks, which are in their initial stage of developments.

Self Check Exercise

3) What are the efforts made in India for establishing library and information networks?

Note: 1) Write your answer in the space given below.

2) Check your answer with the answer given at the end of this unit.

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7.8 ROLE OF STANDARDS

7.81 Cataloguing Standards – MARC-21, UNICODE

MARC is the acronym for Machine Readable Cataloguing. It means that a computer can read and interpret the data of a cataloguing record. This is the standard used for exchange of bibliographic information among computerized library systems.

The very purpose of using MARC is to provide a standard format for the global exchange of bibliographic information available in machine readable format in libraries worldwide.

The History of MARC goes back to the 1960s with the creation of MARC records by the Library of Congress, Washington DC, in 1996. These efforts were followed by UKMARC, CANMARC, AUSMARC. By 1970 there were around 20 different national MARC formats leading to the requirement of writing the conversion programmes from one MARC to another MARC. The UNIMARC was developed to solve this conversion problem which gave two options from one MARC to UNIMARC and vice versa. However the USMARC was used by many international libraries due to its coverage in terms of standards and time to time updation.

MARC-21 is the new name harmonizing CANMARC and USMARC formats. The National Library of Canada and the Library of Congress worked together to formulate a common harmonized format and reconcile the format differences.

UNICODE:

The Unicode Standard is the universal character encoding standard used for representation of text for computer processing. Versions of the Unicode Standard are fully compatible and synchronized with the corresponding versions of International Standard ISO/IEC 10646. For example, Unicode 3.0 contains all the same characters and encoding points as ISO/IEC 10646-1:2000. The Unicode Standard provides additional information about the characters and their use. Any implementation that is conformant to Unicode is also conformant to ISO/IEC 10646.

Unicode provides a consistent way of encoding multilingual plain text and brings order to a chaotic state of affairs that has made it difficult to exchange text files internationally. Computer users who deal with multilingual text — business people,

linguists, researchers, scientists, and others — will find that the Unicode Standard greatly simplifies their work. Mathematicians and technicians, who regularly use mathematical symbols and other technical characters, will also find the Unicode Standard valuable.

The design of Unicode is based on the simplicity and consistency of ASCII, but goes far beyond ASCII's limited ability to encode only the Latin alphabet. The Unicode Standard provides the capacity to encode all of the characters used for the written languages of the world. To keep character coding simple and efficient, the Unicode Standard assigns each character a unique numeric value and name.

The original goal was to use a single 16-bit encoding that provides code points for more than 65,000 characters. While 65,000 characters are sufficient for encoding most of the many thousands of characters used in major languages of the world, the Unicode standard and ISO/IEC 10646 now support three encoding forms that use a common repertoire of characters but allow for encoding as many as a million more characters. This is sufficient for all known character encoding requirements, including full coverage of all historic scripts of the world, as well as common notational systems.

What Characters Does the Unicode Standard Include?

The Unicode Standard defines codes for characters used in the major languages written today. Scripts include the European alphabetic scripts, Middle Eastern right-to-left scripts, and the scripts of Asia.

The Unicode Standard further includes punctuation marks, diacritics, mathematical symbols, technical symbols, arrows, dingbats, etc. It provides codes for diacritics, which are modifying character marks such as the tilde (~), that are used in conjunction with base characters to encode accented or vocalized letters (ñ, for example). In all, the Unicode Standard, Version 3.0 provides codes for 49,194 characters from the world's alphabets, ideograph sets, and symbol collections. These all fit into the first 64K characters, an area of the codespace that is called basic multilingual plane, or BMP for short.

There are about 8,000 unused code points for future expansion in the BMP, plus provision for another 917,476 supplementary code points. Approximately 46,000 characters are slated to be added to the Unicode Standard in upcoming versions.

The Unicode Standard also reserves code points for private use. Vendors or end users can assign these internally for their own characters and symbols, or use them with specialized fonts. There are 6,400 private use code points on the BMP and another 131,068 supplementary private use code points, should 6,400 be insufficient for particular applications.

More discussion on MARC21 is given in Course 2, block 2 unit 2

7.8.2 Information Retrieval Standard Z39.50

Access to online bibliographic resources with the rapid growth in the use of the Internet and world wide web has made it possible to access the information in ways not possible to access before hence shifting the emphasis of libraries from collecting the information to providing access to information using electronic resources. However, the major difficulty in accessing the resources is of variation in the use of software and hardware. Library professionals have to learn specific features of each system, i.e., command languages, search procedures, etc. The more electronic resources

grow, the more will be the confusion as to how to access the information from diverse databases.

ANSI/NISO Z39.50 is an international standard for communication between computer systems primarily, library and information related systems for overcoming the problems of database searching with many search languages. Z39.50 is becoming increasingly important to the future development and deployment of inter-linked library systems.

In z39.50 model, the target is presumed to contain one or more databases, each of which contains a series of objects called records. Each database contains a set of access points, although not all databases need to support the same nor does every record in a particular database need to be able to be accessed by all of the access points supported for that database. A Z39.5 query uses a set of attributes to search one or more databases.

The typical (simplified) search process involved in a Z39.50 session is as follows:

- OPAC user selects Target library (Z-server) from an OPAC menu.
- OPAC user enters search terms
- OPAC software sends search terms and Target library details to a “Z-client” a piece of software usually running as part of the library system.
- Z-client translates the search terms into “Z-speak” and contacts the Target library’s Z-server software.
- There is a preliminary negotiation between the Z-client and the Z-server to establish the rules for the “Z-Association” between the two systems.
- Z-server translates the “Z-speak” into a search request for the Target library’s database and receives a response about numbers of matches etc.
- Z-client receives records
- Records are presented to the OPAC interface for the user.

More on Z39.50 is discussed in Course 2, block 2, unit 2

7.8.3 Network Protocols viz. TCP/IP Protocols, Telnet

IP Address or IP Number

(Internet Protocol number or address). A unique number consisting of 4 parts separated by dots, e.g. 165.113.245.2

Every machine that is on the Internet has a unique IP address. If a machine does not have an IP number, it is not really on the Internet. Most machines also have one or more Domain Names that are easier for people to remember.

TCP/IP

(Transmission Control Protocol/Internet Protocol) — This is the suite of protocols that defines the Internet. Originally designed for the UNIX operating system, TCP/IP software is now available for every major kind of computer operating system. To be truly on the Internet, your computer must have TCP/IP software.

TELNET

Internet service allowing one computer to log on to another, connecting as if not remote.

Self Check Exercise

4) Discuss in brief the role of standards, viz., MARC, UNICODE, Z39.50 in the context of Library and information Network.

Note: 1) Write your answer in the space given below.

2) Check your answer with the answer given at the end of this unit.

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7.9 SUMMARY

In this unit an attempt has been made to highlight the overview of library and information networks. Briefly discussed are the history and development of library and information networks in India and elsewhere. The standards relating to the catalogue viz. MARC-21 standards, and multilingual solution Unicode are discussed in detail at the end. Also the information retrieval protocol Z39.50 plays a vital role in network-based information services.

7.10 ANSWERS TO SELF CHECK EXERCISES

1) Libraries are committed to providing and making accessible the best possible information services to members. The use of modern information technology tools helps libraries to serve the users in a much better way than before. Library networks play a vital role in this exercise providing access to library resources not only within the library to information available globally. A network is developed when a group of libraries and/or information centres decide to exchange information through computer application.

The benefits of networking include: Preparation of union catalogues, retrospective conversion, provision of bibliographies, optimum use of resources including rare collections, cooperative acquisition of documents, resource sharing, and time saving, networking also minimizes cost of the library services.

The objectives of library and information networks include:

- Provide reliable access to document collection of libraries, i.e., Union Catalogues etc.
- Provide document delivery service.
- Optimise information resources through resource sharing mechanisms.

- Facilitate computerisation of all the libraries.
- Facilitate communication among teachers, students, scientists and others.
- Encourage resource sharing.
- Training manpower required by participating libraries.
- Evolve standards, uniform guidelines, methods, and procedures, both for data capturing as well as hardware and software.

2) Library networks in the USA are at a most advanced level of development. The favourable factors responsible for successful development of library networking in the USA are long tradition of cooperation among libraries, introduction of library automation as early as from the 1960s, advances in information science during the 1970s and 1980s and introduction of MARC format by the Library of Congress in 1968. The experience of the USA is valuable for networking in other countries for sharing of resources from between libraries. The Library of Congress played a vital role leading to the development of successful networks such as OCLC, RLIN, in UK JANET CURL, CALIS (China), AARNET (Australia) and many others.

OCLC is a non-profit membership organization serving 41,000 libraries in 82 countries and territories around the world. Its mission is to further access to the world's information and reduce library costs by offering services for libraries and their users, and to be the leading global library cooperative, helping libraries serve people by providing economical access to knowledge through innovation and collaboration. RLG is a not-for-profit membership corporation devoted to the mission of "improving access to information that supports research and learning.

In the UK, *JANET* is the network operated and developed by *UKERNA* under a **Service Level Agreement from the Joint Information Systems Committee (JISC)** of the UK Higher and Further Education Funding Councils. JANET is connected to the equivalent academic networks in other countries and to many commercial networks in the UK and abroad forming part of the global Internet.

There are several other networks established China Academic Library and Information System (CALIS) is a nationwide academic library consortium, and Australian Academic network (AARNET) delivers high-capacity, cost-competitive Internet-based network services. There are several other library networks in different countries which are not discussed here.

3) Forced by circumstances and by design, there has been a spurt in activities in library network development in the country. The development of some of data networks such as NICNET, INDONET, ERNET, etc, are responsible for the development of networks for libraries. The development of these networks has taken three different directions, viz.

- Development of Metropolitan Networks, viz., DELNET (Developing Library Network), CALIBNET (Calcutta Library Network), ADINET (Ahmedabad Library Network), BONET (Mumbai Library Network), etc.
- Development of countrywide networks with establishment of Information and Library Network (INFLIBNET) Centre to cater to the needs of

Academicians and Research community by connecting the higher education institutions in the country at the national level.

- Development of sectoral facilities like the BTISNET (Biotechnology Information System Network), Oil and natural Gas Net, Management Science Net etc.
- 4) Standards play a crucial role in the success of library and information networks to maintain consistency and quality in the databases created by the libraries participating on the network. Each participating library must follow uniform standards in terms of data creation, data access, language etc. MARC (Machine Readable Cataloguing) is one of the widely accepted standards for data preparation. It means that a computer can read and interpret the data of a cataloguing record. This is the standard used for exchange of bibliographic information among computerized library systems. The very purpose of using the MARC is to provide a standard format for the global exchange of bibliographic information available in machine readable format in the libraries worldwide.

The Unicode Standard is the universal character encoding standard used for representation of text for computer processing. The Unicode Standard defines codes for characters used in the major languages written today. Scripts include the European alphabetic scripts, Middle Eastern right-to-left scripts, and the scripts of Asia.

Information Retrieval Standard, Z39.50 is an international standard for communication between computer systems primarily, library and information related systems for overcoming the problems of database searching with many search languages. Z39.50 is becoming increasingly important for the future development and deployment of inter-linked library systems.

7.11 KEYWORDS

- FTP** : File Transfer Protocol. Ability to transfer rapidly entire files from one computer to another, intact for viewing or other purposes.
- MARC** : MARC refers to (1) a computer record structure, (2) a set of tags and indicators to identify parts of the record, (3) the level of cataloging information contained in the Library of Congress's MARC records, and (4) the body of records distributed by the Library of Congress MARC Distribution Service.
- NETWORK** : A structured arrangement of connecting devices such as computer terminals, or libraries, created for the purpose of communications, information exchange, computer and cooperative services.
- Unicode** : A 16-bit, language-independent character set that enables representation of all of the characters commonly used in information processing.

- UNIMARC** : An international MARC format that accepts records created in any of the more than 20 MARC formats, thus facilitating conversion of records among them
- Z39.50** : A NISO (National Information Standards Organization) standard for information retrieval that allows any library using a Z39.50-compliant automated library system to access remote library collections. Z39.50 specifies a query/response protocol between a client and a server.

7.12 REFERENCES AND FURTHER READING

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Joint Academy Network (JANET) <http://www.ukerna.ac.uk/>

Consortium of University Research Libraries (CURL) www.curl.ac.uk/

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