8

COMPUTER NETWORKS

S GANGULY

Structure

Learning Objectives

It is expected that after going through Unit 8 on Computer Networks you would be able to

- Understand basics of the various types network technologies in the area of computers, Local Area Network (LAN) and different components of computer network
- Familiarize yourself with the Internet and its terminologies, web addresses, advantages, benefits disadvantages and its usages in the field of adult

education

- Acquaint yourself with needs and demands of creating demand driven information, rural knowledge repositories, importance of local websites, databases, bulletin boards e-mail lists, etc. in adult education by the help of different case studies
- Appreciate the importance of participation in application oriented networks and community education

8.1 Introduction

In Unit 7 we mentioned about electronics-based networking. In order to understand fully the concept of this type of networking Unit 8 introduces you in greater detail to computer networks. With the greater use of computers it was realized that the use of the computer could not be restricted to a particular place. A need was felt to link computers located at different places, e.g. in the same room or scattered through a building or at distant places for exchange of data/ information. A group of two or more computer systems linked together is known as computer network. Networking has revolutionized use of the computer. It is more cost effective and productivity is also gained. It allows computers and their users to share information and resources. Its other uses are database server, computer server, email, chat, internet, etc.

8.2 Networking through Computers

In Unit 7 you read how networking through computers is emerging and no one could keep himself/herself away from it any longer. But, what are the types of a network within the arena of computers? Those are LAN, MAN and WAN. Not only this, there are certain topologies associated with it and there are certain components which carry out these functions. We need to acquaint ourselves with these technical words and their usages when we move to the area of networking through computers and extend its use in reaching out to adult learners. Let's discuss in detail about seemingly strange terms and their everyday applications.

8.2. 1 Types of Network

Based on geographical dispersion of computers there are mainly three types of network.

- Local Area Network (LAN)
- Metropolitan Area Network (MAN)
- Wide Area Network (WAN)

Local Area Network

In this type of network computers and other communication devices are in a small area and are connected together (networked). The area can be single building, cluster of buildings in the same campus. Examples can be Local Area Network of Lab in which you may be working or a library which you may be using.

Metropolitan Area Network

A Metropolitan Area Network is basically a bigger version of LAN and normally uses similar technology. It might cover a group of nearby corporate offices or it can be in a city. It can be private or public.

Wide Area Network

Computers can be farther apart like covering cities, countries or even continents. The computers are connected by telephone lines or radio waves or optical fibres.

8.2.2 Network Topologies

Topology refers to the shape of a network or network's layout. How different nodes in a network are connected to each other and how they communicate is determined by the network's topology. There are four most common network topologies, namely, i) Bus Topology, ii) Star Topology, iii) Ring Topology and iv) Mesh Topology (See Figure 8.1).

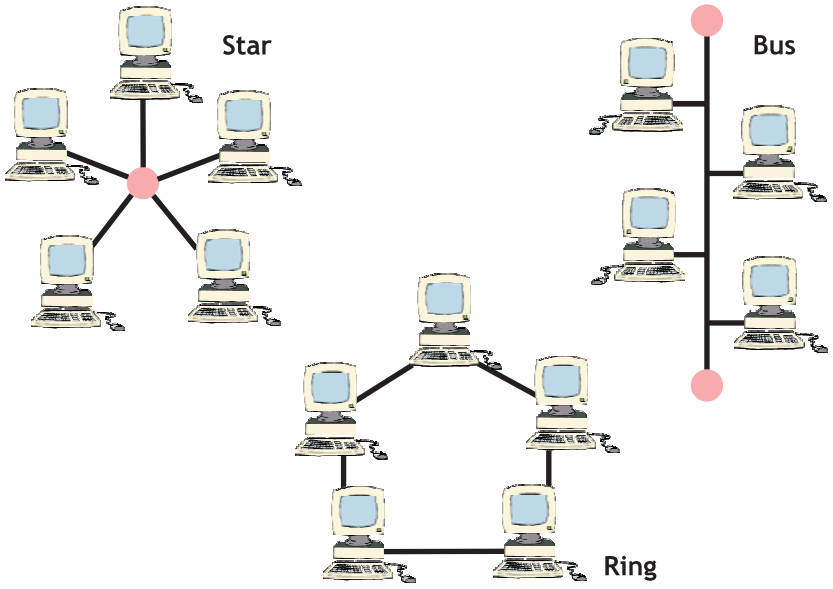

Figure 8.1 Network Topologies - Star, Bus and Ring

Bus Topology

All devices are connected to a central cable, called the bus or backbone.

Star Topology

All devices are connected to a central hub. Nodes communicate across the network by passing data through the hub.

Ring Topology

All devices are connected to one another in the shape of a closed loop, so that each device is connected directly to two other devices, one on either side of it.

Mesh Topology or Point to Point Network

Devices are connected with many redundant interconnections between network nodes. In a true mesh topology every node has a connection to every other node in the network.

8.2.3 Network Components

The following are essential components for computer networking.

a) Network hardware

b) Transmission media

c) Network software

Let us discuss each component in some detail.

a) Network Hardware

The basic component of computer network hardware is a computer. Computers on a network can be divided into two categories,

i) server and
ii) clients or nodes.

Server is the computer of higher power, and speed. It costs more. To this computer resources are attached. And the clients, also known as nodes access, are the resources which are attached to server. In peer to peer computer networks there are no servers.

b) Transmission Media

Communication of data propagation and processing of signals is called transmission. Signals travel from transmitter to receiver via a path. This path is called medium. Medium can be guided or unguided.

Guided Media

In guided media, data is sent along a physical path i.e. cables. There are several types of cables used in network. The type of cable chosen for a network is related to the network's topology, protocol and size. Different types of cables are a) coaxial cables, b) Twisted pair copper wire, and c) Optical fibre cable.

a) Coaxial cable looks like cable that brings the cable TV signal to television.
b) Twisted pair copper wire cable looks like phone cable. Twisted pair cables come in two varieties, a. shielded and b. unshielded.
c) Optical fibre cable

Unguided Media

Here no wire is installed. The data communication is predominantly sent by radio waves and microwaves.

Network Card

We will discuss about networking software. But hardware has also to be connected. Most important part of connection is the network card. This is the middle part of connection. These cards are 8 bit cards, 16 bit cards and 32 bit cards. Each card has its own method of sending information (network protocol) through the cable. The most commonly used is Ethernet Protocol. A network card is called Interface card, network adapter, a NIC etc. It is a circuit board or chip which allows the computer to communicate to other computers on a network.

Modem (MODulator / DEModulator)

A modem converts digital signals (computer signals) from the computer into analogue signals for transmission and vice versa for reception over a telephone line. There are four basic types of modems for a PC: i) External, ii) USB, iii) Internal and iv) Built-in. External and USB are set on your desk outside the PC, while as Internal and Built-in are inside the PC. Present day modems have 56 kilobites per second speed. ISDN (Integrated Services Digital Network) circuits are digital. In this conversion from digital to analogue is not required.

Switch

Switches are basically bridges, but usually have multiple ports. Switches connect network segments, using a table of addresses to determine the segment on which a packet needs to be transmitted.

Hubs

A hub is used to connect multiple computers and devices via a dedicated cable. It is cheap and connections are easy. It generally has 4, 8, 12, 24 ports.

Router

These are used to connect networks and to determine the optimal path along which the network traffic should be forwarded. They are occasionally called gateways. There are other network devices like repeaters, bridges, ports, etc.

c) Network Operating Software

Network operating software (NOS) is a collection of software and associated protocols that allow a set of autonomous computers, which are interconnected by a computer network, to be used together in a convenient and cost-effective manner. It is similar to any other operating system like windows, DOS, etc. except it operates over more than one computer. It controls operation of the network system, including who uses it, when they can use it, what they have access to, and which network resources are available.

At a basic level, the NOS allows network users to share files and peripherals such as disks and printers. They provide data integrity and security. The examples can be categories of NOS: The NetWare, LAN Manager, Solaris and Windows 2000 etc.

The main categories of network software are i) Peer to peer software and ii) Client / Server-based

Peer to Peer Software

In peer to peer networking operating software users can share resources and files located on their computers and can access shared resources on other computers. There is no central server. All computers in the network are equal. They have similar capabilities and resources. Examples of Peer to peer network software are Windows XP, Windows 98. When you are working in Microsoft Office Word under Windows environment, you can share the shared documents. It is possible because Windows XP is peer to peer networking software.

Client Server Based (Two Tier)

This software is in two parts. One part which includes functions and services resides in one or more exclusive (dedicated) computers. This part is called server. It provides security and access to resources. Another part called 'client' resides on other computers (nodes / client). They access resources on the server. The network operating system allows multiple users to simultaneously share the same resources irrespective of physical location. Examples of Server based networking software are: Novel Netware, Windows NT, UNIX, Window 2000 etc.

Client Server Based (Three Tier)

Here a client-software is split into two parts.

i) Browser (user-interface) (thin client)

ii) Logic.

Thus two tier client-server becomes three tier architecture. The logic which describes how to access and process data is moved to a new server. This new server is server for thin client. Nothing changes in the server side.

LAN

Standards for LAN are Ethernet, LocalTalk (for Macs), Token Ring, the most popular in Ethernet Protocol. It allows for linear bus, star or tree topologies. Data can be transmitted over twisted pair, coaxial or fibre optic cable at a speed of 10mbps.

Activity 8.1

Do you have a computer in your adult learning set up? If yes, try to identify the type of network it has and its topology or the shape of its layout. Then with the help of a computer expert, try to find out the type of its network hardware, transmission media and network software. Write a short account of 500 words on your information about the computer in your adult learning setup.

8.3 Internet

The Internet is a network of networks. It connects millions of computers and thousands of computer networks throughout the world. The Internet has revolutionised our society, our economy and our technological systems. The Internet represents one of the most successful examples of the benefits of sustained investment and commitment to research and development of the information infrastructure.

The Internet Society (ISOC) defines the Internet as a "global network of networks" which enables computers of all kinds to directly and transparently communicate and share services throughout the world. It provides for both communications capabilities and information services. It also constitutes a shared global resource of information, knowledge and means of collaboration and cooperation among countless diverse communities. For communication on Internet it uses standard protocol which is called transmission control protocol, Internet Protocol or TCP/IP. Standardized communication protocols allow similar, dissimilar, near and distant computers to communicate with one another. The Internet protocols and standards are being defined from time to time by various international organization and committees after rigorous testing and reviewing.

8.3.1 Trends

You may like to know about Internet 2 and Internet 3, which reflect future trends in computer networks.

Internet 2: It is a consortium being led by 200 universities working in partnership with industry and government to develop and deploy advanced network applications and technologies, accelerating the creation of tomorrow's Internet.

Internet 3: It includes the US Government's initiative to provide high bandwidth network service.

8.3.2 Adult Education

There are discussion groups and e-mail lists relating to adult learning. You may try to access some of the following resources.

Discussion groups

- alt.education.distance is a group that focuses on learning over the Internet, a form of distance education.
- bit.listserv.edtech is an adult education discussion group.
- misc.eeducation.adult is an adult education discussion group (All the three visited by the author on 27.9.2006).

Email Lists

- ADNET is the adult education network
- URL: listserv@alpha.acast.nova.edu
- DEOS-L is the international forum for distance learning.
- URL: listserv@psuvm.psu.edu
- DISTED is an online chronicle of Distance Education and Communication
- URL: listserv@alpha.acast.nova.edu

8.4 Importance of Internet

The Internet is an "enabling technology". When its introduction is sensitive to local values and committed to local capacity-building, it offers important

opportunities to

- **Open dialogue:** Low cost networking facilitates knowledge sharing, awareness of alternative perspectives, more open exchange
- **Improve governance:** Raising efficiency, transparency, participatory systems
- **Improve social and human rights conditions:** Expands access to better quality education, healthcare, disaster relief capacity and other services
- **Reduce poverty:** Opens new opportunities for bypassed groups (women, the poor, rural populations, children)
- **Introduce economic opportunities:** E-commerce, ICT-sector development etc.
- **Improve environmental management, GIS:** Food security early warning systems.
- **Support indigenous knowledge:** Communities document their knowledge.

8.4.1 Disadvantages of Internet

Advances in communication media (VoIP, Instant messaging, email), based on Internet technology have made computer mediated communication more rich and cheap. Yet, today, this potential for knowledge sharing is not fully realized. Indeed, the internet is by nature an anonymous medium in which people find it hard to place their trust. As a result, people who have had few or no face-to-face meetings are not likely to share knowledge.

8.4.2 Benefits of Internet

It supports and encourages the new learning environment, which is based on principles of active learning-reflecting the change in the culture of education from teacher-centred to learner-centred.

The Internet can be used for a variety of purposes from a library. Some of the purposes are

- to exchange e-mail instantly with institutions in India or abroad
- to participate in teleconferences with people on topics of internet or research problems like adult education
- to find out educational information from universities libraries and book stores all over the world
- to search on-line library catalogues for bibliographic data and other databases for textual data
- to have access to electronic journals, newsletters and in-house information of many organisations and institutions.

Activity 8.2

Have you ever used the Internet? If yes, write briefly about the contexts in which you use the Internet. Do you find it an enabling technology? If yes, then write in one short paragraph, how it has enabled you to do what.

Let us now look at some case studies in order to learn from the practice of computer networking.

8.5 Case Studies - I

Here we will discuss about the network that focuses on teachers and another network that focuses on learners. Then we will talk about a network that links literacy efforts and also about futures trends.

8.5.1 ALTIN: Focus on Teachers

The gradually increasing use of instructional technology and online communications in the field of adult literacy is creating both new opportunities and reviving old challenges.

ALTIN: The purpose of the Adult Literacy Technology Innovation Network (ALTIN) technology training program, begun in the mid-1990 was to provide basic instructional technology staff development for adult literacy teachers, including the basics of instructional technology and electronic online communications in a useful and user-friendly way, while at the same time building a network of practitioners who can, after the six months of training, assist other literacy programs and practitioners by means of a mentoring process. ALTIN has shown that an electronic training network works best when participants have established a human network among themselves when they are able to identify commonalities of interest and need, have established a level of trust and commitment among themselves, and can identify areas of collaboration and communication that will result in mutual benefit. Face-to-face meetings appear to make such a people-to-people connection easier, helping to increase the level of trust, facilitating the identification of areas of mutual interest and concern among participants, and increasing the accountability and commitment that participants have to each other online.

8.5.2 SHELCOM: Focus on Learners

The shelter communications Literacy Network was an experimental Internet-based computer writing project for adults living in homeless shelters in Philadelphia, USA. The project began in 1993 and completed in 1995. These poorly educated adults also suffered from a variety of problems associated with drug and alcohol use. SHELCOM showed that such disadvantaged populations can be reached effectively through the Internet, in spite of the initial low literacy abilities of many participants.

8.5.3 Literacy Link

Distance education for learners and teachers: Literacy Link, funded by the U.S. Department of Education is designed to serve the large numbers of Americans who require additional basic skills instruction. As an Internet-based lifelong learning system, Literacy Link has two major goals: (a) to increase the access of adults to learning opportunities that will enable them to obtain their high school diplomas, and (b) to improve the quality of instruction available to individuals and adult literacy providers nationwide through enhanced resources and expanded staff development. Literacy Link is one of the first and most comprehensive initiatives to harness the power of the Internet to provide instruction and demand to adult learners, as well as communities, libraries, schools and homes.

8.5.4 Conclusions and Future Directions

The above case studies illustrate a few of the opportunities that have become available through Internet. Some of them are staff development, reaching out to the disadvantaged, and taking advantage of the convenience of learning in the home or community. In the ALTIN case study, it was found that human networks are an essential component to the electronic networks that are now easily and cheaply available on the Internet. The SHELCOM project

demonstrated that new technologies can be implemented with even the most difficult to reach and difficult-to-retain populations, using fairly simple networking and word-processing techniques. Literacy Link deals with how distance education can provide a cost-effective and comprehensive self-learning system for adult education in the home and community.

Activity 8.3

Do-it-Yourself: ICT & Adult Education Network

It is possible to establish an adult education workers network. In order to communicate with each other adult educators can create an EnoP based on Listserv Technology. This can also encourage knowledge sharing among them. There is listserv-software available, like names of SWS. Or alternatively using "Yahoo mail" they can form "Yahoo group of adult workers". A mailing list of resource people has to be made. If a person needs help to know how to perform a particular task or availability of some information he/she can post a question to the whole network through mailing list. Members of mailing list will reply to his/her question and his/her problem shall be solved.

8.6 Case Studies - II

Production of information and its dissemination through network can be most effective if it comprises local content. We will discuss here importance of local content and creation of local content in India. Then we will look at creation of information that is demand-driven. There will be short pieces of information on creation of rural knowledge repositories and local websites, databases, bulletin boards and e-mail lists.

8.6.1 Information Production and Dissemination through Network

Let us first discuss

a) how important is local content and

b) generation of local content in India.

a) Importance of Local Content

An education centre can provide people in the community with access to computers to send and receive information. Centre should translate the need to provide people with access to content that they can use in their daily lives. Persons may need such practical content as adult literacy programs, information on public benefits, information on health, consumer and credit information, and information related to employment and training. If a woman in the village has access to the Internet, she will not necessarily be able to use the information to improve her child's health because trying to get information from the Internet is like drinking from a fire hose - you don't know the source of the water.

Local content is a big challenge for an adult education centre. A multi-nation study by the International Institute for Communication and Development or IICD (2002) suggests that "easier access to globalized knowledge is fast turning us into 'consumers' of distant and potentially irrelevant information". Local content, the report says faces intense competition because big content initiatives by other groups tend to push their external content onto local communities. In the same vein, another IICD report suggests developing countries are being invaded by foreign ideas and

values that may undermine or overwhelm local cultures.

b) Generation of Local Content in India

Here is a case study of a village knowledge centre. It shows how staff dealt with the issues of local, relevance and language. The centres, established in Pondicherry on the southeast coast of India by the M.S. Swaminathan Research Foundation (MSSRF), demonstrated ingenuity, creativity and sensitivity in developing their information products. In one case, coastal villages were highly dependent on weather and tides information. Many fishermen were not literate. Village Knowledge Centre downloaded whether reports from digital network information and converted that to audio. The audio versions were then played on loudspeakers in the open air. In addition, project volunteers in the villages built their own information resources in the center to complement the external databases thereby providing local and localized information on agricultural, health and government programs for low-income people, for example, a directory of general and crop insurance schemes; a list of about 130 schemes available as entitlements to rural families; a directory of hospitals and medical practitioners in Pondicherry - grouped according to their specialisations; bus and train schedules covering Pondicherry and two nearby towns; and pest management information for the sugarcane crop.

The content in the above cases is based on Dagron (2001) and Harris (2003).

Information must be locally relevant and respond to the information needs of the potential users. In such ways these services shall contribute to social and economic community development and to sustainability of the adult education setup.

8.6.2 Demand Driven Information Production in the Warna Wired Village Project

The project area is a cluster of 70 villages in the Sangli district of Maharashtra, India. The project has been jointly implemented by the Government of India through the National Informatics Centre, the Government of Maharashtra and the Warna Cooperative Society. This project was initiated to serve the information needs of the farmers for different crop cultivation practices of major crops, sugarcane cultivation practices, pest and disease control, marketing information, dairy and sugarcane processing information, and other agriculture-related services.

Apart from information retrieval, there are two client based applications to serve the farmers' needs through the computer booths installed in each village: (a) the Dairy Information Centre; and (b) the Sugarcane Information System.

In the Dairy Information System, information on all farmers who are part of the dairy system is maintained. Other details available to members of the dairy co-operatives include the quantity of milk supplied by each farmer, fat content, billing information and credit details. This information is maintained and updated at the central database on a daily basis.

In the Sugarcane Information System, information on shareholders is maintained. There are about 200-350 shareholders in each village for the sugarcane crop. This system maintains details of the cultivation schedule, the quantity harvested and supplied to the

society, deductions effected by the society towards, credit, and the net income due to the farmers. This data is available with respect to each shareholder.

Booth operators of Paragoam, Bhairwadi, Kuralap and Panhala report that an average of 20-25 farmers visit the computer booths every day for information on crop cultivation practices and disease control, marketing, dairy and sugarcane billing details, etc.

These excerpts are from K Bedi, P J Singh, and S. Srivastava (2001).

8.6.3 Creating Rural Knowledge Repositories

Tele-centers in Kannivadi and Samiarpatty developed a database on indigenous knowledge on issues such as livestock management, integrated pest management, the practices of the farmers in cultivating 42 crops focusing on pest and disease management.

A database on the local expertise has been developed in the form of a rural yellow page. The information consists of consisting of names, addresses and information of various village professions such as blacksmiths, carpenters, plumbers, masons, nurses, traditional healers, etc. Similarly, a local consultant has been employed to gather information about all the development programmes in the region. This database would provide the information regarding the objectives of the programs, eligibility for participation, etc. Details of experts in agriculture and health are also kept in the tele-centers.

Camps are organized where experts and villagers meet and discuss various issues in specific subjects. These discussions are captured in audiocassettes and video photography. In a form of question-answer, the discussions are kept in a database. Camps such as livestock management, credit management, and women's health are being organized. The activities of the region are captured in Thagaval Thinnai (information courtyard) where information on agriculture and horticulture prices in the regular local markets, weekly markets and informal markets, social and cultural events, training programmes, visits of experts, local entertainment, weather reports, local employment opportunities, and news from regional newspapers are regularly given and supplied through local area network. Moreover prints-out of some of the location-specific and very vital information are being pasted at the public places every day. Thus, Tagaval Thinnai is available both in 'online' form as well as in print form. The animators collect the information through formal channels such as web sites and informal channels such as contacting the traders. Some of the main sources of the information are agricultural extension agencies, the block development office, commission agents of the flower market at Nilakotai (a market town), Gandhigram, a deemed university etc. The information is collected and provided on a daily basis.

P. Thamizoli and K. Balasubramanian, Information Management and Knowledge Empowerment: MSSRF Tele-centers in South India, The Journal of Development Communication December 2001.

8.6.4 Local Websites

A local website with the help of users of adult education centre can guide to relevant information. The website can, on the one hand, be a medium for introducing information on the community with information provided by the community. On the other hand, the website will provide links to useful

information sources and present information that has been interpreted into the local languages. The website can further link to online distance learning material and/or local databases. Example of a community-based website is: www.tarahaat.com.

8.6.5 Databases

The tele-center manager in collaboration with project volunteers can build their own databases. These shall be locally generated and, hence, locally and personally relevant information sources that can include details of government programs for low-income rural families (dependent on the context of the particular community); local market prices for grain; local farming families; a directory of insurance plans for both crops and input prices; pest management plans for local products; a directory of local hospitals, medical practitioners and their specialities; a regional timetable for buses and trains; and a directory of local veterinarians, cattle, and animal husbandry programs, etc.

Databases could further include a collection of application software and reference material, such as CD ROMs relevant for responding to local needs. Most software producers donate license for their software to NGOs or community groups upon request, so if a NGO is in need of software, it can contact the producer.

8.6.6 Bulletin Boards

Bulletin boards present an easy-to-realize method of presenting gathered information to a wide number of community members. Bulleting boards could be placed outside the adult education centre building and/or different focal points within the community and be updated regularly.

8.6.7 Email Lists

Email lists allow the posting of questions, receiving of news updates, and sharing of experiences via email within a group that you define. An email list is identified by a single name, such as mail- list@server.com. A message is sent to the mailing list name and it is automatically forwarded or broadcast to all the addresses in the list.

These mailing lists can be extremely helpful in connecting users of adult literacy programmes to share experiences. For example, Chasquinet, an Ecuador-based NGO, hosts a tele-center in Latin America and the Caribbean.

Activity 8.4

Visit a community-based website: www.tarahaat.com and find out if it contains information provided by the community. Does it provide links to useful information sources and present information in the local language? Also look out if the website provides link to online distance learning material. Write a short not of 200 words on what you have discovered after visiting the website: www.tarahaat.com.

8.7 Participation in Application Network

The participation in collaborative networks enables information to flow from and to rural communities, facilitates dialogue between

communities, intermediaries and development organizations, fosters co-ordination of national and local development efforts and overcomes physical barriers to knowledge and information sharing. Networks provide information and help regarding particular topics, as well as access to the Internet, mail connections, radio connections, and e-mail. Generally, these applications use inexpensive store-and-forward systems to provide information on agriculture, public health, medicine, and the environment.

8.7.1 Example for an Application Network: FarmNet

Farmer Information Network (FarmNet) is a network of rural people and supporting intermediary organizations, such as extension services, using ICTs and conventional communication media to facilitate the generation, gathering and exchange of knowledge and information. Operated by farmers and their organisations, FarmNet links farmers to each other and to the resources and services, they need to improve their livelihoods. Design of a FarmNet with the Uganda National Farmers' Association found that the best approach was to enhance existing communication efforts (face-to-face, local radio, publications) with the use of simple e-mail based communication system for information on markets, improved agricultural technologies and weather conditions.

FAO, FarmNet brochure, 2000
URL of FarmNet : http://www.fao.org/sd/2001/KN1008-cn.htm

FarmNet Asia (China, India, Indonesia, Nepal, Philippines, Sri Lanka, Thailand and Vietnam).

The FARM approach has successfully demonstrated that it can bring the farm households to the center of decision-making. The approach also builds the capacity of farm households to collectively assess, decide, plan, implement, manage and be responsible for their own development on a continued "doing and learning process". The approach also enhances the relationship of all stakeholders involved in rural development. It includes the cooperation and collaboration of government and non-governmental organizations with the farm communities.
URL: http://farmnetasia.nic.in/

TARAhaat is a project with the goal of bringing information and Marketing Services using e-business to rural India. Tarahaat acts as a social enterprise to promote effective e-commerce. Users are able to buy seeds, machinery, spare parts, and even household items. Tarahaat puts a special focus on responding to people's needs, making the network highly participatory and responsive.
URL: http://www.tarahaat.com

8.7.2 Community Education

As adult educators, PALDIN learners may be interested in encouraging increased use of community resources and seeking out volunteers to augment the basic educational program. They may like to develop educational partnerships among schools and public and private service providers, business and industry, and civic and social service organization.

By organizing programs and activities that serve all ages and populations, a community school encourages disparate elements of the community to come together to work for common goals. It provides a physical setting as well as an organizational structure for school community collaboration.

8.8 Conclusion

Unit 8 provides details about various types of computer networks such as LAN, MAN and WAN, how they are useful. It explains about different components of network, what is Internet, and tells about some e-mail lists of sites related to adult education, importance of Internet, its benefits and advantages, etc. From the different case studies you learn about the use of instructional technology in reaching out to those who we cannot easily reach and how information can be generated and disseminated at the local level. The case studies show that it is always beneficial to generate locally relevant information and make a database of this information. To have these data in an online and print is also of advantage. The creation of a rural knowledge repository helps in many ways starting from farming and weather information to awareness about health and developmental programmes. Participation in application-oriented networking provides resources, service and possibilities of improvement in livelihood. As an adult educator you need to relate education to development and work on livelihood issues of adult learners. In this context, networking helps in bridging the gap between adult educators and adult learners.

8.9 Apply What You Have Learnt

Have you ever witnessed or participated in an application-oriented network? If yes, share it with your colleagues. If not, then open the Internet and in the website address given in the unit search for it. Write down the information you received. Design and propose to develop such an application-oriented network keeping in view the needs and demands of adult learners in your region.

Create a Rural Knowledge Repository in your area by including some of the points given below.

- Major Crops of the area and its cultivation
- Pest and disease Management by Farmers
- Names, addresses and information of various occupation-holders of the village
- Heath Centres, their timings, etc
- Various developmental Programs, their contact persons and help lines, if any
- Loan Facilities from bank and the name and address of their contact persons