

## LANs for Information Management in University Campuses

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### Abstract

The INFLIBNET proposes to develop Wide Area as well as Local Area Networks to bring out the knowledge sharing among the universities in India. The author describes the configurations of typical Local Area Networks (LANs) for universities in conjunction with Wide area VSAT network. The topology of LAN can be based on Star, Bus and Ring topologies or their combinations. Details of the proposed configuration are provided and its implementation in two phases is suggested. Establishment of such a network will encourage sharing of information and improve overall quality of academic and research work.

### Introduction

Universities are the cradles where future generation of a country grows. The information needs of an university are vast. INFLIBNET proposes to provide suitable networking facilities in universities to manage the knowledge sharing rather than just information. This will include Wide Area as well as Local Area Networks. This paper describes typical Local Area Network configurations for universities in conjunction with Wide area VSAT network to serve universities.

Some of the common information activities which the universities require are :

- Library and information dissemination services
- Online database of projects, papers, course materials
- Academic communication among the teaching, research and other personnel
- Automation of university procedures
- On-line access to UGC information
- Broadcasting programmes of CEC
- List Forum for discussion groups
- Internet access

## INFLIBNET's Initiative

Following objectives have been kept in mind for design of Intranet among the universities.

- to evolve a national network, interconnecting various libraries and information centres in the country and to improve, capability in information handling and service<sup>1</sup>.
- to develop and transmit knowledge and spread culture of sharing information in the light of todays need of, society.
- moving information to the people, rather than people to the information.
- to reduce the gulf between the information rich and poor institutions.
- to provide resource sharing avenues among the universities to bring economy and improve services.

INFLIBNET Centre proposes to provide following help in establishing the network.

- to set up a WAN among the universities.
- to set up a LAN in each university.
- to Provide Remote Access Services (RAS).
- to Provide Internet connectivity.

## Wide Area Network (WAN)

Internet is a network of networks consisting of Government, Education and Business sectors participating around the world. Most of the academicians want to be on the Internet because of the wealth of information that lies there to be made use of. The goal of INFLIBNET can be served by taking a more focussed approach of building an INTRANET that will connect Indian Universities to the world through INFLIBNET Hub.

This Intranet is a secure IM network, with rich functional feates of LANs and WAN, interconnected to rest of the world by the Internet along with its technological applications, visulised in our context. This will be based on open standards and provide for seamless exchange of information-in the form of text, video, audio etc. - between the various organisational entities.

Based on the implementation methodology adopted Intranets can be divided into two categories :

1. Pseudo Intranet (the common one)
2. Real Intranet (the net - so common ones)

### *Pseudo Intranet*

A pseudo Intranet is one which use Internet based technologies and applications for setting up a secure IM network. It does not use the Internet for transmitting packets between organizational systems. There is a web server for the whole university, which provides services like e-mail, news group, web-sites etc. within university through LAN and among universities through private communication channels (say a VSAT network). Pseudo Intranet can be divided into two categories.

- A. One that offers Internet access at the desktop.
- B. One that does not offer Internet access to the desktops but provides access through a private channel.

The basic differences in the implementation issues of these categories are that Firewall is required in case (A) and can be dispensed with in case (B).

Pseudo Intranet is depicted in figure 1.

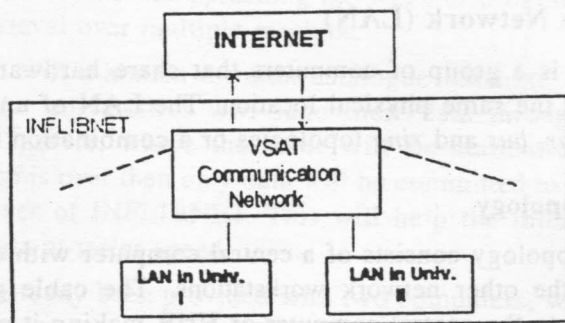


Fig. 1 : Pseudo INTRANET

### *Real Intranets*

Real Intranets are nothing but pseudo intranets of class A with the Internet as the packet - transferring medium. That is different nodes or LANs of the corporate Intranet uses the actual Internet Lines to communicate (send packets to) with each other.

The dotted box shown in the figure 2 represents the Intranet of the university (actually a Wide Area Network). Each of the LAN within the WAN can have their own web-server. The web-server will handle request for Internet access / Intranet access through the VSAT (communication network) at each university.

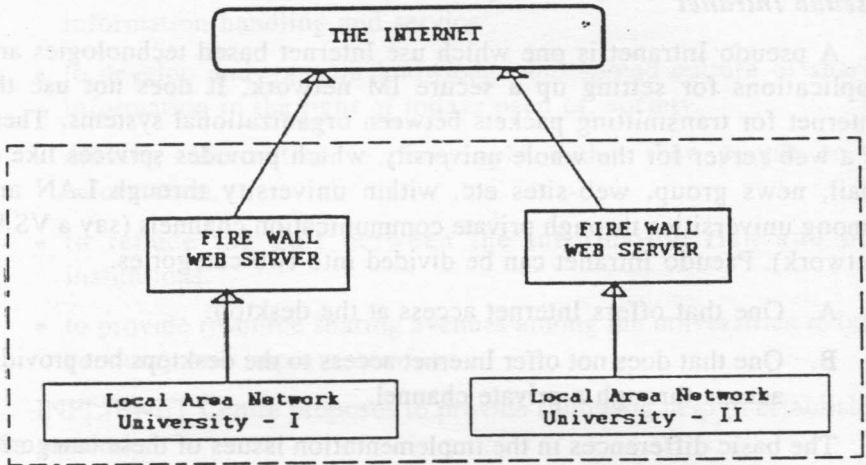


Fig. 2 Real INTRANET

### Local Area Network (LAN)

A LAN is a group of computers that share hardware and software resources at the same physical location. The LAN of university will be based on *star*, *bus* and *ring* topologies or a combination there of<sup>2</sup>.

#### The Star topology

A star topology consists of a central computer with cables radiating from it to the other network workstations. The cable goes from each workstation to the central computer or HUB making it easy to isolate a cable break and equally important, a single cable break will not bring down the entire network.

#### The Bus topology

The bus is a straight line data highway that carries the network information from one network workstation to another. A bus topology results in information being broadcast to all workstation on the network.

Each workstation examines the address on the packet of information and determines whether or not there is a match. This approach differs from a star topology where the central computer or hub ensures that a packet is directed only to the destination workstation.

### Ring topology

A closed ring generally uses a token, a specific bit pattern that indicates that workstation has permission to send information. Rings can be bidirectional as well as unidirectional; the newer Fiber-optic network take advantage of bidirectional cabling to achieve data transmission speeds of over 100 MBPS.

### Proposed LAN configuration

Following are the main features of the proposed LAN for universities. The Star configuration (Fig. 3) and the Ring configuration (Fig. 4) of the LAN in the university campus are drawn accordingly.

1. Networking will be based on Client / Server architecture i.e. RDBMS S/W will be used as a back end tool to store the library database which can be accessed and manipulated by Windows based OPAC customised by INFLIBNET from any node. The server will be kept in the library.
2. Distributed processing will be resorted to for maintaining the entire database of library i.e. the spreading the work of program execution and data retrieval over multiple machine.

INFLIBNET will maintain a union catalogue database at a central place. All the universities will send their data through WAN to INFLIBNET server, where the same will be authenticated. Once authentication is over then only data will be committed to the UNION database server of INFLIBNET. This will help the Internet user to access the data at faster speed.

3. Library has already been provided with two computers, which can be configured as servers and five nodes. The purpose of the server and nodes are proposed to be
  - One server will be to take care of library databases and associated services,
  - Second server is proposed to be a WINDOWS NT based Web-server connected with VSAT to provide E-mail, Telnet, FTP facility, Home page/Web-page of university and other services including Internet access.



6. VSAT connection will be provided to all the universities and a Pseudo Intranet will be set up.
7. Provision to give RAS (Remote Access Services) to any of the server using dial-up telephone lines from colleges can be configured on the Windows NT server or Router to provide Modem connectivity.
8. Every university will maintain their web-page which will be put on their server and link to all kind of information pertaining to the university and departments.
- 9 E-Mail facility will be provide to all the nodes.  
Networking may be provided through EPABX also.

### Advance Options

As services expand and demand grows following newer technologies can be adopted.

- i) *ATM Switches* : Asynchronous Transfer Mode switching technology based on fixed length cells provides speeds from 50 Mbps to 2 Gbps. It provides additional scalability, delivers the quality of services required for multimedia applications and has capability to build networks that use the same basic technology for local, metropolitan and wide area links.
- ii) *Gigabit Ethernet* : Gigabit Ethernet is built on top of the Ethernet protocol but increases speed ten-fold over fast Ethernet to 1000 Mbps or even 1 Gbps.

### Implementation Strategy

The Intranet is proposed to be established in two phases.

#### *First Phase*

- Setup of LAN in a few potential Indian universities.
- Pilot phase Connectivity to 15 VSATs through Shared Hub and check out various applications planned.
- Installation and configuration of Web-server, Database server etc.

#### *Second Phase*

Establishment of the captive network of the VSATs after successful check out in trial phase.

- Establishment of LANs in remaining potential universities to be identified.
- VSAT network to provide WAN for 150 universities will be setup under the proposed IX plan.
- Establishment of own Hub if required.
- Provide Internet access to universities.

## Conclusion

It is hoped that, establishment of the network as envisaged under this scheme will encourage sharing of information and improve overall quality of academic and research work.

## References

1. Development of an Information and Library Network report of the inter agency working group, University Grants Commission, 1988; 13.
2. Stan Schatt, Linking LANS, A Micro Manager Guide, TK 5105>536-1991; 126.