

ADSL PLANNING AND CONFIGURATION

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Electronics and Telecommunication
Engineering

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APPROVAL

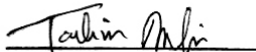
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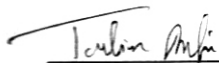
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DECLARATION

I hereby declare that, this project has been done by us under the supervision of **Md.Taslim Arefin** , Assistant Professor, Department of ETE Daffodil International University. I 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

Information technologies are clearly considered a significant feature of the late 20th, early 21st century. The media technologies of television, cable television, video, telephones, cellular phones, pagers, facsimiles, and especially computer-mediated communication are reconfiguring social relationships, social institutions, and the political economy. Given the plethora of communication media in sectors of the larger society, we might expect soldiers and their family members to reflect this trend. Moreover, given that traditionally there have been disparities in technology access and use in the larger society as a function of one's social position, we might expect soldiers and their families to be stratified along certain social characteristics in their use of new communication media. I worked in ADSL technology where checked the exchange line up or down by using different technique LASER , OTDR . On the other hand checking failure of internet connection following rules , IP address, Password, server settings and cabling. In the LAN designing and configuration work with Switch , hub.

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CHAPTER 1

1.1 Introduction

Whether e-mail, e-commerce, or just “surfing,” this activity is, often times, a matter of individuals visiting specific sites on the World Wide Web. Whatever else it is, Web use can be thought of as a kind of mass behavior, similar in many respects to choosing TV programs or publications. Indeed, it has been argued that the Web can be seen as a medium of mass communication and its users as a mass audience. In January 1998, three large computer firms – Compaq, Intel, and Microsoft – and the telephone group formed an alliance to promote high-speed Internet links over ordinary telephone lines. To avoid legal battles and price wars, and to ensure that consumers will be able to connect using equipment from different companies, the equipment makers plan to offer products based on the ADSL standard.

At data rates ranging from about 400 kbps for residential users to 1.5 Mbps for commercial users, ADSL is substantially slower than fiber-optic data rates – up to about 10 Mbps. The ADSL telephone connection will allow a simultaneous telephone conversation – below 4 kilohertz (kHz) – and Internet operation – above 100 kHz – or simultaneous transmission of voice, data, and video. Because, however, copper degrades the voice signal, the local loop connecting a user with the telephone network node – which must be copper and have an ADSL modem at each end for ADSL to work – cannot exceed 8 kilometers (km) without degrading the data signal beyond recognition. About 40% of U.S. telephones are beyond this distance from a central network node. Further, the loading coils on most telephone lines (to improve the voice signal) block the ADSL signal.

An annoying limitation is the inherent difference between receiving (higher) and transmitting (lower) data rates – the asymmetry – which interferes with applications that require symmetric transmission – video conferencing, interactive Internet activity, remote

computer access and operation, or interactive keyboard strokes. Although ADSL does not require a telephone modem for connection, a final problem with ADSL is its inability to compete with the telephone carriers own leased T-1 lines – primarily to commercial and government users at prices up to \$ 1,000/month – which are not subject to any of the ADSL limitations (Zorpette 154). Although faster than the conventional telephone modem, ADSL competes with fiber-optic cable only in price. Its substantially lower data rates and technical limitations may discourage many users, especially commercial users, who are often better served by leased fiber-optic cables.

Local Area Network is usually a small network constrained to a small geographic area. An example of a LAN would be a computer network within a building. Designing LAN to cover the network and configuring the required device. For signal test use LASER, if signal is not available to identify the problem use OTDR. By using OTDR it's easy to find out how long the cable are ok. After checking change the rest of cable. A LAN is useful for sharing resources like files, printers, games or other applications. MAN as a metropolitan area network (MAN) is a network that connects two or more local area networks. Routers, switches and hubs are connected to create a metropolitan area network. The world's most popular WAN is the Internet. Wide Area Network (WAN) usually refers to a network which covers a large geographical area, and use communications circuits to connect the intermediate nodes.

1.2 Objective

- ADSL is capable of providing up to 50 Mbps, that's why it can provide voice, video and data simultaneously, so that it's become more popular now a days.
- Using a frequency splitter device to split a traditional voice telephone line into two different frequencies.
- Separates the 300 Hz to 3500 Hz voice channel from upstream and downstream channels.
- To proper use of IP address need to design LAN and configure.
- Using LAN technique resource can be share which is very effective in advance communication and also reduce the cost.

1.3 Formation

Chapter 1: In this chapter included introduce of ADSL planning and configuration, objective and also added formation.

Chapter 2: I worked ADSL connectivity ,how to make a Dial up,Package migration, Connection maintenance. I given that some BTCL Technical data and Central server network diagram (Moghbazar Exchange).

Chapter 3: In this chapter discusses Basic Computer Networking,LAN, MAN and WAN.

Chapter 4: I discuss in this chapter LAN Devices ,Cables and Connector.

Chapter 5: A **network address** serves as a unique identifier for a computer on a network.

I discussed about different classes of IP.

Chapter 6:I try to solved some problem checks the LAN connection behind the CPU LAN port , checking pinging and checking main switch connect.

Chapter 7: I this chapter, I discussed on my report.

CHAPTER 2

ADSL TECHNOLOGY

2.1 Introduction

The ADSL telephone connection will allow a simultaneous telephone conversation – below 4 kilohertz (kHz) – and Internet operation – above 100 kHz – or simultaneous transmission of voice, data, and video. ADSL differs from the less common symmetric digital subscriber line (SDSL). Bandwidth (and bit rate) is greater toward the customer premises (known as downstream) than the reverse (known as upstream).

- **ADSL** is a form of DSL, a data communications technology that enables faster data transmission over copper telephone lines
- Asymmetric Digital Subscriber Line.
- ADSL is capable of providing up to 50 Mbps, and supports voice, video and data.
- A high-speed Internet access service.
- Speed depends on the length and the diameter of the cable and the type of the mode
- ADSL is the #1 Broadband Choice in the World with over 60% market share
- ADSL is now available in every region of the world [1,2,]

2.2 ADSL Requirements

- Phone-line, activated by your phone company for ADSL
- Filter to separate the phone signal from the Internet signal
- ADSL modem
- Subscription with an ISP supporting ADSL

2.3 ADSL Standards

Standard name	Common name	Downstream rate	Upstream rate
ITU G.992.1	ADSL (G.DMT)	8 Mbit/s	1.0 Mbit/s
ITU G.992.2	ADSL Lite (G.Lite)	1.5 Mbit/s	0.5 Mbit/s
ITU G.992.3/4	ADSL2	12 Mbit/s	1.0 Mbit/s
ITU G.992.3/4 Annex J	ADSL2	12 Mbit/s	3.5 Mbit/s
ITU G.992.3/4 Annex L	RE-ADSL2	5 Mbit/s	0.8 Mbit/s
ITU G.992.5	ADSL2+	24 Mbit/s	1.0 Mbit/s
ITU G.992.5 Annex L	RE-ADSL2+	24 Mbit/s	1.0 Mbit/s
ITU G.992.5 Annex M	ADSL2+	28 Mbit/s	3.5 Mbit/s

2.4 Conectivity

When a signal transmit from a phone then it comes to the splitter , then splitter separate the voice and data. Phone outlet is connected with Splitter by a RJ -11 socket , then a telephone is connected by RJ- 11 and a modem is connected by RJ- 45 . Then any device can be connected which support the RJ 45 socket.

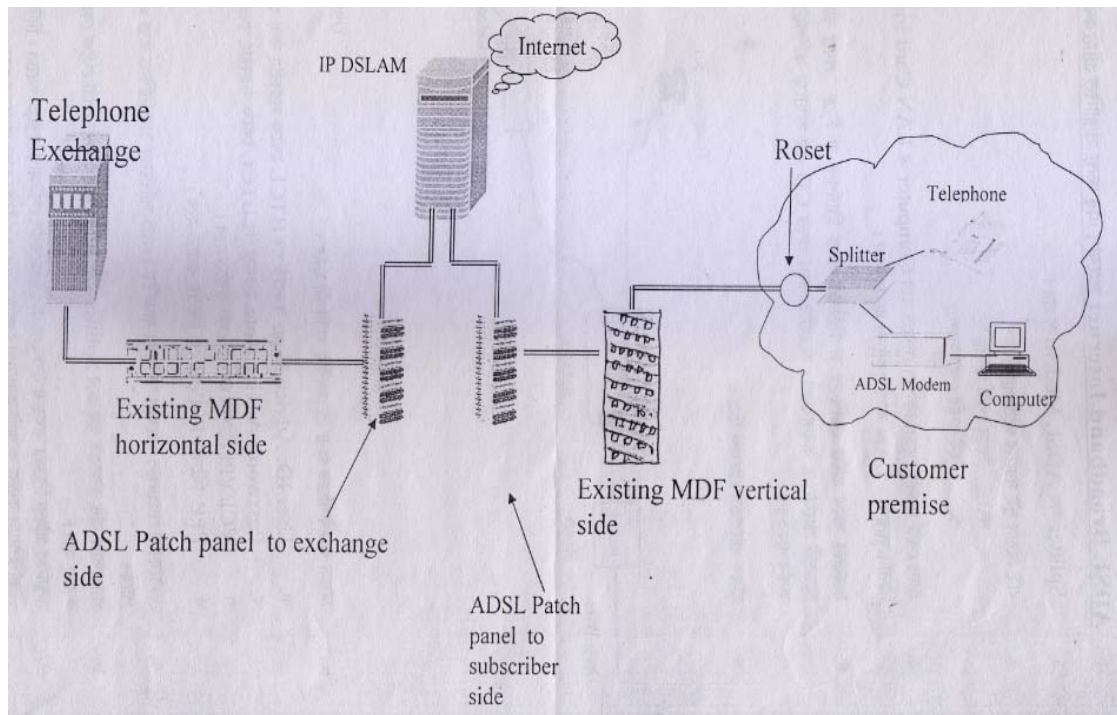


Figure 2.1: ADSL Connectivity

2.5 How to make a Dial-Up

When computer is on then there appeared a screen which shown a my computer option then click the left button of pointer then appeared this window.

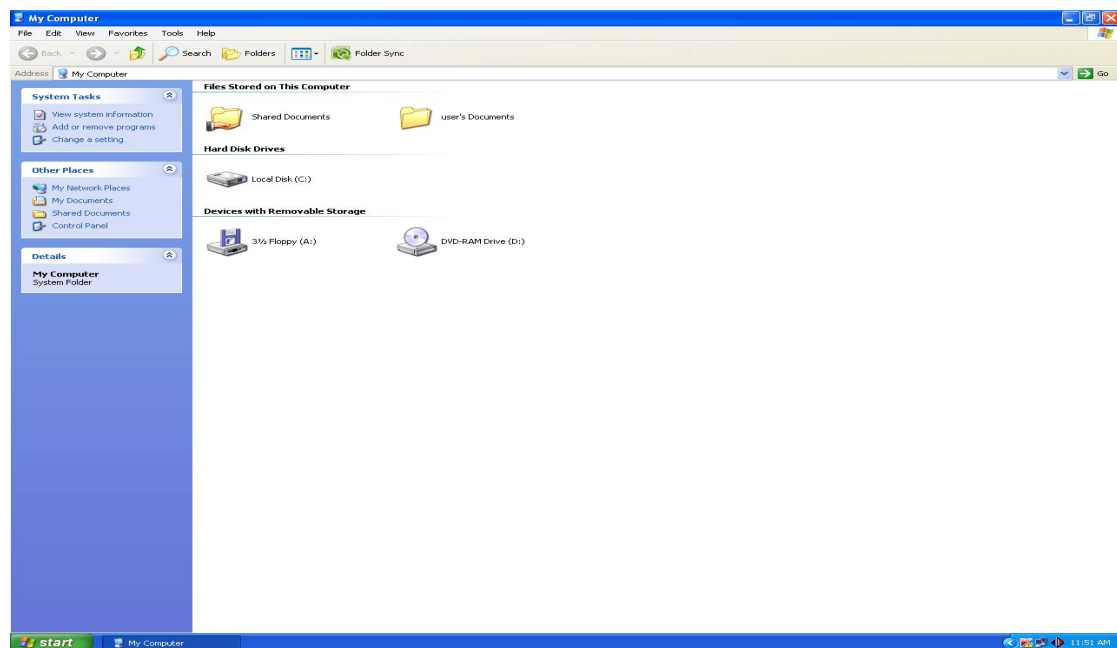


Figure 2.2 :My Computer

Then there is a option control panel and clicked on this option got that is network connection. .

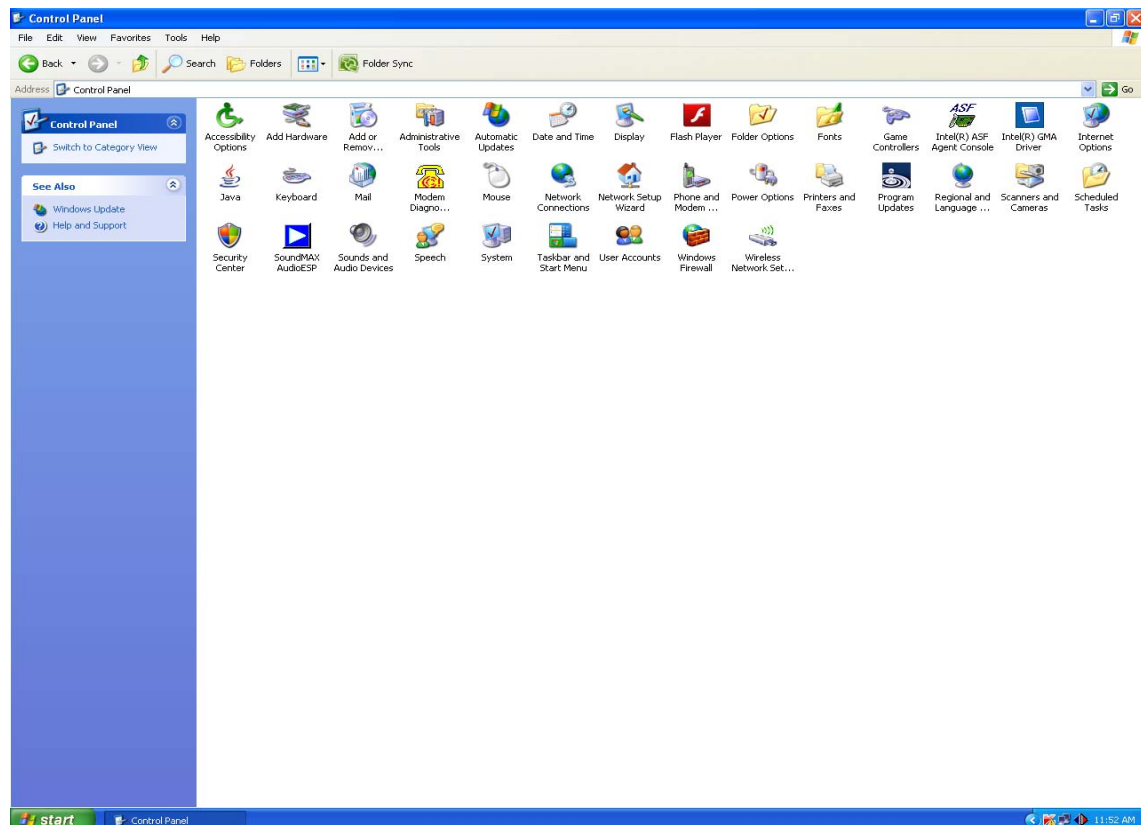


Figure 2.3:Control Panel

In this time I had open create a new connection then I got this picture and fill up Connect to the Internet then I pressed next.

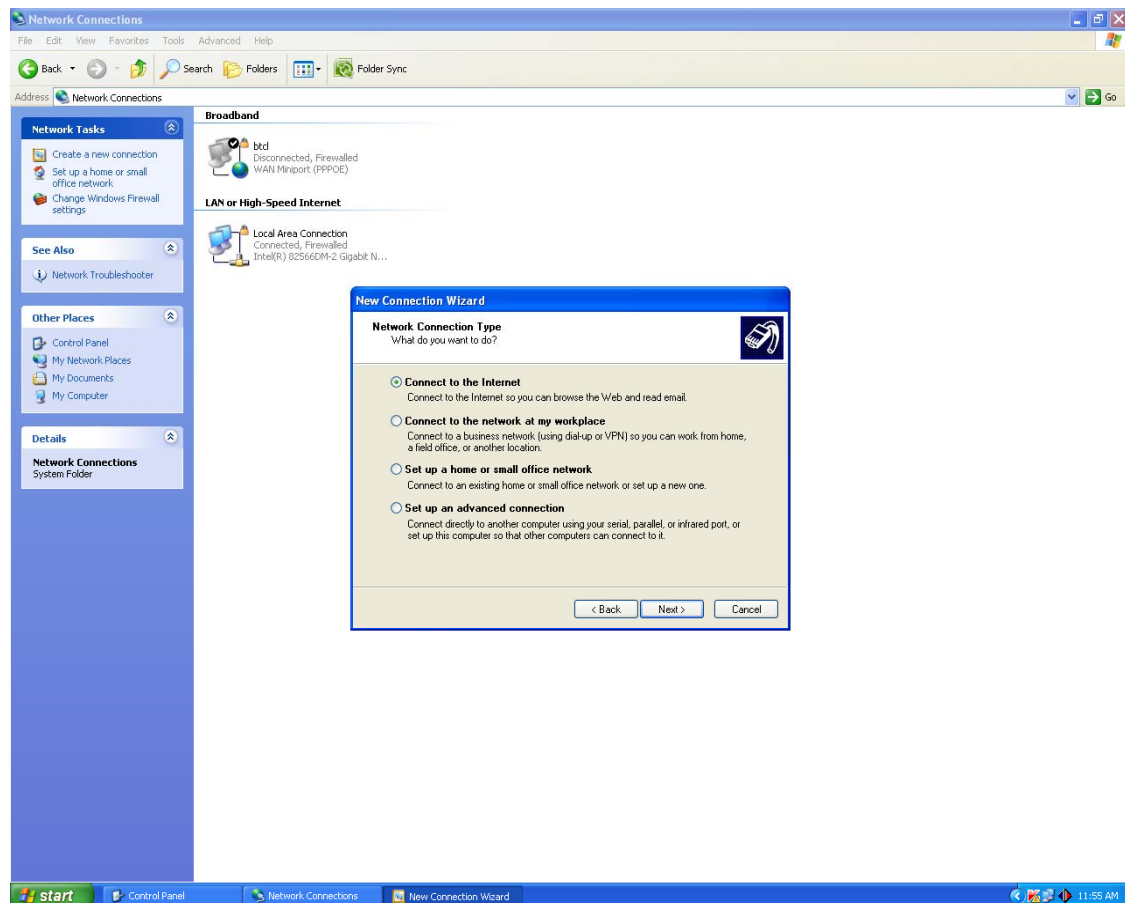


Figure 2.4:Network Connection Type

In this page I saw new connection wizard then same way I fill up set up my connection manually then I clicked next.

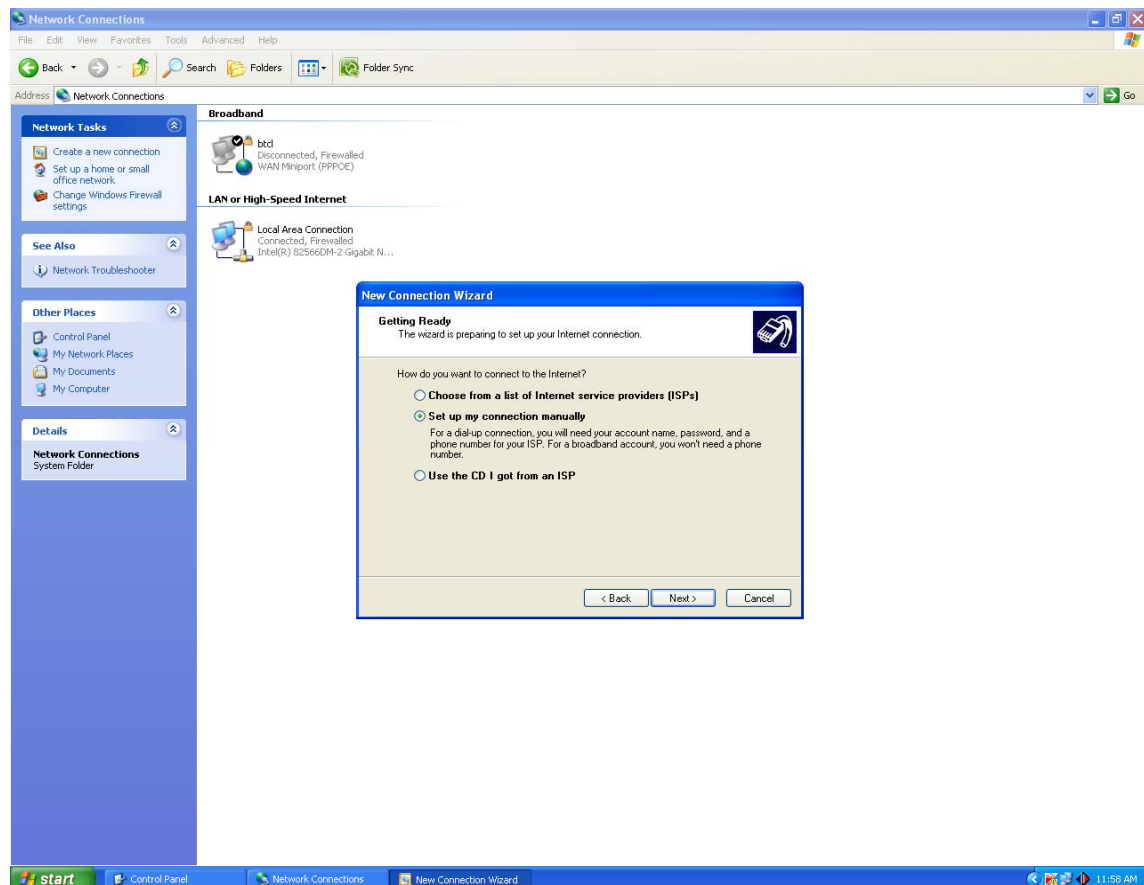


Figure 2.5: Wizard Prepared

I saw some point and choose connect using a broadband connection that requires a user name password then click next

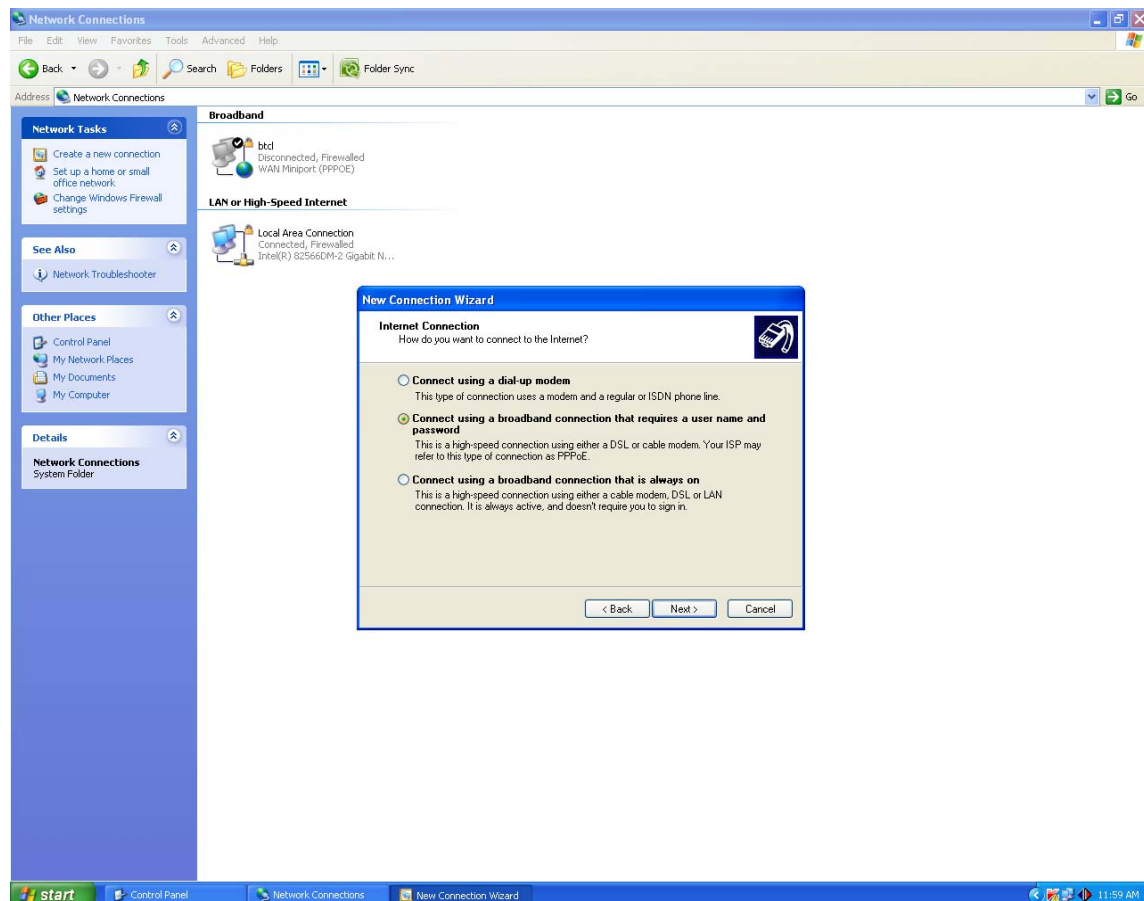


Figure 2.6 : Type of Internet Connect

I wrote a name In this place then pressed next button. Here we can write any name.

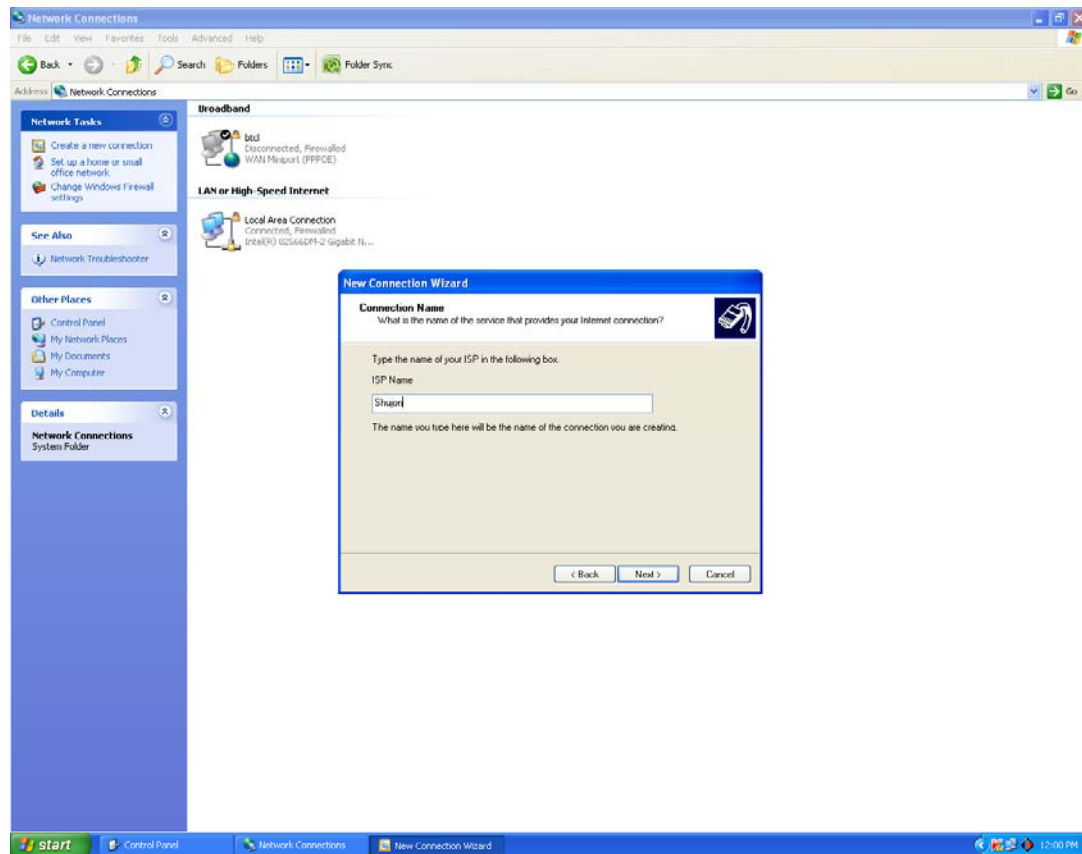


Figure 2.7:Service Provider Name

In same way I filled up use the account name password when anyone connects to the Internet from this computer and Make this the default Internet connection and pressed next.

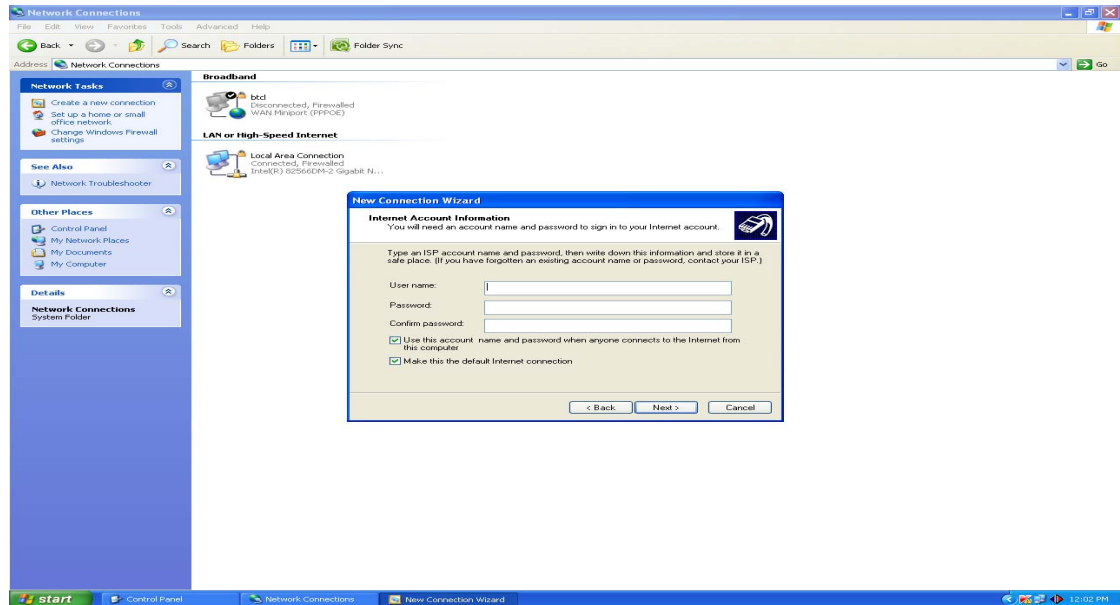


Figure 2.8:Account Information

This time I saw Completed the new connection wizard filled up add a shortcut to this connection to my desktop then press finish.

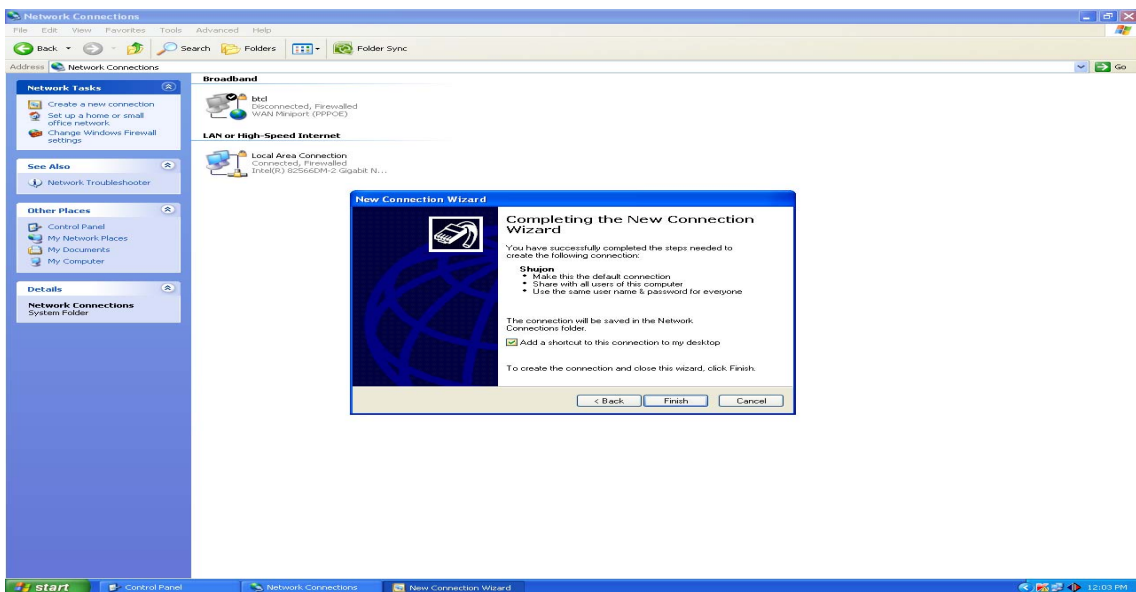


Figure 2.9:Completed setup

At last,I saw successfully finished the work.Then User will permission the Internet browse.After finished the dial up process,client enter the user name and password by fill up.

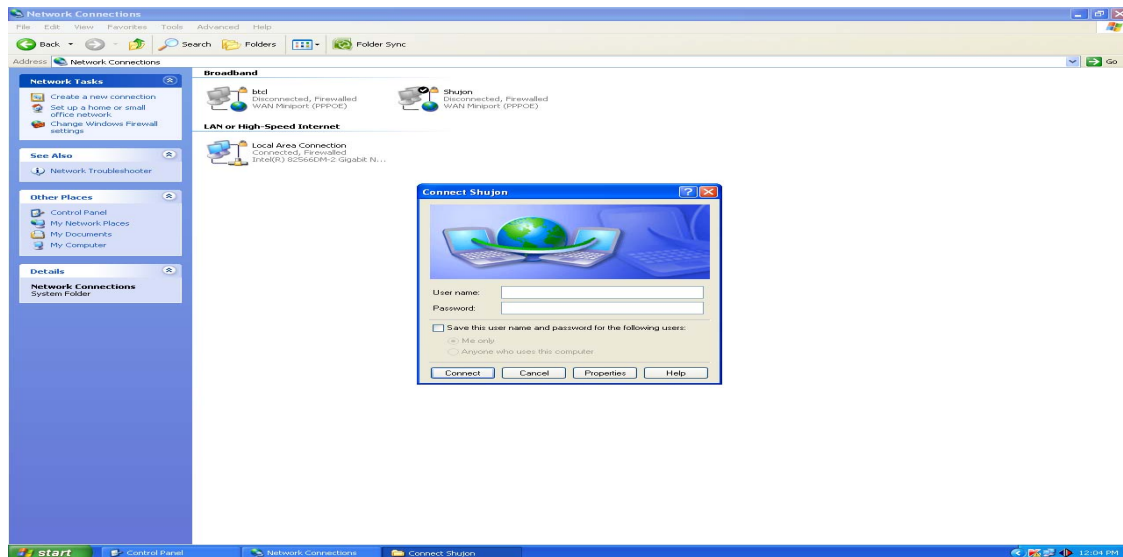


Figure 2.10: User's identify

2.6 How to make a ADSL Package Migration

At first I opened ADSL Billing software then saw this picture. I gone to package then here I saw three type migration,shifting and canceling.

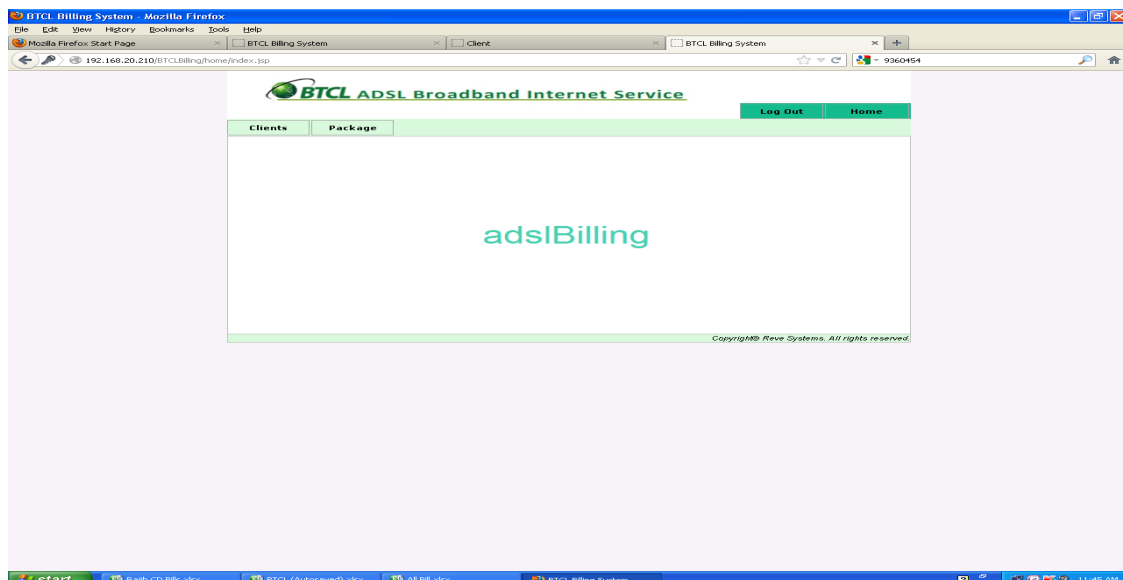


Figure 2.11: ADSL Billing Software

Here I filled up some client information.

Telephone No:0422271232
User Name:rashid422@btc1512

Information	
ID	15055
name	rashid422
password	na71232
First Name	rashid422
Last Name	na71232
Age	71232
Address	Noapara (Avoyanagar)
City	NOAPARA DIGITAL
Country	Noapara-SI
Gender	62
Connection	Private
No	sisviewop7141828854392653009
Additional Information	
Type	-5425.7
	Postpaid
	Recharge Infinity-512
Status	Active
Valid	Yes
Deleted	No

Figure 2.12: Client Information

I gone to invoice,here I took client invoice number.

Invoice Number	Invoice Operator	Invoice Type	Invoice Status
sisviewop3726266790726106315392	sisviewop	Migration	Unused
sisviewop3904414586750286563	sisviewop	Migration	Unused
sisviewop8426899571352226564	sisviewop	Migration	Unused
sisviewop1820722079815206565	sisviewop	Migration	Unused
sisviewop3259021787925576567	sisviewop	Migration	Unused
sisviewop4318223555195265659	sisviewop	Migration	Unused
sisviewop3473321849611726571	sisviewop	Migration	Unused
sisviewop5025457994090986581	sisviewop	Migration	Unused
sisviewop3721958942905338597	sisviewop	Migration	Unused
sisviewop9202814105885486599	sisviewop	Migration	Unused
sisviewop8240266164352576601	sisviewop	Migration	Unused
sisviewop168758587662746608	sisviewop	Migration	Unused
sisviewop2699015827770046610	sisviewop	Migration	Unused
sisviewop9466633186770916614	sisviewop	Migration	Unused
sisviewop348197125915288816	sisviewop	Migration	Unused
sisviewop3808632644743306628	sisviewop	Migration	Unused
sisviewop7904273161694436630	sisviewop	Migration	Unused
sisviewop262661853391486643	sisviewop	Migration	Unused
sisviewop3565869405272876645	sisviewop	Migration	Unused
sisviewop9621042110517256658	sisviewop	Migration	Unused

Figure 2.13: Invoices

I choose migration, then I saw some box. I filled Area code, ADSL phone no., client ID, postpaid invoices no. Migration charge 150 Taka in BTCL.

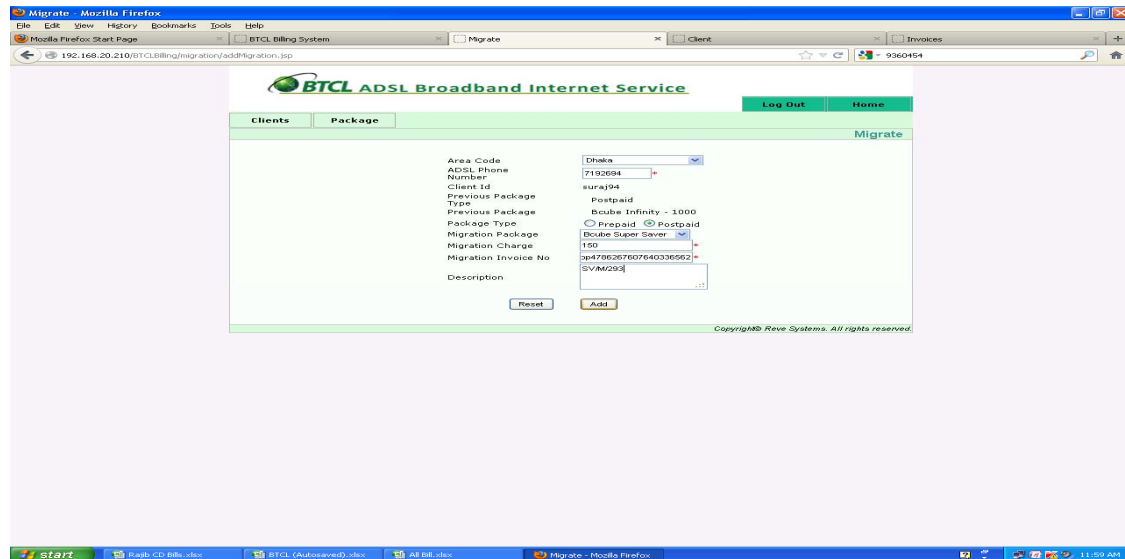


Figure 2.14: Migration description

After some time I saw complete the process by successfully. In the same way I changed shifting, and cancelling package.

2.7 Connection Maintenance

At first open the software, I saw this picture. It is area of cantonment exchange, Here client given a port no. 11. Here I saw some different color shown this picture. Here begun color means line is deactivate and green color means the line is active.

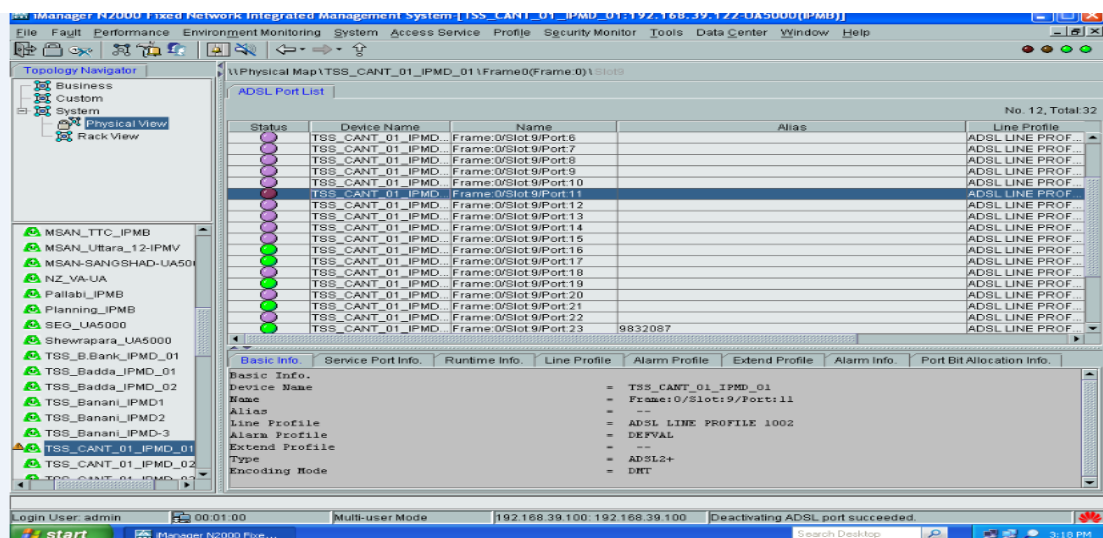


Fig 2.15: Deactivate Line

Here I changed the color by double clic .Then that deactivated line is activate and the color also changed automatic. This color got of green . I changed line activate or deactivated by double.

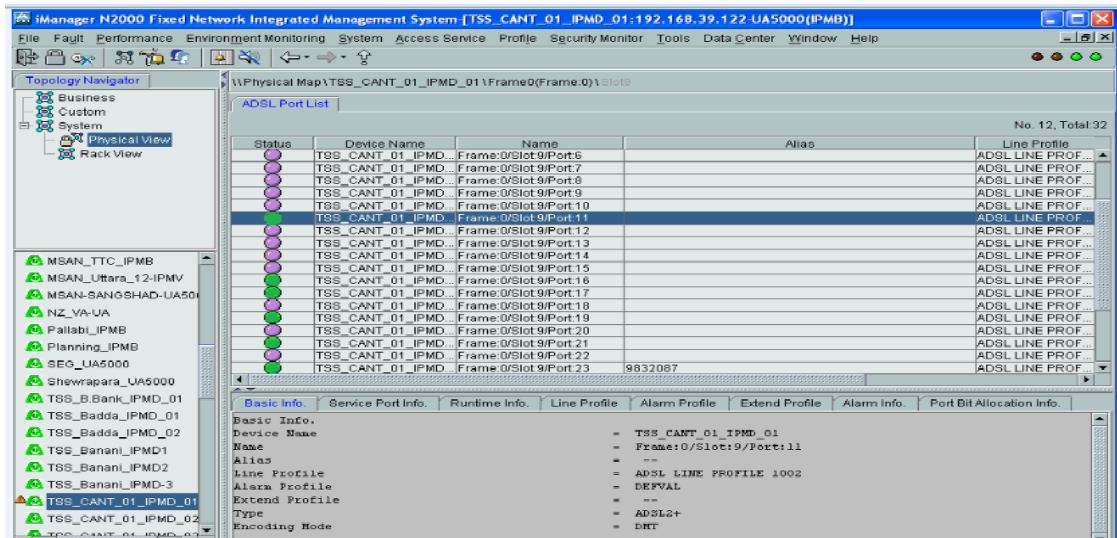


Fig 2.16. Activate Line

2.8 Advantage

- Simultaneous Internet and voice/fax capabilities over a single telephone line
- Uninterrupted, high-speed Internet access that's always on-line
- Cost-effective solution for society
- Data Security that exceeds other technologies
- Fast download speeds [1,2]

2.9 Disadvantage

- Distance-sensitive
- Phone line required
- ADSL conections are not available to everyone,you need to be within 3 miles of an ADSL enabled exchange.
- Slower upload speeds [2,3]

2.10 BTCL Technical Data (30 June 2013)

Telecom Regions (11)	Dhaka (North/South/East/West/Central), Sylhet, Chittagong Barisal, Khulna, Rajshahi, Rangpur
Other Regions	Overseas, Transmission, Upazilla, Palli
Telephone Exchange	747 exchanges in 626 locations
Optical Fibre Bandwidth Capacity of BTCL	(1) Voice: 5Gbps (2) Data: 8Gbps
Satellite Bandwidth Capacity of BTCL	(1) Voice: 36.5x2Mbps (Duplex) (2) Internet: 28Mbps Down + 8Mbps Up
BCube (ADSL 2+) broadband internet (128Kbps-2Mbps)	
Connection/Capacity/Districts covered	13,000/ 47,000/ 45
Dial-up Internet (Click2Net)(56Kbps max)	All telephone subscribers may use this service
Optical Fiber Network	5000 Km
Optical Fiber Coverage	64 districts, 126 Upazillas, 108 Union Parishad

BTCL holds the following licences from BTRC

(1) PSTN (2) IGW (3) ICX (4) IIG (5) ISP

BCube outsourcing partners

- (i) Emem Systems Ltd.**
- (ii) Systems Services Ltd. (SSL)**
- (iii) Sisview Technologies Telecom Ltd.**

2.11 BCube (ADSL 2+)

BCube using ADSL 2+ technology (Asymmetric Digital Subscriber Line) over your telephone line requires an ADSL modem and allows you to browse and talk at the same time. Apply for 128Kbps to 2Mbps account, if service is available at area.

We can also contact any of the following 3 outsourcing partners for BTCL's BCube (ADSL) prompt connection & service. ADSL 2+ Modem with single/ multiple LAN ports and/or wifi router is available in market and can also be purchased from outsourcing partners. Price may from Tk. 2000 to 8000.

2.12 BTCL Services

BTCL services some type of Telephone,Internet,Interconnection,Gateway,IN Based services,Data Link,Web service and Telecom Infrastructure.

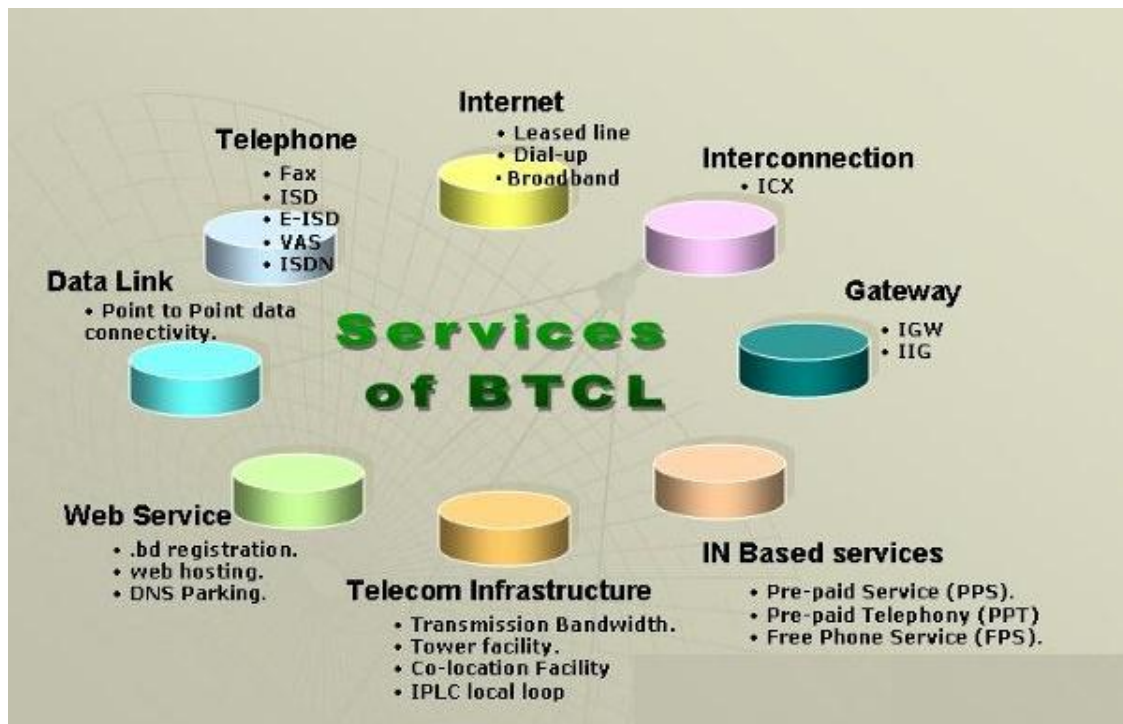


Fig 2.17: Services of BTCL

2.13 Central Server Network Diagram (Moghbazar Exchange)

The system has a central server located at Dhaka Moghbazar BTCL Exchange. Where it is connected with BTCL's DDN network to facilitate remote exchange data collection. With provision for data integrity checking to ensure proper data management.

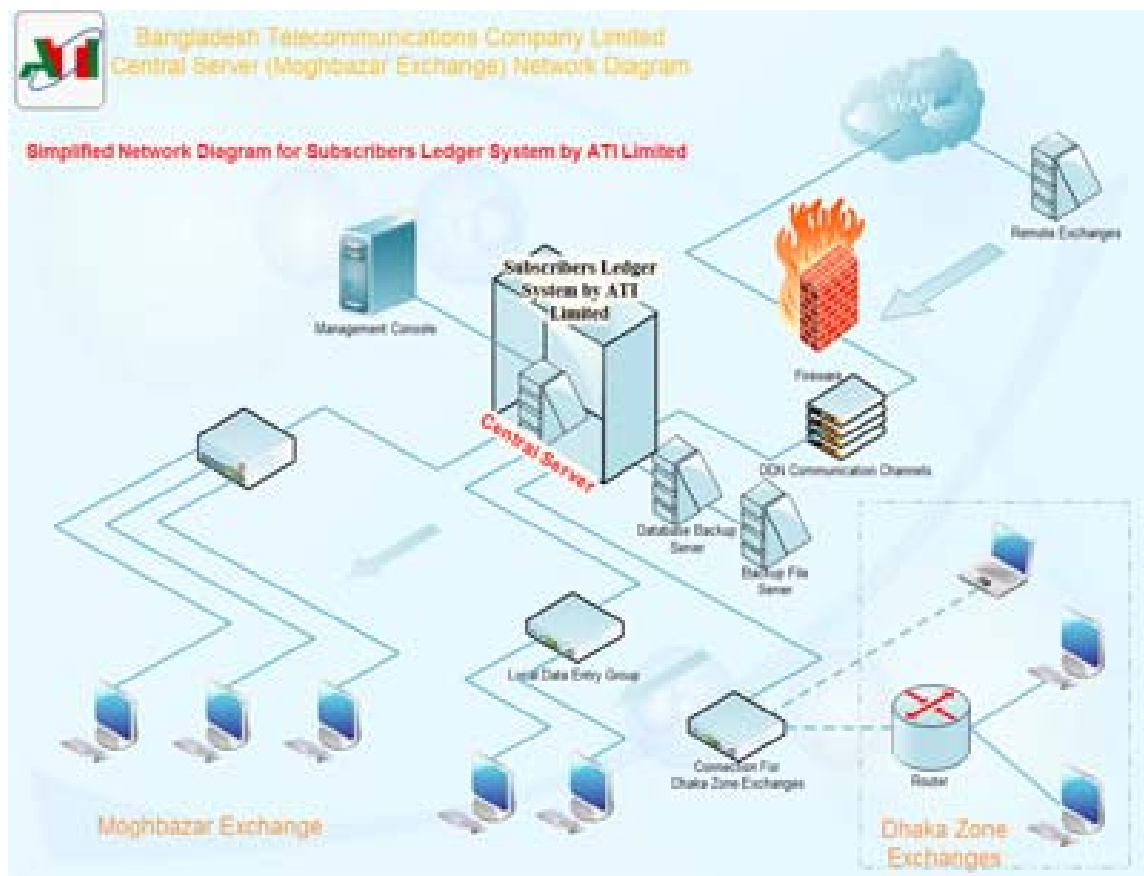


Fig 2.18: Central Server (Moghbaz Exchange) Network

Zonal exchanges located at different areas in Bangladesh gathers their subscriber and service related information and use the BTCL DDN channel to transfer them to the central server.

CHAPTER 03

BASIC COMPUTER NETWORKING

3.1 Computer Networks

A computer network is a group of computers that are connected to each other for the purpose of communication. Computer networking is the engineering discipline concerned with communication between computer systems or devices. Networking, Routers, routing protocols and networking over the public internet have their specifications defined in documents called RFCs (Request for Comment).

A computer network allows sharing of resources and information among devices connected to the network. Computer networking is sometimes considered as a sub discipline of telecommunications, computer science, information technology and/or computer engineering. Computer networks rely heavily upon the theoretical and practical application of these scientific and engineering disciplines.

3.2 Advantages of Computer Network

1. File Sharing : The major advantage of a computer network is that it allows file sharing and remote file access. A person sitting at one workstation of a network can easily see the files present on the other workstation, provided he is authorized to do so. It saves the time which is wasted in copying a file from one system to another, by using a storage device. In addition to that, many people can access or update the information stored in a database, making it up-to-date and accurate.

2. Resource Sharing: Resource sharing is also an important benefit of a computer network. For example, if there are four people in a family, each having their own computer, they will require four modems (for the Internet connection) and four printers,

if they want to use the resources at the same time. A computer network, on the other hand, provides a cheaper alternative by the provision of resource sharing. In this way, all the four computers can be interconnected; using a network, and just one modem and printer can efficiently provide the services to all four members. The facility of shared folders can also be availed by family members.

3. Increased Cost Efficiency: There are many software's available in the market which are costly and take time for installation. Computer networks resolve this issue as the software can be stored or installed on a system or a server and can be used by the different workstations.

4. Increased Storage Capacity: As there is more than one computer on a network which can easily share files, the issue of storage capacity gets resolved to a great extent. A standalone computer might fall short of storage memory, but when many computers are on a network, memory of different computers can be used in such case. One can also design a storage server on the network in order to have a huge storage capacity.

3.3 Disadvantages of Computer Networks:

1. Security Issues: One of the major drawbacks of computer networks is the security issues involved. If a computer is a standalone, physical access becomes necessary for any kind of data theft. However, if a computer is on a network, a computer hacker can get unauthorized access by using different tools. In case of big organizations, various network security softwares are used to prevent the theft of any confidential and classified data.

2. Rapid Spread of Computer Viruses: If any computer system in a network gets affected by computer virus, there is a possible threat of other systems getting affected too. Viruses get spread on a network easily because of the interconnectivity of workstations. Such spread can be dangerous if the computers have important database which can get corrupted by the virus.

3. Expensive Setup: The initial set up cost of a computer network can be high depending on the number of computers to be connected. Costly devices like routers, switches, hubs, etc., can add up to the bills of a person trying to install a computer network. He will also have to buy NICs (Network Interface Cards) for each of the workstations, in case they are not inbuilt.

4. Dependency on the Main File Server: In case the main File Server of a computer network breaks down, the system becomes useless. In case of big networks, the File Server should be a powerful computer, which often makes it expensive.

3.4 Types of Networks:

Different types of (private) networks are distinguished based on their size (in terms of the number of machines), their data transfer speed, and their reach. Private networks are networks that belong to a single origination. The most common type of networks are:

1. **LAN** (Local Area Network)
2. **MAN** (Metropolitan Area Network)
3. **WAN** (Wide Area Network)

3.4.1 Local Area Network (LAN):

Local Area Network is usually a small network constrained to a small geographic area. An example of a LAN would be a computer network within a building.

A **local area network (LAN)** supplies networking capability to a group of computers in close proximity to each other such as in an office building, a school, or a home. A LAN is useful for sharing resources like files, printers, games or other applications.

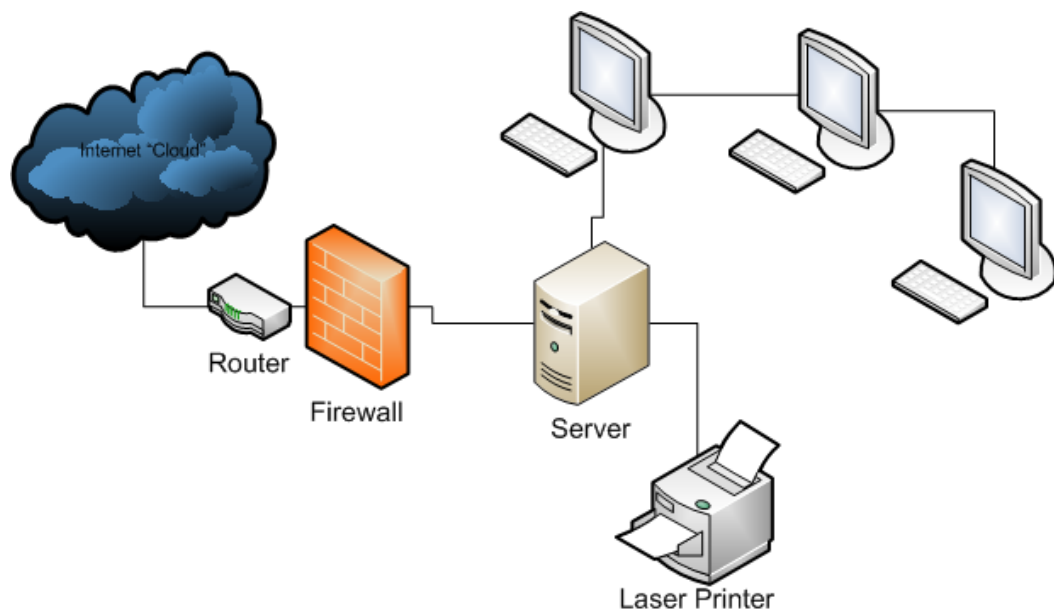


Figure 3.1: Local Area Network [4]

3.4.2 Metropolitan Area Network (MAN)

A metropolitan area network (MAN) is a network that interconnects users with computer resources in a geographic area or region larger than that covered by even a large local area network (LAN) but smaller than the area covered by a wide area network (WAN). It might cover a group of nearby corporate offices or a city and might be either private or public. A MAN can support both data and voice, and might even be related to the local cable television network. A MAN just has one or two cables and does not contain switching elements, which shunt packets over one of several potential output lines. Not having to switch simplifies the design.

In simple Language we can define MAN as a metropolitan area network (MAN) is a network that connects two or more local area networks or campus area networks together but does not extend beyond the boundaries of the immediate town/city. Routers, switches and hubs are connected to create a metropolitan area network. Such networks are being implemented by innovative techniques, such as running optical fibre through subway tunnels. A popular example of a MAN is SMDS. The term is applied to the interconnection of networks in a city into a single larger network (which may then also

offer efficient connection to a wide area network). It is also used to mean the interconnection of several local area networks by bridging them with backbone lines. [5]

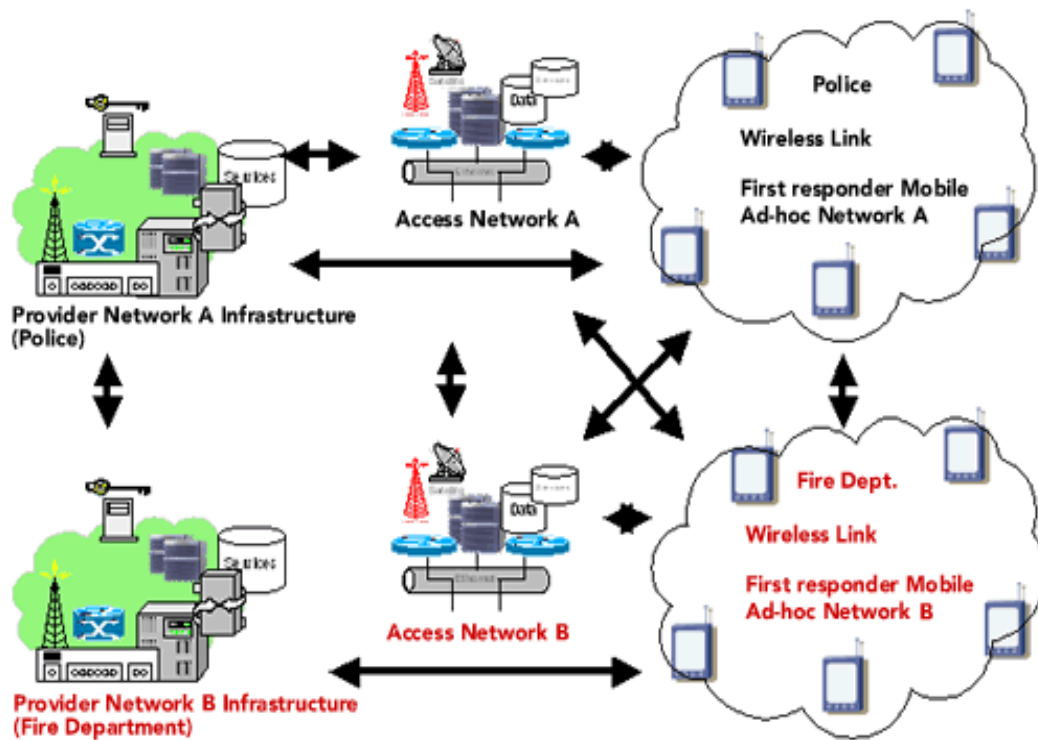


Figure 3.2: Metropolitan Area Network

3.4.3 Wide Area Network (WAN):

The term Wide Area Network (WAN) usually refers to a network which covers a large geographical area, and use communications circuits to connect the intermediate nodes. WANs often connect multiple smaller networks, such as local area networks (LANs) or metro area networks (MANs). The world's most popular WAN is the Internet. Some segments of the Internet, like VPN-based extranets, are also WANs in themselves. Finally, many WANs are corporate or research networks that utilize leased lines.

Numerous WANs have been constructed, including public packet networks, large corporate networks, military networks, banking networks, stock brokerage networks, and airline reservation networks. Some WANs are very extensive, spanning the globe, but most do not provide true global coverage. Organizations supporting WANs using the Internet Protocol are known as Network Service Providers (NSPs). These form the core of the Internet.

In general; there are three broad types of WAN access technology. With Leased Lines, we have point-to-point dedicated connection that uses pre-established WAN path provided by the ISP. With Circuit Switching such as ISDN, a dedicated circuit path exist only for the duration of the call. Compare to traditional phone service, ISDN is more reliable and is faster. With Packet Switching, all network devices share a single point-to-point link to transport packets across the carrier network – this is known as virtual circuits. [6,7]

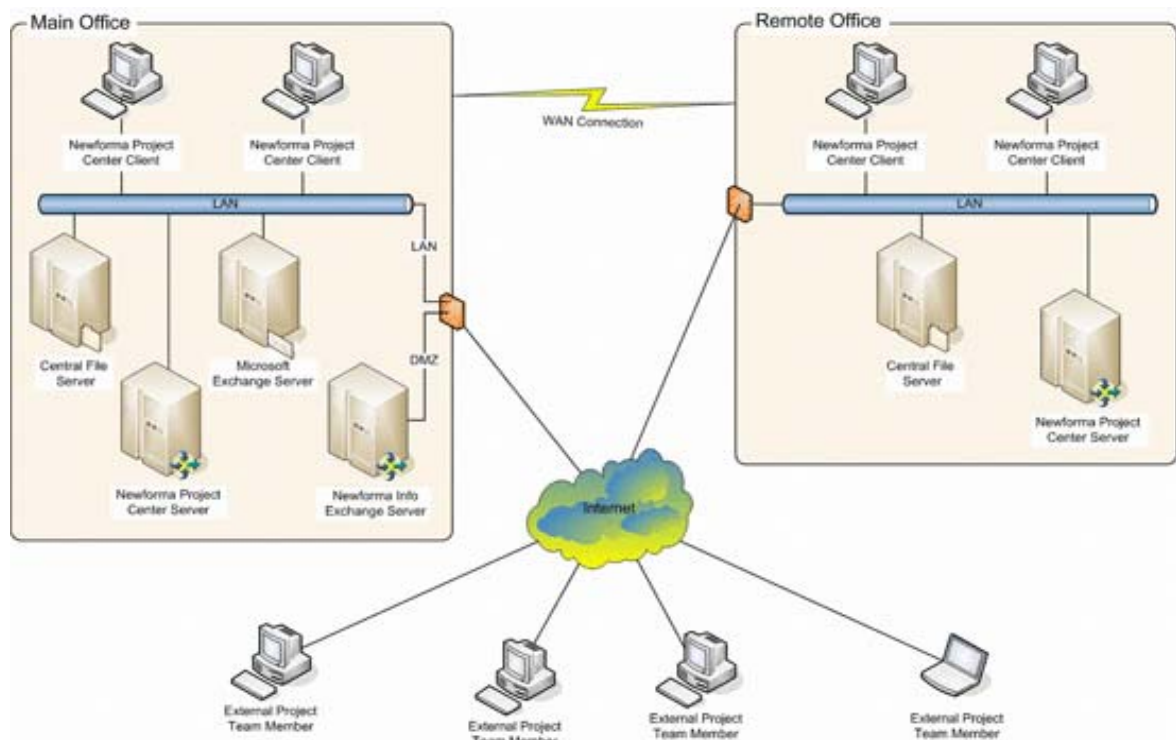


Figure 3.3: Wide Area Network

3.5 Some More Types of Network:

Besides of the three networks system there are more three types of network system is being used which are as follows:

1. Peer to Peer Network
2. Clint/ Server Network
3. Centralized Server Network

3.5.1 Peer to Peer Network

A peer-to-peer network allows two or more PCs to pool their resources together. Individual resources like disk drives, CD-ROM drives, and even printers are transformed into shared, collective resources that are accessible from every PC.

Unlike client-server networks, where network information is stored on a centralized file server PC and made available to tens, hundreds, or thousands client PCs, the information stored across peer-to-peer networks is uniquely decentralized. Because peer-to-peer PCs have their own hard disk drives that are accessible by all computers, each PC acts as both a client (information requestor) and a server (information provider). In the diagram below, three peer-to-peer workstations are shown. Although not capable of handling the same amount of information flow that a client-server network might, all three computers can communicate directly with each other and share one another's resources.

A peer-to-peer network can be built with both 10BaseT cabling and a hub or with a thin coax backbone. 10BaseT is best for small workgroups of 16 or fewer users that do not span long distances, or for workgroups that have one or more portable computers that may be disconnected from the network from time to time.

After the networking hardware has been installed, a peer-to-peer network software package must be installed onto all of the PCs. Such a package allows information to be transferred back and forth between the PCs, hard disks, and other devices when users request it. Popular peer-to-peer NOS software includes Windows 98, Windows 95, Windows for Workgroups, Artisoft LANtastic, and NetWare Lite. [11]

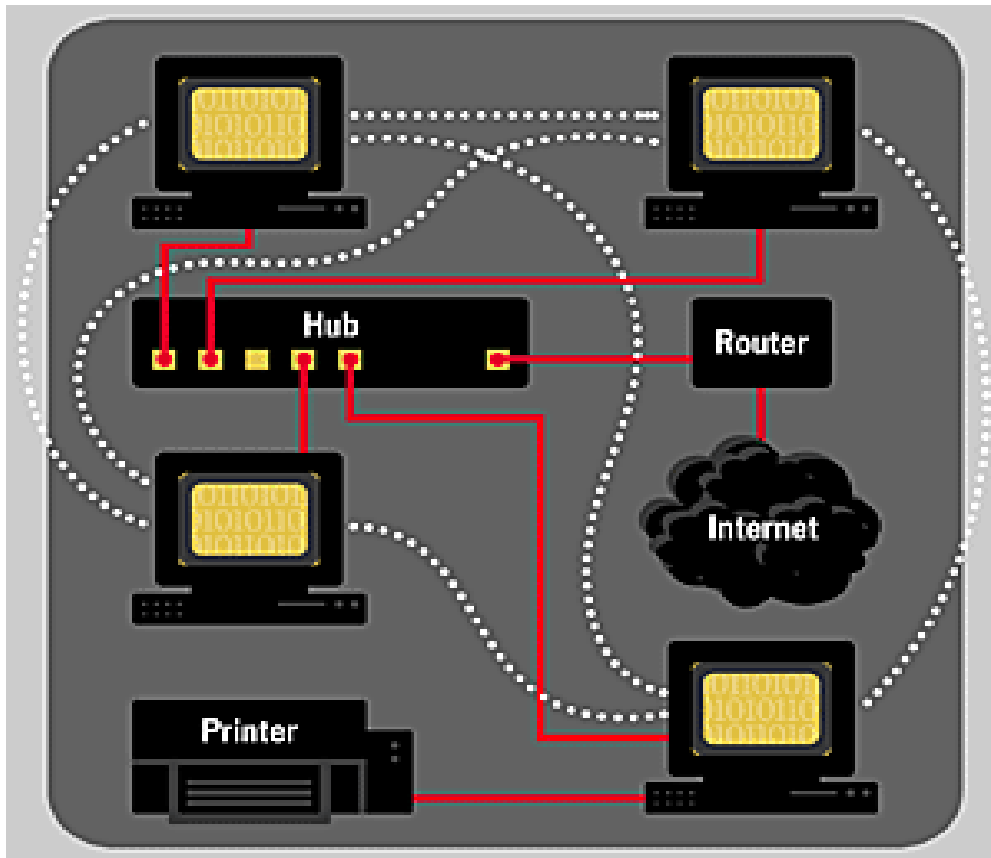


Figure 3.4: Peer to Peer Network

3.5.2 Client/Server Network

In a client-server environment like Windows NT or Novell NetWare, files are stored on a centralized, high speed file server PC that is made available to client PCs. Network access speeds are usually faster than those found on peer-to-peer networks, which is reasonable given the vast numbers of clients that this architecture can support. Nearly all network services like printing and electronic mail are routed through the file server, which allows networking tasks to be tracked. Inefficient network segments can be reworked to make them faster, and users' activities can be closely monitored. Public data and applications are stored on the file server, where they are run from client PCs' locations, which makes upgrading software a simple task--network administrators can

simply upgrade the applications stored on the file server, rather than having to physically upgrade each client PC.

In the client-server diagram above, the client PCs are shown to be separate and subordinate to the file server. The clients' primary applications and files are stored in a common location. File servers are often set up so that each user on the network has access to his or her "own" directory, along with a range of "public" directories where applications are stored. If the two clients above want to communicate with each other, they must go through the file server to do it. A message from one client to another is first sent to the file server, where it is then routed to its destination. With tens or hundreds of client PCs, a file server is the only way to manage the often complex and simultaneous operations that large networks require.

In client-server networks, network printing is normally handled by a print server, a small box with at least two connectors: one for a printer, and another that attaches directly to the network cabling. Some print servers have more than two ports... they may, for example, support 2, 3, or 4 printers simultaneously. When a user sends a print job, it travels over the network cabling to the file server where it is stored. When the print server senses that the job is waiting, it moves it from the file server to its attached printer. When the job is finished, the print server returns a result message to the file server, indicating that the process is complete.

In the diagram below, the client PC sends a job to the file server. The file server, in turn, forwards the job to the print server, which sends it to the printer when it's available. Any client on the network can access the printer in this fashion, and it's quite fast. The print server can be placed anywhere on the network, and a network can have more than one print server... possibly one in an office's accounting department, another in marketing, and so on.

Client Server Network

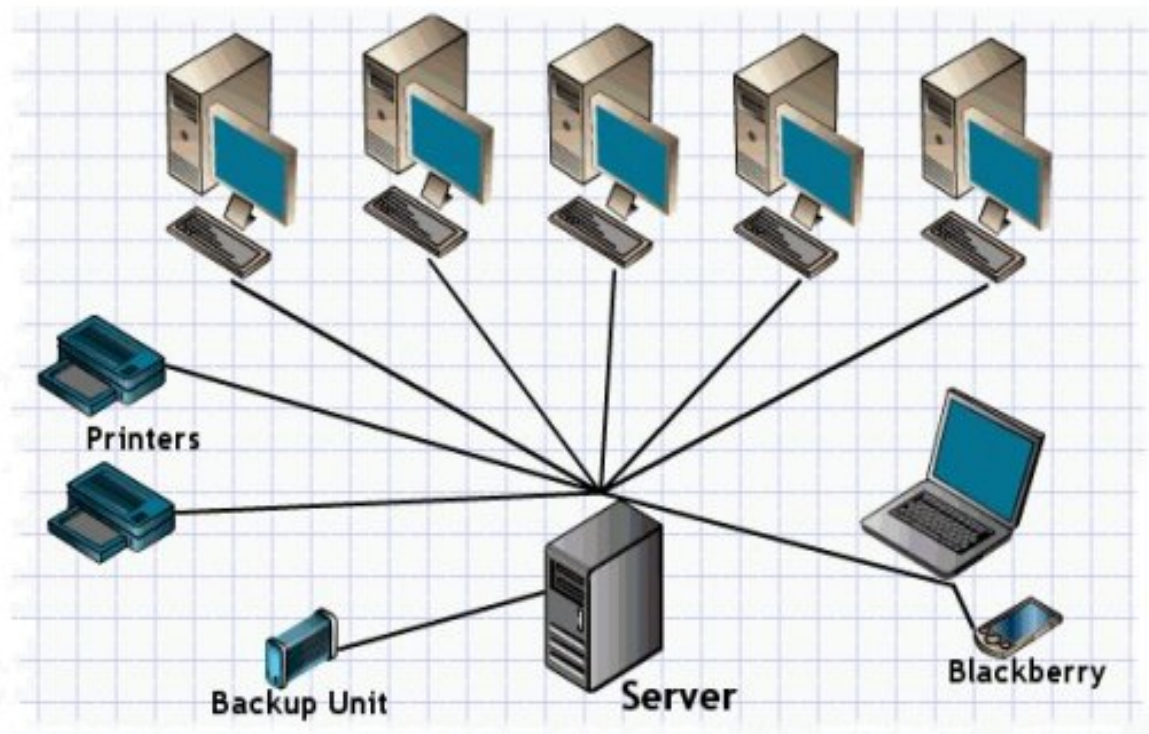


Figure 3.5: Client/Server Network

3.5.3 Centralized Server Network

This is also a client/server based model that is most often seen in UNIX environment, but the clients are “dumb terminals”. This means that the client may have not a floppy drive, Hard disk or CD ROM and all applications and processing occurs on the server/s. As you can imagine, this requires fast and expensive server/s. Security is very high on this network. [11]

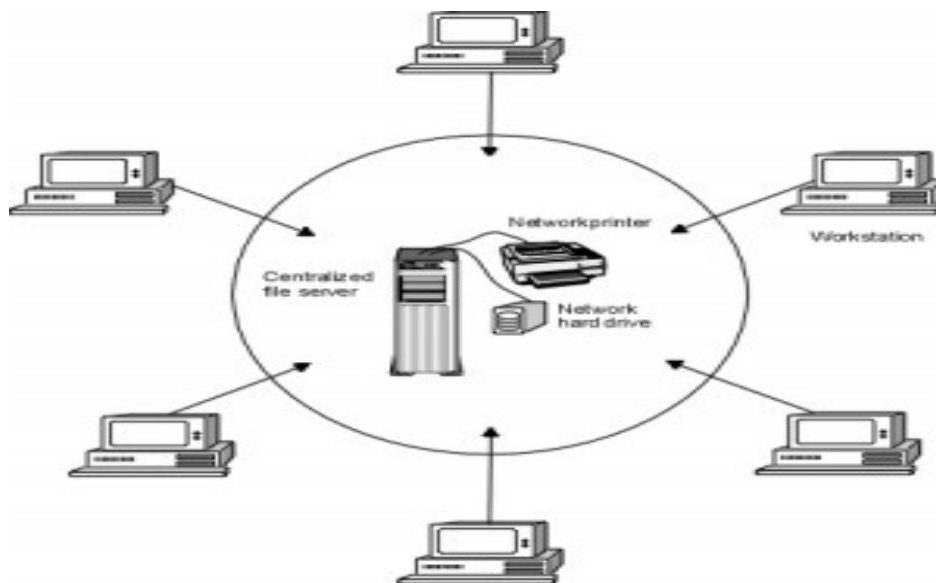


Figure 3.6: Centralized Server Network

CHAPTER 04

LAN DEVICES, CABLES AND CONNECTOR

4.1 Introduction:

Computer network consist of different devices such as router, hub, switch, and others. Without these network devices data cannot be transmitted from one computer to another in a LAN network. These devices link up all the local and remote network segments with each other to make data communication from one segment to another. The two important devices of a big network are routers and switches. A computer network with good infrastructure with properly placed and configured network devices such as routers, switches etc. are helpful in reducing the overall operational cost, improve the performance, manageability and reliability. [4]

4.2 LAN Devices

4.2.1 Hub

A hub is a networking device, which is used to connect the two segments of a wired network. In star topology, every computer is directly connected with the hub. In case of any fault in the hub, the data communication in the network computers stops. In an Ethernet-based network a hub is a central device that is used to connect all the computers with each other.

A hub has multiple ports such as 6, 8, 16 and 24 etc. When data packets are reached at hub, they are broadcasted to all the computers unlike a switch and only the destined computer receives the data. When we connect more than computers with each other a hub or switch is required in a local area network. There are two types of a hub passive hub and active hub.[4]



Figure 4.1: Hub

4.2.2 Switch

A network switch performs the same functionality in a network as a hub except a different that switch does not broadcast the data packets to all the computers in a network like a hub. A network switch has multiple ports like 4, 8, 16 and 24 etc. All the computers in a wired network are directly connected with the switch through Ethernet cable. Switches limit the traffic to and from each port and all the devices connected to the switch has maximum available bandwidth. Switch doesn't provide the built-in firewall capabilities like the routers. In the telecommunication and packet switched infrastructure switches play an important role. They transmit the data towards its destination based on the IP address.[4]



Figure 4.2: Switch

4.2.3 LAN Card

LAN card, network interface card or NIC is used to join the computers in a network. A NIC card is installed in any available PCI port inside the computer. A unique MAC (Media Control Access) address is assigned to LAN card. A MAC address is consists of two portions manufacture's id and the card id (PROM on the network interface card holds the addresses). LAN card operates on the physical and data link layer of the OSI model. A LAN card usually has twisted pair, BNC and AUI sockets where the Ethernet cables are connected. [5]



Figure 4.3: LAN card

4.2.4 Router

A router is a three-layer device that routes packets based on their logical addresses (host to host addressing). A router normally connects LANs and WAN in the internet and has a routing table that is used for making decisions about the route. The routing tables are normally dynamic and are updated using routing protocols. [4,5]

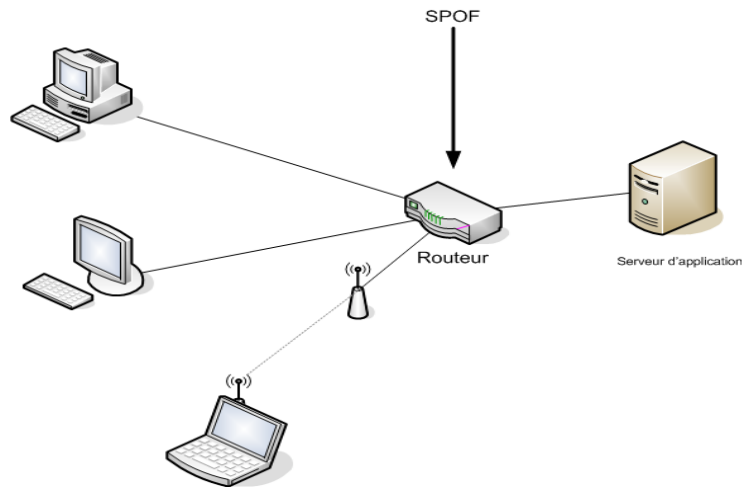


Figure 4.4: Router

4.2.5 CABLES

Cable is the medium through which information usually moves from one device to another. There are several types of cable which is commonly used with LANs.

But in some cases, a network will utilize only one type of cable, other networks will use variety of cable types the type of cable chosen for a network is related to the network topology, protocol and size.

The following types of cables uses in networks

- 1) Twisted pair Cable
- 2) Coaxial Cable
- 3) Fiber Optic Cable

4.2.5.1 Twisted pair Cable

It is costly and more uses. Some copper weirs have twisted for this reason it is called twisted pair cable. Twisted pair Cables are two types.

1.Unshielded Twisted Pair (UTP)

2.Shielded Twisted Pair (STP)

1. Unshielded Twisted Pair (UTP)

Unshielded Twisted Pair is the most common kind of telephone wiring. Twisted pair is the ordinary copper wire that connects home and many business computers to the telephone company.

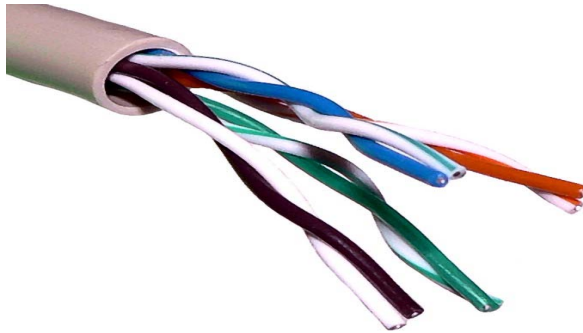


Figure 4.5: Unshielded Twisted Pair (UTP) cable

2. Shielded Twisted Pair (STP)

Shielded twisted pair (STP) is suitable for environments with electrical interference; however the shielding can make the cables quite bulky. Shielded twisted pair is often used on networks using Token Ring topology.

4.2.5.2 Coaxial Cable

Coaxial Cabling has a single copper conductor at its center. A plastic layer provides insulation between the center conductor and braided metal shield.

The metal shield helps to block any outside interference from fluorescent lights, motors, and other computers.

Although coaxial cabling is difficult to install, it is highly resistant to signal interference. In addition, it can support greater cable lengths between network devices than twisted pair cable. The two types of coaxial cabling are thick and thin coaxial.

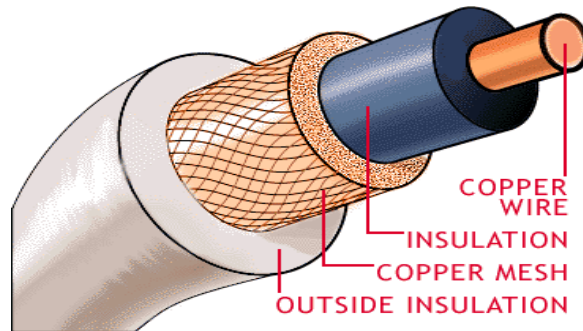


Figure 4.6: Coaxial Cable

4.2.5.3 Fiber Optic Cable

Fiber optic cabling consists of a center glass core surrounded by several layers of protective materials. It transmits light rather than electronic signals eliminating the problem of electrical interference. Fiber optic cable has the ability to transmit signals over much longer distances than coaxial and twisted pair cable. It also has the capability to carry information at vastly greater speeds. The cost of fiber optic cabling is comparable to copper cabling; it is more difficult to install modify.



Figure 4.7: Fiber Optic Cable

4.2.6 Types of cable connections

There are several types of cable connection. These connection are in the below.

1. Straight-through cable

The cable that connects from the switch port to the computer NIC port is called a straight-through cable. [7]

Straight-through cables are used for:

- Switch-to-router
- Switch-to-PC
- Hub-to-PC
- Hub-to-server

2. Crossover Cable

The cable that connects from one switch port to another switch port is called a crossover cable. [9]

Crossover cables are used for:

- Switch-to-switch
- PC-to-PC
- Switch-to-hub
- Hub-to-hub
- Router-to-router
- Router-to-serve

4.2.7 Connector

A different connector is used in an Ethernet-based LAN environment. An RJ-45 connector for the unshielded twisted-pair (UTP) cable is the most common connector used to connect LAN interfaces. The RJ-45 connector is probably most commonly used for 10Base-t and 100Bas-TX Ethernet connections.

At each end of an RJ-45 cable, we should be able to see eight colored strips, or pins. An Ethernet cable uses pins 1, 2, 3, and 6 for transmitting and receiving data.



Figure 4.8: RJ-45 Connector

CHAPTR 05

NETWORK ADDRESSING

5.1 Introduction:

A **network address** serves as a unique identifier for a computer on a network. When set up correctly, computers can determine the addresses of other computers on the network and use these addresses to send messages to each other. One of the best known form of network addressing is the Internet Protocol (IP) address. IP addresses consist of four bytes (32 bits) that uniquely identify all computers on the public Internet.

5.2 IP Address:

In the TCP/IP use IP Address. This IP Address has 32 bits address. 32 - bits are separated 4 parts. Each part has 8 bits. In the 4 parts of have network ID and Host ID. When we write the IP address then we used symbol dot that's mean (.). Example 192.168.168.1

5.3 IP Addressing Class:

There are 5 kinds of IP address. We understood the IP address by the first octet number.

Class A, Class B, Class C, Class D, Class E,

BTCL used Class A, Class B and Class C IP address.

5.3.1 Class A:

Which IP address first bit is Zero (0) then it will be included class A. For this networking first 8 bits are networking address and net 24 bits are host address. Class and IP address show in the table.

0	xxxxxxxx	xxxxxxxx	xxxxxxxx	Xxxxxxxxxx
1 st Octet		2 nd Octet	3 rd Octet	4 th Octet
Network ID		Host ID		

Table 5.1 : Class A

Here 0 is not network number. So first network ID card will be 1. If we ignore the first bit and other bit donated the 1 then we will get the number 127. But the 127 number is used in the local network. This local network called loop Back address. So the Class A is 1-126.

If we count number of host and number on network then have different rules. These rules are given in the below.

Number of network of the host and number on network then have different rules. These rules are given in the below.

Number of network of the host address = 2^{Number of bits for the network ID - 2}

Number of host address = 2^{Number of bits for the host id - 2}

5.3.2 Class B:

Which IP address first bit is Zero (0) then it will be included **Class B**. For this networking first 16 bits are network address and net 16 bits are host address. Class and IP Address are shown below in the table.

10	xxxxxxx	Xxxxxxxx	xxxxxxx	Xxxxxxxx
1 st Octet		2 nd Octet	3 rd Octet	4 th Octet
Network ID			Host ID	

Table 5.2 : Class B

In the rule host ID all bits will not be 0 and 1. For this reason 2 will be

Number of bits for the Number of bits for the host
Subtraction for the 2 and 2

Number of bits for the network id
That's meaning 2 -2.

The Class range 128-191.

Number of the network address = $2^{14} - 2$

Number of the host address = $2^{14} - 2$

5.3.3 Class C:

Which IP address first bit is zero (110) then it will be included **Class C**. For this networking first 24 bits are networking address and net 8 bit is host address. Class and IP address show in the table.

110	xxxxxxx	Xxxxxxxxx	xxxxxxx	Xxxxxxxxx
	1 st Octet	2 nd Octet	3 rd Octet	4 th Octet
Network ID				Host ID

Table 5.3 : Class C

In the rule host ID all bits will not be 0 then 1. For this reason 2 will be

Subtraction for the 2 Number of bits for the network id Number of bits for the host id
and 2

That's meaning 2 Number of bits for the network id -2.

The Class range 192-223.

Number of network address = $2^{21} - 2$

Number of host address = $2^8 - 2$

5.3.4 Class D:

Which IP address First bit is Zero (1110) then it will be included **Class D**. It is a Special class which used multicast network. The range begins 224.0.0.0 and end 239.225.255.255 Class and IP address show in the table.

1110	xxxx	Xxxxxxxx	xxxxxxx	Xxxxxxxx
1 st Octet		2 nd Octet	3 rd Octet	4 th Octet

Table 5.4 : Class D

This IP address we can not give TCP/IP address.

5.3.5 Class E:

Which IP address first bit is Zero (1111) then it will be included **Class E**. It is a Special Class which used different analysis. The range begins 240.0.0 and end 255.255.255.255 class and IP address show in the Table.

1111	xxxx	Xxxxxxxx	xxxxxxx	Xxxxxxxx
1 st Octet		2 nd Octet	3 rd Octet	4 th Octet

Table 5.5 : Class E

This IP address we can not give TCP/IP address:

Class	Range	First Left bit	Number of bits for the network	Number of network will be made	Number of bit for the host ID	Number of Host for Each Host
A	1-126	0	8	126	24	16777214
B	128-191	10	16	16384	16	65534
C	192-223	110	24	2097152	8	254
D	224-239	1110	No need			
E	240-225	1111	No need			

Table 5.6: Range of All classes [10]

CHAPTER 6

LAN MAINTANANCE WITH NETWORK SECURITY

6.1 Introduction

The total network connections and configuration of mobile care are before shown chapter 04. Sometimes this network connection has to face some problem. We know the common problem of every LAN connections is disconnecting, printing and sharing connection problem.

6.2 Procedure of Problem Solving:

For maintenance and solve any problem of local area connections by an administrator.

- 1) When the LAN connections of any computer is disconnected, at first the administrator check that pc and see the icon of LAN connection.
- 2) If the icon is unplugged then the engineer checks the LAN connection behind the CPU LAN port. The engineer reconnects the LAN port if it is looking loose.

(See fig).



Figure 6.1: Connecting the LAN

3) If the connections shown plugged, then the engineer do the following work-

Click –

START

RUN

PING 192.168.1.1

And check pinging. (See fig 6.2)

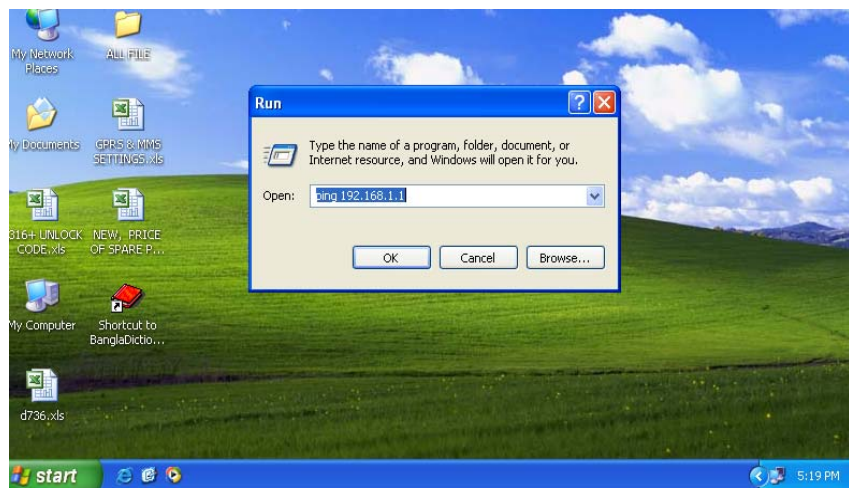


Figure 6.2: ping 192.168.1.1

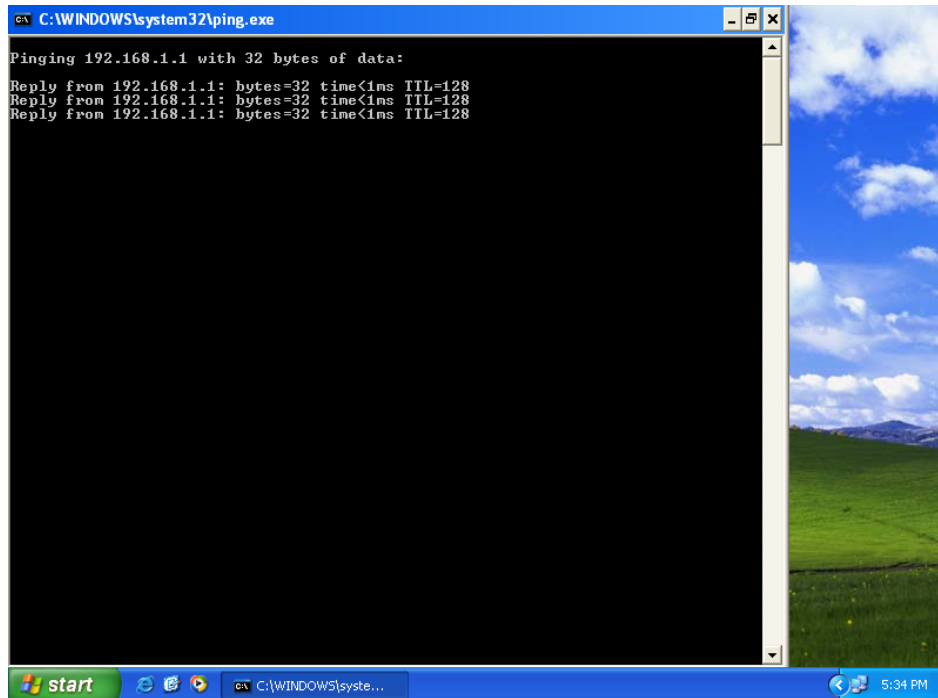


Figure 6.3: pinging result

If ping shown doesn't reply then administrator check the main network switch of mobile care where that pc is connected (see fig 5.4)



Figure 6.4: Checking Main Switch Connect

6.3 Network security

Network security is a complicated subject, historically only tackled by well-trained and experienced experts. However, as more and more people become ``wired'', an increasing number of people need to understand the basics of security in a networked world. This document was written with the basic computer user and information systems manager in mind, explaining the concepts needed to read through the hype in the marketplace and understand risks and how to deal with them.

Some history of networking is included, as well as an introduction to TCP/IP and *internetworking*. We go on to consider risk management, network threats, firewalls, and more special-purpose secure networking devices.

This is not intended to be a ``frequently asked questions'' reference, nor is it a ``hands-on'' document describing how to accomplish specific functionality.

It is hoped that the reader will have a wider perspective on security in general, and better understand how to reduce and manage risk personally, at home, and in the workplace. IP binding with MAC that's why if anyone want to use this IP it's impossible without same MAC.

CHAPTER 7

CONCLUSION

In this internship I have worked with ADSL technology and Network design. ADSL is more useful to the client because simultaneously voice and data can be used . How to connecting ADSL subscriber , manage client by creating dial-up connection. Client assigning with IP addrees which is binding with MAC . Any client face connection failed problem its resolved by checking user ID & Password, IP adress then cable & Server settings sequentially .To find the weak signal in LAN connection used LASER if there is no problem then need to check cable .For check the cable used OTDR.

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