

**STUDY OF COMPUTER NETWORKING PROTOCOLS AND IMPLEMENTATION
OF THE VIDEO CONFERENCING CONTROL, NETMEETING WITH AN
EMPHESIS/UNDER WIRED NETWORKING ENVIRONMENT**

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This Report Presented in Partial Fulfillment of the Requirements for the Degree
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APPROVAL

This Project Report entitled “**Study of Computer Networking Protocols and Implementation of the Video Conferencing Control, NetMeeting with an Emphasis/under Wired Networking Environment**” By Abdullah-Al-Rumi & Md. Imran Hossain has been submitted to the department of Electrical and Electronics Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronics Engineering. This project work has been accepted as the satisfactory by the following Honorable members of the Board of Examiners after its presentation that was held on May 25 2014.

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of, **Professor Dr. M. Shamsul Alam, Dean, Faculty of Engineering, Daffodil International University** & co-supervision of **M. Akhter Uz Zaman, Assistant Professor, Department of Electrical and Electronics Engineering, Daffodil International University**. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma

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ABSTRACT

In this project we basically worked on the very basic of computer networking, we went to the root level of the networking process how the things are done behind the interface. We discussed about different types of internet connection, which we used in various format of our daily live, the seven layers that are used in networking process. We also discussed about TCP/IP, Telnet, FTP, and HTTP. The project is basically aimed to measure the ease use of network diagram software particularly to help users to create a network diagram for multiple reasons. This is to find out whether the software can save them more time and money by reducing the effort to manually graph out a network diagram. The aim of this project is also to find out the properties of NetMeeting software which can help us to learn more about the general aspects of video conferencing and file sharing.

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CHAPTER 1: Introduction of Computer Network

1.1 WHAT IS A COMPUTER NETWORK?

A computer or data network is a telecommunications network that allows computers to exchange data. In computer networks, networked computing devices pass data to each other along data connections. The connections (network links) between nodes are established using either cable media or wireless media. The best-known computer network is the Internet

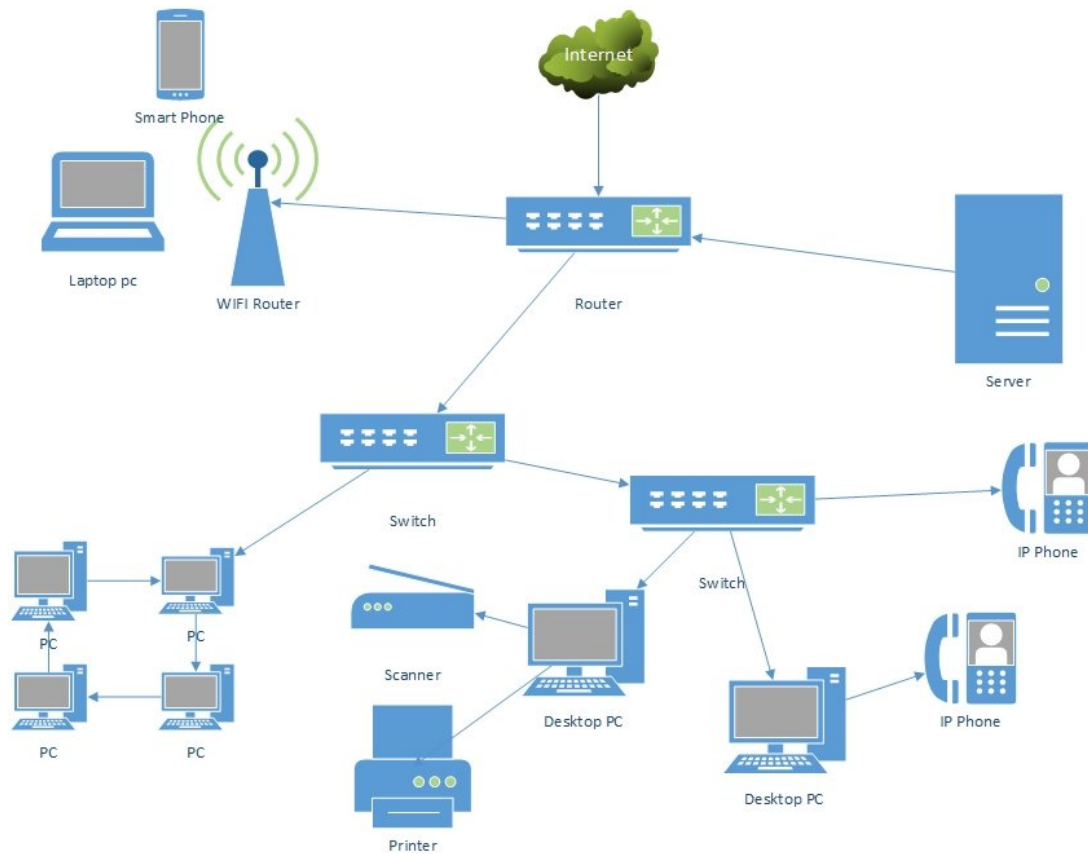


Figure 1.1 Computer Network

Every network includes:

- At least two computers (Server or Client workstation).
- A connection medium, usually a wire or cable, although wireless communication between networked computers and peripherals is also possible.
- Network Operating system software, such as Artisoft LANtastic Microsoft Windows Server and Windows NT, Novell NetWare, UNIX and Linux.

1.2 TYPES OF NETWORK:

A network is basically all of the components (hardware and software) involved in connecting computers across small and large distances. Networks are used to provide easy access to information, thus increasing productivity for users

1.2.1 LOCAL AREA NETWORK (LAN)

A local area network (LAN) is a group of computers and associated devices that share a common communications line or wireless link. Typically, connected devices share the resources of a single processor or server within a small geographic area (for example, within an office building). Usually, the server has applications and data storage that are shared in common by multiple computer users. A local area network may serve as few as two or three users (for example, in a home network) or as many as thousands of users (for example, in an FDDI network).

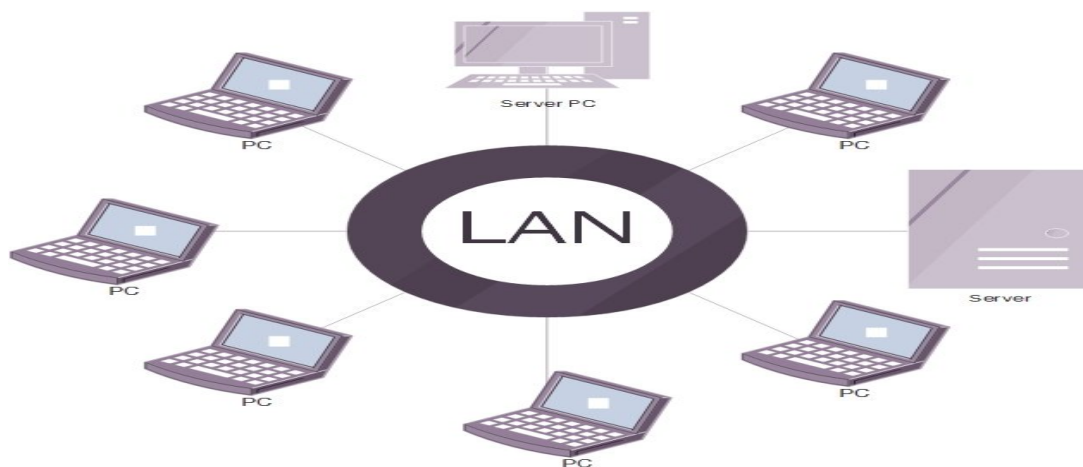


Figure 1.2 Local Area Network

1.2.2 WIDE AREA NETWORK (WAN)

A wide area network (WAN) is a geographically dispersed telecommunications network. The term distinguishes a broader telecommunication structure from a local area network (LAN). A wide area network may be privately owned or inclusion of public (shared user) networks.

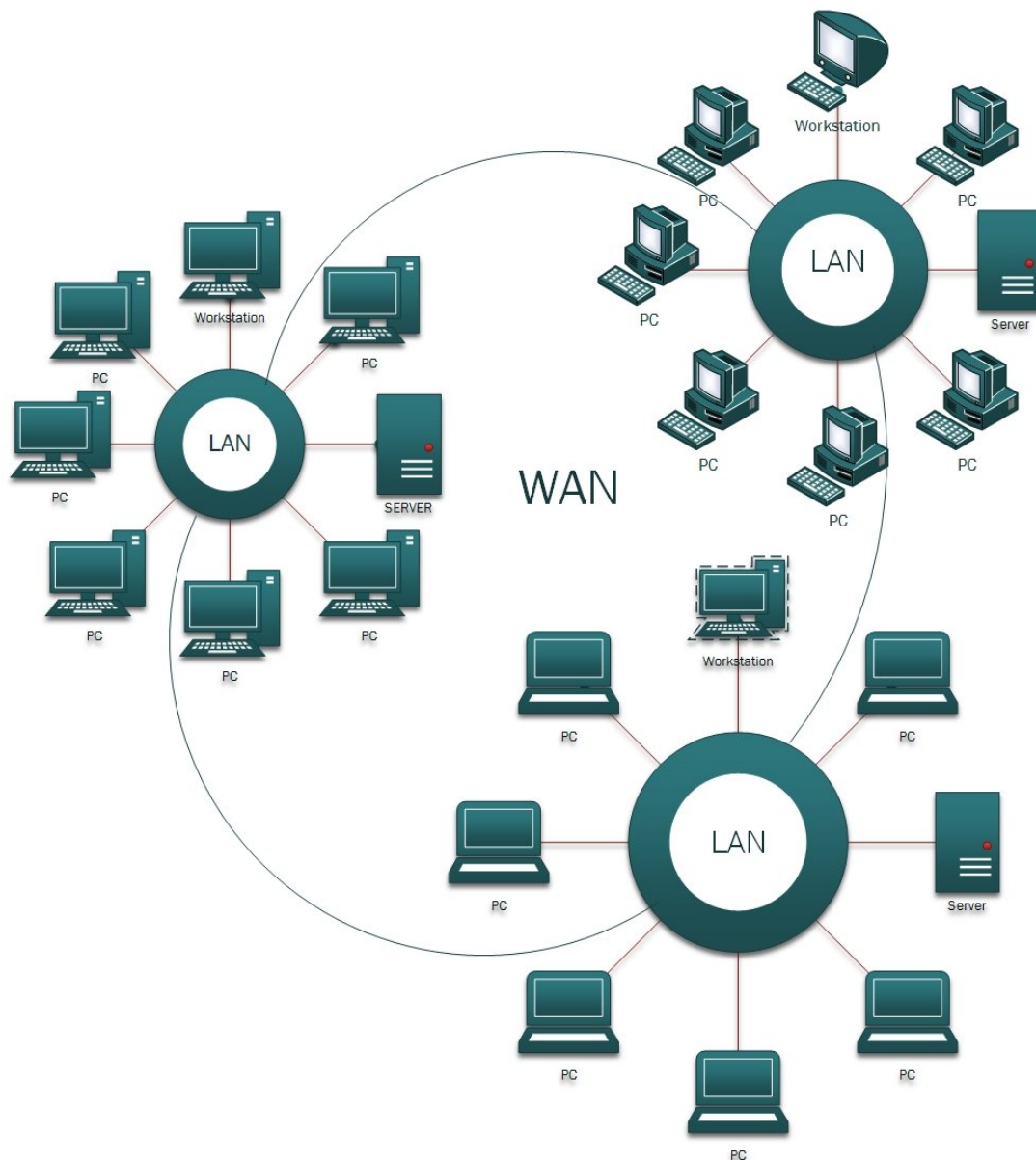


Figure 1.3 Wide Area Network

1.2.3 CAMPUS AREA NETWORKS (CANs)

A campus area network (CAN) is a network of multiple interconnected local area networks (LAN) in a limited geographical area. A CAN is smaller than a wide area network (WAN) or metropolitan area network (MAN). A CAN is also known as a corporate area network (CAN).

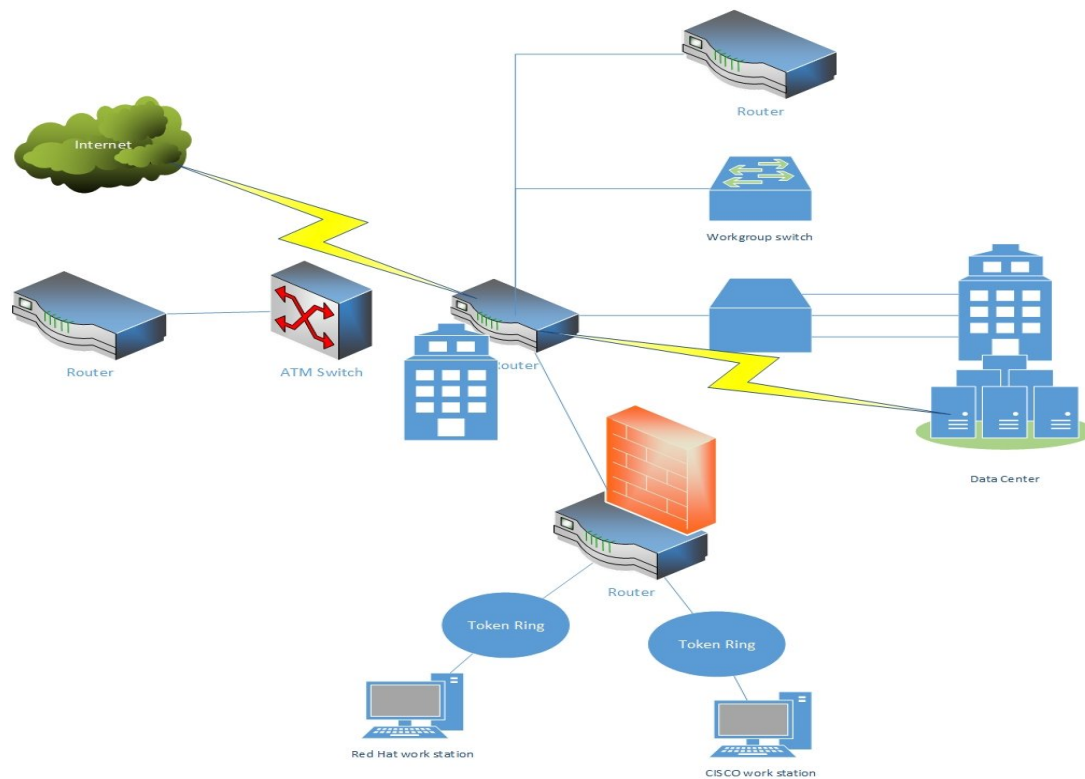


Figure 1.4 Campus Area Network

1.2.4 METROPOLITAN AREA NETWORK (MAN)

A metropolitan area network (MAN) is similar to a local area network (LAN) but spans an entire city or campus. MANs are formed by connecting multiple LANs. Thus, MANs are larger than LANs but smaller than wide area networks (WAN). MANs are extremely efficient and provide fast communication via high-speed carriers, such as fiber optic cables. A MAN is ideal for many kinds of network users because it is a medium-size network. MANs are used to build networks with high data connection speeds for cities and towns.

The working mechanism of a MAN is similar to an Internet Service Provider (ISP), but a MAN is not owned by a single organization. Like a WAN, a MAN provides shared network connections to its users. A MAN mostly works on the data link layer, which is Layer 2 of the Open Systems Interconnection (OSI) model.

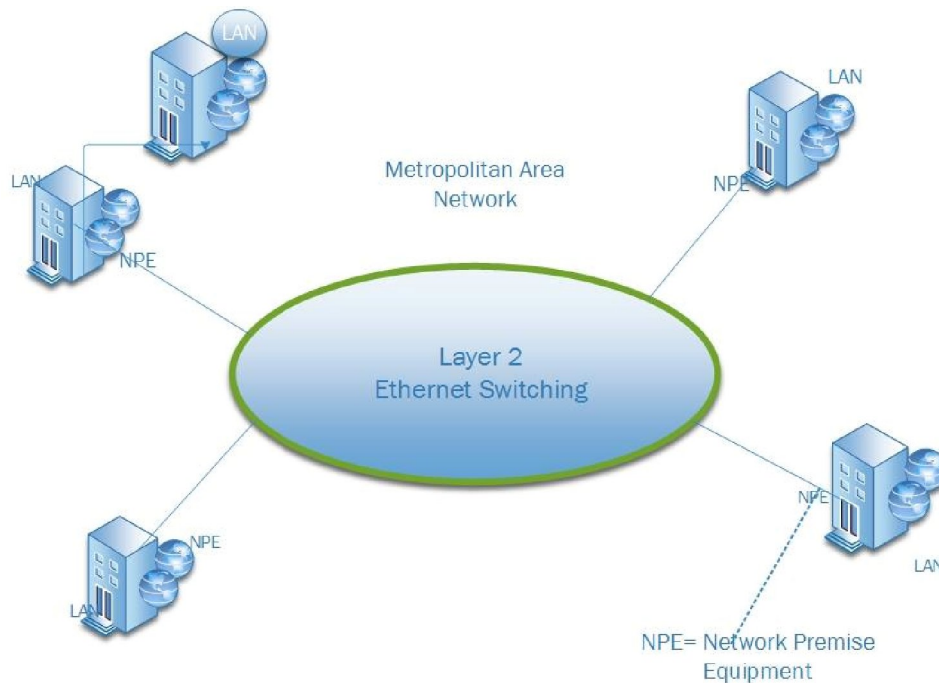


Figure 1.5 Metropolitan Area Network

1.2.5 HOME AREA NETWORKS (HANs)

A Home Area Network is a type of local area network that develops from the need to facilitate communication and interoperability among digital devices present inside or within the close vicinity of a home. Devices capable of participating in this network—smart devices such as network printers and handheld mobile computers—often gain enhanced emergent capabilities through their ability to interact. These additional capabilities can then be used to increase the quality of life inside the home in a variety of ways, such as automation of repetitious tasks, increased personal productivity, enhanced home security, and easier access to entertainment.

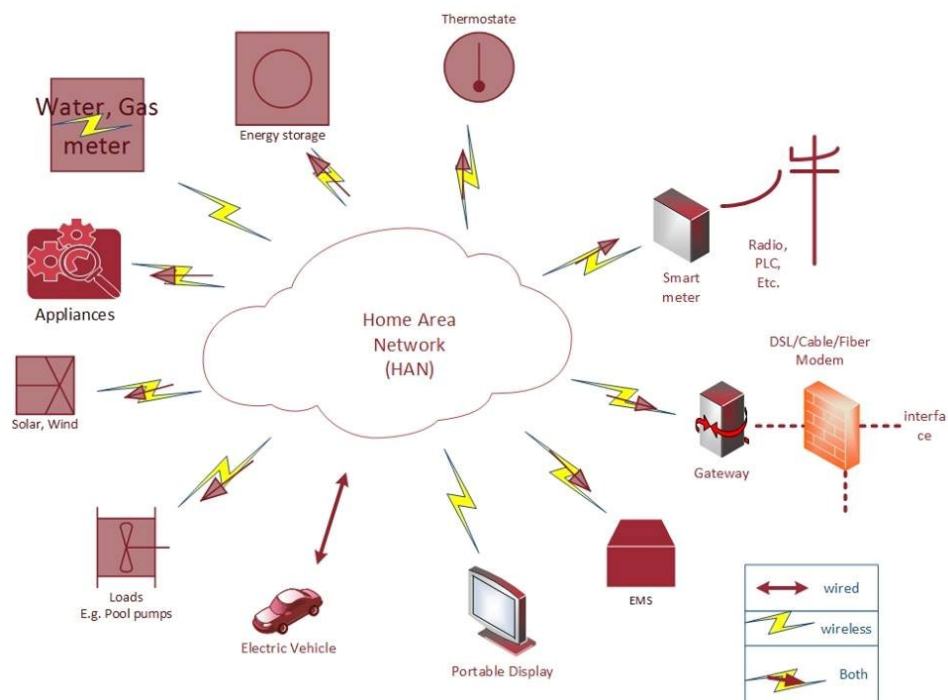


Figure 1.6 Home Area Network

1.2.6 WIRELESS LOCAL AREA NETWORK (WLAN)

A wireless local area network (WLAN) is a wireless distribution method for two or more devices that use high frequency radio waves and often include an access point to the internet. A WLAN allows users to move around the coverage area, often a home or small office, while maintaining a network connection. A WLAN is sometimes called a local area wireless network (LAWN).

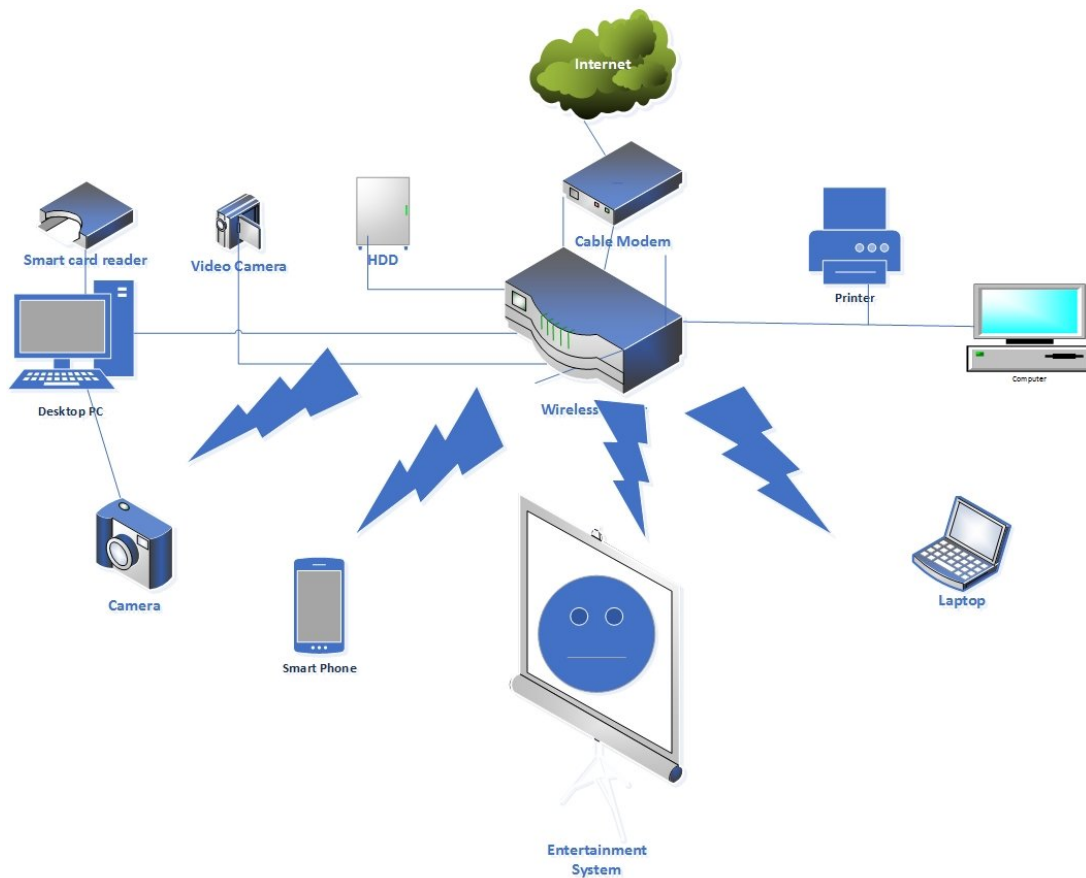


Figure 1.7 Wireless Local Area Network

1.3 NETWORK REFERENCE MODELS

A computer network connects two or more devices together to share information and services. Multiple networks connected together form an internetwork.

Internetworking present challenges - interoperating between products from different manufacturers requires consistent standards. Network reference models were developed to address these challenges. A network reference model serves as a blueprint, detailing how communication between network devices should occur.

The two most recognized network reference models are:

- The Open Systems Interconnection (OSI) model
- The Department of Defense (DoD) model

1.3.1 OSI REFERENCE MODEL

The Open Systems Interconnection model (OSI) is a conceptual model that characterizes and standardizes the internal functions of a communication system by partitioning it into abstraction layers. The model is a product of the Open Systems Interconnection project at the International Organization for Standardization (ISO), maintained by the identification ISO/IEC 7498-1.

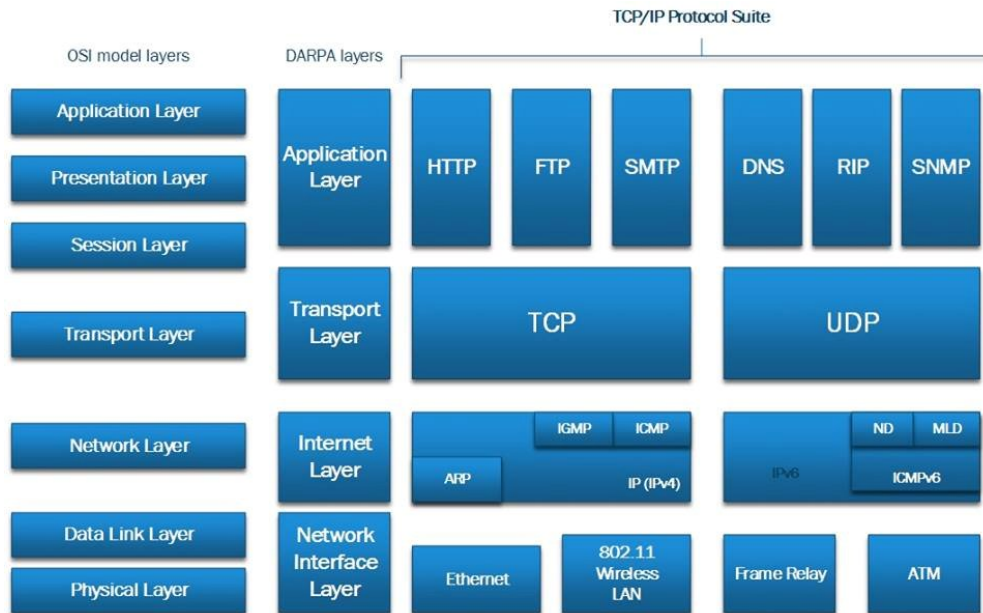


Figure 1.8 OSI Reference Model

The model group's communication purposes into seven logical layers. A layer serves the layer above it and is served by the layer below it. For example, a layer that provides error-free communications across a network provides the path needed by applications above it, while it calls the next lower layer to send and receive packets that make up the contents of that path. Two instances at one layer are connected by a horizontal connection on that layer.

1.4 DATA COMMUNICATION BASIC

To send data between a devices on one local area network to another device on another LAN, a standard way of communication is required since local area networks may use different types of technologies. This need led to the development of IP addressing and the many IP-based protocols for communicating over the Internet, which is a global system of interconnected computer networks. Before IP addressing is discussed, some of the basic elements of Internet communication such as routers, firewalls and Internet service providers are covered below.

CHAPTER 2: Communications protocol

2.1 WHAT IS A PROTOCOL?

A communication protocol defines a set of rules, according to which the communication between two or more parties must be performed.

Network protocols are standards that allow computers to communicate. A protocol defines how computers identify one another on a network, the form that the data should take in transit, and how this information is processed once it reaches its final destination. Protocols also define procedures for handling lost or damaged transmissions or "packets." TCP/IP (for UNIX, Windows NT, Windows Server and other platforms), IPX (for Novell NetWare), DEC net (for Networking Digital Equipment Corp. computers), AppleTalk (for Macintosh computers), and NetBIOS/NetBEUI (for LAN Manager and Windows NT networks) are the main types of network protocols in use today.

We discussed about different form of Application layer, Transport layer & Network layer.

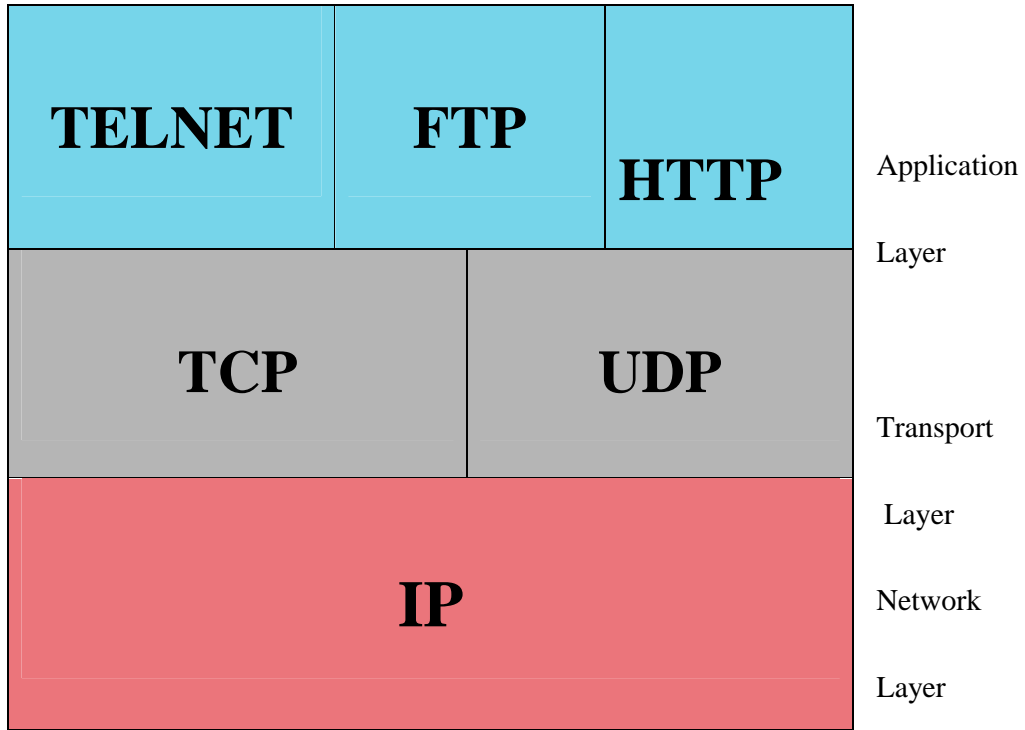


Figure 2.1 Protocol Types

2.2 APPLICATION LAYER

❖ Self-Contained Programs

- **Email Protocols:** Simple Mail Transfer Protocols (**SMTP**), Post Office Protocol (**POP**),
- **File Transfer:** File Transfer Protocol (**FTP**), Trivial File Transfer Protocol (**TFTP**), Secure File Transfer Protocol (**SFTP**), Secure Shell (**SSH**),
- **Terminal Services:** **TELNET**, Remote Desktop
- **Formatting :** Hypertext Transfer Protocol(**HTTP**)

2.3 TRANSPORT LAYER

- ❖ **Transmission Control Protocol (TCP):** A connection-oriented reliable protocol for packet delivery from an application to another.
- ❖ **User Datagram Protocol (UDP):** Connectionless unreliable packet delivery.

2.4 NETWORK LAYER

- ❖ **The Internet Protocol (IPv4 and IPv6):**
- ❖ **Address Resolution Protocol (ARP):**

TELNET

A network protocol that allows a user on one computer to log into another computer that is part of the same network or log into a remote computer using a telnet program.

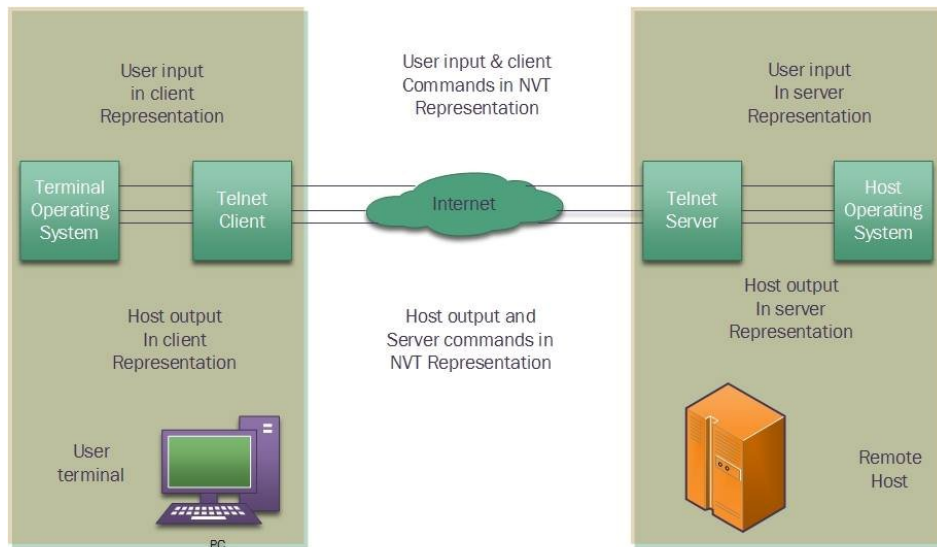


Figure 2.2 Telnet

2.5 WHAT IS TELNET?

Telnet is an old computer protocol (set of programmatic rules). Telnet is famous for being the original Internet when the Net first launched in 1969. Telnet stands for 'telecommunications network', and was built to be form of remote control to manage mainframe computers from distant terminals. In those original days of large mainframe computers, telnet enabled research students and professors to 'log in' to the university mainframe from any terminal in the building. This remote login saved researchers hours of walking each semester. While telnet pales in comparison to modern networking technology, it was revolutionary in 1969, and telnet helped pave the way for the eventual World Wide Web in 1989. While telnet technology is very old, it is still in some use today by purists. Telnet has evolved into a new modern version of remote control called 'SSH', something that many modern network administrators use today to manage Linux and UNIX computers from a distance.

Telnet is a text-based computer protocol. Unlike Firefox or Google Chrome screens, telnet screens are very dull to look at. Very different from Web pages that sport fancy images, animation, and hyperlinks, telnet is about typing on a keyboard. Telnet commands can be rather cryptic commands, with example commands being 'z' and 'prompt%'. Most modern users would find telnet screens to be very archaic and slow.

2.5.1 HOW TELNET WORKS?

Telnet uses software, installed on your computer, to create a connection with the remote host. The Telnet client (software), at your command, will send a request to the Telnet server (remote host). The server will reply asking for a user name and password. If accepted, the Telnet client will establish a connection to the host, thus making your computer a virtual terminal and allowing you complete access to the host's computer.

Telnet requires the use of a user name and password, which means you need to have previously set up an account on the remote computer. In some cases, however, computers with Telnet will allow guests to log on with restricted access.

2.5.2 THE TELNET CONNECTIONS

A telnet connection is a network connection established with a remote computer using the telnet command.

For example, if a command line like below is used,

```
telnet md.imran.hossain
```

then telnet will inform the user that a connection is being established, like that:

```
Trying 192.168.0.10...
Connected to md.imran.hossain.
Escape character is '^]'.
HP-UX md B.10.01 A 9000/712 (ttyp1)
Login:
Password:
```

To establish the connection telnet will usually ask the user to type a login name and a password like in the example above. Here, Login prompts for the user name, which is a name given by the system administrator, Password prompts for the password, which is a confidential name known only by the user.

Some computers are configured to accept telnet connections only for a specific port. In such situations the user has to specify arguments in telnet command, the *host* and the port arguments. For example,

```
telnet acad.moldnet.md 23
```

Here 23 is the default telnet port.

2.6 FILE TRANSFER PROTOCOL (FTP)

FTP is a standard network protocol used to transfer files from one host to another host over a TCP-based network, such as the Internet.

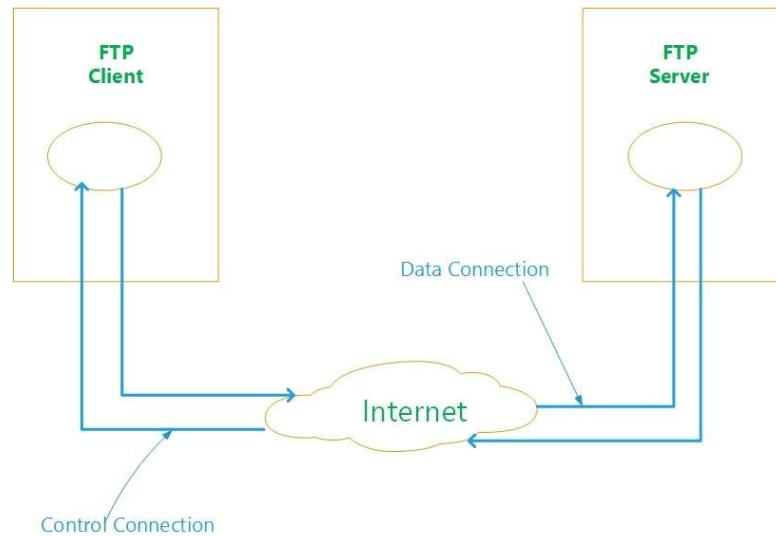


Figure 2.3 File Transfer Protocol

File Transfer Protocol (FTP) is a standard Internet protocol for transmitting files between computers on the Internet. Like the Hypertext Transfer Protocol (HTTP), which transfers displayable Web pages and related files, and the Simple Mail Transfer Protocol (SMTP), which transfers e-mail, FTP is an application protocol that uses the Internet's TCP/IP protocols. FTP is commonly used to transfer Web page files from their creator to the computer that acts as their server for everyone on the Internet. It's also commonly used to download programs and other files to your computer from other servers.

As a user, you can use FTP with a simple command line interface (for example, from the Windows MS-DOS Prompt window) or with a commercial program that offers a graphical user interface. Your Web browser can also make FTP requests to download programs you select from a Web page. Using FTP, you can also update (delete, rename, move, and copy) files at a server. You need to logon to an FTP server. However, publicly available files are easily accessed using anonymous FTP.

Basic FTP support is usually provided as part of a suite of programs that come with TCP/IP. However, any FTP client program with a graphical user interface usually must be downloaded from the company that makes it.

FTP is built on a client-server architecture and uses separate control and data connections between the client and the server. FTP users may authenticate themselves using a clear-text sign-in protocol, normally in the form of a username and password, but can connect anonymously if the server is configured to allow it. For secure transmission that hides (encrypts) the username and password, and encrypts the content, FTP is often secured with SSL/TLS ("FTPS"). SSH File Transfer Protocol ("SFTP") is sometimes also used instead, but is technologically different.

The first FTP client applications were command-line applications developed before operating systems had graphical user interfaces, and are still shipped with most Windows, UNIX, and Linux operating systems. Dozens of FTP clients and automation utilities have since been developed for desktops, servers, mobile devices, and hardware, and FTP has been incorporated into hundreds of productivity applications, such as Web page editors.

2.7 HTTP

Short for Hypertext Transfer Protocol, the underlying protocol used by the World Wide Web. HTTP defines how messages are formatted and transmitted, and what actions Web servers and browsers should take in response to various commands. For example, when you enter a URL in your browser, this actually sends an HTTP command to the Web server directing it to fetch and transmit the requested Web page. The other main standard that controls how the World Wide Web works is HTML, which covers how Web pages are formatted and displayed. HTTP is called a stateless protocol because each command is executed independently, without any knowledge of the commands that came before it. This is the main reason that it is difficult to implement Web sites that react intelligently to user input.

2.8 PING

Ping is the name of a standard software utility (tool) used to test network connections. It can be used to determine if a remote device (such as Web or game server) can be reached across the network and, if so, the connection's latency. Ping tools are part of Windows, Mac OS X and Linux as well as some routers and game consoles.

Most ping tools use Internet Control Message Protocol (ICMP). They send request messages to a target network address at periodic intervals and measure the time it takes for a response message to arrive. These tools typically support options like

- how many times to send requests
- how large of a request message to send
- how long to wait for each reply

The output of ping varies depending on the tool. Standard results includes

- IP address of the responding computer
- length of time (in milliseconds) between sending the request and receiving the response
- an indication of how many network hops between the requesting and responding computers
- error messages if the target computer did not respond

2.9 TCP

TCP (Transmission Control Protocol) *is a connection-based protocol that provides a reliable flow of data between two computers.*

When two applications want to communicate to each other reliably, they establish a connection and send data back and forth over that connection. This is analogous to making a telephone call. You should send data back and forth over the connection by speaking to one another over the phone lines. Like the phone company, TCP guarantees that data sent from one end of the connection actually gets to the other end and in the same order it was sent. Otherwise, an error is reported.

TCP provides a point-to-point channel for applications that require reliable communications. The Hypertext Transfer Protocol (HTTP), File Transfer Protocol (FTP), and Telnet are all examples of applications that require a reliable communication channel. The order in which the data is sent and received over the network is critical to the success of these applications. When HTTP is used to read from a URL, the data must be received in the order in which it was sent. Otherwise, you end up with a jumbled HTML file, a corrupt zip file, or some other invalid information.

2.10 UDP

UDP (User Datagram Protocol) is a protocol that sends independent packets of data, called datagrams, from one computer to another with no guarantees about arrival. UDP is not connection-based like TCP. The UDP protocol provides for communication that is not guaranteed between two applications on the network. UDP is not connection-based like TCP. Rather, it sends independent packets of data, called datagrams, from one application to another. Sending datagrams is much like sending a letter through the postal service. The order of delivery is not important and is not guaranteed, and each message is independent of any other.

2.11 IP

Any device that wants to communicate with other devices via the Internet must have a unique and appropriate IP address. IP addresses are used to identify the sending and receiving devices. There are currently two IP versions: IP version 4 (IPv4) and IP version 6 (IPv6). The main difference between the two is that the length of an IPv6 address is longer (128 bits compared with 32 bits for an IPv4 address). IPv4 addresses are most commonly used today.

2.11.1 IPv4 addresses

IPv4 addresses are grouped into four blocks, and each block is separated by a dot. Each block represents a number between 0 and 255; for example, 192.168.12.23.

Certain blocks of IPv4 addresses have been reserved exclusively for private use. These private IP addresses are 10.0.0.0 to 10.255.255.255, 172.16.0.0 to 172.31.255.255 and 192.168.0.0 to 192.168.255.255. Such addresses can only be used on private networks and are not allowed to be forwarded through a router to the Internet. All devices that want to communicate over the Internet must have its own individual, public IP address. A public IP address is an address allocated by an Internet service provider. An ISP can allocate either a dynamic IP address, which can change during a session, or a static address, which normally comes with a monthly fee.

2.11.2 IPv6 addresses

An IPv6 address is written in hexadecimal notation with colons subdividing the address into eight blocks of 16 bits each; for example, 2001:0da8:65b4:05d3:1315:7c1f:0461:7847.

The major advantages of IPv6, apart from the availability of a huge number of IP addresses, include enabling a device to automatically configure its IP address using its MAC address. For communication over the Internet, the host requests and receives from

the router the necessary prefix of the public address block and additional information. The prefix and host's suffix is then used, so DHCP for IP address allocation and manual setting of IP addresses are no longer required with IPv6. Port forwarding is also no longer needed. Other benefits of IPv6 include renumbering to simplify switching entire corporate networks between providers, faster routing, point-to-point encryption according to IPSec, and connectivity using the same address in changing networks (Mobile IPv6).

Setting an IPv6 address for an Axis network video product is as simple as checking a box to enable IPv6 in the product. The product will then receive an IPv6 address according to the configuration in the network router.

Class	1st Octet Decimal Range	1st Octal High order bits	Network/Host ID (N=Network, H=Host)	Default Subnet Mask	Number of Networks	Host per Network (Useable addresses)
A	1-126	0	N.H.H.H	255.0.0.0	126(2⁷-2)	16,777,214(2²⁴- 2)
B	128-191	10	N.N.H.H	255.255.0.0	16,382(2¹⁴-2)	65,534(2¹⁶-2)
C	192-223	110	N.N.N.H	255.255.255.0	2,097,150(2²¹- 2)	254(2⁸-2)
D	224-239	1110	Reserved for multicasting			
E	240-254	1111	Experimental; used for research			

Private IP range

Class	Private Networks	Subnet Mask	Address Range
A	10.0.0.0	255.0.0.0	10.0.0.0- 10.255.255.255
B	172.16.0.0-172.31.0.0	255.240.0.0	172.16.0.0- 172.31.255.255
C	192.168.0.0	255.255.0.0	192.168.0.0- 192.168.255.255

IPv6 addresses

CHAPTER 3: Categories of Network

3.1 NETWORK CAN BE DIVIDED INTO TWO MAIN CATEGORIES:-

1. Peer-to-peer Network.
2. Server – based Network.

3.1.1 PEER-TO-PEER

In peer-to-peer networking there are no dedicated servers or hierarchy among the computers. All of the computers are equal and therefore known as peers. Normally each computer serves as Client/Server and there is no one assigned to be an administrator responsible for the entire network. Peer-to-peer networks are good choices for needs of small organizations where the users are allocated in the same general area, security is not an issue and the organization and the network will have limited growth within the foreseeable future.

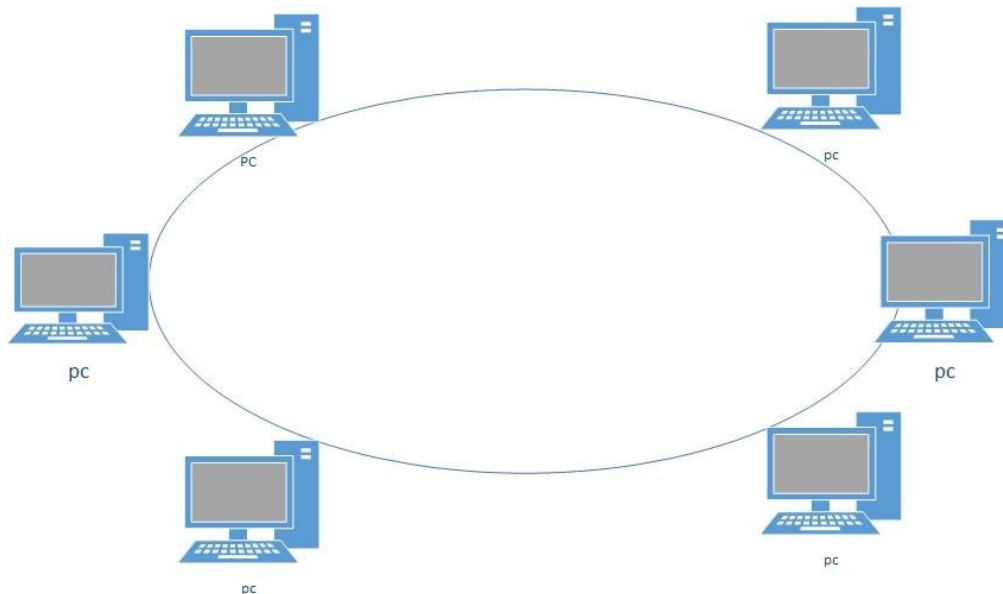


Figure 3.1 Peer-to-Peer Networks

3.1.2 SERVER – BASED

- Databases and management of applications such as Spreadsheets, Accounting, Communications and Document management.
- Network management.
- Centralized file storage.

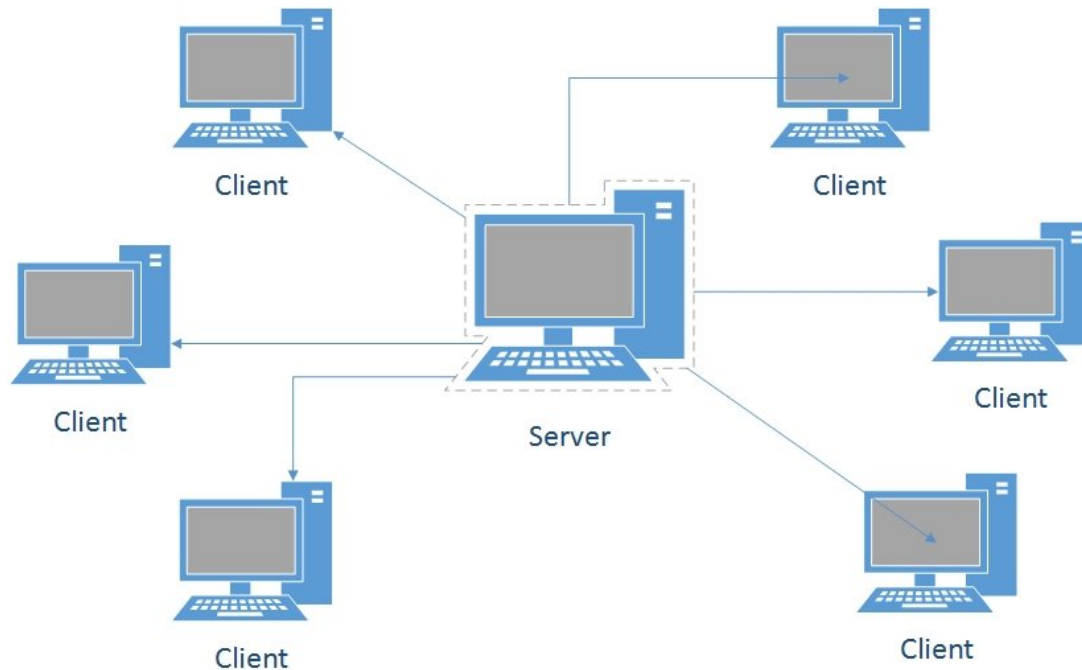


Figure 3.2 Server – based Network

The client/server model is basically an implementation of distributed or cooperative processing. At the heart of the model is the concept of splitting application functions between a client and a server processor. The division of labor between the different processors enables the application designer to place an application function on the processor that is most appropriate for that function. This lets the software designer optimize the use of processors--providing the greatest possible return on investment for the hardware.

3.2 ETHERNET SWITCHES

Ethernet switches are an expansion of the concept in Ethernet bridging. LAN switches can link four, six, ten or more networks together, and have two basic architectures: cut-through and store-and-forward. In the past, cut-through switches were faster because they examined the packet destination address only before forwarding it on to its destination segment. A store-and-forward switch, on the other hand, accepts and analyzes the entire packet before forwarding it to its destination. It takes more time to examine the entire packet, but it allows the switch to catch certain packet errors and keep them from propagating through the network. Both cut-through and store-and-forward switches separate a network into collision domains, allowing network design rules to be extended. Each of the segments attached to an Ethernet switch has a full 10 Mbps of bandwidth shared by fewer users, which results in better performance (as opposed to hubs that only allow bandwidth sharing from a single Ethernet). Newer switches today offer high-speed links, FDDI, Fast Ethernet or ATM. These are used to link switches together or give added bandwidth to high-traffic servers. A network composed of a number of switches linked together via uplinks is termed a "collapsed backbone" network.

3.3 ROUTERS

To forward data packages from one LAN to another LAN via the Internet, a networking equipment called a network router must be used. A router routes information from one network to another based on IP addresses. It forwards only data packages that are to be sent to another network. A router is most commonly used for connecting a local network to the Internet. Traditionally, routers were referred to as gateways.

3.4 NETWORK FIREWALLS

A firewall is a system or group of systems that enforces an access control policy between two networks. The actual means by which this is accomplished varies widely, but in principle, the firewall can be thought of as a pair of mechanisms: one which exists to block traffic, and the other which exists to permit traffic. Some firewalls place a greater emphasis on blocking traffic, while others emphasize permitting traffic. Probably the most important thing to recognize about a firewall is that it implements an access control

policy. If you don't have a good idea of what kind of access you want to allow or to deny, a firewall really won't help you. It's also important to recognize that the firewall's configuration, because it is a mechanism for enforcing policy, imposes its policy on everything behind it. Administrators for firewalls managing the connectivity for a large number of hosts therefore have a heavy responsibility.

3.5 NAT (Network address translation)

When a network device with a private IP address wants to send information via the Internet, it must do so using a router that supports NAT. Using this technique, the router can translate a private IP address into a public IP address without the sending host's knowledge.

3.6 INTERNET CONNECTIONS

In order to connect a LAN to the Internet, a network connection via an Internet service provider (ISP) must be established. When connecting to the Internet, terms such as upstream and downstream are used. Upstream describes the transfer rate with which data can be uploaded from the device to the Internet; for instance, when video is sent from a network camera. Downstream is the transfer speed for downloading files; for instance, when video is received by a monitoring PC.

In most scenarios for example, a laptop that is connected to the Internet downloading information from the Internet is the most important speed to consider. In a network video application with a network camera at a remote site, the upstream speed is more relevant since data (video) from the network camera will be uploaded to the Internet.

CHAPTER 4: Video Conferencing Concept's and Practice's

4.1 INTRODUCTION

The World Wide Web is a multimedia platform. Web-based conferencing is one of those exciting multimedia applications on the Internet. This will give you a brief introduction about one type of Web-based conferencing: videoconferencing, and about two of its popular application software packages: CU-SeeMe and Microsoft NetMeeting.

4.2 VIDEO CONFERENCING

Video conferencing means to conduct a conference between two or more participants at different sites by using computer networks to transmit audio and video data. For example, a point-to-point (two-person) video conferencing system works much like a video telephone. Each participant has a video camera, microphone, and speakers mounted on his or her computer. As the two participants speak to one another, their voices are carried over the network and delivered to the other's speakers, and whatever images appear in front of the video camera appear in a window on the other participant's monitor.

Two way real time transmission of audio and video signals between specialized devices or computers at two or more locations via satellite (Wireless) over a network such as a LAN or internet. Full motion (30 frames per second), full color video conferencing requires a bandwidth of 6 MHz for analog signals and 1.54 Megabyte per second (Mbps) of digital signals. Video conferencing protocols are governed by the ITU-TSS standard H.261 and its successors. Also called video teleconferencing.

4.3 SIGNIFICANCE OF TOPIC

Video conferencing is most popular thing for the Internet, and its popularity is growing quickly. It is a full-motion, two-way, audio/video system that permits two or more people in different locations to communicate with each other. Video conferencing is often used in distance learning and Web-based courses. Video conferencing provides educators and businesses with the opportunity to learn, share and interact across distances. Video conferencing technology utilizes both the telephone and a video camera. The camera is often connected to a laptop or desktop computer. Video conferencing improves productivity and reduces travel time. Individuals using video conferencing can share data with each other and transfer information such as photos or documents.

Understanding what are required for video conferencing and what software programs are available becomes more and more important to people working in education and business, and also for those who are enthusiastic about personal communication in this way.

4.4 DISCUSSION

There are some special requirements for video conferencing:

1. Hardware Requirements for Video conferencing:

- Computer (PC or Mac) with fast processor speed and large RAM
- Video camcorder (which requires a video capture card for PC or AV card for Mac)
- Speakers
- Microphone

2. Connection Requirements for Video conferencing:

- LAN (Local Area Network)
- ISDN (Integrated Services Digital Network) or
- ADSL (Asymmetric Digital Subscriber Line) or
- Two-way cable modem or
- Other high speed connections

3. Software:

The two most popular video conferencing software being used over the LAN or Internet are CU-SeeMe and Microsoft NetMeeting

4.4.1 CU-SeeMe

CU-SeeMe is a video conferencing program which combines audio, video and text-based chat capabilities that can be used equally as well with both PCs and Macs. It is an application initially developed at Cornell University (therefore the "CU") and later further developed by White Pine Software (the product is called Enhance CU-SeeMe). With CU-SeeMe, we can video conference with another site located anywhere in the world. By using a reflector, which are video conferencing chat rooms, we can see and communicate with a number of people from different sites at the same time.

4.4.2 MICROSOFT NETMEETING

Microsoft's NetMeeting is an Internet video conferencing package. It can be used over the local LAN, the Internet, ISDN, or over 14.4 kbps+ modems. NetMeeting supports the International Telecommunications Union (ITU) H.323 standard for audio and video conferencing and can thus interoperate with other H.323 compliant software packages. H.323 itself is a family of standards that define the transmission of audio and video. It includes H.263 video, G.711 and G.723 audio codecs. NetMeeting also supports the IETF's RTP/RTCP protocol which provides time stamping and synchronization control for the audio flow. While the audio and video are strictly point-to-point, NetMeeting supports multi-point T.120 compliant data conferencing. Some of its data collaboration tools include a shared whiteboard, application sharing, file transfer, and a chat tool.

The following are the minimum system requirements to install and run Microsoft NetMeeting.

- 90 megahertz (MHz) Pentium processor
- 16 megabytes (MB) of RAM for Microsoft Windows 95, Windows 98, Windows Me

- 24 megabytes (MB) of RAM for Microsoft Windows NT version 4.0 (Microsoft Windows NT 4.0 Service Pack 3 or later is required to enable sharing programs on Windows NT.)
- Microsoft Internet Explorer version 4.01 or later
- 28,800 bps or faster modem, integrated services digital network (ISDN), or local area network (LAN) connection (a fast Internet connection works best).
- 4 MB of free hard disk space (an additional 10 MB is needed during installation only to accommodate the initial setup files).
- Sound card with microphone and speakers (required for audio support). To use the data, audio, and video features of NetMeeting, your computer must meet the following hardware requirements:
 - For Windows 95, Windows 98, or Windows Me, a Pentium 90 processor with 16 MB of RAM (a Pentium 133 processor or better with at least 16 MB of RAM is recommended). For Windows NT, a Pentium 90 processor with 24 MB of RAM (a Pentium 133 processor or better with at least 32 MB of RAM is recommended).
 - 4 MB of free hard disk space (an additional 10 MB is needed during installation only to accommodate the initial setup files).
 - 56,000 bps or faster modem, ISDN, or LAN connection.
 - Sound card with microphone and speakers (sound card required for both audio and video support).
 - Video capture card or camera that provides a Video for Windows capture driver (required for video support).

4.5 COMPARISION OF CU-SEEME AND MICROSOFT NETMEETING:

The following table compares different features of these two software packages:

	CU-SeeMe	Microsoft NetMeeting
Instant Messaging Instant Messaging via Microsoft MSN Messenger service for point- to-point call	Yes	Yes
Whiteboard The whiteboard lets you collaborate in real time with others via graphic information.	Yes	Yes
Chat Chat lets you conduct real-time conversations via text, with as many people as you like.	Yes	Yes
File Transfer File transfer lets you send one or more files in the background during a conference.	No	Yes
Program Sharing Program Sharing feature lets you flexibly share multiple programs during a conference and retain greater control over the way they're used.	No	Yes
Remote Desktop Sharing Remote Desktop Sharing lets you operate a computer from a remote location.	No	Yes

4.6 PRACTICES FOR CONDUCTING A SUCCESSFUL VIDEO CONFERENCE:

The following tips will help to ensure a video conference is successful.

Before beginning the video conference, be sure to know:

1. How to establish a connection to another endpoint or to the CSSD video bridge.
2. How to mute and un-mute microphone.
3. How to accept an incoming call.
4. How to call out from the video conferencing unit.
5. The telephone number or IP address for each conference location.

4.7 BEFORE THE MEETING:

- Be sure to allow sufficient lead time before the meeting to establish the necessary telephone/IP and video connections.
- When room scheduling permits, have the conference locations call into the video bridge at least 15 minutes before the conference begins. This step will allow problems to be identified and resolved prior to the start of the meeting.
- Check all cameras to be sure that important conference elements (such as the table where the participants will sit, whiteboards, and sketch pad easels) can be displayed as needed. Know which camera you are using. If you switch to an auxiliary camera to show a whiteboard or a graphics stand, switch back to the main camera when the discussion turns to other topics.
- Provide good lighting. Avoid back lighting. Make sure that overhead lights and any other reflections do not show. Make sure any blinds and doors are closed.
- Ensure the microphones are properly positioned before dialing into a video conference.
- Eliminate background noises (such as fans) near microphones.

4.8 DURING THE MEETING:

- Introduce yourself and other participants when your site joins the conference.
- Many systems have a voice activated switching feature to automatically switch the camera to the speaker. Announce your name when you start speaking. Speak calmly and slowly, allowing the camera to adjust and focus on the speaker. Do not interrupt. Interrupting another speaker may cause the voice activated switching to become confused.
- Use names to direct questions to specific people.
- Make it a standard practice for all sites to mute their microphones when not speaking. This practice enables the current speaker to be heard by all sites without interruption.
- Be aware of the transmission delay and allow a sufficient pause for others to comment. When speaking, do not hesitate because you see or hear something unexpected. Small delays are always present.
- Small noises can be big distractions. Avoid shuffling paper, covering the microphone, tapping fingers, or clicking pens. These noises can be picked up by the microphone and can be transmitted to the conference participants.

CHAPTER 5: Video Conferencing Implementation by NetMeeting

5.1 WHAT IS NETMEETING?

Microsoft NetMeeting is a free program that comes installed on most Windows computers. NetMeeting allows people to ‘dial’ one another to connect computers, sharing files, chatting, even Seeing and hearing one another if the computers have that capability. This guide will describe how to locate and configure NetMeeting on your computer (worked in Windows XP) as well as how to set up and host a meeting .It is specifically designed for troubleshooting purpose, for advance or more options refer NetMeeting help.

5.2 CONFIGURE NETMEETING

Microsoft NetMeeting is a nice inbuilt feature of XP. It's allow to share files and desktop. It can also use it for chat, video conferencing. We need to configure Net Meeting before you could use it.

5.2.1 HOW TO START THE NETMEETING PROGRAM?

The easiest way to start and configure NetMeeting is

- Click on start menu and go to RUN option
- In RUN option type CONF and press Enter
- Follow the procedure explained below in setting up NetMeeting for the first time

Once the NetMeeting is configured, double click the icon shown on desktop or start NetMeeting using first two steps mentioned above.

5.2.2 SETTING UP NETMEETING

When NetMeeting starts it will go through a series of dialog boxes

- a. When the first dialog box appears, click on “Next”

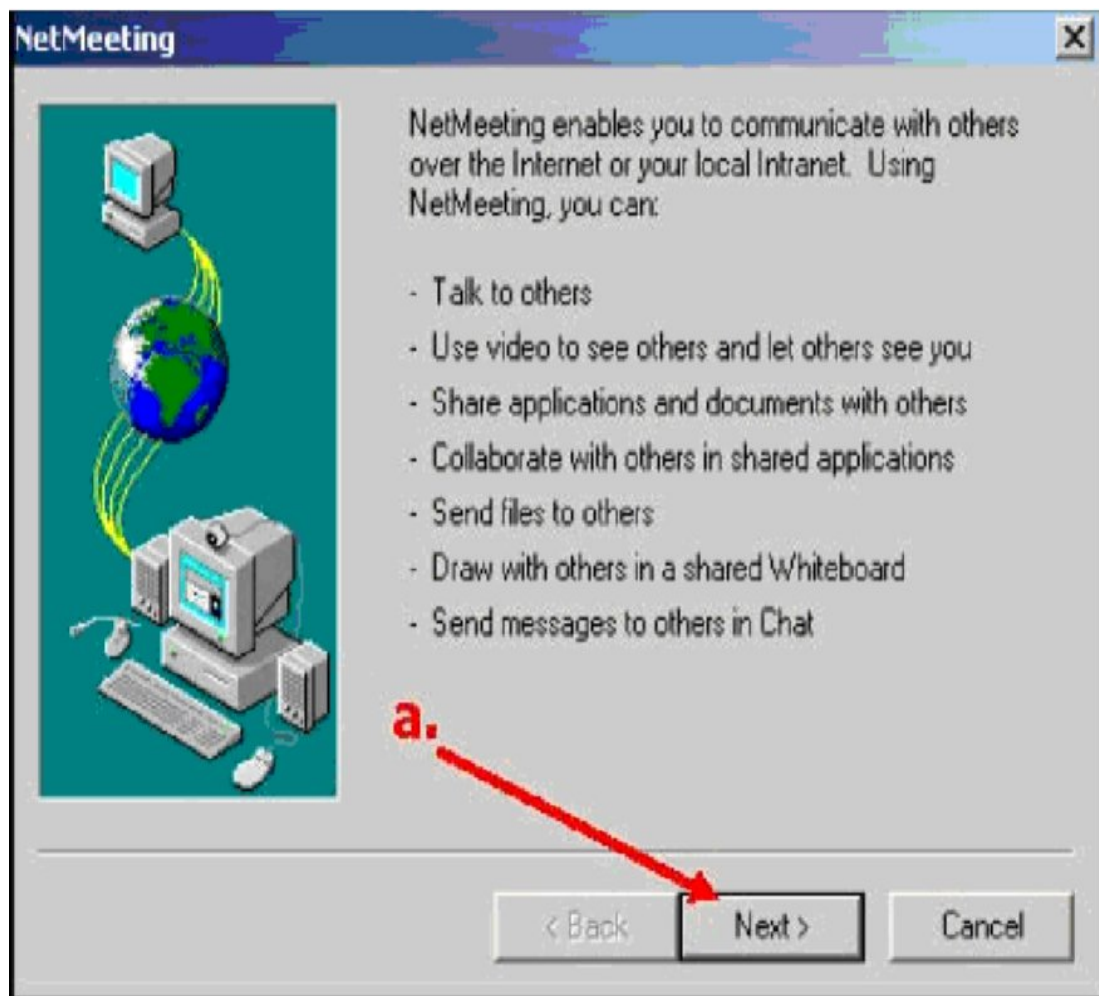


Figure 5.1 Setting up NetMeeting figure (a)

b. Enter the personal information

- First name
- Last name
- Email Address
- Location
- Comments

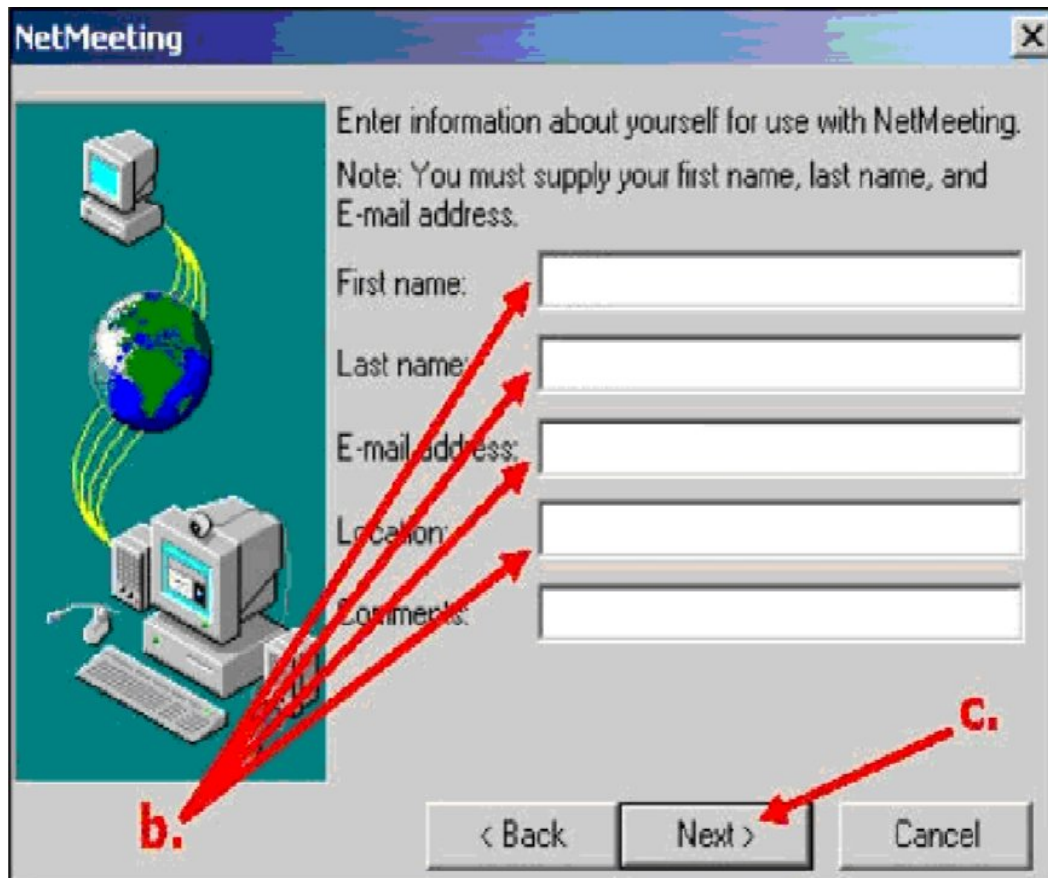


Figure 5.2 Setting up NetMeeting figure (b)

- c. Then click on the “Next” button again.
- d. Uncheck “Log on to directory server when NetMeeting starts.”
- e. Check, “Do not list info on directory.”
- f. Click on the “Next” button.

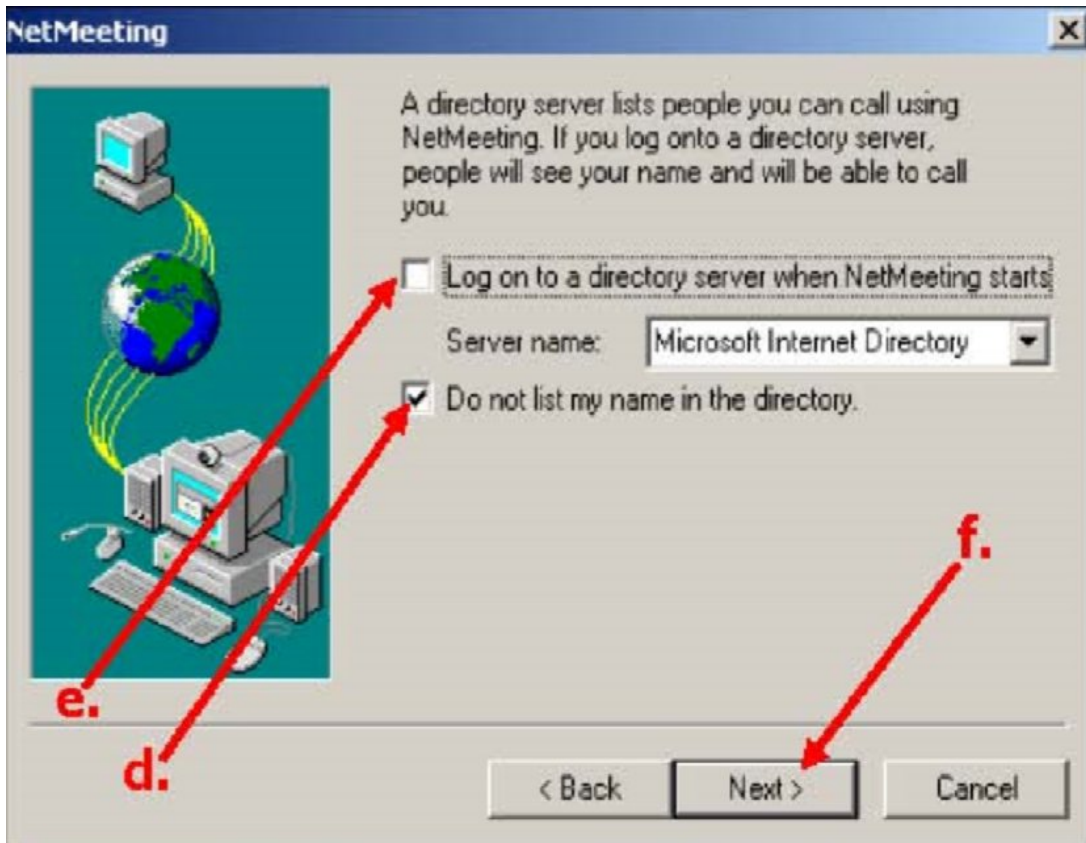


Figure 5.3 Setting up NetMeeting figure (c)

g. If you are on campus, select, “Local Area Network,” otherwise, select the connection speed that fits with your Internet service. If you are not sure what to select, contact with ITC.

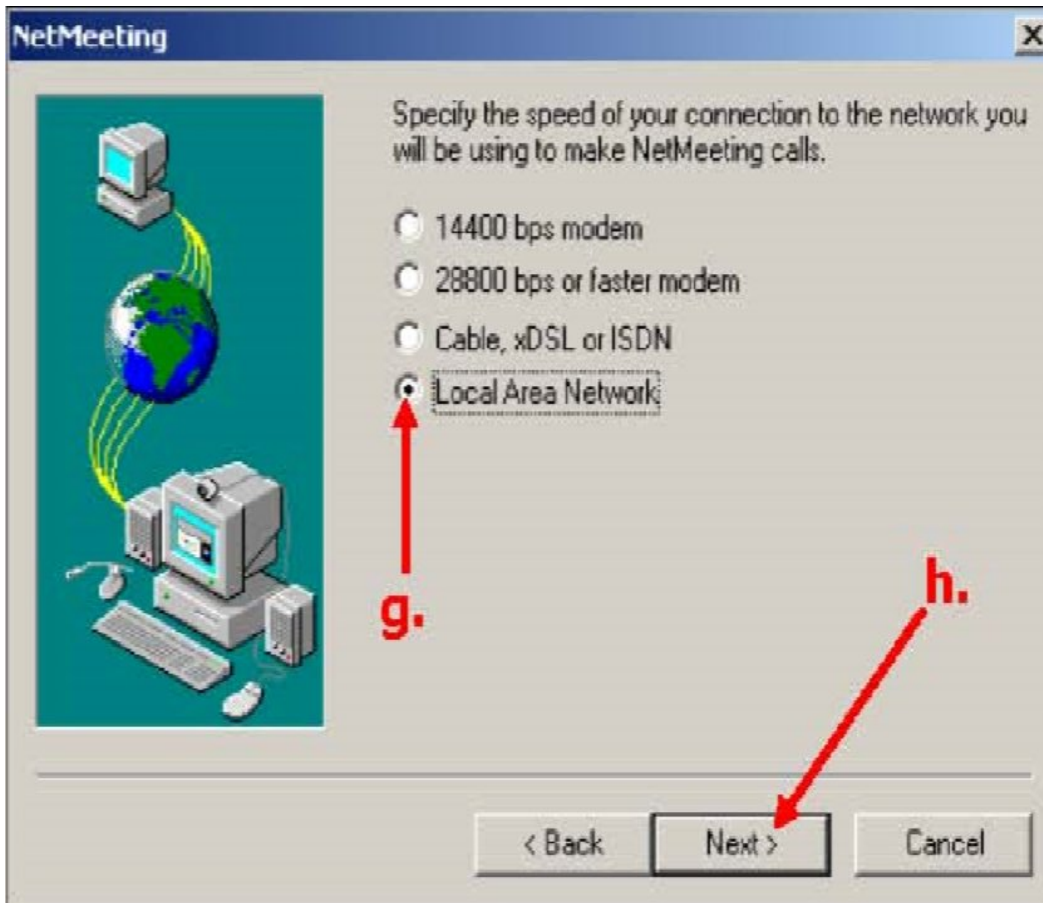


Figure 5.4 Setting up NetMeeting figure (d)

h. Click on the “Next” button again.

i. In this page if you would like to open NetMeeting from your desktop in the future, than leave the two options, “Put a shortcut to NetMeeting on my desktop,” and, “Put a shortcut NetMeeting on my Quick Lunch bar,” selected.

j. Click on the “Next” button.



Figure 5.5 Setting up NetMeeting figure (e)

k. The next screen will prepare to test the volume of your speakers. This is only important if you will be receiving auditory signals during a meeting. Click the "Next" button again.

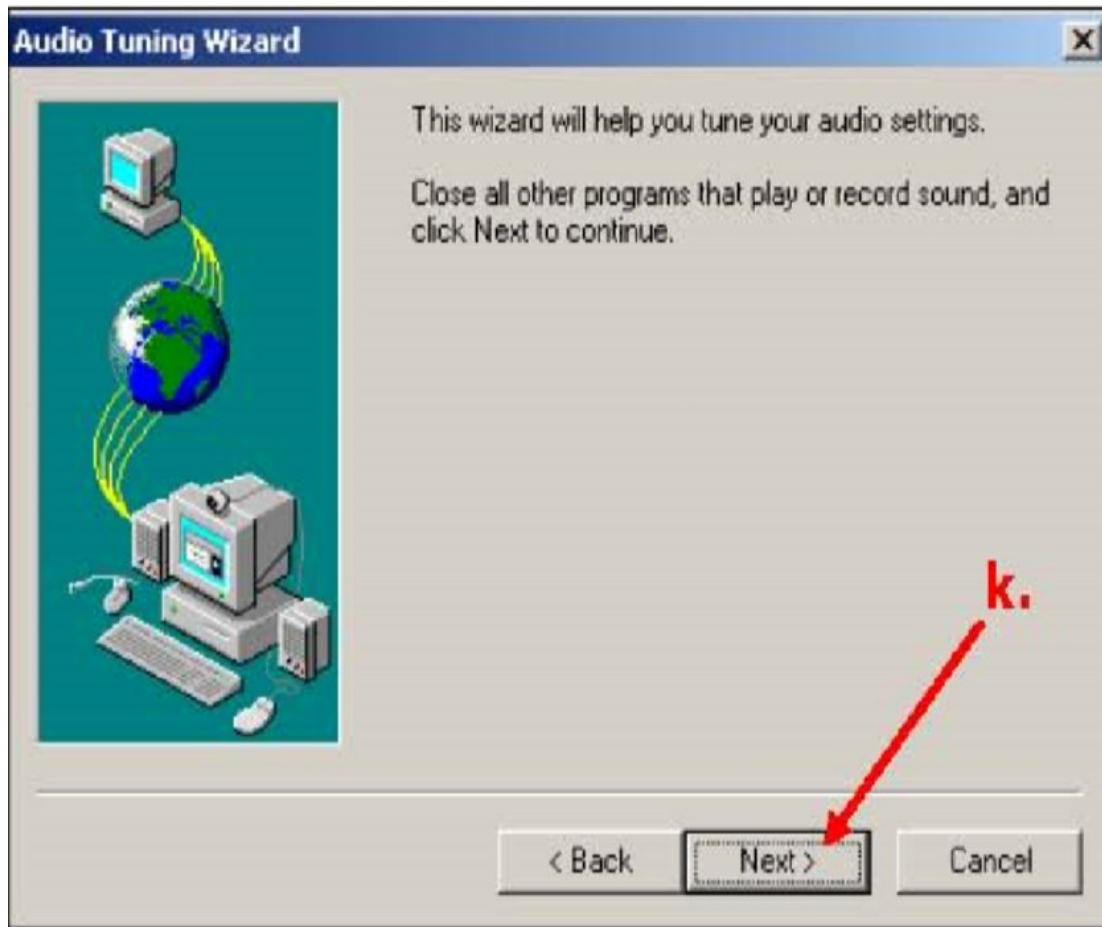


Figure 5.6 Setting up NetMeeting figure (f)

1. If you do not have speakers you can click the "Next" option and skip the step. You can click "Test" button to test the speakers.

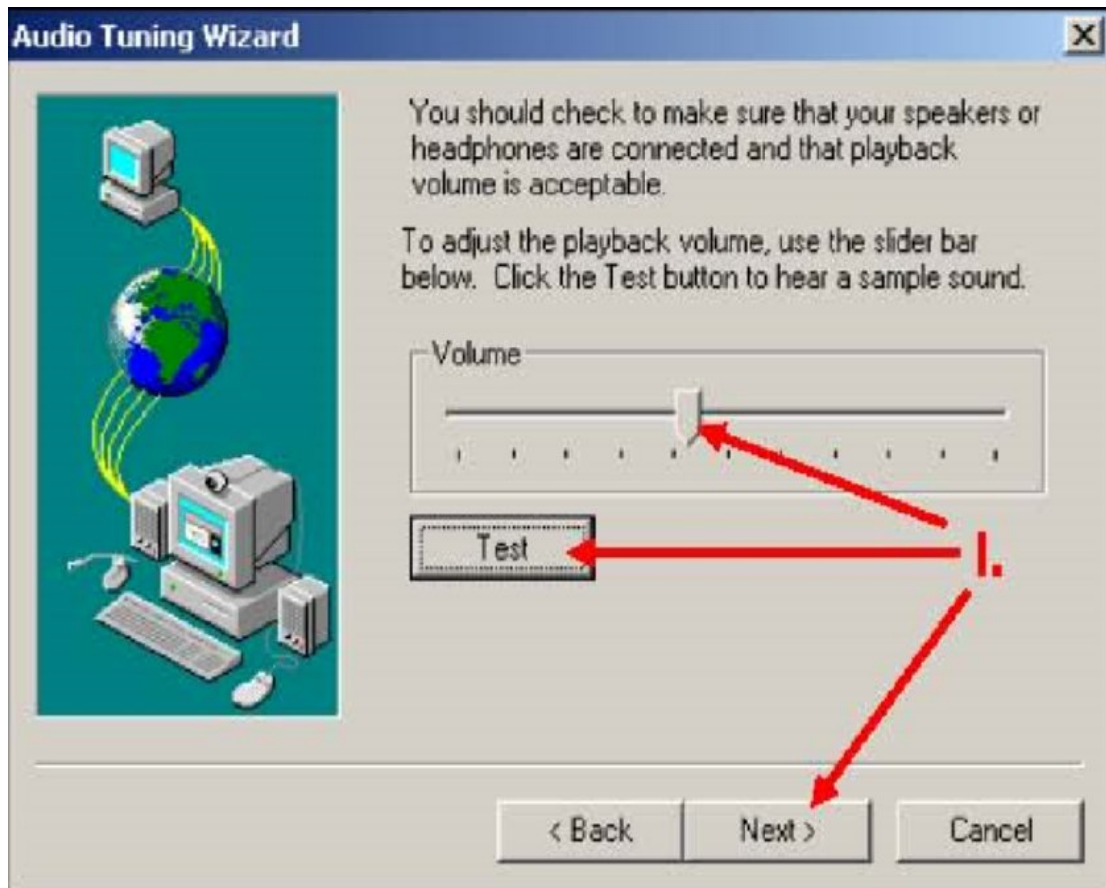


Figure 5.7 Setting up NetMeeting figure (g)

m. If you do not have a microphone, then you can click the “Next” button, and skip this step. Move the slider to a position that makes the volume comfortable. When finished, click the “Next” button

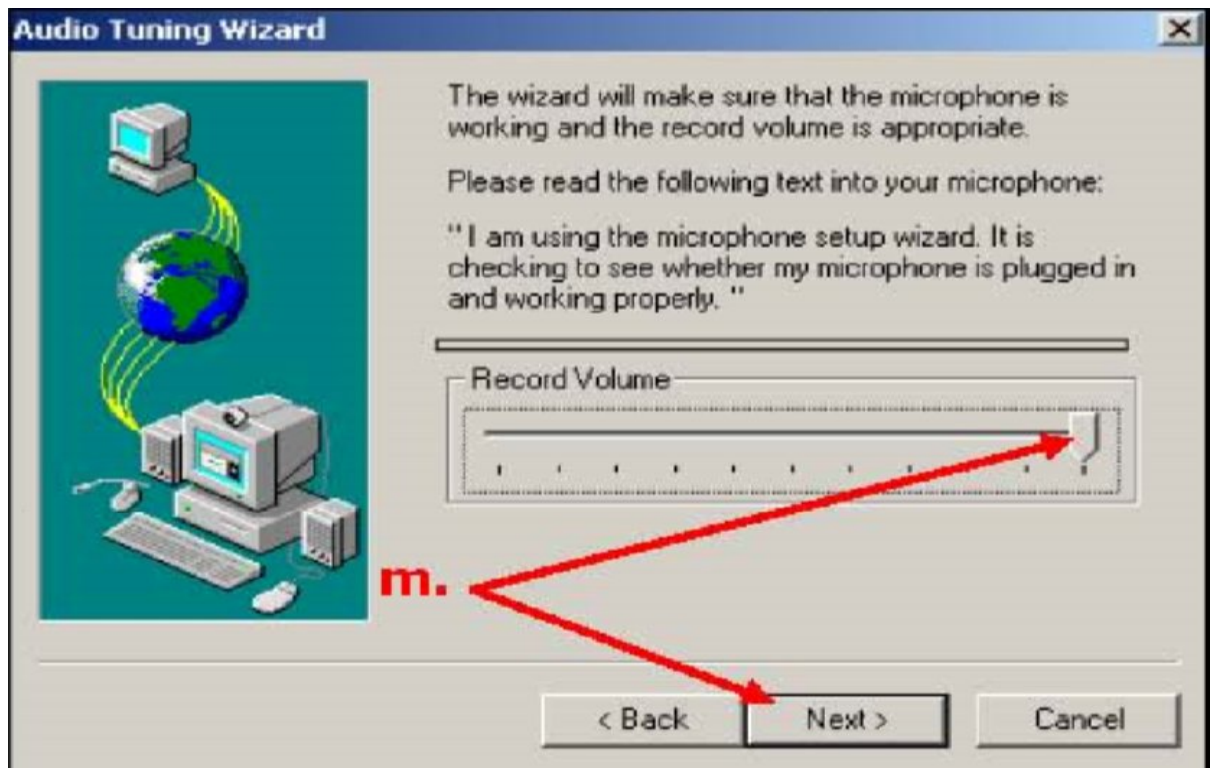


Figure 5.8 Setting up NetMeeting figure (h)

n. The next dialog box will report the results of the microphone test. If you do not have microphone, then it will say that the audio tuning wizard was not able to record any

sound. Ignore this message and click the “Next” button, otherwise the message will say, “You have tuned your setting,” etc. Click the “Next” button.



Figure 5.9 Setting up NetMeeting figure (i)

o. Click the “Finish” button to complete the configuration of NetMeeting.

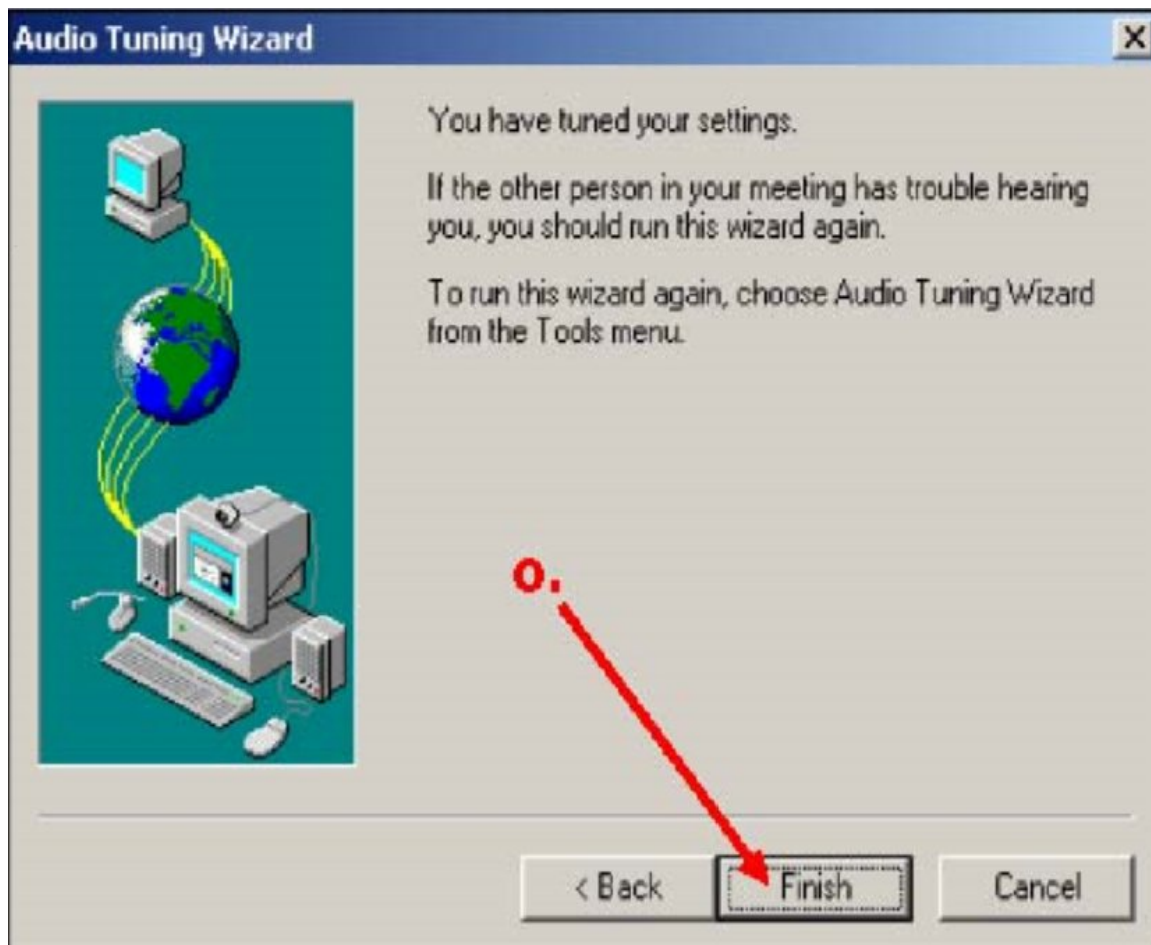


Figure 5.10 Setting up NetMeeting figure (j)

When you see this following window it means that you have successfully configured NetMeeting program.



Figure 5.11 NetMeeting Program Interface

5.3 LOCATE IP ADDRESS

NetMeeting works by dialing the IP (Internet Protocol) address for each computer. If you don't know IP address, then you will need to check your IP address either by command prompt or the procedure shown below.

- a) To check your IP Address, click the "Help" menu.
- b) Select the "About NetMeeting" option.



Figure 5.12 Locate IP figure (a)

c) The IP address appears in the dialog box that comes up. It will be a series of four numbers separated by periods, e.g. 134.50.150.61

d) Make a note of IP address, then click the “OK” options.

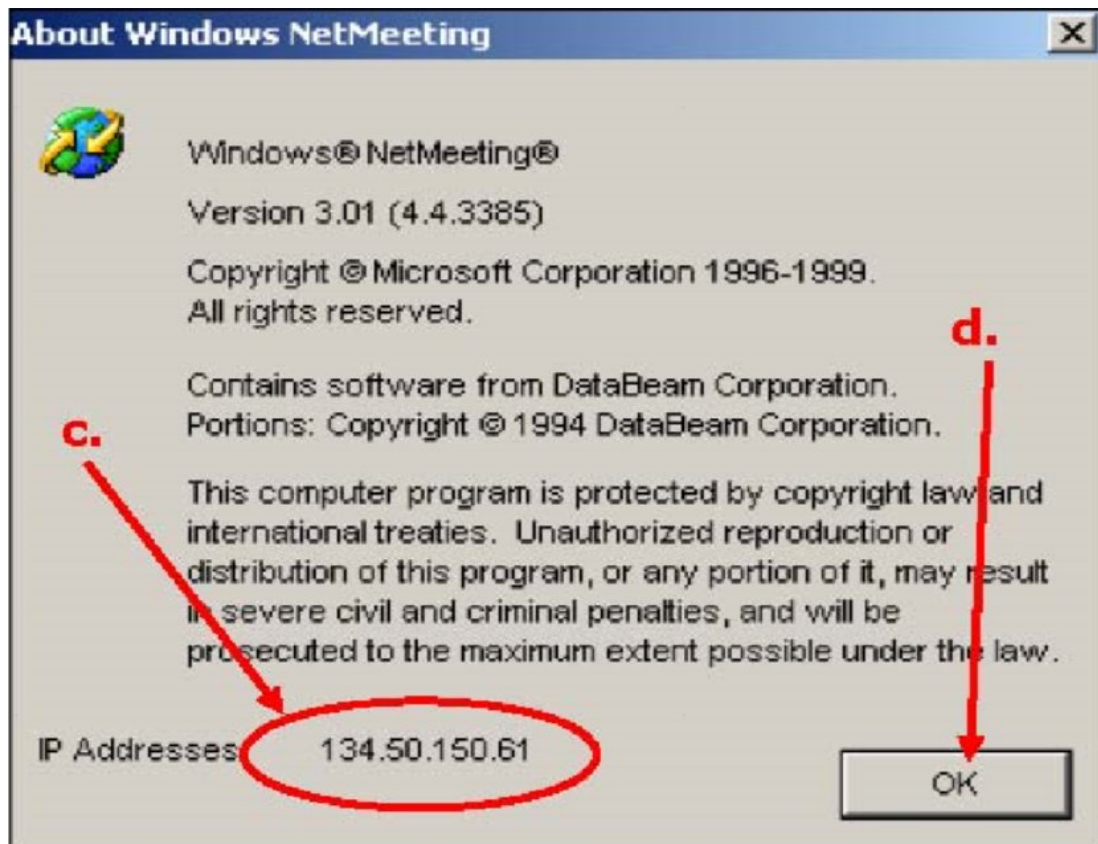
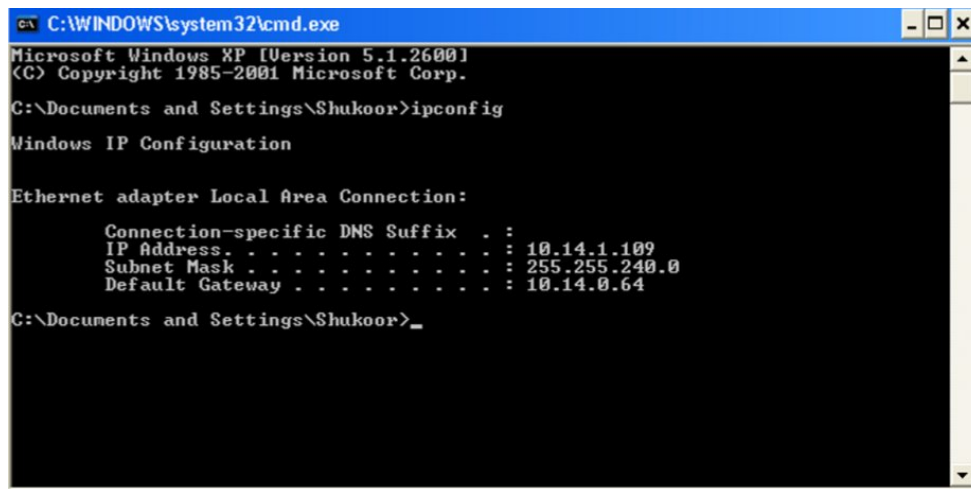


Figure 5.13 Locate IP figure (b)

Important NOTE - The IP address change each time you logged on.

5.4 CHECK IP ADDRESS USING COMMAND PROMPT

- Click on START and go to RUN options
- In the run window type cmd and press “ENTER”
- At the prompt type “ipconfig” and then press “ENTER”, following window will showed up



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\Shukoor>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : 
    IP Address. . . . .               : 10.14.1.109
    Subnet Mask . . . . .             : 255.255.240.0
    Default Gateway . . . . .         : 10.14.0.64

C:\Documents and Settings\Shukoor>_
```

Figure 5.14 Windows Command Prompt

5.5 OPERATE NETMEETING

NetMeeting can be operated in two ways, for one-to-one calls or group meetings. One-to-one calls can include two-way video or audio signals. If video is going to be used, then the host and the clients must have a webcam. If the audio is to be used, then the host and the client must have a microphone and sound system. As we will be using NetMeeting for troubleshooting purpose we will see one-to-one call.

5.6 PLACING ONE-TO-ONE CALL

- a) Find out the IP number of the person who will receive the call or the client IP address.
- b) Click the “place call” button, which looks like a telephone.

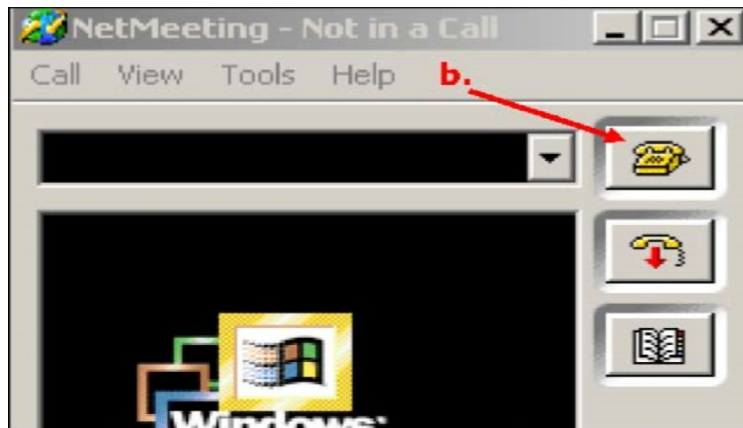


Figure 5.15 Placing Call figure (a)

- c) Type the IP number, including the periods, into the “To” field.
- d) Leave the “Using” field set to “Automatic”.

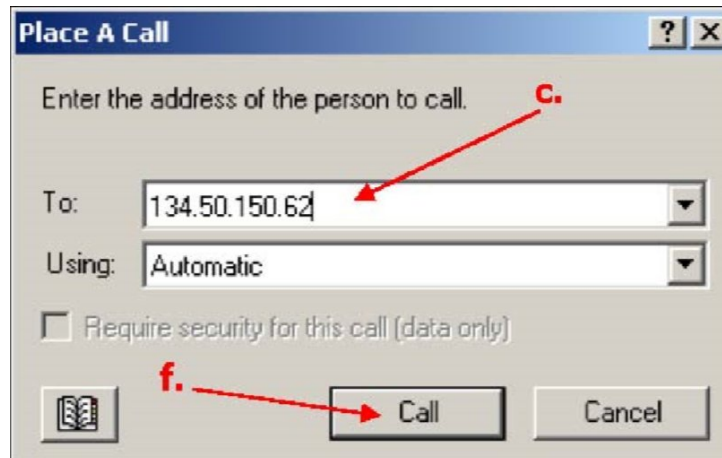


Figure 5.16 Placing Call figure (b)

- e) Leave the “Require security” check box unchecked.
- f) Click the “Call” button.

5.7 SHARE FILE OR PROGRAM, CHAT, VIDEO CONFERENCE

- a) Click on the “Share Program” button.

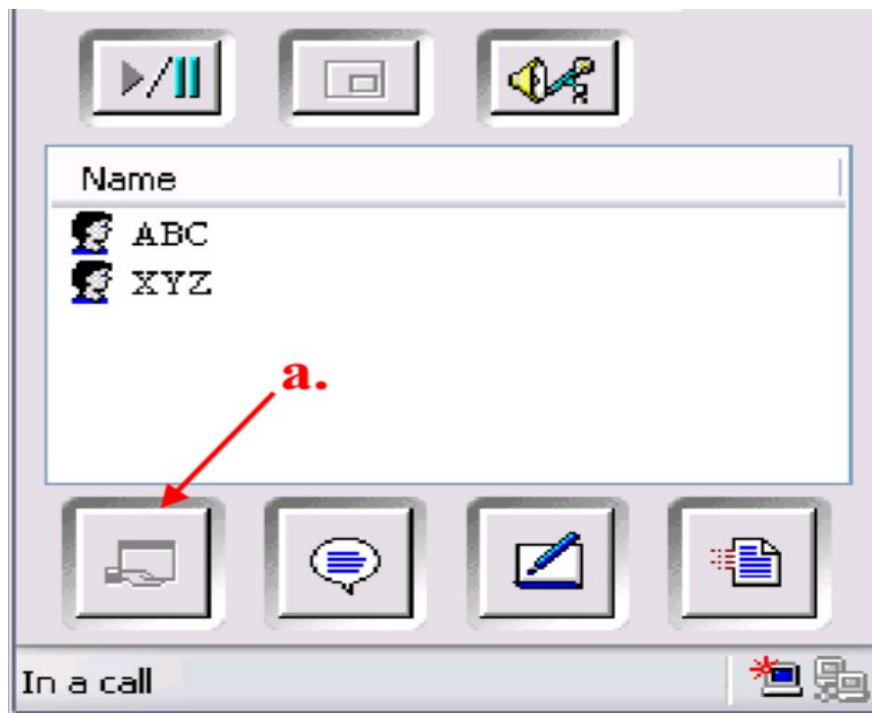


Figure 5.17 Share file or program, chat, video conference (a)

- b) In the “Sharing” dialog box, select the item to be shared. Any file program, or the folder that is currently open, as well as your Desktop, will be included on the list. If the item to be shared is not shown, then it may need to be opened.
- c) Click the “Share” button.



Figure 5.18 Share file or program, chat, video conference (b)

- A new window will appear on the participants screen and further options will be available in the “Sharing” dialog box.
- If you want to participants to be able to modify the shared file, then click the Allow Control button, then check the other options depending on what best suites the situation.

When a program, file or folder is shared, and the host opens another window or program that is not shared, the participants will see a dark green and red checkered box covering all or part of the shared window. The host’s unshared window will cover the shared window in participants view.

Chapter 6: Finding

In the end we may say that, A NetMeeting is a great way for people to get together and discuss issues without having to attend too many of the expensive and inconvenient arrangements that are required by personal meetings. Videoconferencing technology is becoming a helpful tool to businesses and individuals. A NetMeeting is the technology which is used for people to interact over an Internet connection. It is also referred to as video teleconferencing. People can hear and see each other as if they were face to face if they have an internet-connected computer, a microphone and a camera. Here we provide some runtime outputs what we get from the very beginning of our project

Outputs:

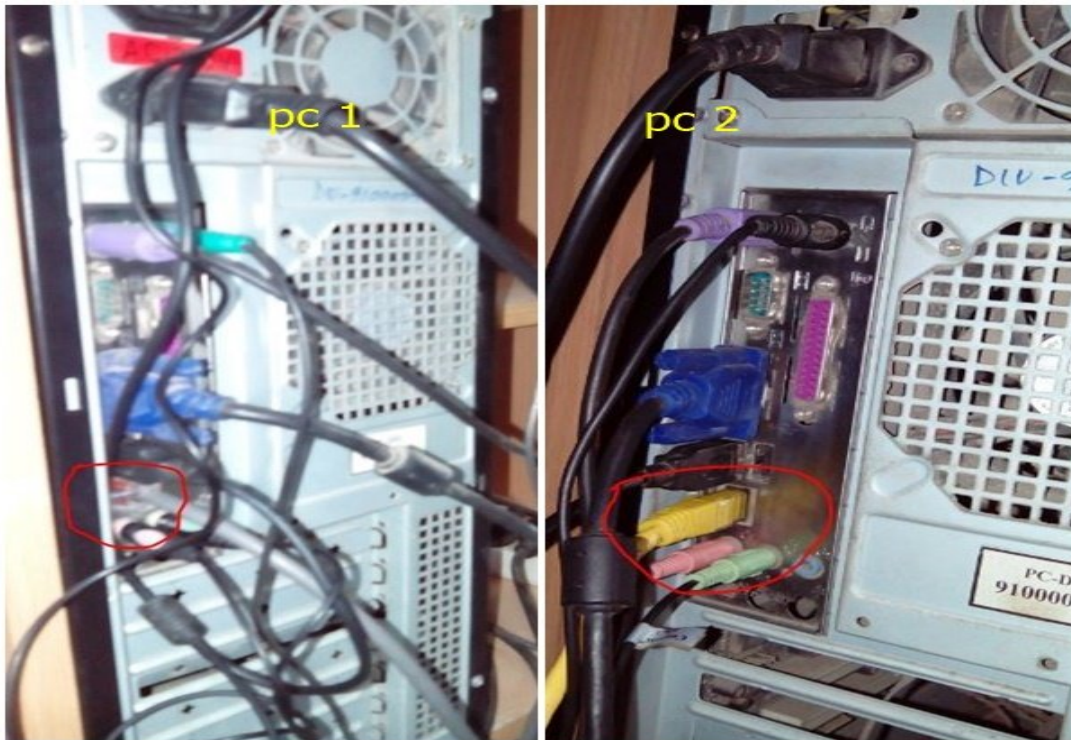


Figure 6.1: PC-1 & PC-2 Mounted Connections



Figure 6.2: Placing Call



Figure 6.3: Connected Interface

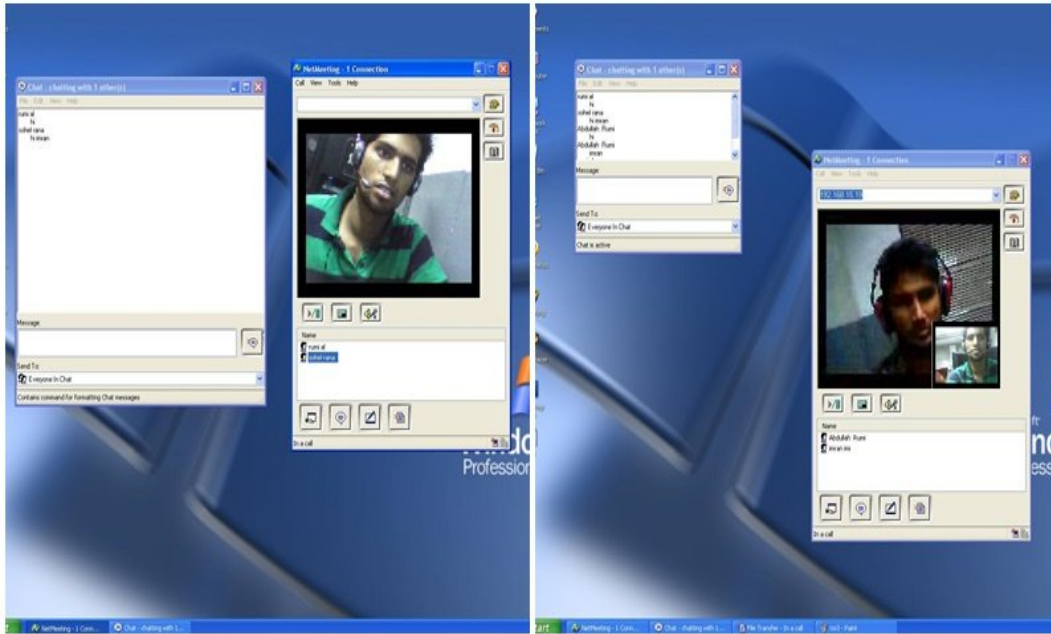


Figure 6.4: Chat on NetMeeting

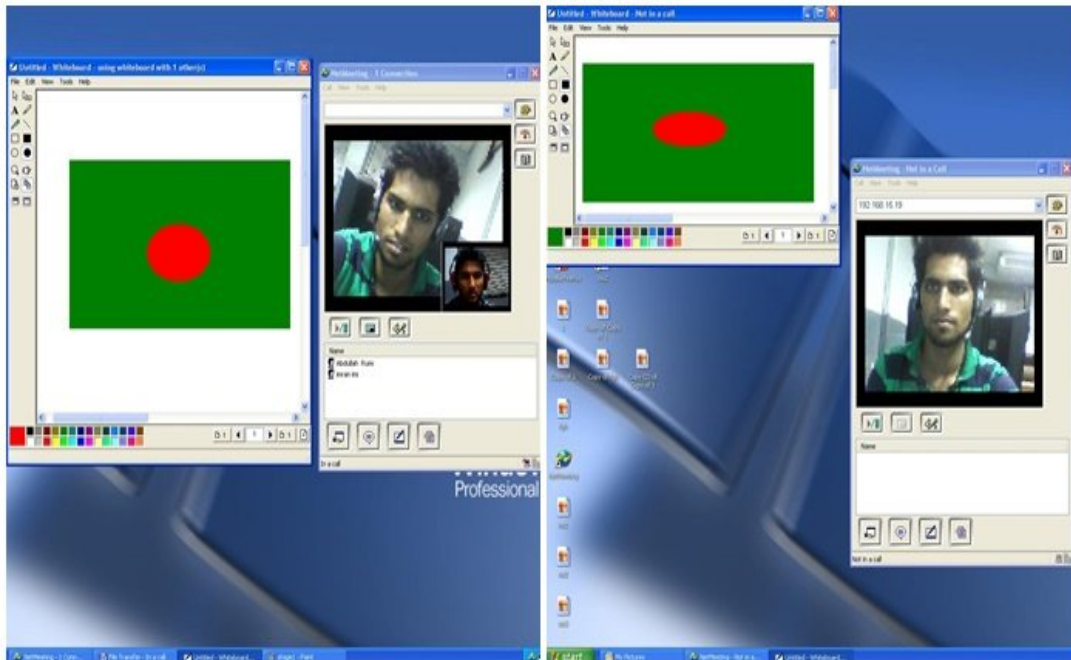


Figure 6.5: Whiteboard Drawing



Figure 6.6: File Transfer in NetMeeting

6.1 SUCCESS:

Finally we are able to perform a wireless NetMeeting teleconference between two computers in a wired medium. NetMeeting also provides instant messaging while we are connected, thus we can chat or discuss certain aspects of what we are doing. We can use it frequently to control databases of our clients. It is great for seeing and correcting problems on a remote client's PC no matter where they are located, down the hall or across the country. They can learn by watching us fix it. Here we may say it's far more impressive to work on a wireless medium, but it has some technical difficulties. Overall, it is a really good software to work on.

6.2 ADVANTAGES:

- It's a very convenient software.
- A NetMeeting can help bring customers and salespeople together without the added expense of travel and accommodations.
- Ability to link several sites simultaneously.

- Net meetings can be planned around someone's daily schedule rather than being concerned with travel schedules and delays. It makes meetings more efficient and productive.
- Access to remotely located experts.
- A net meeting can help companies improve productivity by bringing together people from different locations to discuss issues that may require more than just a phone call. Net meetings can also be used to help families stay in touch with service people deployed overseas, and help families stay in touch all over the world.
- Having a set time for the meeting encourages more control and less time wasted on non-agenda items
- There are free video conferencing hosts available. By using a free host, an international video teleconference could cost significantly less than a standard phone conference and offer clearer sound along with accompanying video
- Net meetings can be planned around someone's daily schedule rather than being concerned with travel schedules and delays. It makes meetings more efficient and productive.
- Access to remotely located experts.
- A net meeting can help companies improve productivity by bringing together people from different locations to discuss issues that may require more than just a phone call. Net meetings can also be used to help families stay in touch with service people deployed overseas, and help families stay in touch all over the world.
- Having a set time for the meeting encourages more control and less time wasted on non-agenda items
- There are free videoconferencing hosts available. By using a free host, an international video teleconference could cost significantly less than a standard phone conference and offer clearer sound along with accompanying video.

6.3 FAILURE: We haven't found such problems doing this project. The problem basically occurred due to slow internet connections while video conferencing. So doing things not smoothly is our only weakness. Except that everything we worked for act well. Certainly some of the disadvantages may affect the experience.

6.4 DISADVANTAGES:

- On lower internet speed movement can be jerky.
- Body language can be lost if movement is jerky and picture quality is reduced.
- There may be a delay on the sound that participants need to get familiar to.

6.5 SUMMARY:

This paper only presents some preliminary information about video conferencing and some of its software programs. It should be noted that “the field of video conferencing software is rich in variety, and many good products are available, each with its own strengths and weaknesses.” Many e-Learning companies also offer their own software products and services for video conferencing. Video conferencing will change the way we do business, the way we learn and the way we stay connected with people.

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