NETWORKING OF LIBRARIES UNDER INFLIBNET PROGRAMMES PRESENT AND FUTURE SCENARIO

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1.0   Introduction

Networking is an important element of INFLIBNET Programme. Sharing of library resources and information exchange between academicians is not possible without networking. Computerisation of libraries is a pre-requisite for their networking . Accordingly in the initial phase of INFLIBNET Programme, computerisation of libraries, has been accorded high priority. Networking will, never-the-less, be carried out using existing data networks. Establishment of INFLIBNET'S own captive network may be taken up, if required, at a future date.

2.0   INFLIBNET

INFLIBNET envisages to provide wide accessibility to information resources to information users disbursed all over the country by inter-connecting various college libraries, university libraries, libraries of R&D institutions and Information centres. A user, irrespective of his distance and location , can access information available from any where in the network. In the network, physical availability of information at a place is not a consideration, because the user can draw upon the entire resources of the network sitting at a terminal in his own place.

INFLIBNET proposes to connect around 400 unique nodes through out the country. These nodes include 150 university libraries, 50 autonomous colleges/PG centres and 200 others comprising R&D institutions, document resource centres and sectoral information centres.

2.1   System Hierarchy for Information Flow

The system hierarchy in relation to different function of the INFLIBNET is illustrated in Fig.1. The functions of some of the nodes shown in this figure are as follows :

- REGIONAL CENTRE (RC) :

  The Regional Centre will be responsible for maintaining the union catalogue of monographs, serials and non-book materials held in the libraries of the region. There will be four regional centres to be located in four geographical regions of the country - north, south, east and west. The four regional centres will be inter-connected through communication links. Each regional centre will also maintain the copies of union catalogues of other regions, so that union catalogue enquiries relating to the entire country's holdings can be handled at the regional centre itself, thereby reducing the traffic between the regional centres.

- SECTORAL INFORMATION CENTRE (SIC)

  These are for bibliographic and information services. About 40 SICs will be considered. These may belong to the University system as well to outside institutions. The SICs will have a rich collection of materials in their specialised areas. The centres will be based on subject specialisation.

- DOCUMENT RESOURCE CENTRE (DRC)

  100 libraries/information centres will be designated as Document Resource Centres. Their main function will be to provide document delivery service . These DRCs will be identified from universities/R&D institutions, based on their collection strengths. DRCs will be suitably supported for strengthening their document collection and photocopying facilities.

- The terminal at college/departmental library is to be connected to the university library. In respect of non-bibliographic services, the terminal at the university library is to be connected to the Regional centre. For bibliographic services, the University library should have direct access to sectoral Information Centre. For document delivery through Fax and Non-Fax, the university library or R&D institution library should be connected directly to a Document Resource Centre. The catalogue search in the overall system hierarchy should be such that a user could first find out from his college/ department library if his book is available or not and if not available, as a next step, from his university library and as final resort to approach the Regional Centre to find out, through union catalogue, if the book required by him is available in his

REGIONAL CENTRE

SECTORAL INFORMATION CENTRE

DOCUMENT RESOURCE CENTRE

UNION CAT. DATABASE

SUBJECT SPECIFIC SERVICE

DOCUMENT DELIVERY FAX/NON - FAX

UNIVERSITY LIBRARY
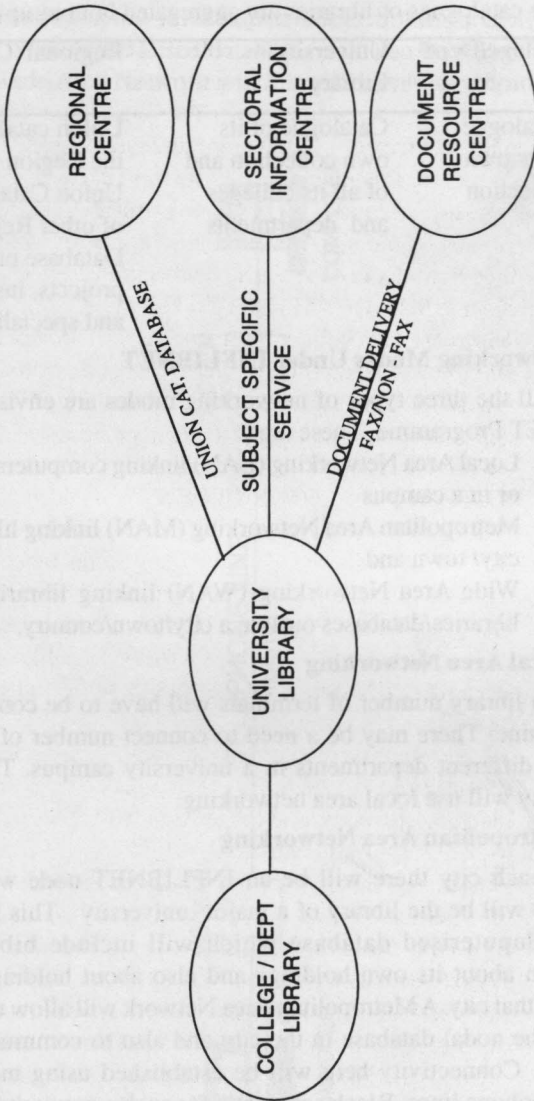
COLLEGE / DEPT LIBRARY

FIG. 1   COMMUNICATION HIERARCHY

region or in any other region or not at all available in the network.

The catalogues of libraries are aggregated bottom up as follows:

College/Dept. Library	University Library	Regional Centre
Catalogue of its own collection	Catalogue of its own collection and of all its colleges and departments	Union catalogue of the Region and Union Catalogues of other Regions: Database on projects, institutions and specialists

3.0 Networking Modes Under INFLIBNET

All the three types of networking modes are envisaged under INFLIBNET Programme. These are

i) Local Area Networking (LAN) linking computers in a library or in a campus

ii) Metropolitan Area Networking (MAN) linking libraries in a city/ town and

iii) Wide Area Networking (WAN) linking libraries to other libraries/databases outside a city/town/country.

3.1 Local Area Networking

In a library number of terminals will have to be connected to a main machine. There may be a need to connect number of computers located in different departments in a university campus. This type of connectivity will use local area networking.

3.2 Metropolitan Area Networking

In each city there will be an INFLIBNET node which in all probability will be the library of a major university . This library will have a computerised database which will include bibliographic information about its own holdings and also about holdings of other libraries in that city. A Metropolitan Area Network will allow the libraries to access the nodal database in the city and also to communicate with each other. Connectivity here will be established using modems and normal telephone lines. Block schematic for such a network is shown in Fig. 2.

3.3 Wide Area Networking

INFLIBNET Programme is generating a Union Catalogue in respect of bibliographic information about holdings of libraries of universities. Some specialised databases will also be part of this union catalogue. Wide Area Network will allow libraries all over the country
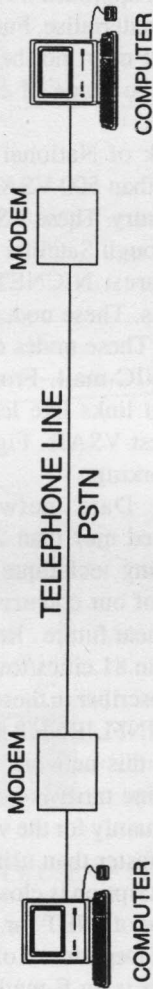

FIG. 2 PSTN BASED MAN

to access this centralised database. Similar databases may be created at few more locations in the country. These distributed databases will be accessed by libraries. The network will also allow academicians, researchers all over the country to exchange information.

The simplest way to connect libraries all over the country to each other and to databases is through Public Switched Telephone Network (PSTN) using modems. In this approach STD calls will have to be made which may take long time to materialise, Further the call charges will be quite high. in this approach it may not be possible to send high data rates. Alternatively use can be made of existing data networks like NICNET, INET or ERNET etc.

NICNET is a network of National Informatics Centre of the Planning Commission. More than 500 VSATs are operational in district head quarters all over the country. These VSATs are hooked to a central hub station in New Delhi through Satellite link. An INFLIBNET node can be connected to the nearest NICNET VSAT terminal through telephone lines using modems. These nodes can then access databases connected to the hub station. These nodes can communicate with each other using E-mail called NIC-mail. From on-line communication between the nodes, dedicated links like leased lines will be required between the nodes and nearest VSATs. Fig. 3 depicts possible use of NICNET for wide area networking.

INET is a Public Data network of Department of Telecommunication established mor than 2 years back. This network makes use of packet switching technique. Presently this network is operational in 8 major cities of our country. DOT plans to cover about 89 cities under INET in very near future . Recently DOT has announced provision of 099 dial facility in 81 cities/towns having STD facility.

Using this facility a subscriber in these cities/ towns can get linked to one of the 8 INET nodes. INFLIBNET nodes can access data bases and contact each other using this network by subscribing to INET. In this approach the telephone line tariff is quite low as compared to the normal STD. One has to pay mainly for the volume of data exchanged. It works out to be cheaper and faster than using normal STD for sending data. Presently the INET subscription is closed and there is a big waiting list. Fig. 4 depicts possible use of INET for wide area networking.

ERNET is a network of Department of Electronics basically meant for educational purposes. This is an E-mail based network and can be used by INFLIBNET nodes for query and response type of applications.
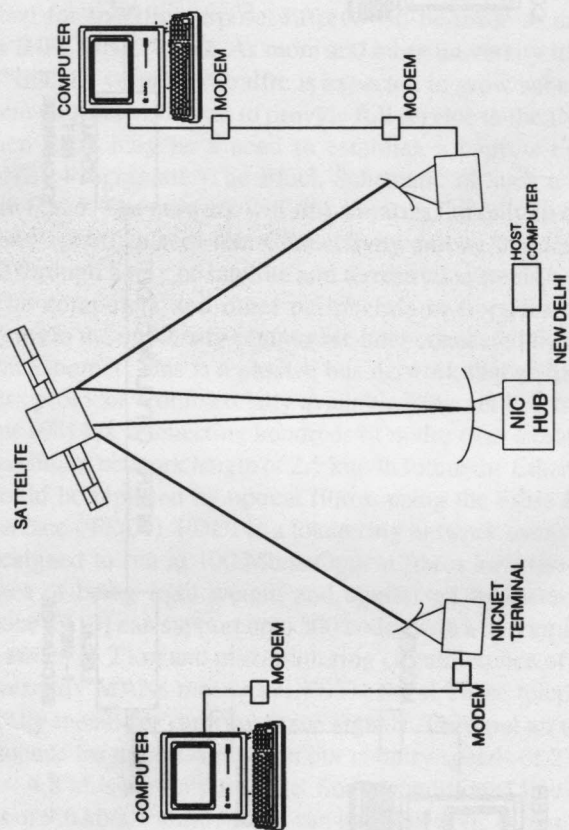
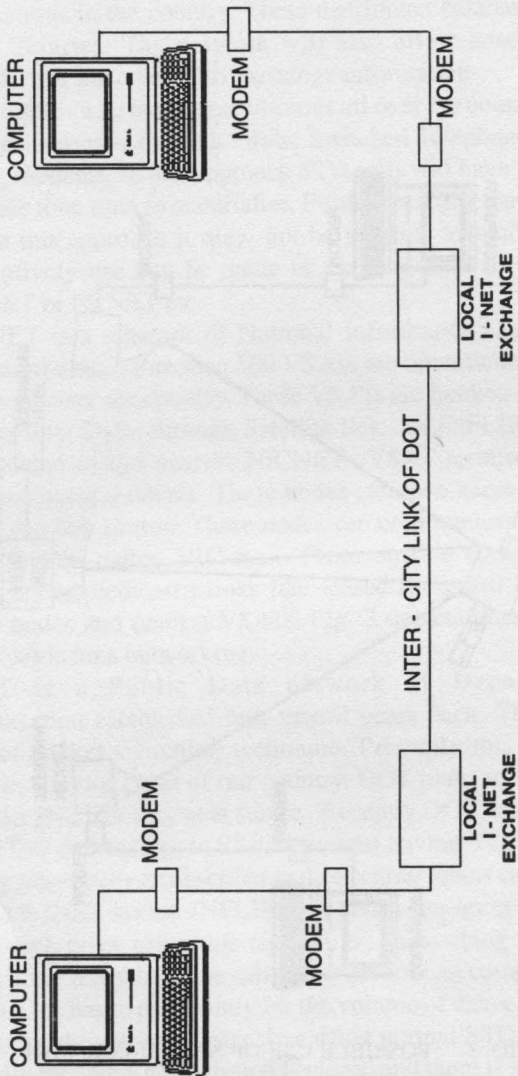FIG. 3   POSSIBLE USE OF NICNET FOR WAN

FIG. 4   POSSIBLE USE OF I-NET FOR WAN

An ERNET subscriber has to make, at present, an STD call to Bombay or some other ERNET node to enter the network. Now ERNET is establishing a satellite based network and plans to have satellite nodes in about 8 cities initially.

4.0 Future Scenario

Various data networks presently available in the country have been established for specific purpose. Efforts will be made to make use of them for INFLIBNET work. As more and more university libraries join INFLIBNET the volume of traffic is expected to grow substantially. If the present data networks fail to provide full service to the INFLIBNET users then there may be a need to establish a captive network for INFLIBNET Programme. The Block Schematic of such a network is shown in Fig. 5. The network will link libraries not only in cities but in remote and far off places too. Connectivity among the nodes will be provided through a mix of satellite and terrestrial systems.

The computers and other peripherals in libraries or in other departments in the university campus are inter connected by LAN based mostly on Ethernet. This is a passive bus network that utilizes CSMA/CD access protocol. Commercially available Ethernet LANs can easily operate at 10M b/s, connecting hundreds of nodes over a branching bus with a maximum network length of 2.5 km. In future the Ethernet coaxial cables could be replaced by optical fibres, using the Fibre Distributed Data Interface (FDDI). FDDI is a token ring network using fibre optic cables designed to run at 100 Mb/s. Optical fibres have the additional advantages of being light weight and unaffected by electromagnetic interference. FDDI can support upto 500 nodes with a maximum distance between nodes of 2 km and maximum ring circumference of 200 km

Presently MANs mostly use PSTN lines. These telephone lines are basically meant for carrying voice signals. They put an upper limit on data speeds for digital signals. In our country speeds of 2.4 kb/s and at the best 4.8 kb/s are only feasible. Some conditioned lines can carry data rates of 9.6 kb/s. Future MANs can use fibre optic cables. MAN can be considered as a large LAN having appropriate speed. The architecture can be optimized for a distance of 5 to 50 km.

Presently different networks are provided for different services like voice, video, electronic funds transfer, telemail, teleconferencing, telegraphy etc. In near future a user will have easy access to a multiplicity of services using Integrated Services Digital Network (ISDN) over a
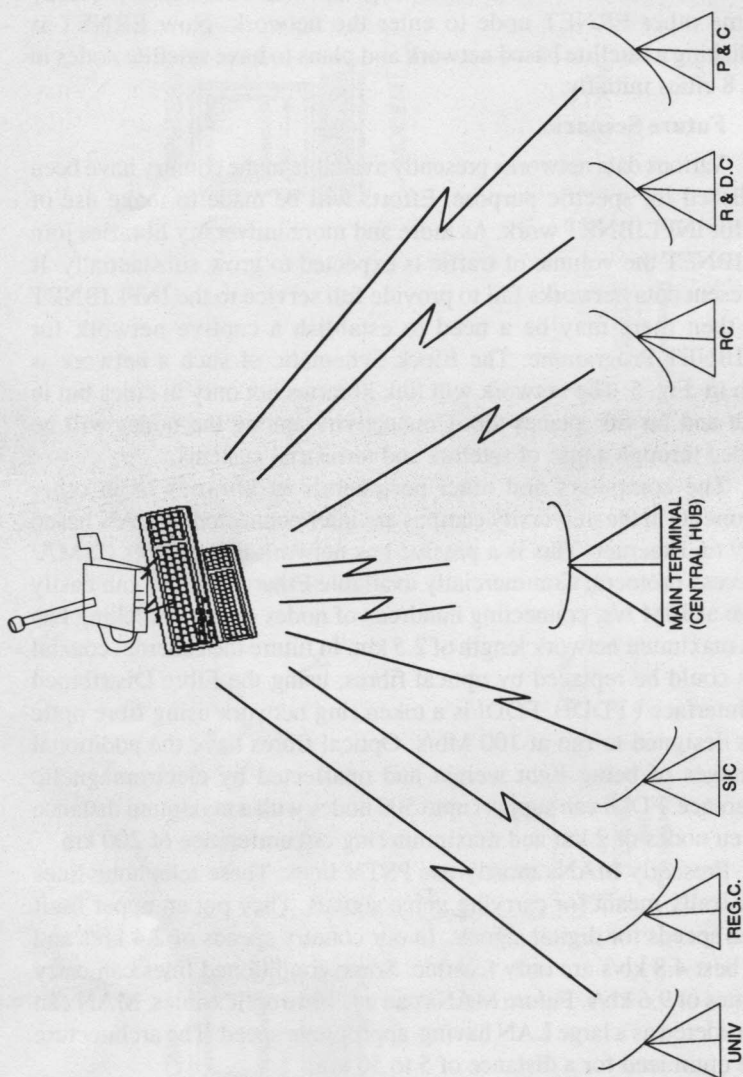
FIG. 5   SCHEMATIC OF OVERALL NETWORK (INFLIBNET)

single connection to the network. Telephone network becoming digital has been the impetus to the ISDN. For digital data to be transmitted over normal telephone lines, it is modulated into analogue form and the possibility of interference with neighbouring channels puts a maximun limit on data speeds. But with the whole network or the whole transmission going digital, there will be no interference problem and high data rates are possible for ISDN. Presently ISDN allows for the integration of voice and data services at the rates of upto and including 64 kb/s utilising existing cable networks. Optical fibres are being used increasingly as the transmission medium and their costs too are falling down. This will open up the possibility of providing economically an integrated wide-band access to the network directly from the customer. B-ISDN or broad band ISDN is such a futuristic network which will allow all the multimedia services mentioned above to be carried over a single medium.

An important issue which needs to be addressed to in our country in near future is the interconnection of different networks. Presently number of data network like I-NET, NICNET, ERNET etc. are operational in India. But there is no interconnetion between them. How will two users subscrbing to different networks communicate with each other? The number of Metropolitan Area Library networks like DELNET, CALIBNET,BONET,MALIBNET, ADINET etc. is increasing. How a user of one of these library network will access database of other library networks? There is a need to interconnect all these networks on the line of "INTERNET" so that these net works are transparent to a user. The Internet is a world wide network of computer networks. It links about 30,000 networks in over 90 countries connecting around 2.5 million computers giving access to over 15 million users. The high level of connectivity provided by Internet has resulted in an unparalleled degree of communication, collaboration, resource sharing and information access. Internet has become a forum for human communication in wide variety of disciplines ranging from computers, medicine, biosciences, social sciences to art, music, sports etc.

5.0   Conclusion

India has been touched by the strong winds of Information Technology blowing across the world. Importance of information dissemination using modern tools of it has been recognised. Our libraries are fast embracing computer technology. INFLIBNET is endeavouring

to automate the university libraries and provide them networking facilities. INFLIBNET plans to make use of existing data networks in the country for this purpose as far as possible, INFLIBNET may establish a captive network of its own linking all academic & R&D libraries in the country if other networks do not suffice to meet its requirements. Keeping pace with the rapid developments in IT, these networks will have to move towards all digital multimedia networks in future.

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