Fundamentals of Computer Networking (FCN)

PGDCA 201

BLOCK 1:
NETWORKING CONCEPT

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Ahmedabad

Fundamentals of Computer Networking (FCN)

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ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self-instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual-skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self-instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)

PREFACE

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included may tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

FUNDAMENTALS OF COMPUTER NETWORKING

(FCN)

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PGDCA 201

Fundamentals of Computer Networking (FCN)

BLOCK 1: NETWORKING CONCEPT

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Block Introduction

Internet is a collection of computers where many computers grouped together share their information. Protocols are the set of rules that helps in communicating and controlling across a network. They run behind each service and hence for each internet service there is a specific protocol. By using certain applications, there are lots of services that are present on the internet.

In this block we will study and learn about networking and its devices. The concept related to various networking topologies are well detailed for future use. The mechanism of working and features of switches and routers with different types of networking characteristics are explained to you to gather knowledge about external networking devices.

The block will help readers with the basic understanding of how computers can be connected in a network and perform task. After reading this block you will able to connect to web with the use of modem and various OSI layer. The concept of different types of networking topologies with their arrangements will allow students to know more about different types of arrangements of computers as seen in daily life.

Block Objective

After learning this block, you will be able to understand:

- The basic of Networking.
- Features of computer networking.
- Basic of WAN, LAN and PAN.
- Idea about Topologies.
- Familiarization about Network Adaptor Cards.

Block Structure

Unit 1: Introduction and Networking Basics

Unit 2: Network Interface Devices

UNIT 1: INTRODUCTION AND NETWORKING BASICS

Unit Structure

1.0 Learning Objectives

After learning this unit, you will be able to understand:

- About computer network
- About Internet
- About Topologies
- About connecting media

1.1 Introduction

Networking involves association among two or more computers. The two computers will be connected across the world with the help of web and networking. There are two forms of modem one is with wires that's connected inside the computer system and other is wireless, that are more comfortable and accessible today. There are certain optical storage devices like CD and DVDs where information will be stored from 10 MB to 4.6 GB.

1.2 Advantages of computer networking

Basically, Networking is a connection between two or more computers. The main purpose of a network is to share the information among different users. Figure 1.1 shows the networking of two computers:

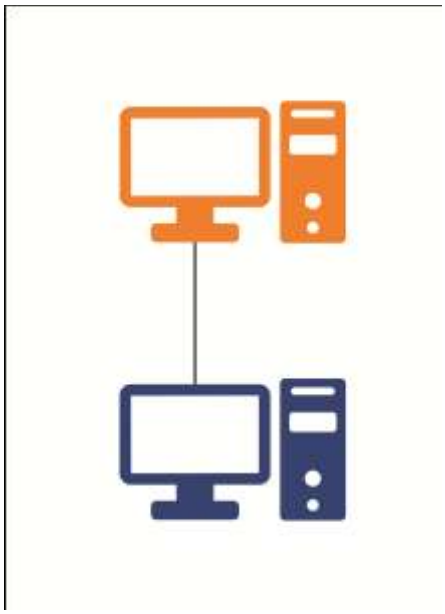

Fig 1.1 Computer in network

Computer network consist of the following:

- Two or multiple computers that can be a Server or a Client.
- A Network Interface Card (NIC).
- Connection medium that can either have wires or no wires.
- Network Operating system like MS Windows, NT or MS 2000, Novell NetWare, UNIX and Linux.

Internet is a setup of computers across the globe. Every computer that is connected to the internet is considered as a part of that network. Fig 1.2 shows the arrangement of computers in a network.

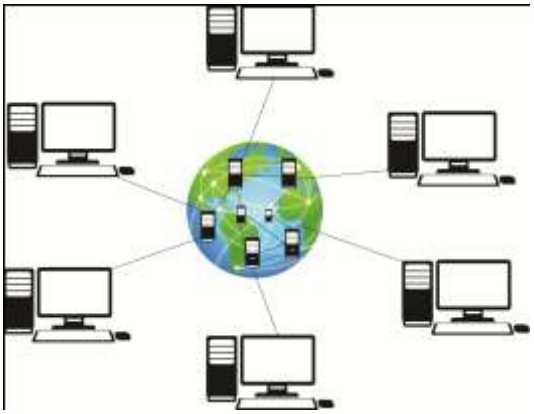

Fig 1.2 Computers connected by Internet

In order to share the information among people quickly and easily, we use the Internet. Internet is a collection of computers where many computers grouped together to share their information. In this case the information can be sent by the Sender and the Receiver receives that information. In this chapter we will study about Internet and it's working.

Advantages of Computer Network

- Resource sharing
- Remote login (Access to remote data base)
- E-Mailing (person-to person communication)
- Entertainment
- Internet services
- Video conferencing
- Exchange of messages
- Sharing information at Low Cost
- Storing Files in server allows data to be shared easily
- Fast and Quick backing up of Files
- Software and resources can be easily managed.
- Network software have fast installation

- Devices can be shared easily
- Accessing files from any workstation

Check your progress 1

1. What are the advantages of computer networks?
   a. Resource sharing
   b. Internet services
   c. File storage
   d. All of these

1.3 Computer networks and the Internet

On internet you'll be able to do chatting and exchange of information with many services offered by it. As internet is collection of computers where several computers grouped together share their data, the results of such sharing will led to spread of virus on host computer, that the user download any infectious attachment send by someone.

Network is usually the connection between the Sender and also the Receiver

The figure 1.3 shows two people sitting in a network.

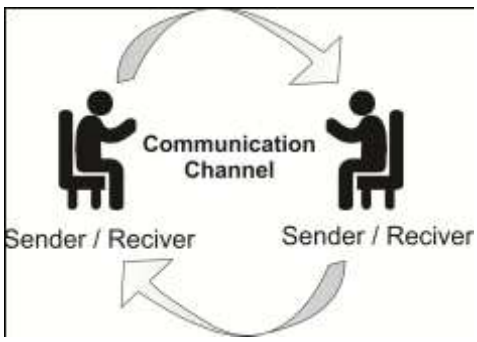

Fig 1.3 Networks

The general network comprises of:

- Sender
- Communication Channel Medium
- Receiver

A computer network is an interconnection of two or more computer systems located at the same or different places. It is a network that can connect two computers as shown in fig 1.4.

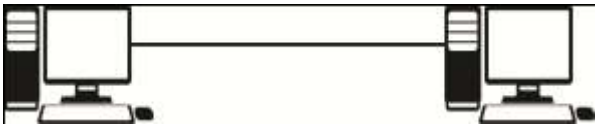

Fig 1.4 Computers in network

A computer network is a collection of two or more connected computers. When these computers are joined in a network, people can share files and also share the peripheral devices such as modems, printers, tape backup drives, or CD-ROM drives as shown in figure 1.5.

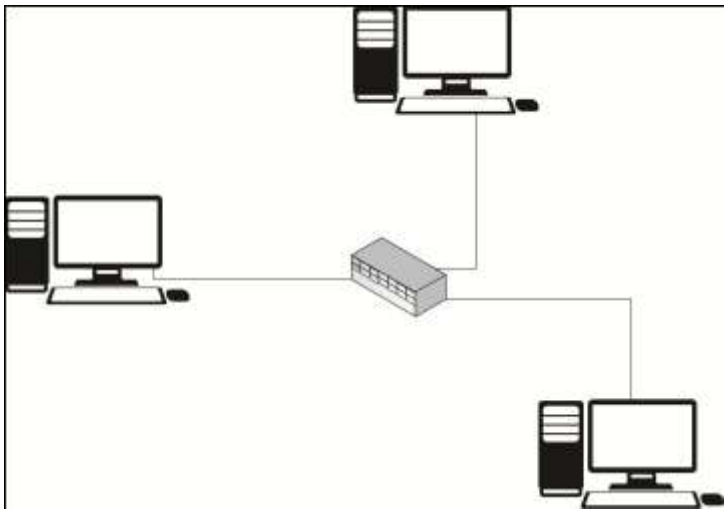

Fig 1.5 Network of computers

Computer network consist of:

- Two or more computers Server or Client workstation.
- Networking Interface Card's (NIC)
- A connection medium i.e. wires or wireless.
- Network Operating system software, such as Microsoft Windows NT or 2000, Novell NetWare, UNIX and Linux.

Check your progress 2

1. Internet is:

a. Network of Computers

b. Connecting Single Computer in network

c. Connecting different Computers in network

b. All of these

1.4 WAN, LAN and PAN

Networking is a connection between two or more computers. The purpose of network is to share the information among different users. If more than two computers are to be connected in a network, this requires a HUB or a PORT as shown in fig 1.6.

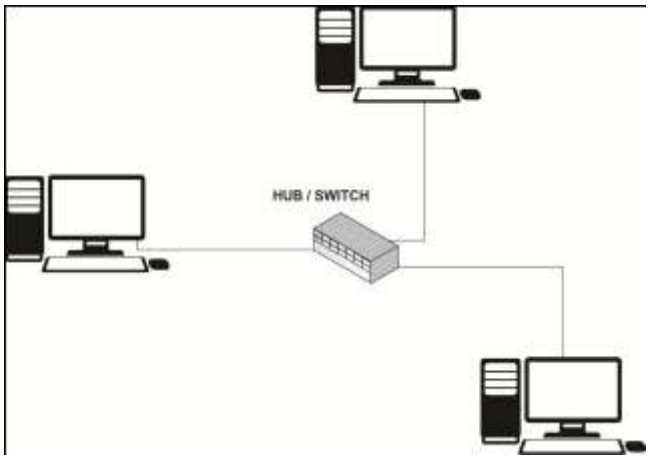

Fig 1.6 Network with HUB

Some of the common networks are:

LAN - Local Area Network

WLAN - Wireless Local Area Network

WAN - Wide Area Network

MAN - Metropolitan Area Network

SAN - Storage Area Network, System Area Network, Server Area Network, or sometimes Small Area Network

CAN - Campus Area Network, Controller Area Network, or sometimes Cluster Area Network

PAN - Personal Area Network

DAN - Desk Area Network

LAN and WAN are the original categories of area networks. The other networks have actually emerged over many years out of technology evolution.

LAN

It is a typical network which is named as local area network or LAN. This network consists of group of computers along with its connecting devices that has a common communications channel. In this there will be only one main computer with which the rest of the computers are connected and they also shared a common processor speed as shown in fig 1.7.

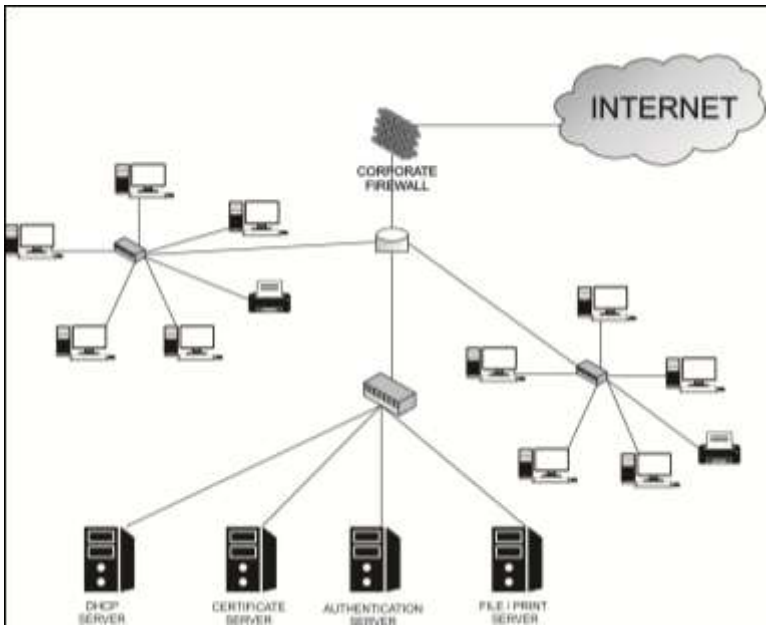

Fig 1.7 LAN Network

It is normally installed and available in an office building, school and university. In LAN Network, the server contains an applications and data storage that are commonly shared by many computer users. Such network serves as few as two or three users up to many thousands of users. A LAN server may also be used as a web server provided it is safely handled and precautions are carried to safe its internal applications and data from outside access.

WAN

WAN is a network that connects users across larger distance. It is mainly used to connect across cities, states, or countries. The figure 1.8 shows the arrangement of WAN across the globe.

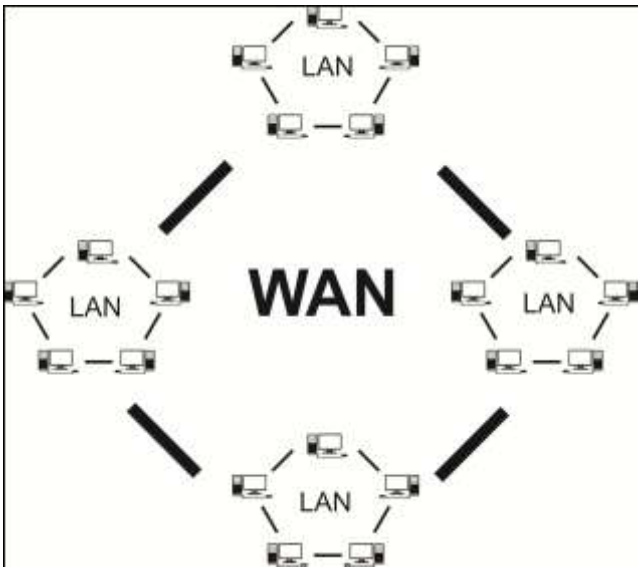

Fig 1.8 Computer in WAN

WANs normally uses public telephone network & satellite links for data transmission. Data transmission rates are below 1 Mbps for WAN. It is normally owned by multiple organizations. The transmission time is more for WAN because of longer distances & different transmission medium used.

Different Types of Area Networks:

Apart from LAN and WAN, there are many other computer networks such as:

MAN or Metropolitan Area Network: It is a network that uses much larger area as compared to LAN but smaller than WAN. It is a computer network that is owned and operated by an individual.

CAN or Campus Area Network: It is a network which spreads in area which covers multiple LANs and covers lesser area as compared to MAN.

SAN or Storage Area Network: It is a network that uses fibre optics channel for communication and connects servers to data storage devices through such technology.

SAN or System Area Network: It is another type of network that links with high performance computers having high speed connections in a zigzag configuration. It is also known as Cluster Area Network.

Check your progress 3

1. Which network is used to connect people globally?

   a. Local Area Network

   b. Wide Area Network.

   c. Metropolitan Area Network.

   d. None of above.

1.5 Topologies

Another way to classify computer networks is based on the underlying topology used for constructing the networks. Topology is defined as the geometrical arrangement of nodes. Nodes are the various computer resources and communication devices.

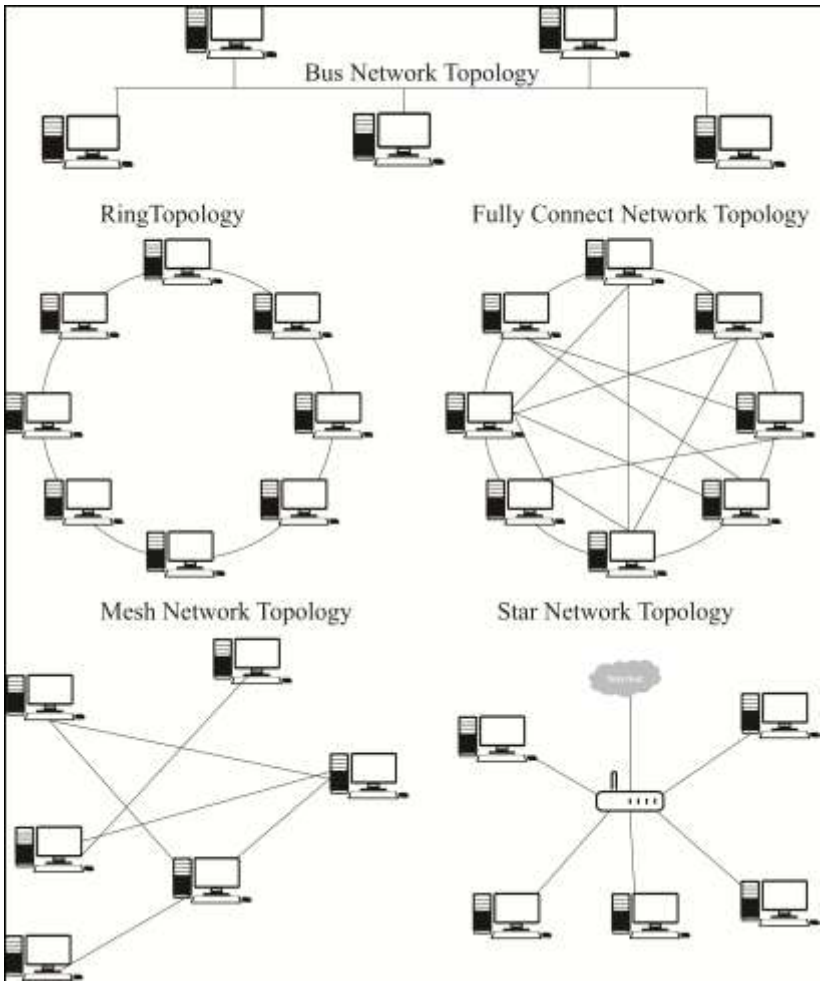

Fig 1.9 Network Topology

Different Types of Topologies

Following are the different classes of network based on the topological structure.

- Bus Network
- Star Network
- Ring Network
- Mesh Network
- Tree Network

Bus Network: in a bus network, all nodes are connected to one line known as bus. it is conjointly referred as a time-shared bus. The bus permits just one pair of nodes to establish communication at a time. This property restricts the total number of nodes connected to form a reliable bus network. However, several protocols were developed for a bus to form communication more efficient and reliable. CSMA/CD and Token bus protocols ar sensible examples. The structure of a bus network is shown in Figure 1.10.

Advantage of a bus network is its ability to connect any number of nodes without extensive hardware. Nodes can also be removed from the bus simply. It's straightforward to maintain the bus network.

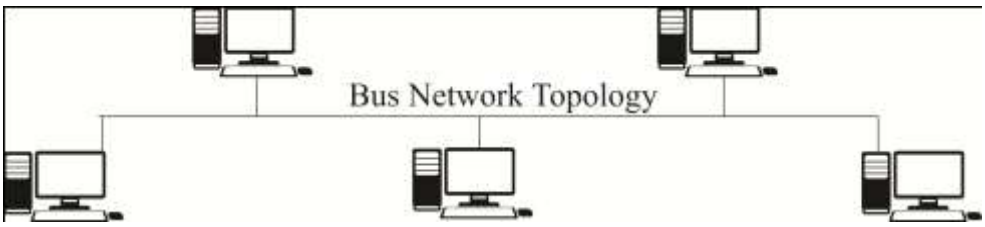

Fig. 1.10 Bus network

Star Network: In a star network, each node is connected by means of a dedicated point-to-point(P2P) channel to a central node called server that will act as a switch. The central server will provide the connectivity for all pair of nodes willing to communicate with each other. But, if the central server fails, the whole network will also fail. The transmission media may be a twisted pair, coaxial cable or optical fibre. Structure of a star network is shown in Figure 1.11.

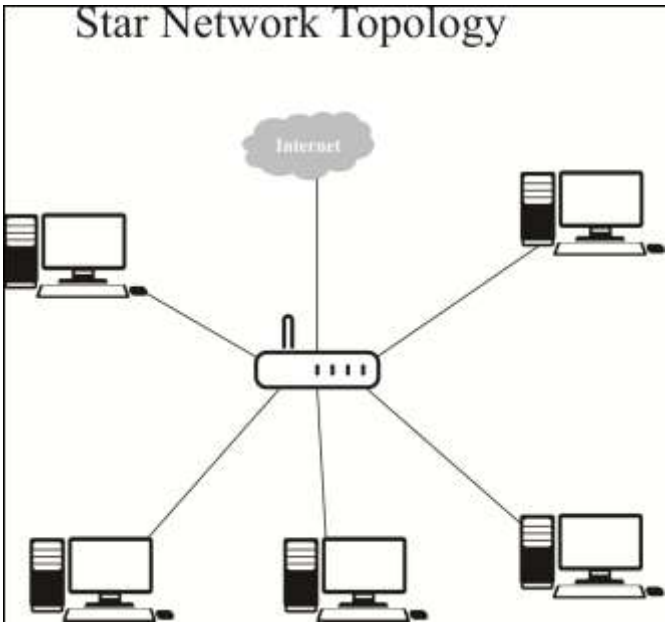

Fig. 1.11 Star network

Some of the advantages of star network are:

- Easy implementation
- Centralized control
- Simple access protocols

The main disadvantage of star network is that they suffer from the problem of central node failure. They also require long cable length; each new device requires an exclusive cable. Campus PBXs are often implemented using star network topology.

Ring Network: Nodes in a ring network are connected in the type of a closed loop. One communication channel is commonly implemented to provide the connectivity. Data from the sending node circulates round the ring till it reaches the destination. a ring will be unidirectional or bi-directional. In a unidirectional ring, data moves in one direction solely. In a bi-directional ring, data can move in both directions, but moves in one direction at a time. Single node failure may paralyse the transmission of information to a set of nodes in a unidirectional ring. but messages will be sent to nodes in either side of the affected node. .

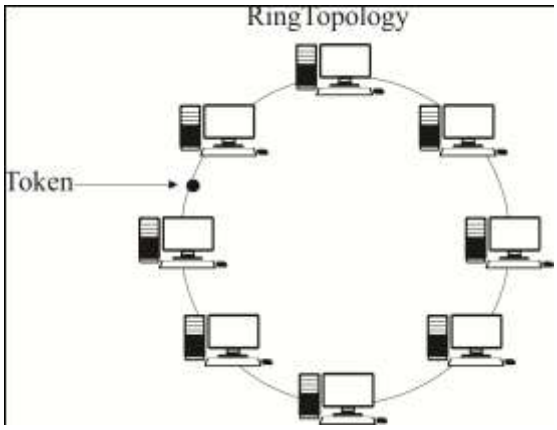

Fig. 1.12 Ring network

Ring network with a method called token passing (Token Ring) was proposed by IBM and approved by IEEE as one of the standards for LAN. Advantages of a ring network are its short cable length, suitability for optical fibre implementation and its flexibility to include new nodes which is also called as Network expansion. Disadvantages of ring networks include the failure of entire network in the presence of a single node failure, difficulty in diagnosing faults and its non-adaptability to structural changes.

Mesh Network: In a mesh network, each pair of nodes is connected by means of an exclusive point-to-point link. Each node requires a separate interface to connect with the other device. Mesh networks are seldom constructed in practice. They are useful in situations, where one node or station needs to frequently send messages to all other nodes. Otherwise, a considerable amount of network bandwidth got wasted. The advantages of mesh network are excessive amount of bandwidth and inherent fault-tolerance. The structure of a mesh network is shown in Figure 1.13.

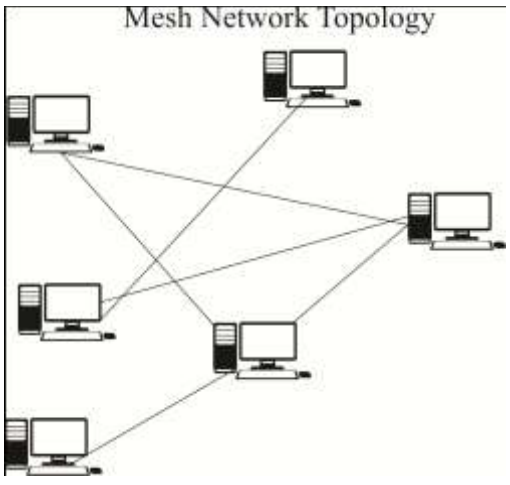

Fig. 1.13 Mesh network

Tree Network: A tree network is another form of bus network. Several nodes are connected into a hierarchical form as shown in diagram

The root node may be a powerful server or a mainframe computer often called a head-end. Tree networks are suitable for organizations, where head offices need to communicate with regional offices and regional offices needs to communicate with remote offices. Advantages of a tree network are its ease of expansion, identification and isolation of faulty nodes whereas its disadvantage is that, it also suffers from the problem of the network being highly dependent on the root node.

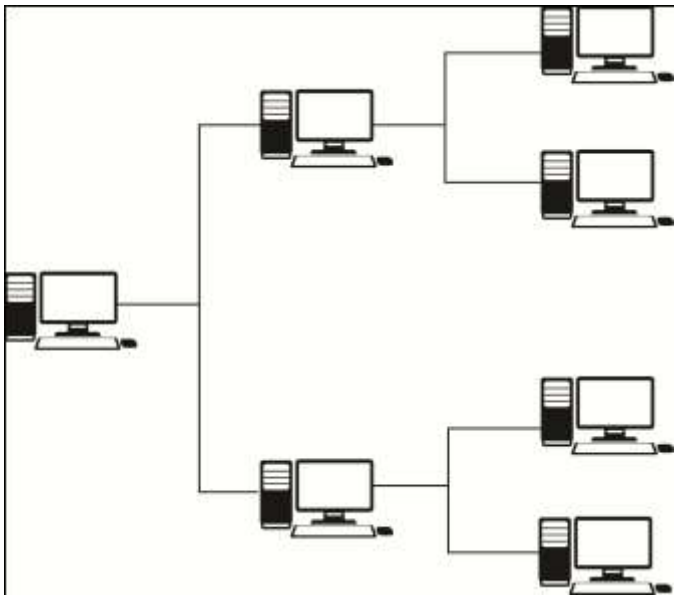

Fig. 1.14 Tree network

Check your progress 4

1. Which is not a network topology?

   a. Bus topology

   b. Star topology

   c. Brush topology

   d. Ring topology

1.6 Connecting Media: Wired and Wireless and their characteristics

Nowadays, internet users wish to enjoy accessing the internet even when they are away from their home and office place. Wireless modem is a modem that sends or receives network signals without the use of cable connections. It can access the internet without using any wired connectors or cable. Because of being wireless, it is much faster, reliable and is less expensive.

Today, many companies are into manufacturing wireless modems. These are designed as per the user requirements and are not expensive. Some of the famous and common wirelesses modems which are available include connect cards, USB sticks, Wi-Fi devices and wireless routers.

Connect Cards

It is the starting series of wireless modems which first appeared in two versions:

- PC data cards
- Connect cards

Such wireless modems are very small and compact. They are used to provide internet facility in laptops, personal computers or routers.

USB Sticks

It is a type of stick that is connected with the wireless modem and gives good internet speed in desktops and laptops. The size of USB stick is same as the size of a pen drive. The stick fits correctly into the USB port available in either the desktop or laptop. These sticks are not plug_and_play because it requires certain installation drivers in order to work. Such type of USB sticks are very easy to carry and can work anywhere.

Mobile Hotspots

Wireless modems serve as a portable internet hotspots. Internet products such as Novatel's Mi-Fi routers get a wireless broadband network and move the signal to a particular range in the same way as Wi-Fi hotspots. It will make the respective devices with Wi-Fi features along with wireless broadband network that can be of much use to the user who use Computers, Smartphone and tablets while moving here and there.

Wireless Routers

These are routers which are especially designed for home users as there is no need of a transmission cable. This router works without the internet cable and can receive or send the signal faster than a normal router.

Check your progress 5

1. Wireless modem requires _____.

   a. Cable

   b. A Sockets

   c. Some Wires

   d. No Wires

1.7 Introduction to NIDs and their specifications

NIDs are an efficient method of providing operational and capital savings to service providers. A NID is installed at the customer premise and provides a demarcation point between the service provider and customer's network. Network Interface Devices allow end-to-end Operations, Administration and Maintenance (OAM) functionality for the service provider.

While the operational savings of NIDs are often shown with their features and capabilities for remote troubleshooting, easy installation and service Level Agreement (SLA) monitoring to reduce SLA penalties, it's necessary for service providers to be aware of the additional revenue streams and services that can be achieved once employing a NID at the demarcation purpose.

An NID may also be known as a network interface unit (NIU),telephone network interface (TNI), system network interface (SNI), or telephone network box

Check your progress 6

1. What do you understand by the term NID?

   a. Network Interface Design

   b. Network Identification Design

   c. Node Interface Design

   d. None of these

1.8 Let Us Sum Up

In this unit we have learnt that networking involves arrangement of 2 or more computers that are connected across the world with the help of web and networking. It is studied that a workstation model is a basic arrangement where system comprises of workstations which are high end personal computers spread across the building or campus and are joined or connected through high speed LAN

It is found that a computer network is a group of interconnected computers which may be classified as per wide variety of characteristics. It is noted that a personal area network (PAN) is a computer network used for communication among computer devices close to one person.

The Metropolitan Area Network 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. It is noted that CAN network may be considered as MAN network which in general is limited to smaller area as compared to typical MAN.

1.9 Answers for Check Your Progress

Check your progress 1

Answers: (1–d)

Check your progress 2

Answers: (1-d)

Check your progress 3

Answers: (1–b)

Check your progress 4

Answers: (1-c)

Check your progress 5

Answers: (1-d)

Check your progress 6

Answers: (1–a)

1.10 Glossary

1. **Network -** It is a relationship between the Sender and the Receiver.
2. **Computer network -** It is an interconnection of two or more computer systems located at either same or different places.
3. **Networking -** It is a connection between two or more computers.
4. **Wireless Modem -** It is a modem that sends or receives network signals without the use of cable connections.

1.11 Assignment

Define LAN and WAN.

1.12 Activities

Can a Wireless modem be taken anywhere to connect to the internet? Study and comment

1.13 Case Study

Study the network topology of your college.

1.14 Further Readings

1. Basic of Internet by Er. Nishit Mathur

2. Internet and the World by Ahmed Ansari

UNIT 2: NETWORK INTERFACE DEVICES

Unit Structure

2.0 Learning Objectives

After learning this unit, you will be able to understand:

- About Network Adaptor Cards
- About Hubs and Switches
- About Routers

2.1 Introduction

Networks are built by adding a network interface card (NIC) or other network adapter to computer and then connecting that adapter to the medium--a wire or radio frequency--over which the data flows. Depending on network

topology, there may also be a central hub or router to which each of the computers connects. If the hub also routes data between the local network and another network, it is then called a router.

2.2 Network Adaptor Cards (both wired and wireless)

In order to connect to a network, a computer must be equipped with a device called a network card. A network card, or a network adapter, also called a network interface card, or NIC, permits a computer to attach to the exterior. If you buy a computer from one of those popular stores or big companies on the web, most of their computers have a network card tested and ready. If you go to a store that sells or manufactures computers, you will ask them to install or make sure that the computer has a network card.

Types of Network Adapters

A network adapter is a unit of computer hardware. Several types of hardware adapters exist:

- Many new computers contain integrated (built in) wireless network adapter chips
- A USB network adapter plus into a standard USB port to enable computer network connections (typically Wi-Fi or Ethernet)
- A wireless game adapter (sometimes called a "media adapter") connects to an Xbox or Play station game console or other home entertainment product, providing a bridge to Wi-Fi wireless capability.
- On older PCs,a PCI adapter (often called a NIC) was a type of add-in card installed inside a desktop personal computer. A variant PCI adapter called "PC Card" (also known as PCMCIA cards) inserted into the side of a notebook computer to provide similar capability.

Wired Network Cards: External

We have mentioned that a network card could also be used or installed externally. This can be done using USB. Before using it, you can purchase it from a computer store or a web store as shown in fig 2.1.

Fig 2.1 USB drive

Wireless Network Cards

Depending on your network or budget of customers, instead of using wired network cards, you can use wireless ones. Most laptops already have a built-in wireless card so you may not have to acquire one. Many new desktop computers now have built-in wireless capability as shown in fig 2.2.

Fig 2.2 Wireless Network Card

Overall, the physical installation of a wireless network card follows similar rules as that of a wired NIC. They usually come with simple to follow instructions but it may be a good idea to install the wireless network adapters once installing the wireless router. Also, it may be a good plan to purchase the network cards and the wireless router from the same manufacturer.

Most desktop computers come without a wireless network card. If you buy a computer from a store and if you wish to use wireless networking, you'll buy a wireless network card separately. As stated already, a wireless network card isn't particularly tough to install.

Besides the wireless network cards that can be installed within the computer, you'll use external cards. These are installed using a USB port known as USB adapter as shown in fig 2.3.

Fig 2.3 USB Adapter

These adapters, like most USB objects, are easy to connect and use. Like any other hardware parts, when you connect these, the computer detects them and helps you to get them ready for use.

Unlike desktop computers, nowadays mostly laptops come equipped with a wireless network card. This means that, after purchasing or acquiring a laptop, you should simply check whether it has a wireless adapter. Therefore, check its documentation properly.

Check your progress 1

1. Network cards can be _____.
   a. Wired
   b. Wireless
   c. Both of these
   d. None of these

2.3 Hubs

A hub is a rectangular box that is used as the central object on which the computers and other devices are connected. To make this possible, a hub is equipped with small holes called as ports. Fig 2.4 shows such type of hub:

Fig 2.4 Hub

It comes with 4 ports, depending on its type and is equipped with 4, 5, 12, or more ports. Fig 2.5 shows hub with 8 ports:

Fig 2.5 8 Bit Hub

When configuring 8 bit hub, you need to attach an RJ-45 cable from the network card of a computer to one port of the hub. In most cases for a home-based or a small business network, you will not need (or should not use) a hub.

Hubs are the simplest way to connect 2 or more computers, servers and peripherals to form a simple network. A hub receives signals from each machine though wired connections, and then broadcasts them to all the other connected machines. So if computer A sends out a signal, Computers B, C and D can all receive it, even though the signal was meant only for computer D.

Hubs are of 2 types:

- Active Hub: they are smarter than the passive hubs. They not only provide the path for the data signals in fact they regenerate, concentrate and strengthen the signals before sending them to their destinations. Active hubs also are termed as ‘repeaters’.
- Passive Hub: they're more like point contact for the wires to inbuilt the physical network. They have nothing to do with modifying the signals.

Check your progress 2

1. Which is known as repeaters?
   a. Active Hub
   b. Passive Hub
   c. Both of these
   d. None of these

2.4 Switches

A switch is a network device that selects a path or circuit for sending a unit of data to its next destination. A switch may additionally include the function of the router, a device or program that can determine the route and specifically what adjacent network point the data should be sent to. In general, a switch could be a simpler and quicker mechanism than a router, which needs knowledge about the network and the way to work out the route.

A switch is effectively a higher-performance alternative to a hub. People tend to benefit from a switch over a hub if their home network has four or a lot of computers, or if they want to use their home network for applications that generate significant amounts of network traffic, like multiplayer games or heavy music file sharing. Technically speaking, hubs operate using a broadcast model and switches operate using a virtual circuit model.

Switches are capable of determining the destination of each individual traffic element (such as an LAN frame) and selectively forwarding data to the one computer that actually needs it. By generating less network traffic in delivering messages, a switch performs higher than a hub on busy networks.

When a signal enters a port of the switch, the switch looks at the destination address of the frame and internally establishes a logical connection with the port connected to the destination node. Other ports on the switch have no part within the connection. The result's that each port on the switch corresponds to an individual collision domain, and network congestion is avoided. Thus, if a 10-Mbps Ethernet switch has 10 ports, every port effectively gets the complete bandwidth of 10 Mbps-to the frame, the switch's port seems to provide a dedicated connection to the destination node. {Ethernet|local area network|LAN} switches

are capable of building multiple internal logical connections at the same time, while routers usually process packets on a first-come, first-served.

There are 2 main types of switches. Layer-2 switches operate at the data-link layer of the OSI model and are based on bridging technologies. They establish logical connections between ports based on mac addresses. Use layer-2 switches for segmenting your existing network into smaller collision domains to improve performance. Layer-3 switches operate at the layer 3 of the OSI model and are based on routing technologies. They establish logical connections between ports based on network addresses. Use these for connecting different networks into an internetwork. Layer-3 switches are typically known as routing switches or multilayer switches.

Check your progress 3

1. Which of the following operates at data link layer of the OSI model?
   a. Layer-3 switch
   b. Layer-2 switch
   c. Hub
   d. None of these

2.5 Routers

Routers are network layer devices and are notably known as Layer- 3 devices of the OSI Model. They process logical addressing information within the Network header of a packet like ip Addresses. Router is used to form larger complex networks by complex traffic routing. It's the ability to connect dissimilar LANs on the same protocol. It additionally has the ability to limit the flow of broadcasts. A router primarily comprises of a hardware device or a system of the computer that has more than one network interface and routing software.

Fig 2.6 Router

When a router receives the data, it determines the destination address by reading the header of the packet. Once the address is determined, it searches in its routing table to get know how to reach the destination so forwards the packet to the higher hop on the route. The hop may be the final destination or another router.

Routing tables play a very pivotal role in letting the router makes a decision. So a routing table has to be compelled to be updated and complete. The 2 ways through which a router will receive information are:

- Static Routing: In static routing, the routing information is fed into the routing tables manually. It doesn't solely become a time-taking task but gets prone to errors as well. The manual change is additionally needed just in case of statically configured routers when change within the topology of the network or within the layout takes place. So static routing is feasible for tinniest environments with minimum of one or two routers.
- Dynamic Routing: For larger environment dynamic routing proves to be the practical solution. The process involves use of peculiar routing protocols to hold communication. The purpose of these protocols is to enable the routers to transfer information about to other routers, so the other routers can build their own routing tables.

Check your progress 4

1. Which of the following is true about routers?
   a. Routers operates on network layer
   b. Routing table is maintained b 2 ways
   c. Routers have the ability to limit the flow of broadcasts.
   d. All of these

2.6 Access Points (Wireless)

In a wireless local area network, an access point may be a station that transmits and receives data. An access point connects users to different users among the network and can also serve as the point of interconnection between the WLAN and a fixed wire network. Every access point can serve multiple users within a defined network area; as people move beyond the range of 1 access point, they're automatically handed over to the next one. A small WLAN might solely need a single access point; the number required will increase as a function of the number of network users and therefore the physical size of the network.

A wireless access point is largely a hub with no wires that uses radio signals to try to its talking. Each one will handle some number of clients, usually about 30, very similar to a hub. They come available} in lots of sizes and shapes and have many different feature sets: those you'd use at home are completely unsuited to be used in a campus environment (and vice versa).

Fig 2.7 Wireless Access Point

Wireless access points (APs or WAPs) are the special-purpose communication devices on wireless local area networks (WLANs). Access points act as a central transmitter and receiver of wireless radio signals. Mainstream wireless APs support Wi-Fi and are most commonly used to support public Internet hotspots and other business networks where larger buildings and spaces need wireless coverage.

Check your progress 5

1. What are WAPs?

   a. Software used for routing.

   b. Layers used in communication

   c. Communication device on WLAN

   d. None of these

2.7 Repeaters

Repeaters are network device used to regenerate or replicate a signal. Repeaters are employed in transmission systems to regenerate analog or digital signals distorted by transmission loss. Analog repeaters frequently will solely amplify the signal while digital repeaters will reconstruct a signal to near its original quality.

In a data network, a repeater will relay messages between sub networks that use different protocols or cable types. Hubs will operate as repeaters by relaying messages to all connected computers. A repeater cannot do the intelligent routing performed by bridges and routers.

In a wireless communications system, a repeater consists of a radio receiver, an amplifier, a transmitter, an isolator, and 2 antennas. The transmitter produces a signal on a frequency that differs from the received signal. This so-called frequency offset is critical to prevent the strong transmitted signal from disabling the receiver. The isolator provides additional protection in this respect. A repeater, once strategically located on top of a high building or a mountain, will greatly enhance the performance of a wireless network by permitting communications over distances much greater than would be possible without it.

Check your progress 6

1. Repeater comprises of _____?

   a. Amplifier

   b. Transmitter

   c. Isolator

   d. All of these

2.8 Let Us Sum Up

In this unit we have learnt that networks are built by adding network interface card to the computer and connecting adapter to the medium which can be wire or radio frequency over which the data flows. A network card allows a computer to attach to exterior. If you buy a computer from one of those popular stores or big companies on the web, most of their computers have a network card tested and ready.

Unlike desktop computers, mostly laptops are equipped with wireless network card. A hub is a rectangular box that is used as central object on which the computers and other devices are connected. A switch is a network device that selects a path or circuit for sending a unit of data to its next destination and include the function of router, a device or program that can determine the route and specifically what adjacent network point the data should be sent to.

Routers are network layer devices and are notably known as Layer- 3 devices of the OSI Model which process logical addressing information in Network header of a packet like IP Addresses. Repeaters are network device used to regenerate or replicate signals which are used in transmission systems to regenerate analog or digital signals distorted by transmission loss.

2.9 Answers for Check Your Progress

Check your progress 1

Answers: (1 –c)

Check your progress 2

Answers: (1 -a)

Check your progress 3

Answers: (1 –b)

Check your progress 4

Answers: (1 -d)

Check your progress 5

Answers: (1 –c)

Check your progress 6

Answers: (1 –d)

2.10 Glossary

1. **Network -** It is an arrangement of network interface card or network adapter to computer.
2. **Network card -** It is a type of adapter which allow computer to attach externally.
3. **Hub -** Rectangular box on which computers and other devices are connected and carry many ports.
4. **Switch -** A network device which sends unit of data to next destination and has the function of router.
5. **Router -** A network layer devices which process logical addressing information in Network header of packet.

2.11 Assignment

Explain the purpose of Wireless Routers?

2.12 Activities

Explain the features of Network Switch?

2.13 Case Study

Compile the information about the type of network used in University.

2.14 Further Readings

1. Basic of Internet by Er. Nishit Mathur
2. Internet and the World by Ahmed Ansari

Block Summary

In this block, you will understand about Networking and knowledge on various types of networks. The block gives an idea on architecture and distribution of various network topologies with study about various topology features. The examples related to concept of network card, network adapter and network interface card are also discussed.

In this block, you will understand about the basic of working of switches and routers with their networking features. The concept related to wireless local area network and different OSI layers are also detailed. You will be demonstrated practically about the working of wireless modem.

Block Assignment

Short Answer Questions

1. If some packets arrive at router A and didn't find its destination in the router table, what will be action of router?
2. What is the name of the technology that is used to connect devices without physical connection?
3. What is a network?
4. If one switch is server and other switches attached are client, will the server switch vlans will propagate to client switches?

Long Answer Questions

1. Switch A have 45 vlans and revision number 10 and switch B have 19 vlans and revision number 109, which switch vlan will propagate to which switch?
2. If Switch A is in server mode and switch B is in transparent mode, will the switch B will update its vlan database when switch A changes its own?
3. Describe Routimg and ways to maintain routing table?

Enrolment No. ☐

1. How many hours did you need for studying the units?

Unit No	**1**	**2**	**3**	**4**
Nos of Hrs				

2. Please give your reactions to the following items based on your reading of the block:

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____ _____
Language and Style	☐	☐	☐	☐	_____ _____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____ _____
Conceptual Clarity	☐	☐	☐	☐	_____ _____
Check your progress Quest	☐	☐	☐	☐	_____ _____
Feed back to CYP Question	☐	☐	☐	☐	_____ _____

3. Any Other Comments

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Education is something which ought to be brought within the reach of every one.

- Dr. B. R. Ambedkar

Dr. Babasaheb Ambedkar Open University
Jyotirmay' Parisar, Opp. Shri Balaji Temple, Sarkhej-Gandhinagar Highway, Chharodi,
Ahmedabad-382 481.

Fundamentals of Computer Networking (FCN)

PGDCA 201

BLOCK 2:
CREATING WIRED AND WI-FI LAN

Dr. Babasaheb Ambedkar Open University
Ahmedabad

Fundamentals of Computer Networking (FCN)

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ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self-instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual-skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self-instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)

PREFACE

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included may tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

FUNDAMENTALS OF COMPUTER NETWORKING

(FCN)

Contents

BLOCK 3: ADSL BROADBAND INTERNET AND WI-FI USB DONGLES

UNIT 1 ADSL BROADBAND INTERNET

Introduction to ADSL broadband technology, motivation for ADSL Broadband, PSTN Basics, ADSL Modem basic architecture, working, standards, ADSL Wi-Fi Modem and Router, configuring a wired ADSL Modem for Internet Access, configuring a Wi-FI ADSL modem/Router for Internet Access

UNIT 2 WI-FI USB DONGLES

Motivation and Need for Wi-FI Dongles, basic architecture and working, connecting and configuring a Wi-Fi Dongle with a PC.

BLOCK 4: INTERNET ACCESSING AND APPLICATION

UNIT 1 TETHERING FOR INTERNET ACCESS

Need and Motivation for Tethering, Tethering with Wi-Fi, Tethering with Bluetooth, Tethering with USB Cable, Reverse Tethering

UNIT 2 INTERNET/LAN APPLICATIONS

Popular Browsers like Internet Explorer and Chrome, their configuration and settings, FileZilla File Transfer software, Team Viewer, Remote Desktop, Telnet, Microsoft Outlook Express.

Dr. Babasaheb
Ambedkar
Open University

PGDCA 201

Fundamentals of Computer Networking (FCN)

BLOCK 2: CREATING WIRED AND WI-FI LAN

BLOCK 2: CREATING WIRED AND WI-FI LAN

Block Introduction

The Ethernet cables are number sequence categories which support various specifications which are updated with certain testing standards. There are many types of cables which are used for various purposes. Category 5 cables was revised, and mostly replaced with, category 5 enhanced (Cat-5e) cables which did not change anything physically within the cable, but instead applied more demanding testing standards for crosstalk.

In this block, we will detail about the basic of RJ connector and its working techniques. The block will focus on architecture and distribution of cross-over cable applied to connect router to computer or ethernet switch along with their characteristics. The concept of Wi-Fi networks with infrastructure mode and working characteristics are also explained.

In this block, you will make to learn and understand about the basic of ad-hoc network and its techniques. The concept related to Wi-Fi networks and its working features are explained that will help you in learning more about networks. You will be demonstrated practically about various types of USB connectors.

Block Objective

After learning this block, you will be able to understand:

- The basic of UTP CAT cables.
- Features of RJ-45 connectors.
- Idea about crimping of UTP cable with RJ-45 connector.
- Features of server machine.
- Characteristics of Windows 8.1 Server Installation and Configuration.
- Features about Wi-Fi Technology.
- Characteristics about Wi-Fi capability to PC.
- Configuration of AP and client Machines.

Block Structure

Unit 1: Creating a Switched Wired Ethernet LAN

Unit 2: Creating a Wi-Fi LAN

UNIT 1: CREATING A SWITCHED WIRED ETHERNET LAN

Unit Structure

1.0 Learning Objectives

After learning this unit, you will be able to understand:

- About UTP CAT series cables
- About crimping UTP cable
- About server machine

- About Windows 8.1 Server

1.1 Introduction to UTP CAT series cables

Ethernet cables are grouped in sequence numbered categories supported different specifications; typically the category is updated with further clarification or testing standards. These categories are how we can simply know what type of cable we need for a particular application.

It is noticed that Category 5 cable was revised and upgraded with category 5 enhanced (Cat-5e) cables with similar physical look inside and outside the cable, with required testing standards.

Category 6 was revised with greater than before category 6 (Cat-6a) which shows testing for 500 MHz communication. It is noted that higher communication frequency will eliminate alien crosstalk (AXT) that allow for longer range upto 10 Gb/s.

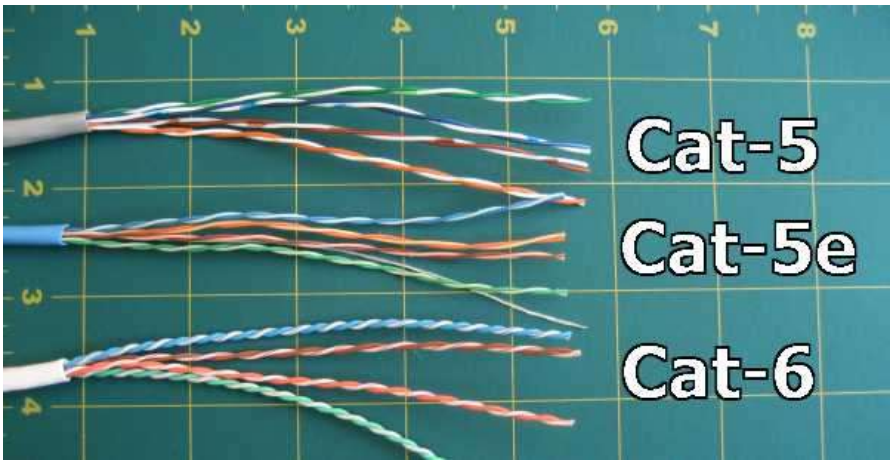

Fig 1.1 Types of CAT cable

It is found that certain Cat-6 cables will carry out nylon spline that will help to remove crosstalk. It is noted that mostly spline is not required in Cat-5 cable. In Cat-6 cable, spline is not required either the cable is long or short and as per standard. Fig 1.1 shows Cat-5e cable with spline.

Generally, Ethernet cables are twisted pair where manufactures uses shielding so as to safeguard from interference, while unshielded twisted pair also applied for cables among computer and wall which uses shielding cable for areas having high interference and running cables outdoors or inside walls.

Fig 1.2 UTP and STP Cable

There are different ways to shield an Ethernet cable, but typically it involves putting a shield around each pair of wire in the cable. This protects the pairs from crosstalk internally. It is found that manufactures protect the cables from foreign identities simply by screening UTP or STP cables.

1.2 RJ-45 connectors

RJ connector is registered jack (RJ) standardized physical network interface that connects telecommunications or data equipment. RJ45 could be a standard type of connector for network cables. RJ45 connectors are most commonly seen with Ethernet cables and networks. It's an eight pins to which the wire strands of a cable interface electrically. Standard RJ-45 pin outs define the arrangement of the individual wires needed when attaching connectors to a cable.

Several other kinds of connectors closely resemble RJ45 and might be easily confused for each other. The RJ-11 connectors used with telephone cables, for example, are only slightly smaller (narrower) than RJ-45 connectors.

Fig 1.3 RJ Connector

It is noted that connectors with required jacks are mostly modular connector which can be 50-pin miniature ribbon connector type. Such types are most common twisted pair connector types which is 8-position, 8-contact (8P8C) modular plug and jack called as RJ45 connector.

Check your progress 1

1. Which of the following connector is used with telephone cable?

   a. RJ45

   b. Ethernet

   c. RJ 11

   d. None of these

1.3 Color coding scheme

RJ-45 conductor data cable consists of 4 pairs of wires each consists of a solid colored wire and a strip of the same colour. There are two wiring standards for RJ-45 wiring:

- T-568A
- T-568B

There are 4 pairs of wires; 10BaseT/100BaseT Ethernet uses only 2 pairs:

- Orange
- Green

Apart from this, other two colors are:

- Blue
- Brown

This is used for second Ethernet line or for phone connections. The two wiring standards are used to create a cross-over cable:

- T-568A on one end
- T-568B on other end

Straight-through cable:

- T-568B
- T-568A

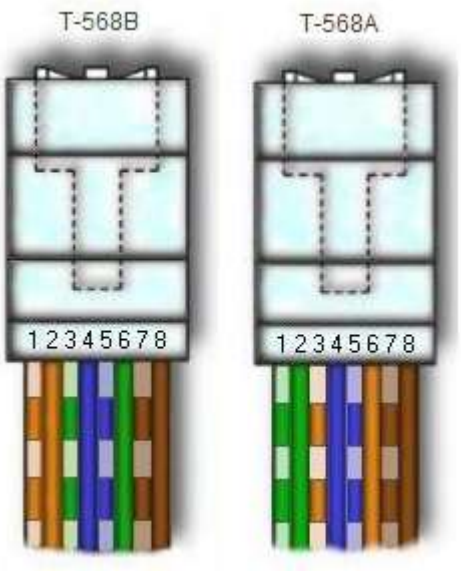

Fig 1.4 Cable T568B and T568A

The RJ45 data cable is used to connect computers to Ethernet switch by straight-through cables. The RJ45 cable uses only 2-pairs of wires:

- Orange (pins 1 & 2)
- Green (pins 3 & 6)
- Pins 4, 5 (Blue) and 7, 8 (Brown) are NOT used

Straight-through cable connects:

- pin 1 to pin 1
- pin 2 to pin 2
- pin 3 to pin 3
- pin 6 to pin 6

Cross-over cables are used to connect:

- TX+ to RX+
- TX- to RX-

That connects pin 1 to pin 3, pin 2 to pin 6, pin 3 to pin 1 and pin 6 to pin 2. The unused pins are generally connected straight-through in both straight-through and cross-over cables.

To network two computers without a hub, a cross-over cable is used. Cross-over cable is also used to connect a router to a computer, or Ethernet switch (hub) to another Ethernet switch without an uplink. Most Ethernet switches today provide an uplink port, which prevents a use of cross-over cable to daisy chain

another Ethernet switch. Straight-through cables are used to connect a computer to an Ethernet switch, or a router to an Ethernet switch.

It is noted that RJ45 cables carries 8 color coded wires, and the plugs have 8 pins and conductors. In this eight wires are used as 4 pairs, each representing positive and negative polarity.

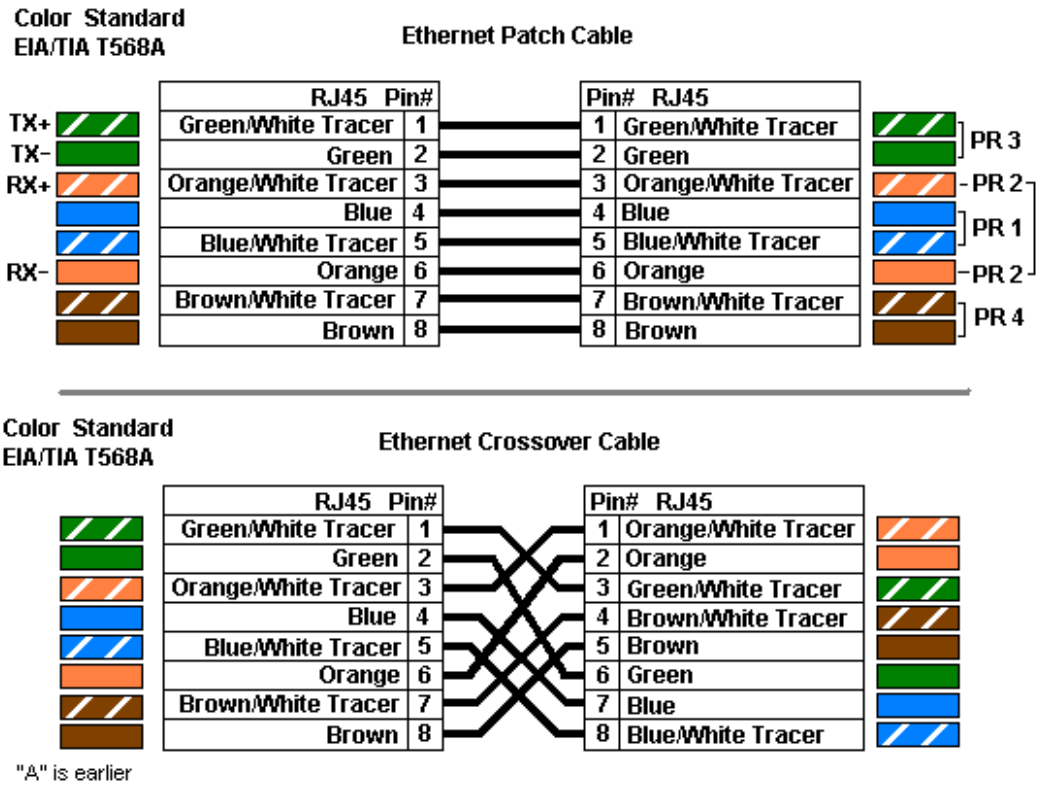

Fig 1.5 Colour Standard of T568A

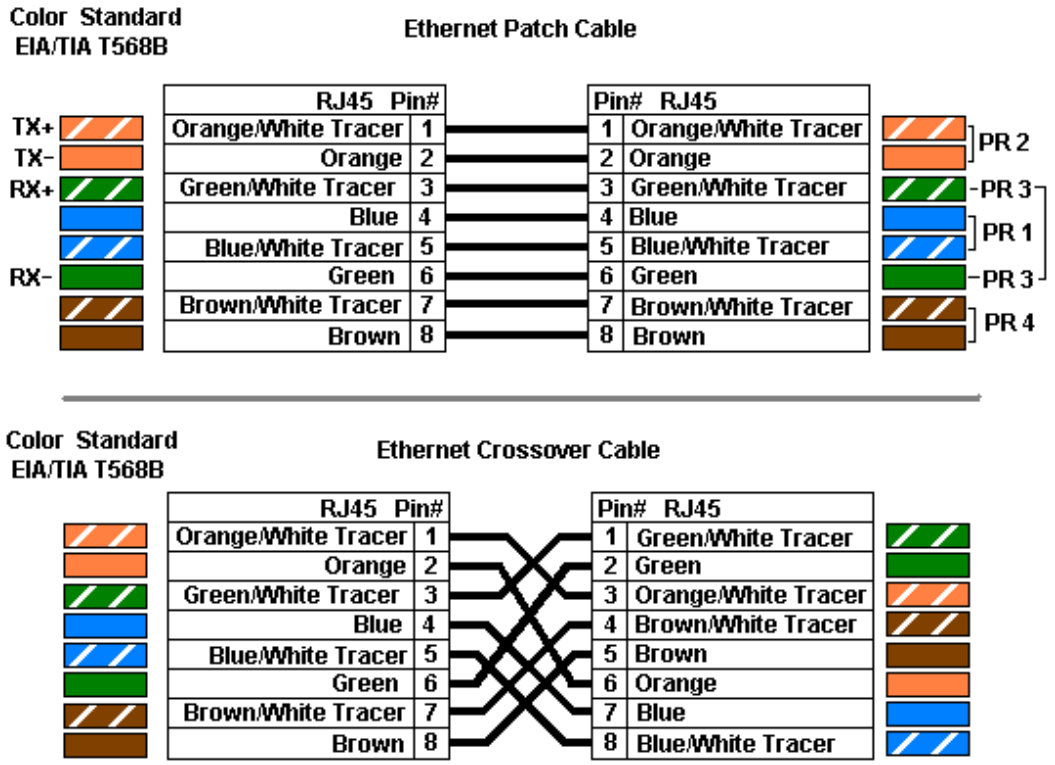

Fig 1.6 Colour Standard of T568B

The most commonly used wiring standard for 100baseT is T-586B standards. Prior to EIA 568A and 568B standards, the color-coded scheme was used to wire RJ45 cables. The table below shows pin and color schemes used in various setup.

Pin	Colored Scheme	T-568B (Common)	T-568A
1	Blue	Orange Stripe	Green Stripe
2	Orange	Orange	Green
3	Black	Green Stripe	Orange Stripe
4	Red	Blue	Blue
5	Green	Blue Stripe	Blue Stripe
6	Yellow	Green	Orange
7	Brown	Brown Stripe	Brown Stripe
8	White (or Grey)	Brown	Brown

Table 1.1 Pin and Colour Scheme of RJ45 Connector

Check your progress 2

1. RJ-45 conductor data cable consists of _____ of wires

   a. 4 pairs

   b. 2 pairs

   c. 3 pairs

   d. 6 pairs

1.4 Crimping a UTP cable to RJ-45 connector

A UTP cable is one of the most popular LAN cables which consist of 4 twisted pairs of metal wires. Adding RJ45 connectors at both the ends of the UTP cable will allow the cable to work in LAN network system. There are some steps that to be followed to crimp UTP cable into RJ 45 connector:

Step 1: Initially cut the plastic sheath about 1 inch from end of cut cable with the use of razor blade located in crimping tool.

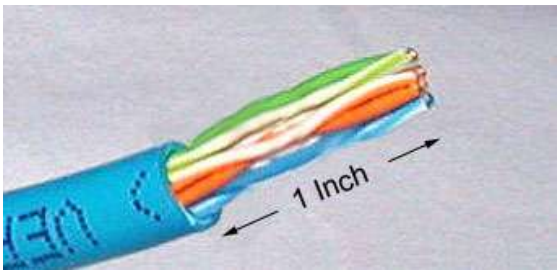

Fig 1.7 Cutting of Cable sheath

Step 2: Now unwind and pair the similar colors as shown in fig.

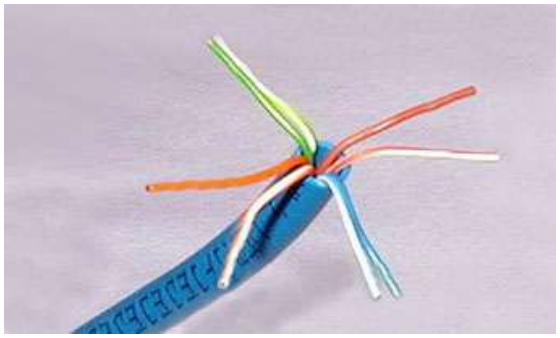

Fig 1.8 Unwind the coloured wires

Step 3: Keep the wires in between the fingers and make the wires straight with required colour orders.

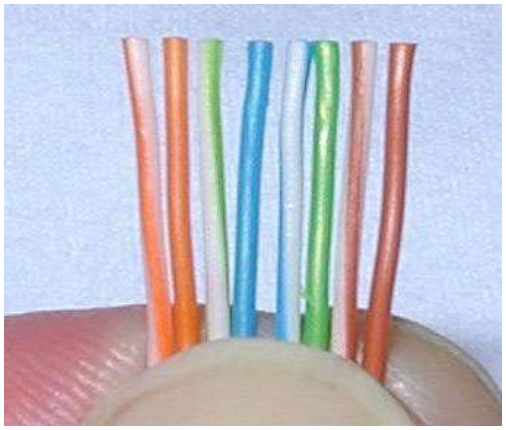

Fig 1.9 Straighten wires with fingers

Step 4: Use scissors to make a straight cut across 8 wires to make them short by 1/2 Inch from cut sleeve to wire end.

Fig 1.10 Scissor

Step 5: Now insert 8 colour wires in RJ 45 connector by considering proper position of blue plastic sleeve.

Fig 1.11 Wires in RJ 45 Connector

Step 6: Now crimp the cable carefully by putting RJ 45 connector in Ethernet Crimper and push on handles tightly. You will find that copper splicing tabs on connector will cut into each of eight wires.

Fig 1.12 Crimping of wire

After crimping UTP cable in RJ 45 connector, you find the cable as shown in fig 1.13.

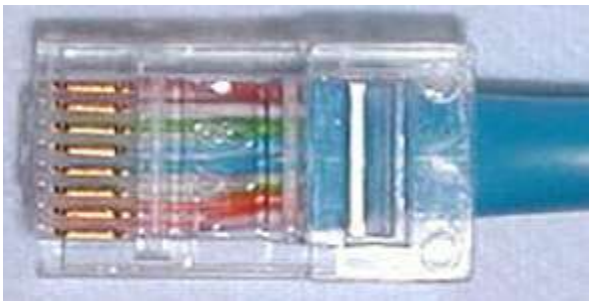

Fig 1.13 Cable in RJ 45 Connector

Check your progress 3

1. Full name of UTP is_____.
   a. Universal Transport Port
   b. Unshielded Transport port
   c. Unshielded Twisted Pair
   d. None of these

1.5 Physically connecting individual nodes to the switch

Switches are often a valuable asset to networking. Overall, they can increase the capacity and speed of your network. However, switching shouldn't be seen as a cure-all for network problems.

Switches occupy the same place in the network as hubs. Unlike hubs, switches examine each packet and process it accordingly rather than simply repeating the signal to all ports. Switches map the Ethernet addresses of the nodes residing on each network segment then allow only the required traffic to pass through the switch. Once a packet is received by the switch, the switch examines the destination and source hardware addresses and compares them to a table of network segments and addresses.

.

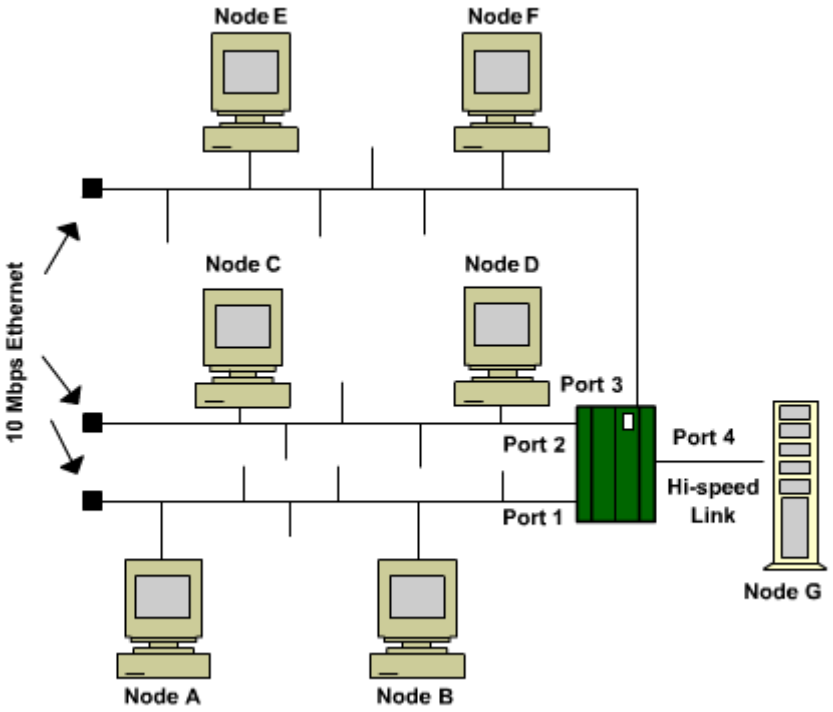

Fig 1.14 Nodes in network

Just like bridge, a switch does more of its job in high-speed hardware by providing performance closer to single-LAN performance than bridged-LAN performance.

Also unlike a bridge, which shares the LAN bandwidth among all of its ports, a switch dedicates the entire LAN media bandwidth, such as 10-Mbps Ethernet, to each port-to-port frame transmission. In this way, a switch easily multiplies the amount of effective network bandwidth.

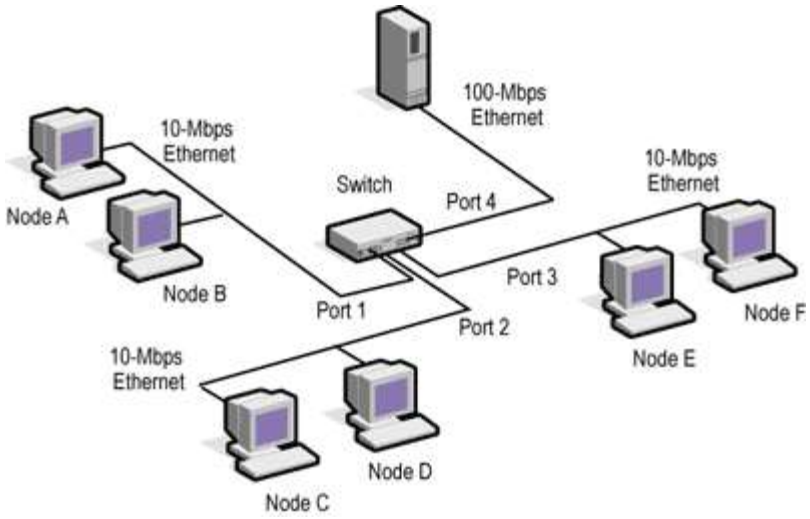

Fig 1.15 Connecting nodes with switches

Check your progress 4

1. Switches operates at_____.

   a. Network layer

   b. Data Link layer

   c. Transport layer

   d. None of these

1.6 Selection of server machine

It is found that small server look not different from high end desktop computer which is designed for easy operating system which can run certain desktop applications such as:

- word processor
- spreadsheet
- email client
- web browser

A server runs a specialised operating system designed to support several users. It's engineered to run multiuser applications like email, messaging, and print servers; shared calendar programs; databases; and enterprise resource planning and customer relationship management software.

A server additionally makes it easy for your employees to share information and collaborate, since it operates as a central repository for all of your documents, images, contacts, and other necessary files. It can host a company intranet, for sharing information with your employees quickly and economically. Set up a virtual private network, and you and your employees will access the data on the server remotely from anywhere you have internet access. On top of that, a server can automatically back up your desktop and laptop systems; therefore you'll never lose critical data if one machine fails or is lost or stolen. Servers are designed to be reliable, secure, and fault-tolerant, with redundant storage options.

When selecting correct server it is noted that it depends on large measure on applications which you want to work on. In case of file sharing, automated client backup, and light-duty remote access for PCs, we need to think for NAS or Windows Home Server. In a business having more than 10 employees are using

computers, then if you wish to use an email or print server, or you want to handle complex database, or run sophisticated server-based applications, or you have to store large information, or large-scale virtualization, in such cases there are more option such as tower, rack or blade server.

Virtualization enables one server to behave as several servers, each with its own operating system and unique set of applications. A virtual machine consists solely of software, yet it has all the components of a physical machine: it's a motherboard, a CPU, a hard disk, a network controller, and so on. The operating system and other applications run on a virtual machine just as they would on a physical machine--they see no difference between the 2 environments.

In virtualization, a program referred to as a hypervisor places an abstraction layer between the operating systems and therefore the hardware. The hypervisor will operate multiple virtual machines with the same OS or different OSs on the same physical server. Microsoft, Oracle, and VMware are among the top virtual-machine developers.

Check your progress 5

1. A server runs a specialised _____ system designed to support several users.
   a. Operating
   b. Hardware
   c. OS and Software
   d. None of these

1.7 Windows 8.1 Server Installation and Configuration on Server Machine

Windows 8.1 is an upgraded version of Windows 8 which is also computer operating system by Microsoft. It is part of Windows 8's support lifecycle and on installation maintains access to support. According to Microsoft, the following actions need to be performed before the installation of Windows Server:

Unplug of UPS system: Any power backup system needs to be unplugged or removed before installing Windows Server 8.1.

Back up data: It is highly recommended that you should take complete backup of configuration information for servers which include booting and system partitions.

Running of Windows Memory Diagnostic tool: Such type of testing procedure will tests the capacity and features of computer's RAM.

Use of mass storage drivers: You need to save driver file to appropriate media so that you can provide it during setup.

Default action of Windows Firewall: Server applications that require inbound connections will fail until you create inbound firewall rules that allow these connections.

Prepare your Active Directory environment for Windows Server 2012 R2: Before adding a Windows Server 2012 R2 domain controller or updating an existing domain controller to Windows Server 2012 R2, prepare the domain and forest by running Adprep.exe.

Check your progress 6

1. Why backing up of data is required?

   a. To save configuration information

   b. To save System data

   c. To be secure from data loss in case of system failure

   d. All of these

1.8 Windows 8.1 Desktop installation and configuration on client nodes

Client deployment refers to the planning, installation, and management of System Center 2012 Configuration Manager Client computers and mobile devices in your enterprise. The types of devices that you have, your business requirements, and your preferences, determine the methods that you use to manage computers and mobile devices.

For installation of Windows 8.1 Desktop version, the table 1.1 shows the required parameters:

Component	Minimum Requirement	Microsoft Recommended
Processor	1.4 GHz	2 GHz or faster
Memory	512 MB RAM	2 GB RAM or greater
Available Disk Space	32 GB	40 GB or greater
Optical Drive	DVD-ROM drive	DVD-ROM drive
Display	Super VGA (800x600) monitor	XGA (1024x768) monitor

Table 1.1 Parameters required for installation of Windows

Check your progress 7

1. What is meant by client deployment?

   a. delivering software to client

   b. user testing

   c. It is the planning, installation, and management of System

   d. All of these

1.9 Checking connectivity

The next target is to check the connectivity of modem or routers which can be configured initially so as to use the Internet while preventing other services from Internet. If you are not confident of your network whether it has configured or not, in such case you have to contact network administrator. If your network is not configured to block services, but some Internet applications work and others do not, then the issue is probably not related to your Wi-Fi network. There are certain steps you need to follow:

Step 1: Make sure that Wi-Fi device is ON. Computer carry inbuilt card that gets ON when turning it ON for use. When the Wi-Fi interface is ON and connected to Wi-Fi network, then Wi-Fi menu gets bold which is at top right corner of screen.

When the menu becomes dark, in such case your computer gets connected to Wi-Fi network.

Step 2: If Wi-Fi is off, choose Turn Wi-Fi On from the menu.

When you do find menu bar, then in such case select System Preferences from Apple menu and click Network icon and after that select Wi-Fi. Now click on check box located next to Show Wi-Fi status in menu bar as shown:

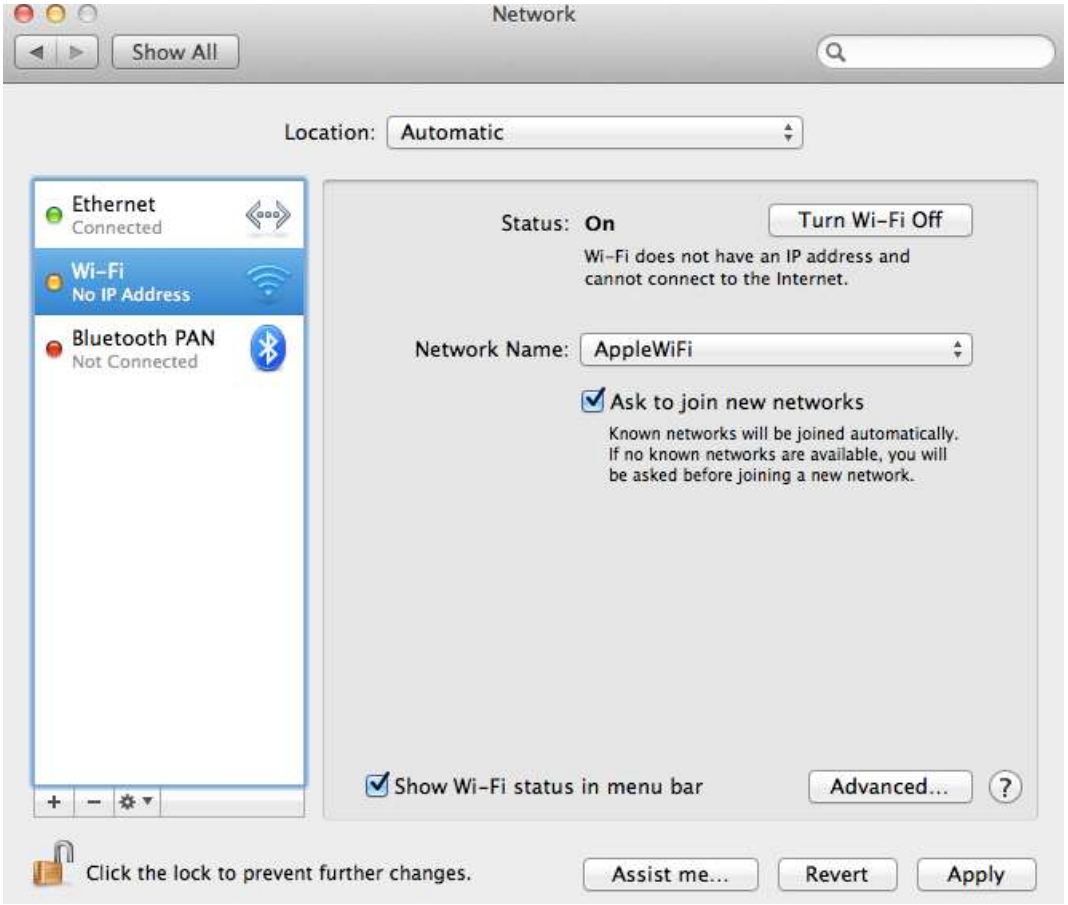

Fig 1.16 Checking connectivity

If your Wi-Fi interface does not appear in System Preferences, then you'll need to make assure that Wi-Fi card gets identified by computer. In such case load using CD or from Recovery HD if OS X Lion is installed. Your computer should be able to access available networks.

Step 3: After all when you are unable to get it online, then in such case make sure that your computer has connected with right Wi-Fi network as per the listing from the Wi-Fi menu as shown in figure:

Fig 1.17 Setting of Wi-Fi

Select your network if it is not chosen. If your Wi-Fi network is secured using a password, you will be prompted to enter a password as shown below.

Fig 1.18 Using Password

In this, you have to insert password. If you do not know your network password, then in such case, you have to contact the administrator of Wi-Fi network. If you are administrator/owner of network, you should configure router to define password for network.

Your Wi-Fi network may not be visible in the list. If the network is closed, it will not broadcast its network name. In order to join the Wi-Fi network, choose Join Other Network from the Wi-Fi menu. You will be prompted for the network name and security setting.

Fig 1.19 Network name

In this, enter the name of network and select Security of your network uses.

When the network is not seen in your Wi-Fi network list, then it means that such network is not applicable. To check the standards, you have use Network Utility, where you should set network interface to Wi-Fi and study about information listed after Model:

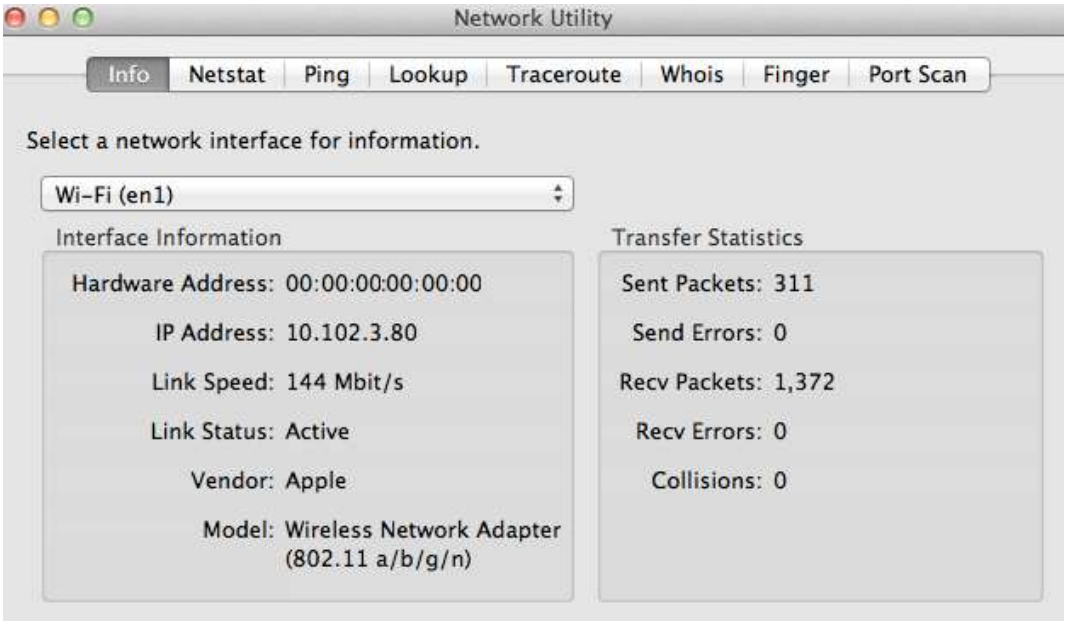

Fig 1.20 Network Utility

In case of correct Wi-Fi network, but still can't find online, then you need to check TCP/IP settings which is available in Network pane of System Preferences.

- Choose System Preferences from the Apple menu.
- Choose Network from the View menu.

- Select Wi-Fi, and then click the advanced button in the lower-left hand corner of the screen.
- Select the TCP/IP tab from the top of the screen.

After doing all setting your window will look like:

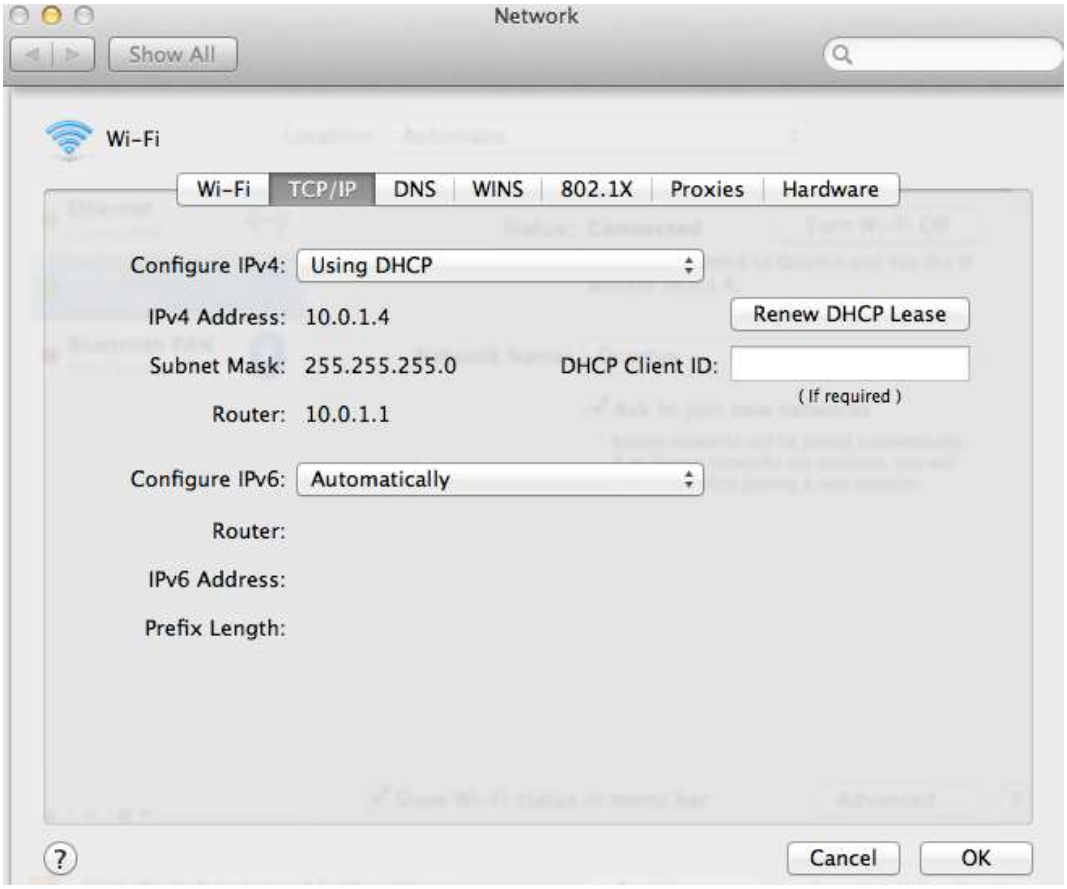

Fig 1.20 Network TCP/IP

If you see no IPv4 address, or if IP address starts "169.254.xxx.xxx", in such case you need to click on Renew DHCP Lease. Without the correct TCP/IP settings, your computer will not be able to get online.

If your TCP/IP settings appear to be correct, and your computer still cannot access the Internet, check the DNS tab. See below for this tab. DNS is an Internet service that translates IP addresses into URLs and vice-versa. A correct DNS configuration allows your computer to connect to www.apple.com without having to enter the specific IP address of the Apple servers.

Check your progress 8

1. Network configuration cannot be done:

a. using CD

b. online

c. pen drive

d. hard disk

1.10 Basic troubleshooting/diagnostic commands

Local area networks (LAN) are integral to the operation of many businesses today. The most common LANs use Ethernet, a data link layer protocol, and Internet Protocol (IP), a network layer protocol.

Root causes of network troubleshooting problems are frequently caused by one of these three sources:

1. Physical layer: copper, fibres or wireless

Possible causes:

- Damaged or dirty cabling or terminations
- Excessive signal attenuation
- Insufficient cable bandwidth
- Wireless interference

2. Network Layer: Ethernet and IP

Possible causes:

- Damaged networking devices
- Incorrect or sub-optimal device configurations
- Authentication and association issues
- Insufficient network bandwidth

3. Switches and VLANs

Possible causes:

- Excessive utilization
- Too many errors

- Incorrectly assigned VLAN membership
- Traffic priority (CoS/QoS) issues

Check your progress 9

1. What is the cause of trouble at network layer?

a. Excessive utilization

b. Damaged or dirty cabling or terminations

c. Incorrect or sub-optimal device configurations

d. Excessive signal attenuation

1.11 Let Us Sum Up

In this unit we have learnt that RJ connector is registered jack standardized physical network interface that connects telecommunications or data equipment. RJ45 could be a standard type of connector for network cables. To network two computers without a hub, a cross-over cable is used. Cross-over cable is also used to connect a router to a computer, or Ethernet switch (hub) to another Ethernet switch without an uplink.

Switches are often a valuable asset to networking. Overall, they can increase the capacity and speed of your network. However, switching shouldn't be seen as a cure-all for network problems. Client deployment refers to the planning, installation, and management of System Center 2012 Configuration Manager Client computers and mobile devices in your enterprise.

1.12 Answers for Check Your Progress

Check your progress 1

Answers: (1 –c)

Check your progress 2

Answers: (1 -a)

Check your progress 3

Answers: (1 –c)

Check your progress 4

Answers: (1 –b)

Check your progress 5

Answers: (1 -a)

Check your progress 6

Answers: (1 –d)

Check your progress 7

Answers: (1 –c)

Check your progress 8

Answers: (1 –b)

Check your progress 9

Answers: (1 –c)

1.13 Glossary

1. **Structured P2P -** where the nodes are arranged having a particular distributed data structure.
2. **Unstructured P2P -** where the nodes have arbitrarily selected other close nodes.
3. **Hybrid P2P -** where some nodes are presented as special functions in a good organized manner.
4. **Workstation-server Model -** Workstation may be a standalone system or a part of a network.
5. **Processor-pool Model -** Provides processing power on a demand basis.
6. **Integrated Hybrid Model -** Workstations used as processor pools.

1.14 Assignment

Try to do Windows 8.1 Server Installation.

1.15 Activities

Crimp a UTP cable into RJ 45 connector.

1.16 Case Study

Study the LAN network of your college.

1.17 Further Readings

1. Distributed Systems, Principles and Paradigms by Tanenbaum.
2. Distributed Systems, Concepts and Design by Coulouris, Dollimore, Kindberg.

UNIT 2: CREATING A WI-FI LAN

Unit Structure

2.0 Learning Objectives

After learning this unit, you will be able to understand:

- About Wi-Fi Technology.
- About Wi-Fi based LAN.
- About AP and client Machines.
- About data from File Server.

2.1 Introduction to Wi-Fi Technology

Wi-Fi is a technology that has revolutionized the way we tend to network computers and electronic devices together, making wired connections

unnecessary. Wi-Fi allows networking of computers and digital devices without the need for wires. Data is transferred over radio frequencies, allowing Wi-Fi capable devices to receive and transmit data after they are in range of a Wi-Fi network. The widespread use of the technology and its availability in both residential homes and public places – as well as parks, gathering spots, and coffee shops – have made it one of the most popular information transmission technologies out there nowadays.

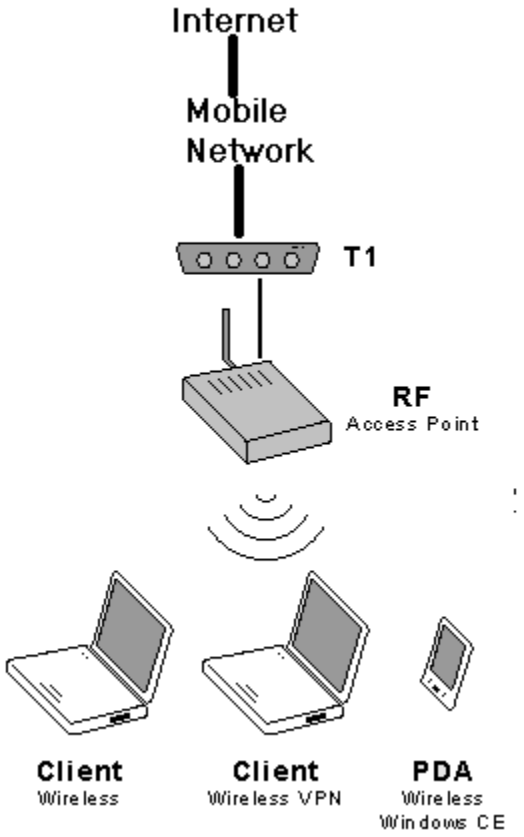

Fig 2.1 WiFi arrangement

Currently there are four major types of Wi-Fi which are:

- 802.11a
- 802.11b
- 802.11g
- 802.11n

Out of this the two most common and oldest types of Wi-Fi are:

- 802.11b
- 802.11g

Which operate at frequency of 2.4GHz.

It is seen that Wi-Fi 802.11b has theoretical maximum transmission speed of about 11Mbps while 802.11g will able to transmit data at speeds upto 54Mbps. 802.11a was the next version of Wi-Fi developed, and it operated on a frequency of 5GHz and allowed data transmission at speeds of up to 54Mbps. It is not backwards compatible with 802.11b or g, due to its operation on a different frequency, thus limiting its use. 802.11n is the newest version of the technology and it is backwards compatible with devices running 802.11b or g. It operates at speeds up to 450Mbps on either 2.4GHz or 5GHz, either on a single channel or two channels. On dual channel devices, data transmission can theoretically exceed 450Mbps limit.

2.2 How to Provide Wi-Fi capability to a PC

Generally, PCs do not usually come with built-in Wi-Fi, especially older models. So if you need to get wireless connectivity you have options like- you can use either USB Wi-Fi adapter, a PCI-E Wi-Fi card, a new motherboard with built-in Wi-Fi.

USB Wi-Fi Adapters: It is plug and play device. The plug-and-play convenience means that you can remove it if it isn't needed, and use it in another PC.

Wi-Fi PCI Cards: If you have limited USB ports on your PC already, the Wi-Fi PCI card help

Wi-Fi Enabled Motherboard: If you're looking to upgrade your PC anyway, it might make more sense to upgrade your motherboard than buy an adapter.

Check your progress 1

1. What is the full form of Wi-Fi?
   a. Wired fidelity
   b. Wireless Fidelity
   c. Wireless files
   d. None of these

2.3 Creating an ad-hoc Wi-Fi based LAN

An ad-hoc network is a local area network (LAN) that's built impromptu as devices connect. Rather than relying on a base station to coordinate the flow of messages to each node within the network, the individual network nodes forward packets to and from one another.

If you would like to share information stored on your pc with other people nearby and everyone's pc has a wireless network adapter, an easy methodology of sharing is to set up an ad hoc wireless network. In spite of the fact that members should be within 30 feet of each other, this type of network presents lots of prospects. In the Windows operating system, ad-hoc is a communication mode that allows computers to directly communicate with each other without a router.

Ad hoc networks are by definition temporary; they cease to exist when members disconnect from them, or once the computer from which the network was established moves beyond the 30-foot effective range of the others. you can share an internet connection through an ad hoc network, however keep in mind that the internet connection is then available to anyone logging on to a computer that's connected to the network, and thus is probably going not very secure

To set up an ad hoc network, follow these steps:

1. On the Start menu, click Connect To.
2. In the Connect to a network window, click the Set up a connection or network task.
3. On the Choose a connection option page, click Set up a wireless ad hoc (computer-to-computer) network, and then click Next.
4. Read the ad hoc network information, and then click Next.
5. Provide a network name, select whether the network is open or requires authentication, provide a security phrase if necessary, and then click Next.

After Windows Vista sets up ad hoc network, you can share Internet connection. If you wish to disconnect your connection from an ad hoc network, display the Connect To A Network window, click the ad hoc network, and then click Disconnect.

Advantages:

- It is easy to set up if you just want to connect two devices to each other without using central access point.

- It is possible to connect them directly with ad-hoc mode to form a temporary Wi-Fi network without router.
- The new Wi-Fi Direct standard of ad-hoc mode, allow devices to communicate directly over Wi-Fi signals.

Check your progress 2

1. An Ad-hoc network is a _____.
   a. LAN
   2. B.WAN
   3. MAN
   4. None of these

2.4 Creating an infrastructure based LAN using Wireless Access Point

In the case of wireless networking in Infrastructure mode you're connecting your devices using a central device, namely a wireless access point. To affix the WLAN, the AP and all wireless clients should be configured to use the same SSID. The AP is then cabled with the wired network to allow wireless clients access to, for example, internet connections or printers.

Most Wi-Fi networks are deployed in infrastructure mode. In infrastructure mode, a base station acts as a wireless access point hub, and nodes communicate through the hub. The hub typically, but not always, has a wired or fiber network connection, and will have permanent wireless connections to other nodes. Wireless access points are typically fastened, and provide service to their client nodes among range. Wireless clients, like laptops, smart phones etc. connect to the access point to join the network. Typically a network can have a multiple access points, with the same 'SSID' and security arrangement. In that case connecting to any access point on that network joins the client to the network. In this case, the client software can try and choose the access point to do to give the best service, like the access point with the strongest signal.

Infrastructure mode wireless networking is the mode that you most often encounter in your work as networking professional supporting networks for clients or in an exceedingly corporate environment.

At a minimum, the sole network infrastructure component that's required for Infrastructure mode is an access point, however if an AP is all you have, you have no more than you'd have had once using ad hoc mode. However, most Infrastructure mode implementations include other components from your traditional network infrastructure.

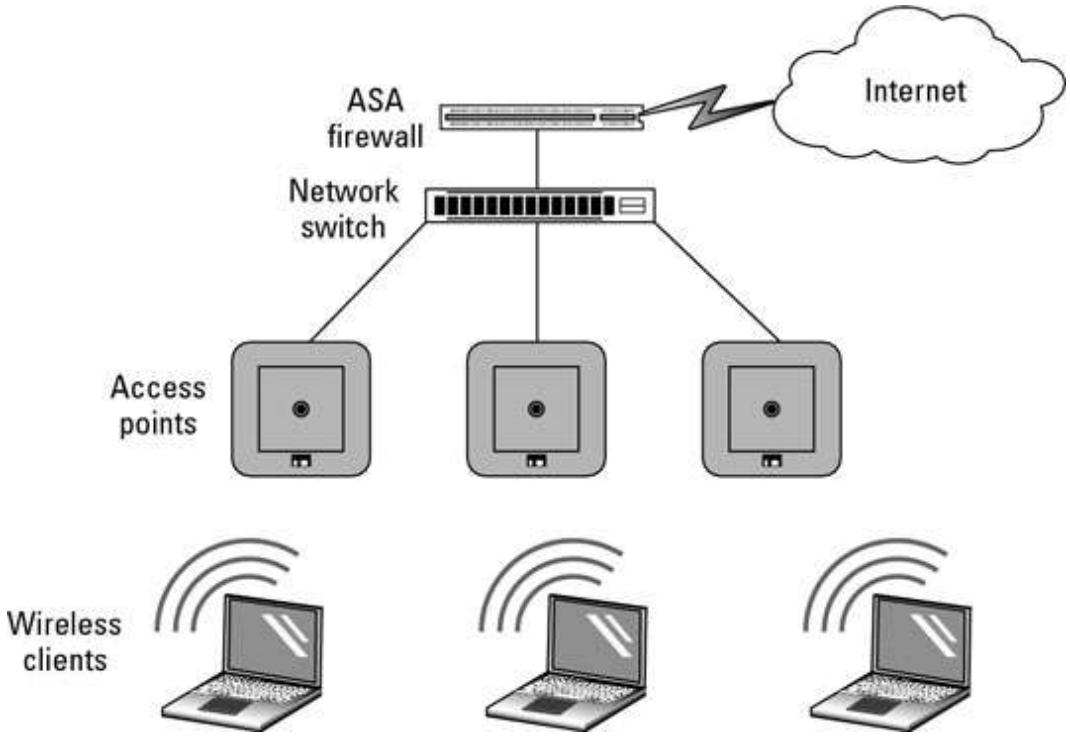

Fig 2.2 network infrastructure component

Check your progress 3

1. What are wireless access points?
   a. Connection points
   b. It is a is a networking hardware device
   c. Ports
   d. None of these

2.5 Configuration of Access Point and client Machines

You can configure the access by using the following steps:

Step 1 - Connect your computer to other LAN port by Ethernet cable and login to TP-LINK web interface by IP address on bottom label.

Step 2 - Go to Network ->LAN on the left side menu, change the LAN IP address of TP-LINK router to the same segment of the main router

Step 3 - Configure the wireless

Go to Wireless->Wireless Settings page, configure the SSID (Network name) and Channel. Then Click Save button.

Step 4 - Go to DHCP on the left side menu, disable the DHCP Server and click **Save** button.

Step 5 - Go to System Tools->Reboot page, click Reboot button to reboot the device

Step 6 - Connect the main router to the LAN port on TP-Link router through Ethernet cable.

Check your progress 4

1. Configuration of access point is a _____installation.
   a. LAN
   b. WAN
   c. WLAN
   d. None of these

2.6 Accessing data from File Server through Wi-Fi Interface from client machine

You easily transfer information from file server using Wi-Fi technology from client machine. It is easy to use external hard drive and the router will create network storage accessibility for anyone on network. On setting up, any files stored on particular drive gets accessed by devices that are on particular network. Here's how to set it up on Windows.

Step 1: Choose your drive

The drive which you want to share is small enough or can be large as TB and put it.

Step 2: Enable USB drive sharing

On computer having Wi-Fi network, you can launch the browser and navigate your router's IP address which is at back of it or you can find it online. Now when the page gets loaded, you will be asked to log in with username and password.

It is noted that all router's interface are different, but if it is with USB port, then you can find a link written as File Sharing under Administrator settings. Here you have to enable file sharing server. Apply the settings, and exit.

Step 3: Access the drive

Now after this, you are ready to read and write the attached hard drive by opening a file explorer window and navigating on to Network folder located at left sidebar. After this, clear the path at top of explorer window and enter\\[your IP address].

Fig 2.3 File accessing

You will find that your drive will appear. In this, open the contents which you want to transfer. If you're asked to log in, simply use your router's login details. If you wish to leave the attached hard drive so as to access from any Explorer window, you have to right-click on drive and select Map network drive.

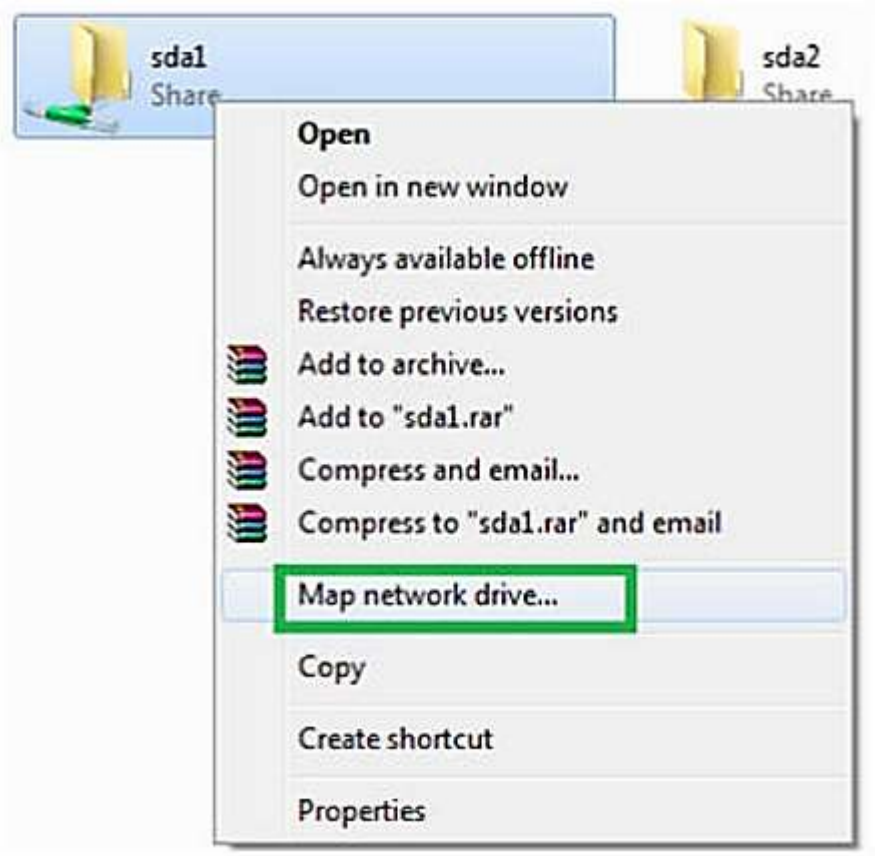

Fig 2.4. File transfer

Check your progress 5

1. Transferring of data from client machine can be done by:

   a. Configuring The Machine

   b. Configuring The Data

   c. Configuring The Files

   d. All Of Above

2.7 Let Us Sum Up

In this unit we have learnt that Wi-Fi is a technology that has revolutionized the way we tend to network computers and electronic devices together, making wired connections unnecessary. An ad-hoc network is a local area network (LAN) that's built impromptu as devices connect. Rather than relying on a base station to coordinate the flow of messages to each node within the network, the individual network nodes forward packets to and from one another.

Wi-Fi networks are deployed in infrastructure mode. In infrastructure mode, a base station acts as a wireless access point hub, and nodes communicate through the hub.

2.8 Answers for Check Your Progress

Check your progress 1

Answers: (1 –b)

Check your progress 2

Answers: (1 –a)

Check your progress 3

Answers: (1 –b)

Check your progress 4

Answers: (1 –c)

Check your progress 5

Answers: (1-a)

2.9 Glossary

1. **Wi-Fi -** A network technology used in computing devices to connect to internet.
2. **Ad-hoc network -** It is a LAN network which is built in and depends on base station to arrange message flow.

2.10 Assignment

Explain infrastructure based LAN using Wireless Access Point

2.11 Activities

Create an ad-hoc Wi-Fi based LAN for your college

2.12 Case Study

How does Wi Fi plays an important role in accessing internet?

2.13 Further Readings

1. Distributed Systems, Principles and Paradigms by Tanenbaum.
2. Distributed Systems, Concepts and Design by Coulouris, Dollimore, Kindberg.

Block Summary

In this block, you will understand about the basic of client deployment features with various working characteristics related to planning, installation and management of System Center 2012 Configuration Manager are well detailed. The block gives an idea on architecture and distribution of various forms of RJ45 USB connectors with certain characteristics features. The examples related to concept of different RJ cables along with working characteristics are well detailed.

In this block, you will understand about the basic of Wi-Fi is a technology and its techniques. The concept related to Ethernet switch and hub along with working features is detailed. You will be demonstrated practically about RJ45 crimping technology.

Block Assignment

Short Answer Questions

1. What is Wi-Fi and why it is used?
2. What are Ethernet cables?
3. What are access points and why are they important?
4. How can we create an Ad- hoc Wi-Fi based LAN?

Long Answer Questions

1. Explain in detail the steps to configure access points in client side.
2. How can we provide Wi-Fi capabilities to a PC?
3. What is the color-coding scheme for Ethernet?

Enrolment No. ☐

1. How many hours did you need for studying the units?

Unit No	**1**	**2**	**3**	**4**
Nos of Hrs				

2. Please give your reactions to the following items based on your reading of the block:

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____ _____
Language and Style	☐	☐	☐	☐	_____ _____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____ _____
Conceptual Clarity	☐	☐	☐	☐	_____ _____
Check your progress Quest	☐	☐	☐	☐	_____ _____
Feed back to CYP Question	☐	☐	☐	☐	_____ _____

3. Any Other Comments

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Education is something which ought to be brought within the reach of every one.

- Dr. B. R. Ambedkar

Dr. Babasaheb Ambedkar Open University
Jyotirmay' Parisar, Opp. Shri Balaji Temple, Sarkhej-Gandhinagar Highway, Chharodi,
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Fundamentals of Computer Networking (FCN)

PGDCA 201

BLOCK 3:
ADSL BROADBAND INTERNET AND WI-FI USB DONGLES

स्वाध्यायः परमं तपः

Dr. Babasaheb Ambedkar Open University
Ahmedabad

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ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self-instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual-skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self-instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)

PREFACE

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included may tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

FUNDAMENTALS OF COMPUTER NETWORKING

(FCN)

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BLOCK 4: INTERNET ACCESSING AND APPLICATION

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Popular Browsers like Internet Explorer and Chrome, their configuration and settings, FileZilla File Transfer software, Team Viewer, Remote Desktop, Telnet, Microsoft Outlook Express.

Dr. Babasaheb
Ambedkar
Open University

PGDCA 201

Fundamentals of Computer Networking (FCN)

BLOCK 3: ADSL BROADBAND INTERNET AND WI-FI USB DONGLES

BLOCK 3: ADSL BROADBAND INTERNET AND WI-FI USB DONGLES

Block Introduction

ADSL broadband is a famous internet connection which means Asymmetric Digital Subscriber Line. It is a type of connection which is provided over telephone lines. It can run on existing telephone line. It is a package which is sold by Internet providers. The USB Wi-Fi adapter also called as dongle is a USB supportive portable device which can be attached to desktop and laptop for running Internet with wireless network connectivity.

In this block, we will detail about the basic of ADSL broadband technology and data communications technology. The block will focus on architecture and communication of Wi-Fi Dongle with necessary steps of installation and its characteristics. The concept of Wi-Fi Dongle features with internet connectivity is well explained.

In this block, you will make to learn and understand about the basic of Public Switched Telephone Network and its techniques. The concept related to Asymmetric Digital Subscriber Line and its operating features are explained to the students. You will be given detailed about the usability and features as compared with ADSL.

Block Objective

After learning this block, you will be able to understand:

- About ADSL broadband technology
- Features of ADSL Broadband
- Characteristics of PSTN
- Idea about working and features of ADSL Modem
- Characteristics of Wi-Fi Modem and Router
- Features of Wi-FI Dongles

ADSL Broadband Internet and Wi-Fi USB Dongles

Block Structure

Unit 1: ADSL Broadband Internet

Unit 2: Wi-Fi USB Dongles

UNIT 1: ADSL BROADBAND INTERNET

Unit Structure

1.0 Learning Objectives

After learning this unit, you will be able to understand:

- About ADSL broadband technology
- About PSTN
- About Wi-Fi Modem and Router
- About configuring wired ADSL Modem

1.1 Introduction to ADSL broadband technology

ADSL broadband is a famous internet connectivity technology which is termed as Asymmetric Digital Subscriber Line. It is a type of internet connection which can be worked on existing telephone line. Such type of broadband communications technology is used for connecting to Internet which allows data to be sent over existing telephone lines and works in the similar manner as normal modem lines. For using ADSL, a microfilter, is installed on subscriber's telephone line which allows ADSL and telephone services to be used at the same time. It makes use of special ADSL modem and subscriber’s position should be within the required network locations so that the subscriber should receive signal in the modem. Normally it is seen that the required distance of ADSL working is within radius of 1 kilometer. In ADSL, the data rates ranges from 1.5 to 18 Mbps when receiving data and 1.6 to 4 Mbps for sending data.

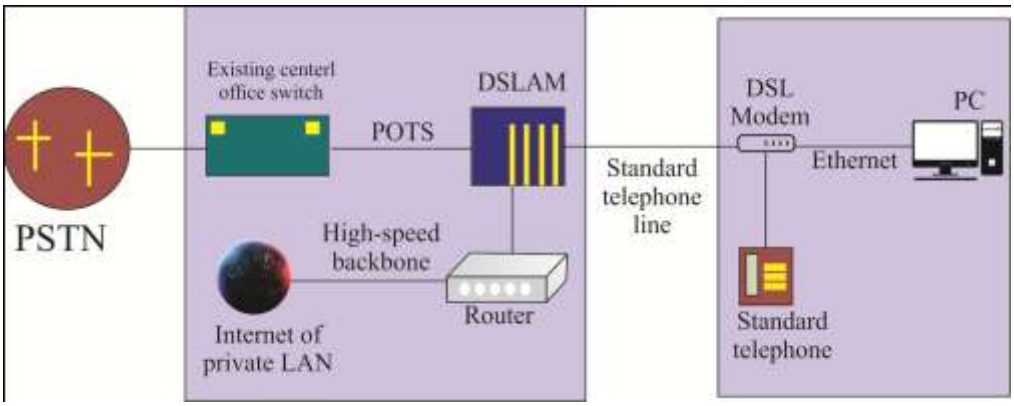

Fig 1.1 ADSL connection

It is noted that at user place, the ADSL connection will collects high frequency digital data and keeps it for transmission to Computer or network. In the exchange, Digital Subscriber Line Access Multiplexer will connect ADSL user to wider Internet which totals the incoming lines into one data connection for transmission of voice and data networks. Further, it is noticed that the phone signals hereby sends the switched telephone network and digital data which will route required data to Internet by using high speed backbone.

There are many forms of ADSL modems which are directly connected to Computer through USB port or can be by way of Ethernet. It is noticed that many devices allow Internet connection which gets shared across many computers.

1.2 Motivation for ADSL Broadband

Asymmetric digital subscriber line which is ADSL is a form of digital subscriber line technology where data communications technology makes faster data transmission by way of copper telephone lines instead of standard voice band modem. This is different from less common symmetric digital subscriber line. In this the bandwidth is more with customer premises as compared to the reverse, for this reason it is asymmetric. Nowadays ADSL is commonly used in metro cities as the network providers are commonly expanding. It is much advanced as compared to normal modem because of its connectivity speed. It is noted that technically and with business point of view, ADSL in many places are commonly applied at home users. With technical aspect, there exits crosstalk from circuits at DSLAM end which is located at customer premises.

ADSL is preferred because it is:

- Instantaneous internet and voice/fax features which can be used with telephone line
- Continuous, high-speed internet access features
- Cheapest solution
- Carries data security which goes beyond technologies
- Fastest downloading speed

Check your progress 1

1. Telephone lines are made of:
   a. Aluminum
   b. Copper
   c. Tin
   d. Bronze

1.3 PSTN Basics

PSTN also known as Public Switched Telephone Network is a global mixture of interconnection which initial designed to handle circuit switched voice

communication. It shows original Plain Old Telephone Service (POTS) which is a form of landline phone services used by residences and establishments. There are many parts of PSTN which uses DSL, VoIP and other Internet network technologies.

Public Switched Telephone Network is a domestic telecommunications network which is normally worked using telephones, key telephone systems, private branch exchange trunks with many different sort of data arrangements. It comprises of telephone exchanges which is network which describes nationwide telephone communications system. This network served as public since the system is present to anyone who will able to handle such services. Here, calls are switched where caller's conversation gets divided into several packets which are sent all together over several connections in order to reach receiver at other end. In this, single pieces are switched from one telephone device to another till both reach at required place at receiving end. It is noted that every phones in PSTN are arranged in web network where any phone involves in calling to other phone as local phone systems across the web are connected among each other.

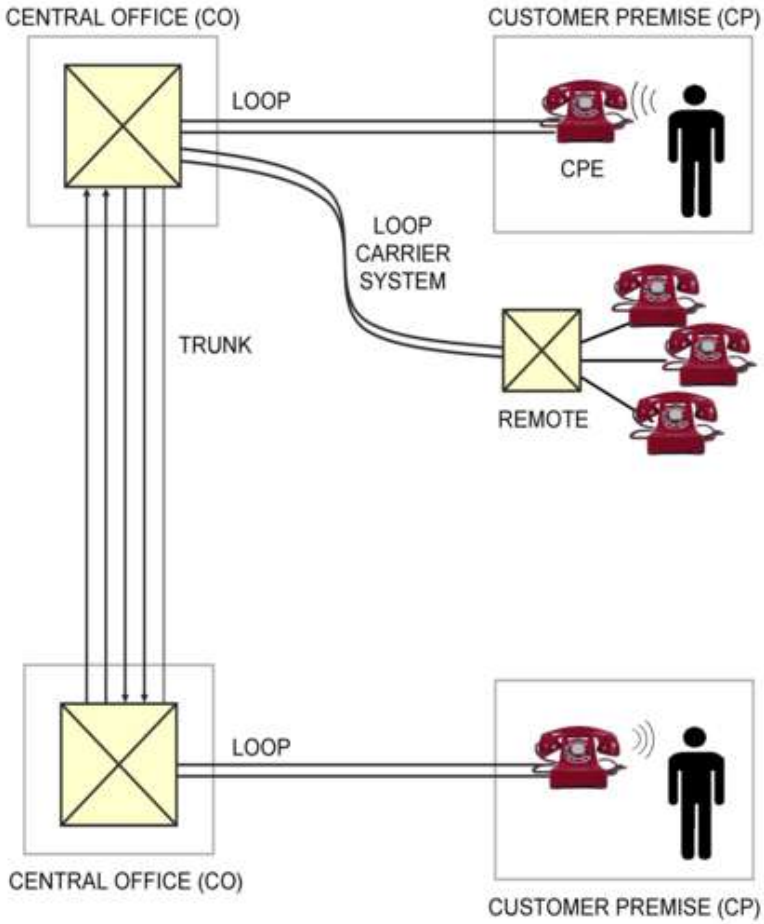

Fig 1.2 Public Switched Telephone Network

It is found that several communication technologies are designed on Public Switched Telephone Network (PSTN) technology which has options to work on voice, data or network. In fig 1.2, a telephone is placed in the Customer Premise while telephone switch is placed in Central Office (CO) which is commonly called as Customer Premise Equipment. In the figure, telephone is connected across telephone switch using two copper wires called as local or subscriber loop. Such looping system has a right to enter in the circuit from customer premise onto network.

It is noted that copper being good conductor of electricity is resistant to electricity which makes the signals to lower in intensity with distance. It is noted that maximum resistance which is allowed normally has 1200 ohms that uses 16,000 feet which can be 5 km using 26-gauge thickness cable. In the figure, the Central Office has serving area of 5 kilometers. Building of Central Office after every 5 miles with subdivisions are used using low capacity remote switches which are placed in small huts or underground. The remote in figure will help the telephone service locally to work in loops in particular subdivision.

It is further seen that the telephone switches are connected with trunks, while subscriber loops are fixed to work with circuits and trunks that can be shared with connection among Central Offices. In order to establish connection among customer premise and other, the required network address gets signalled to network over loop where switch gets seized on idle trunk circuit which moves in required direction and further connects loop with the trunk. Also, it is noted that the voice and data equipment that connects to PSTN over regular telephone lines needs to work using features of local loop.

Check your progress 2

1. In PSTN, phones are arranged in:

   a. web network

   b. individually

   c. pairing

   d. none of above

1.4 ADSL Modem basic architecture, working, standards

ADSL which is Asymmetric digital subscriber line is a type of digital subscriber line which allows quick data transmission over telephone lines. It provides speed up to 50 Mbps and handles video, voice and data which is normally available across every part of world.

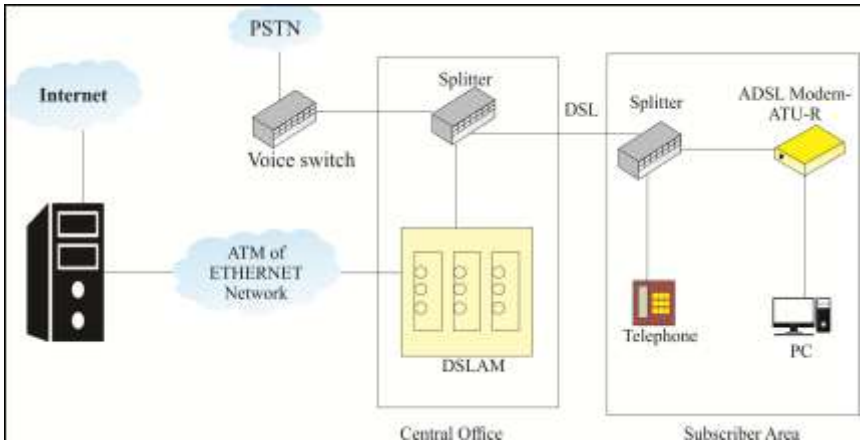

Fig1.3 Architecture of ADSL

ADSL Architecture

ADSL architectural layout uses ADSL modem which is connected at every end of twisted pair telephone line having data channels such as:

- High-speed downstream channel which ranges from 1.5 to 8 Mbps.
- Low-speed upstream channel having ranges from 16 to 640 Kbps.

It is found that the basic telephone service channel is separated from digital modem using filters or with plain old telephone service (POTS) splitters which gives uninterrupted basic telephone service. It is noted that upstream and downstream bandwidth ranges simply depends upon distance among customer place and DSL provider's place. It is noted that larger is the distance, smaller will be the bandwidth space.

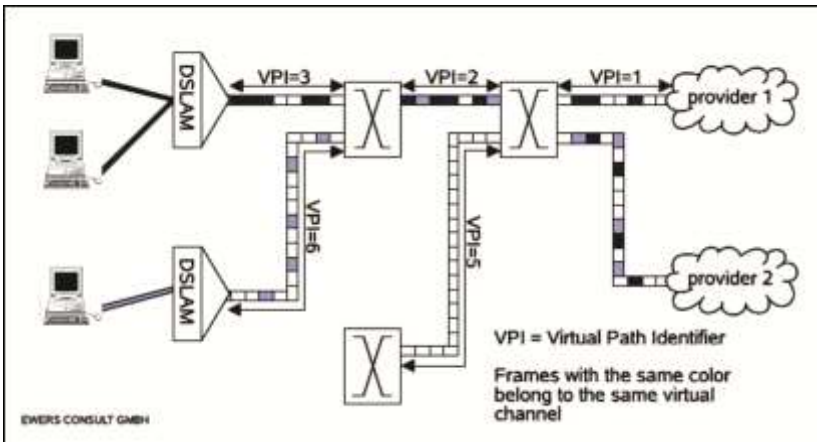

Fig 1.4 Arrangement of ADSL network

The ADSL architecture comprises of following components:

Transport System: The transport system of ADSL shows carrier backbone transmission interface for DSLAM system. It provides service interfaces such as T1/E1, T3/E3, OC-1/3 and STS-1/3.

Local Access Network: In ADSL, local carrier Inter office network shows foundation with connectivity that exists among various service providers and services users.

Digital Subscriber Line Access Multiplexer: The DSLAM, will focus on data traffic from multiple DSL loops against backbone network to connect rest of network.

DSL Transceiver Unit-Remote: In ADSL, xTU-R is a customer site equipment which is applied for service connection to DSL loop.

POTS Splitters: It is sometimes used at Central Office and user locations which allows copper loop used for synchronized DSL and single line telephone service. The POTS splitters appear in two configurations:

- Single splitter
- Multiple splitter

POTS splitters are passive or active which requires external power source or no power and often has high mean time failure (MTBF) as compared to active splitter.

ADSL Standards and Associations

American National Standards Institute approves ADSL standard which rates ADSL to 6.1 Mbps. European Technical Standards Institute further contributes annex to T1.413 which reflects European requirements using single terminal

interface at premise side of access circuit. It is analysed that ATM Forum and Digital Audio Visual Council recognizes ADSL as physical layer transmission protocol which is particularly applied for unshielded twisted pair (UTP) media.

UTP which is unshielded twisted pair is a famous form of cable which has two unshielded wires that is twisted around each other. The UTP cable is cheap and is used mainly for local area networks and telephone connections. Such cable has low bandwidth or protection from interference which appears with coaxial or fiber optic cables.

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

Table 1.1 ADSL Standards

Working of ADSL

Asymmetric digital subscriber line makes use of the vacant similar bandwidth which is present in wires. ADSL work with frequency splitter device which further split in standard voice telephone line having two frequencies.

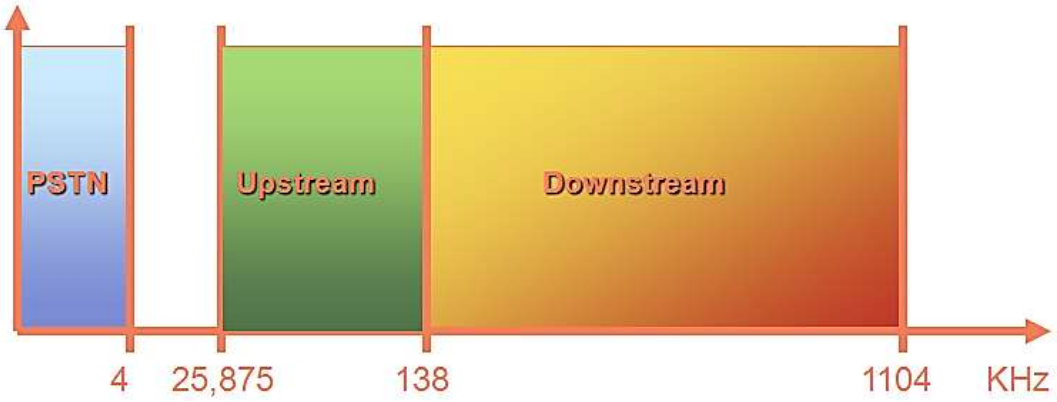

Fig 1.5 ADSL bandwidth

In this, modulation transfers the information by electronic or in form of optical carrier waveform where there shows two opposite and unsuited standards that is applied for modulating ADSL signal. The modulation is carried out using:

Carrierless Amplitude Phase: It is sort of encoding method which divides the signals in different bands:

- Upstream data channel having band range from 25 - 160kHz
- Downstream data channel having band range from 200kHz - 1.1MHz .

These data channels are commonly apart so as to lower the options of interfering which are present in the channels.

Discrete Multi-Tone: It is called as DMT which separates DSL signal that are used by frequency which carries range that is divided in 256 channels each having 4.31kHz. This type of multi tone carries will carry 224 downstream frequency and has 32 upstream frequency bins. The DMT continuously transfers signals with different channels to ensure that good channels can be used for transmission and reception.

Check your progress 3

1. In ADSL architecture, low speed upstream channel has range from:

   a. 160 to 200 Kbps

   b. 640 Kbps to 640 Kbps

   c. 8 to 84 Kbps

   d. 500 to 5064 Kbps

1.5 ADSL Wi-Fi Modem and Router

ADSL or Asymmetric Digital Subscriber Line is a type of digital subscriber line (DSL) which serves as data communications technology which allows faster data transmission over telephone lines as compared to standard voice band modem.

There are many types of ADSL connection which can be:

- G.DMT
- T1.413

- ADSL2
- AnnexL
- ADSL2+
- AnnexM

ADSL is hi speed Internet connection having fastest dial-up modems having 56 kilobits per second (Kbps) that works at 53 Kbps under normal conditions. It has an efficient download speeds from 1.5 to 8 megabits per second (Mbps) as per grade of respective DSL services.

The ADSL wifi router has router and router for wifi connection in a single box whereas in case of normal wifi router, you have to use a separate Wired ADSL modem.

Check your progress 4

1. Wi-Fi Modem works with:

   a. Battery

   b. Cable

   c. Antenna

   d. All Of Above

1.6 Configuring wired ADSL Modem for Internet Access

You can configure wired ADSL Ethernet modem which can be used for Internet access by using the following steps:

Step 1:

Initially open web browser and then type IP address and then press Enter.

Step 2:

After that, enter Login name and password and click on Login option.

Step 3:

Once the username and password has entered, now click on Setup tab which is located at top panel where you have to choose Connection from left.

Step 4:

Now you need to configure following:

Type - Set connection Type

Name - Type name for connection

Encapsulation - Set encapsulation recommended by ISP

Username - Type ISP login username

Password - Type login password

Keep alive - leave default

MAX Fail - leave default

MTU - leave default

MRU - leave default

Set Route - enable set route

VPI - set to ISP recommended settings

VCI - set to ISP recommended settings

Click on Apply when done.

Step 5:

Select Status tab located at top and choose on Connection Status which is placed on left. Here the connection be seen in WAN section of page. Once the computer is connected, you have IP address from ISP.

Step 6:

Click on Tools which is located at top of panel window and chosse on System Commands on left. Now, click on Save All to permanently save changes you have done.

Check your progress 5

1. ADSL Modem runs:

   a. Using password

   b. Using username

   c. Using login

   d. All of above

1.7 Configuring Wi-Fi ADSL modem/Router for Internet Access

We see that ADSL Wi-Fi router serves as hardware component that can be typically applied to transfer data over ADSL phone line. While doing this, the router plays a role of interfacing among computer or network as per the needs of Internet. In order to configure Wi-Fi ADSL router/modem, you need to follow following steps:

Step 1 Locate the IP address:

To install the fresh router connection, you need to find the default IP address which is available on the label that is fixed on router or in document. If you are unable to locate the IP address, then you can obtain it through internet search by writing router/modem model number. The format of the IP addresses is grouping of four three digit numbers, separated by periods as shown 192.168.1.1, 192.168.0.1, or 192.168.2.1.

Step 2 Open a web browser on computer:

Once you have the IP address, you need to enter it on address bar and then finally press Enter. You will find that the browser will attempt to connect to router's configuration menu. You can also do it manually by referring router installation disc.

Step 3 Enter username and password:

To access the router/modem configuration page, you require being on router's IP address where you have to enter your valid username and password. Most routers have a basic account set up that you will need to use to log on which depends on model to model. It is noted that the default username is admin with default passwords as admin or password. It is found that mostly routers will need

only username and blank password where as many asked you to keep the particular space blank. You can also search with router or modem model on the internet for correct default password or username.

Step 4 Open Wireless Settings:

When you log in to your router, you will be taken to the router's main menu or status screen. There will be several options to choose from. The Internet section can usually be left at default settings, unless you received specific instructions from your internet service provider. The Wireless section will allow you to set up your wireless network.

Step 5 Enter a name for wireless network:

In Wireless section, in SSID or Name field, enter unique name for wireless network. Now check the box so as to start SSID broadcast which will turn on wireless network so that it can be seen by anyone.

Step 6 Select security methods:

From the list of security options you need to select WPA2-PSK as encryption method for security. Such type of security is hard to break and will give full protection from hackers.

Step 7 Create a passphrase:

After selecting security method, now you need to enter passphrase for network which should be a type of hard and complex password that should be combination of letters, numbers, and special symbols.

Step 8 Save your settings:

After completing naming and give security to wireless network, you now have to click on Apply or Save button. With this, all your changes get saved in few moments.

Step 9 Change your router's username and password from the default:

Once you have your network configured, you should change the username and password that you use to access your router. This will help protect your router from unauthorized changes. You can change these from the Administration section of the router configuration menu.

Step 10 Block sites:

Now if you need to save your device which is connected to network from accessing certain websites, you need to apply built-in blocking tools which will stop all the access. It is present in Security/Block section of router.

Check your progress 6

1. After configuring your router, you need to:

   a. Save It

   b. Erase It

   c. Delete It

   d. None Of This

1.8 Let Us Sum Up

In this unit we have learnt that ADSL broadband an important internet connectivity technology which is a type of internet connection that works on existing telephone line. It is found that Asymmetric digital subscriber line is a form of digital subscriber line technology where data communications technology makes faster data transmission through copper telephone lines rather than standard voice band modem.

It is noted that PSTN is Public Switched Telephone Network which is a global mixture of interconnection that is designed to handle circuit switched voice communication. An Asymmetric digital subscriber line uses vacant similar bandwidth that uses wires and works with frequency splitter device that split in standard voice telephone line with two frequencies.

1.9 Answers for Check Your Progress

Check your progress 1

Answers: (1 –b)

Check your progress 2

Answers: (1 -a)

Check your progress 3

Answers: (1 –b)

Check your progress 4

Answers: (1 –c)

Check your progress 5

Answers: (1 -d)

Check your progress 6

Answers: (1 –a)

1.10 Glossary

1. **ADSL -** It is a broadband for connecting internet that works on existing telephone line.
2. **PSTN -** It is Public Switched Telephone Network which is combination of interconnection which handle circuit switched voice communication.

1.11 Assignment

What are the features of ADSL?

1.12 Activities

Discuss steps how to configure a Wi-Fi Modem.

1.13 Case Study

Are you institute equipped with PSTN.

ADSL
Broadband
Internet and Wi-Fi
USB Dongles

1.14 Further Readings

1. An Introduction to Modern Electronic Media, Joseph Dominick, Barry Sherman, and Fritz Messere
2. Introduction to Wi-Fi technology; Lawrence Harte.

UNIT 2: WI-FI USB DONGLES

Unit Structure

2.0 Learning Objectives

After learning this unit, you will be able to understand:

- About Wi-Fi Dongles.
- About architecture of Wi-Fi Dongles.
- About configuring Wi-Fi Dongle.

2.1 Introduction

A dongle is a small piece of computer hardware which can be connected to another device say USB to provide internet services. A dongle works with software which on installing will allow dongle to connect to internet. It is mostly connected on USB ports on computer or laptop. Dongle is associated with a device which provides wireless connectivity to devices with USB connections.

ADSL
Broadband
Internet and Wi-Fi
USB Dongles

Fig 2.1 Wi-Fi dongle

Dongle is a Wi-Fi computing internet device which is fixed in USB Port available on computer or laptop. Dongle is a plug and play devices which is fixed to connect to internet. Dongles are there in many configurations and in different make which are used for locating and connecting to wireless internet connection for a laptop or desktop. They are popular computing device as they allow more flexibility and movement as compared to fixed-line internet connections. They are external devices which simplify use of secured software when attached to laptop or computer and are easy to carry and simple in use.

2.2 Motivation and Need for Wi-FI Dongles

Dongle also known as USB Wi-Fi adapter is a plug and play device which can be used on desktop or laptops and can be connected to universal serial bus (USB) ports for connecting to wireless network. They are portable and require no telephone lines. They are easy to carry anywhere and can be connected to internet in home, office or public place. They are simple to carry and easy to handle and because of such quality, they are preferred nowadays instead of ADSL modems. They are cheap in price with high configuration and simple to connect across globe. While connecting to internet, it helps in accessing shared files, devices and documents or helps in connecting for chat on Internet. Because of their compact size and high speed, dongles are preferred as they can be used on computers or laptop on in any USB supportive designs.

As commonly available nowadays, dongle serves as fast compatible USB device which is less expensive and can be replaced fast because of its good and prompt services. They are vertical stick which is USB Wi-Fi enabled and connects fast across the internet.

Fig 2.2 Wi-Fi adapter

Wi-Fi dongle is a wireless computer network adapter which uses high frequency radio signals that can transmit and receive information using Ethernet protocol. Dongle works on the principle of sending and receiving signals that helps the receivers and transmitters that are wider in range which are normally 20 metres that works indoor. Devices such as computers connect to the network via Wi-Fi hotspots. Mobile phones, media players, and other consumer electronic devices are also capable of connecting to these networks. Wi-Fi connectivity allows you to connect to the Internet wirelessly at home, in the office, at an airport, in a coffee shop, or anywhere near a public access Wi-Fi hotspot.

Dongle or USB adapters are fast internet connectivity USB device which are manufactured by many companies. The speed of connectivity depends on speed of receiving and sending of signals, so companies nowadays are taking care of all essential features in this competitive world. They are available in various configurations from 4MBPS to 128MBPS with low price. You'll find it priced around $50. The D-Link AC1900 Wi-Fi USB adapter is an upcoming product that should enable even greater performance.

A Wi-Fi connection in the workplace allows users to connect to the local area network immaterial of the place and location. They are mostly used nowadays for meeting, training rooms, presentation halls and for online lecturers. If the business is housed in more than one building a Wi-Fi network can connect buildings' networks to each other. It is simple and flexible and can be handled easily with wide scope in small or big business. Wi-Fi is the perfect solution for staying flexible and keeping staff connected. Since there is no need to reroute cables, moving offices as the business starts to grow has no costs attached. Opting for USB dongles and adapters instead of upgrading or installing onboard network adapters could mean substantial savings.

Check your progress 1

1. Dongle works on the principle of:

   a. Wi-Fi technology

   b. Leased line technology

   c. ADSL technology

   d. All of above

2.3 Basic architecture and working

A USB wireless adapter is known as dongle which is made of plastic cabinet having digital circuit that is used to connect the device with the internet. In earlier usage, dongle acts as hardware key which is normally applied in order to run certain network applications. It is another form of broadband wireless adapter.

In today's time, dongle comes with 3G/4G USB technology. It is compact in size and varied in configuration with various sizes and shapes. It is similar to USB flash drives and is used as flash drives or memory stick. This flash memory contains a file system with software which the host computers can load and run. In this, the software includes a driver for one or more operating systems (OSs) and a management application which will help the user to control certain applications. Normally, the flash memory is applied for software which provides routing software that will help in routing of packets to WLAN or 3G interfaces. All the necessary drivers and software are stored in the dongle by the manufacturer so that the user can conveniently use the dongle immediately (or soon) after they plug the dongle into their laptop.

Each USB dongle contains a small modem and transceiver inside the dongle, enabling the device to connect to a 3G/4G network. To access the Internet via a cellular network the OS frequently makes use of the dongle as a modem to connect to a terminal server via PPP. The OS begins by negotiating the protocol family it is going to use, gets assigned an IP address, and then the OS encapsulates IP packets into PPP frames and transmits these frames over the PPP link to their destination. If the connection is lost, then the process has to start all over again. This is the approach used by many current dongles, but in this thesis a new approach is proposed.

Check your progress 2

1. Wi-Fi Dongle comes with:

   a. 3G technology

   b. 4G technology

   c. Both a and b

   a. Neither a nor b

2.4 Connecting and configuring Wi-Fi Dongle with PC

A USB Wi-Fi adapter or dongle connects a computer or laptop to Wi-Fi network. If the computer is not having network card, then such type of device will allow you to connect to internet without installing network card in the computer. Also if your computer has outdated network card, you can also upgrade it without removing old card. In such case, you need to disable the integrated wireless network card in order to allow new card to install. Wireless networking lets you connect your computer to other devices on the same network or share an Internet connection. Nowadays the requirement of cables are not there, which on the other hand becomes convenient, as you can watch internet on laptop which can be carried to any place or network location and once connected the data can be shared among two or more computers in a network. Once the device is connected, you can share files, videos, printers, scanners and Internet connection across in network. If you own a small business, keeping employees connected is easy, and there are no costs involved in moving computers from one office to another should your business grow.

Connecting a dongle to desktop or laptop computer requires few simple steps which can be carried out by instructions as provided. Users can learn how to connect dongles to laptops with the click of a few buttons. For a laptop or computer that does not have integrated wi-fi or a wireless card, wi-fi dongles are an easy way to enable wireless functionality. Users may begin by plugging the wi-fi dongle into the USB port. Once the operating system reads it, add the installation CD and follow the steps that appear on the screen. In some cases, the computer requires a complete reboot. Once completed, a wi-fi icon will appear on the screen, showing a list of available wireless networks. Then, it’s time to select the wireless network and start surfing.

- After plugging the dongle, you will see a pop message asking you to auto-install the device on your desktop or laptop computer.
- Now you need to click on Install button and wait for the completion of process.
- If you don't receive the auto message, in such case you need to go to My Computer and select the Wi-Fi device.
- On the Wi-Fi device, you have to double click in order to start the installation.
- After installing, the Wi-Fi device will create a shortcut icon on desktop, on which you have to double click in order to make the dongle run.

Check your progress 3

1. Wi-Fi Dongle:

   a. Requires software to installing

   b. Can be installed directly using latest operating system

   c. Needs USB port

   d. All of above

2.5 Let Us Sum Up

In this unit we have learnt that a dongle is a computer hardware which is connected to USB to provide internet services and works with software that is required to connect to internet. It is known that a Dongle is a USB Wi-Fi adapter which is a plug and play device that on affixing with desktop or laptop's can be connected to internet.

It is seen that a USB wireless adapter is a dongle which is made of plastic with digital circuit that connects device with internet and is also another form of broadband wireless adapter. It is noted that a dongle is connected to desktop or laptop computer which can be installed in simple steps and provides user with how to connect dongles to laptops with few buttons.

2.6 Answers for Check Your Progress

Check your progress 1

Answers: (1 -a)

Check your progress 2

Answers: (1 -c)

Check your progress 3

Answers: (1 –d)

2.7 Glossary

1. **ADSL -** It is a broadband for connecting internet that works on existing telephone line.
2. **PSTN -** It is Public Switched Telephone Network which is combination of interconnection which handle circuit switched voice communication.
3. **Dongle -** It is a portable Wi-Fi internet device which is connected with USB interface for internet.

2.8 Assignment

Explain the working of Wi-Fi Dongle.

2.9 Activities

Write steps to install dongle in laptop computer.

2.10 Case Study

Compile the details about hardware configuration of Wi-Fi Dongle.

ADSL
Broadband
Internet and Wi-Fi
USB Dongles

2.11 Further Readings

1. An Introduction to Modern Electronic Media, Joseph Dominick, Barry Sherman, and Fritz Messere.
2. Introduction to Wi-Fi technology; Lawrence Harte.

Block Summary

In this block, you will understand about the basic of Asymmetric Digital Subscriber Line and its working techniques. The block gives an idea on architecture of Public Switched Telephone Network with study about their characteristics. The examples related to usability and advantages are well detailed.

In this block, you will understand about the basic of necessity of Wi-Fi portable Dongle and its installation in windows. The concept related to distribute internet connectivity without wires are well detailed which will allow you to compare Wi-Fi technology with ADSl technology.

ADSL
Broadband
Internet and Wi-Fi
USB Dongles

Block Assignment

Short Answer Questions

1. What are the advantages of PSTN?
2. What are the features of ADSL?
3. What are the advantages and drawbacks of Wi-Fi Dongle?
4. What is the quality of Wi-Fi Dongle?
5. Explain the features of USB dongle?

Long Answer Questions

1. Explain steps to install Wi-Fi router?
2. What are the different types of Wi-Fi Dongles?
3. Explain the characteristics of Dongle?

Enrolment No. ☐

1. How many hours did you need for studying the units?

Unit No	**1**	**2**	**3**	**4**
Nos of Hrs				

2. Please give your reactions to the following items based on your reading of the block:

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____ _____
Language and Style	☐	☐	☐	☐	_____ _____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____ _____
Conceptual Clarity	☐	☐	☐	☐	_____ _____
Check your progress Quest	☐	☐	☐	☐	_____ _____
Feed back to CYP Question	☐	☐	☐	☐	_____ _____

3. Any Other Comments

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Education is something which ought to be brought within the reach of every one.

- Dr. B. R. Ambedkar

Dr. Babasaheb Ambedkar Open University
Jyotirmay' Parisar, Opp. Shri Balaji Temple, Sarkhej-Gandhinagar Highway, Chharodi,
Ahmedabad-382 481.

Fundamentals of Computer Networking (FCN)

PGDCA 201

BLOCK 4:
INTERNET ACCESSING AND APPLICATION

स्वाध्यायः परमं तपः

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Fundamentals of Computer Networking (FCN)

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ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self-instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual-skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self-instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)

PREFACE

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included may tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

FUNDAMENTALS OF COMPUTER NETWORKING

(FCN)

Contents

BLOCK 3: ADSL BROADBAND INTERNET AND WI-FI USB DONGLES

UNIT 1 ADSL BROADBAND INTERNET

Introduction to ADSL broadband technology, motivation for ADSL Broadband, PSTN Basics, ADSL Modem basic architecture, working, standards, ADSL Wi-Fi Modem and Router, configuring a wired ADSL Modem for Internet Access, configuring a Wi-FI ADSL modem/Router for Internet Access

UNIT 2 WI-FI USB DONGLES

Motivation and Need for Wi-FI Dongles, basic architecture and working, connecting and configuring a Wi-Fi Dongle with a PC.

BLOCK 4: INTERNET ACCESSING AND APPLICATION

UNIT 1 TETHERING FOR INTERNET ACCESS

Need and Motivation for Tethering, Tethering with Wi-Fi, Tethering with Bluetooth, Tethering with USB Cable, Reverse Tethering

UNIT 2 INTERNET/LAN APPLICATIONS

Popular Browsers like Internet Explorer and Chrome, their configuration and settings, FileZilla File Transfer software, Team Viewer, Remote Desktop, Telnet, Microsoft Outlook Express.

Dr. Babasaheb
Ambedkar
Open University

PGDCA 201

Fundamentals of Computer Networking (FCN)

BLOCK 3: INTERNET ACCESSING AND APPLICATION

BLOCK 4: INTERNET ACCESSING AND APPLICATION

Block Introduction

Internet is interconnection of various networks. It is also known as the World Wide Web, it's a huge web spreading across the globe for information interchange. Internet is one such convention that cannot be seen but based upon its services provided internet is one big giant that is very user friendly, feasible and at your tips.

In this block, we will detail about the basic of tethering applicable in cell phone and Internet connectivity with Desktop or Laptop. The block will focus on tethering technique involved in sharing smartphone's Internet connectivity with computers with devices using USB cable. The concept of WiFi technique and working characteristics are also explained.

In this block, you will make to learn and understand about the basic of working of web browsers and working techniques of Internet Explorer, Google Chrome and Firefox. The concept related to Remote desktop and Telnet programs allows students you to know more about remote login. You will be demonstrated practically about use of File Zila software which can be used for uploading and downloading of files on web.

Block Objective

After learning this block, you will be able to understand:

- The requirement for Tethering.
- Features of Tethering with Wi-Fi, Bluetooth and USB Cable.
- Characteristics of Reverse Tethering.
- Understanding about Browsers.
- Idea about File Zilla File Transfer software.
- Characteristics about Microsoft Outlook Express.

Block Structure

Unit 1: Tethering for Internet Access

Unit 2: Internet/LAN Applications

UNIT 1: TETHERING FOR INTERNET ACCESS

Unit Structure

1.0 Learning Objectives

After learning this unit, you will be able to understand:

- About Tethering.
- About Tethering and Bluetooth.
- About Reverse Tethering.

1.1 Introduction

Tethering is the use of cell phone as modem for another device, usually a laptop or a Wi-Fi-only tablet. It is the best way to share phone's Internet Connection with Desktop or Laptop. It provides solution for those who use

Internet accessing and application

Cellular Internet Connection on their phones and want to use the same Connection on their Desktop too.

Tethering can be done in three ways, via USB, via Wi-fi or via Bluetooth. USB Tethering is nice but why would you want to use a USB cable when you can tether wirelessly. Wi-fi tethering is again good but not economical; it drains the battery of your phone quickly. The best way to wirelessly tether your desktop using your phone is using Bluetooth Tethering.

This gives you internet access when you want and can be worked at hotel or at home. Tethering enables us to go online from our laptops, tablets, and other mobile devices like portable gaming systems even without a built-in 3G or 4G mobile data plan. Finally, tethering could help you conserve laptop battery power, because Wi-Fi can be turn off on laptop and further phone can be used as modem.

It is also noted that speed you get on tethered device may not be as fast as see on cell phone itself as the information has to take that extra step over the air or through the wire. With 3G service on your handset, upload and download speeds will typically be less than 1 Mbps. If you're in an area not covered by mobile broadband, you'll likely get speeds only a few times faster than dial-up.

1.2 Need and Motivation for Tethering

Tethering is the method of sharing smartphone's Internet connection with computers or with several other devices which can be done by connecting the devices with USB cable, Bluetooth wireless link or with Wi-Fi connection.

Tethering is a way of making cell phone to work as modem for another device which can be laptop or tablet. With this, the Internet can be taken from phone and can be shared with device that carries Internet connection quality. Tethering the phone is useful at that time when you need to get laptop online as fast as possible. It is easy and simple technology and depends mostly on service provider’s conditions and phone capabilities.

With this method, people can use internet on their mobile devices. Since due to emerging technology, nowadays the people are very particular to check their mails anytime or can talk or write whatsapp messages, so such type of technology are nowadays preferred. With this fast technology timming, people are very much after the view of adopting such technology for faster updated features. It is seen that mostly all mobile devices are equipped with tethering quality that allows them to make the internet available to user along with voice anytime and anywhere.

Check your progress 1

1.Tethering works in:

a. Desktop

b. Laptop

c. Palmtop

d. Mobiles

1.3 Tethering with Wi-Fi

Tethering is a good and easy way to provide Internet access to other devices which can be laptop or desktop computer. Tethering is about what many people got excited long back in early days when the mobiles were there. Tethering will take less energy which makes the mobile to work faster by expending power through antenna which allows communicating with carrier. Since the tethered connection requires wires instead of wireless, still it is safer, secure and results in faster access.

Tethering using WiFi serves as a simple and easiest way to set which is perhaps well-matched with many types of devices. Simply put, if your laptop includes WiFi support, you should be able to tether with the use of WiFi by quickly and easily using any hotspot. The main advantages of such technique results in faster, quicker, easy and compatible activities those are compatible with everything. You're also not limited to connecting just one device like you are with the USB method, though some OEMs cap connections to five or so. WiFi, depending on what security configuration you use, could be anywhere from not secure at all, to "fairly" secured. Also, since you're not required to plug in to a USB port, your battery is going to wipe out while you're in the process of tethering. Bringing along a wall charger or a portable battery pack would be advisable.

Check your progress 2

1. Tethering Wi-Fi is:

   a. Simple

   b. Fast

   c. Faster installation

   d. All of above

1.4 Tethering with Bluetooth

Bluetooth is an excellent method for tethering. Similar to Wifi, you can connect multiple devices to your smartphone without using wires. Similar to WiFi, it requires no cable with less power consumption. Bluetooth tethering is a built in feature which is commonly available in Android mobiles that can be easily setup and requires pairing of smartphone with desktop or laptop for setting connection type on laptop bluetooth settings.

For this, initially you need to do pairing of mobile phone with your computer with the help of Bluetooth technology. On enabling Bluetooth both on Android phone and PC, you can open System Preferences by clicking on Bluetooth and by Setting up of New Device in Device and Printer section. Now, in phone, go to Settings, in Wireless & Networks and click on Tethering & portable hotspot as shown in fig 1.1.

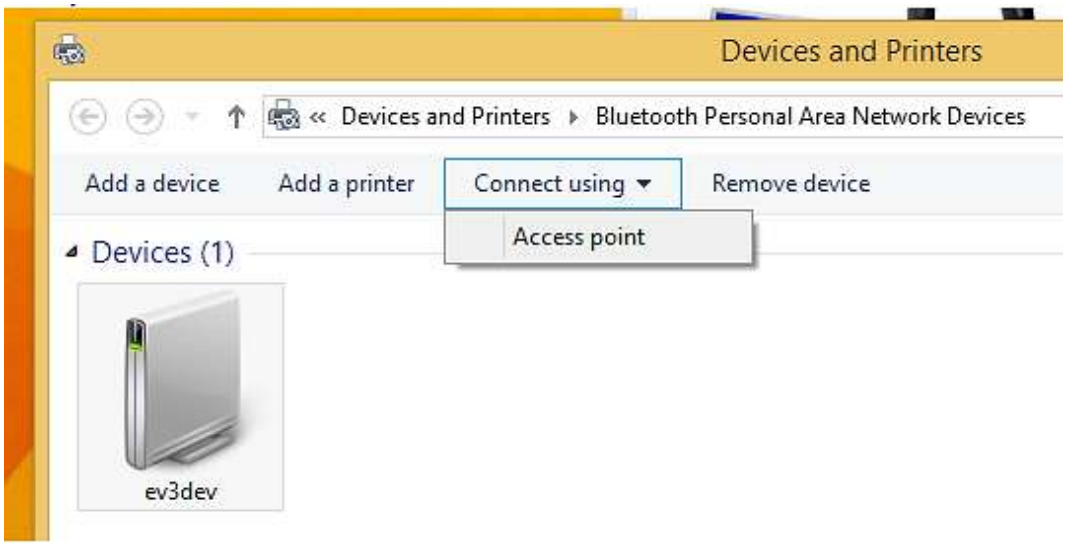

Fig 1.1 Bluetooth setting

In computer, you need to go to Bluetooth Preferences selection area and select phone from the list and click on Connect to Network option which will automatically connect. Further you can check Show Bluetooth in menu bar option which is located in Bluetooth Preferences. After checking, it displays Bluetooth icon in the menu bar and make use of icon so as to connect to phone quickly. Now clicking on Bluetooth icon, you have to select the device which you want to connect with and then click on Connect to Network.

As the speed is slower in WiFi tethering, the main advantage to Bluetooth tethering is low battery drain which is in comparison with WiFi tethering just like USB tethering where single connection is allowed through Bluetooth as shown in fig 1.2.

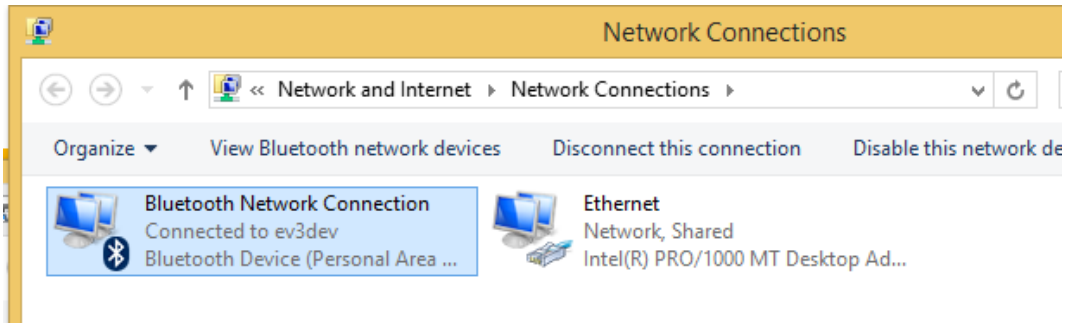

Fig 1.2 Connection of Bluetooth

It is found that Bluetooth is mainly designed for mobile use, where it is comfortable for battery prospects as it consumes less power to do particular job as compared to WiFi tethering.

It is normally seen that people will perform such type of setting since very few involves in setting of WiFi which in comparison with Bluetooth tethering. If power consumption is an issue, Bluetooth is mostly the way to go, if you're ready to configure it.

Features of Bluetooth Tethering are as follows:

- It is another form of Wireless Tethering and it is independent and does not require any router.
- One can easily connect it with PC and use phone as modem for Internet.
- It can be enabled with a touch of your finger.
- It saves Battery if compared to Wi-Fi and USB tethering.
- One needs to have Bluetooth in both the connected devices.

Check your progress 3

1. The excellent method for tethering is:

   a. Wi-Fi

   b. Bluetooth

   c. Network

   d. None of above

1.5 Tethering with USB Cable

Connect internet in Computer or Laptop by android mobile with USB cable is more common today. Today many android phones have facility to share its data packet with personal computer or laptop by just allowing only single check box of your mobile. It is normally seen that connecting internet to laptop using USB cable will be easy. You will not be requiring any PC suite for connecting to access internet nor do you need user-id and password to access. This is all possible by tethering feature which actually applied for sharing of Internet connection of mobile phone with other devices with the use of cable. You can even access internet on PC by mobiles using WI-FI tethering and Bluetooth tethering feature.

There are steps to be followed while using tethering with USB cable:

Step 1: Initially you need to connect your mobile with Computer or Laptop with the help of USB cable.

Step 2: Now check whether your data packet is enable or not and further ensures that your internet is properly working in mobile and also you are able to open web pages on your android mobile.

Step 3: After performing this, go to mobile setting and select wireless and networks and select “Tethering and portable hotspot”.

Setting -> Wireless and networks ->Tethering and portable hotspot.

Now select “USB Tethering” and make it enable as shown in fig 1.3.

Fig 1.3 Setting screen

Step 4: In this, check for internet network which appears in your computer in the bottom right position as shown in fig 1.4. You have to click on that icon to check the notification that if you can make internet access.

Fig 1.4 Internet network access screen

Check your progress 4

1. Internet network icon on computer screen is located on:
   a. Taskbar
   b. Desktop
   c. Desktop icons
   d. None of these

1.6 Reverse Tethering

Reverse tethering is a method which can be used to share your PC internet connection with other devices such as android phone or tablet. This is a reverse

process of tethering. Reverse tethering can be done in many ways. It is a method of sharing computers internet connection to Android based device using USB cable. To use Reverse Tether, simply connect your phone to your computer using a USB cable. After setting Reverse Tethering, you can connect to Internet immediately and easily. Every time if you want to work on Internet, you need to simply insert your phone in your computer using USB cable. Initially, you need to have your device rooted for Reverse Tether to work. You should have a tether option on mobile device and you computer should have an option to edit network connections, which most computers do. Reverse Tether has certain disadvantages as it is not functional on all devices. As per the feedback, application worked on certain devices which can be Samsung Galaxy S2, Samsung Galaxy 5 and Sony Xperia Arc. It involves factors related to carrier restrictions or configuration of phone that shows whether Reverse Tether will work on phone or not. The application is not free and comes with trial version which allows connecting for certain time. Reverse Tethering can be done by following the steps shown:

Step 1: Select USB Internet option which is built-in option available in specific model devices. It works both on rooted and non-rooted devices and requires USB Cable.

Step 2: Connect the android with the laptop using USB cable using settings option in android phone.

Step 3: In wireless & networks option, select option of USB internet and select an operating system.

Step 4: Now click the next option and finally click on done button.

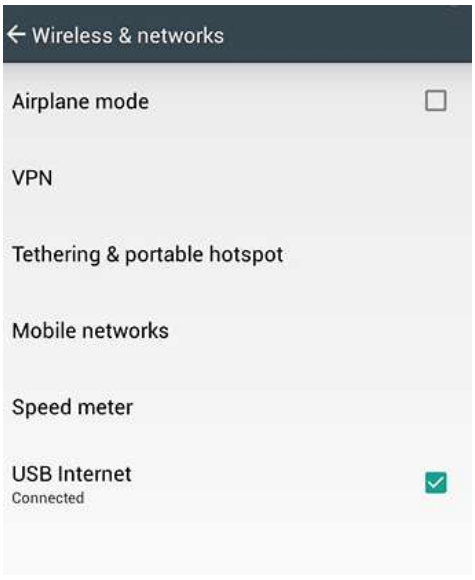

Fig 1.5 USB internet - reverse tether

Step 5: On final selection, you will find the device get connected with new adapter in computer.

Step 6: Click on properties of internet connection which you wish to share using the navigation sharing tab.

Step 7: Select the first option and choose new adapter from drop-down list and press OK button.

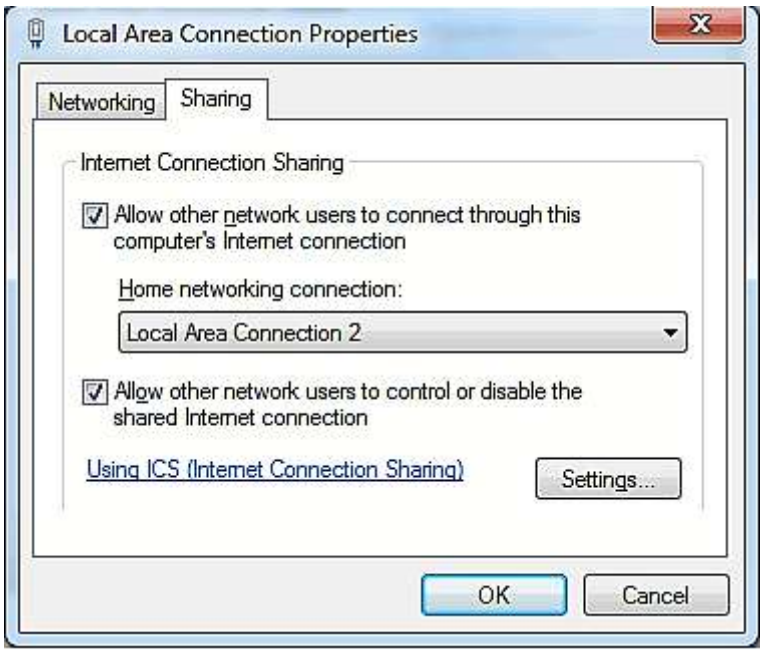

Fig 1.6 reverse tethering - share internet connection

Finally you will find that the internet is shared with android with the help of USB internet option.

Check your progress 5

1. Reverse tethering involves sharing of PC internet connectivity with:

   a. Pen drive

   b. Dongle

   c. Mobile

   d. All of above

1.7 Let Us Sum Up

In this unit we have learnt that tethering uses cell phone as modem to share phone's Internet Connection with Desktop or Laptop. It is known that tethering shares smartphone's Internet connection with computers or with other devices by connecting devices with USB cable, Bluetooth wireless link or with Wi-Fi connection.

It is known that tethering uses WiFi which serves as simple and easy way to set and match with many devices. It is found that bluetooth is method for tethering which is same as Wifi that connects various devices to smartphone without wires. It is seen that reverse tethering allow sharing of PC internet connection with other devices like android phone or tablet which shares computers internet connection to Android based device using USB cable.

1.8 Answers for Check Your Progress

Check your progress 1

Answers: (1 – d)

Check your progress 2

Answers: (1 - d)

Check your progress 3

Answers: (1 – b)

Check your progress 4

Answers: (1 – a)

Check your progress 5

Answers: (1 - c)

1.9 Glossary

1. **Tethering -** Method that uses cell phone as modem for sharing phone's Internet Connection with Desktop or Laptop.
2. **Bluetooth -** It is a method for tethering which connects many devices to smartphone without wires.
3. **Reverse tethering -** It is a method that shares PC internet connection with devices and shares computers internet connection to Android based device with USB cable.

1.10 Assignment

What is tethering?

1.11 Activities

Explain the role of tethering in mobile devices?

1.12 Case Study

What are the features of tethering activities?

1.13 Further Readings

1. Internet processes tethering, Ronald, 2010
2. An Introduction to Networks, Marconi, 2006
3. Introduction to Understanding the Internet, Worth Godwin, 2010

UNIT 2: INTERNET/LAN APPLICATIONS

Unit Structure

2.0 Learning Objectives

After learning this unit, you will be able to understand:

- About Browsers
- About FileZilla File Transfer software
- About Remote Desktop

2.1 Introduction

Internet is a setup of computers across the globe. Every computer that is connected to the internet is considered as a part of that network. The figure 2.1 shows the arrangement of Computers in a network.

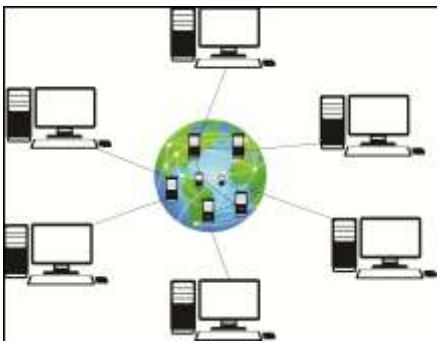

Fig 2.1 Arrangement of computers

In this each computer is connected with server to form the internet. The Internet provides many types of information such as:

- E-mail: It is called as electronic post office that is used to send messages across globe.
- World Wide Web: It is a library of information.
- Newsgroups: It is a platform where people can share and write information.
- Chat Rooms: It is place where live conversation is done among people through computers.

The purpose of Internet connection is to allow a person to communicate with each other. It is often known as World Wide Web that shows a quick and easy exchange of information. Apart from this, the Internet has many scope and applications.

Local Area Network (LAN): LAN is a computer network that consists of few or more computers and other communication devices connected in the form of a network within a well-defined area such as a room or a building. A typical example is a college or university computer network. Users in a LAN can share both hardware and sharable software resources. For example, hardware resources include expensive laser printer, plotter, fax machines, modem, etc. Almost all local area networks use a single communication medium, as it is restricted to a limited area. All network resources and their management activities are controlled by means of special system software called Network Operating System (NOS).

2.2 Popular Browsers like Internet Explorer and Chrome

Internet browsing serves as an important part of our day-to-day lives where you can browse things in no time because of availability of software's that are available for web interface. Web browsers results in great impact on the way we observe the internet, so we need to choose correct and appropriate anyone which is required.

Internet Explorer

Internet Explorer also known as Microsoft Internet Explorer is a free web browser application which is produced by Microsoft in the year 1995. It was designed in response to first geographical browser which is Netscape Navigator. Microsoft introduces Internet Explorer as its first web browsing platform in August 1995 with the version of Internet Explorer 1.0 that was initially covered with Microsoft Windows 95. Internet Explorer has been included with all versions of Windows since then.

To start using Internet, double click the mouse pointer on the blue "e" symbol on the desktop. This will start the Internet Explorer. If you learn just a few basic things about browsing the Web, such as how to use the buttons on Internet Explorer (IE) toolbar, you will find that browsing the web is very easy. A page known as Home page appears on your screen when you start the Internet Explorer. If the default Home page is already set in for example, www.academic solution.com then whenever you start with Internet Explorer, you will get the home page of the site www.academic solution.com.

Google Chrome

Apart from Internet Explorer, Google Chrome is also an internet browser which was developed and launched by Google Inc. That is a mixture of minimum design with special technology that allows Web to work faster, safer and easier. Google Chrome offers features which includes access to favourite pages at the same time using thumbnails, desktop shortcuts to launch Web applications and will able to run tabs independently inside the browser so as to save the browser from crashing. Chrome browser is available for Windows Vista, Windows XP, Window 7 and SP2.

It is a faster and famous web browser apart from Microsoft Internet Explorer and Mozilla Firefox. Google Chrome browser has certain features which include:

- Browser sync
- Tabbed browsing
- Translation
- Spell check
- Resize form text boxes
- Omnibox etc.

Google Chrome browser is light weight as it doesn't come with pre-loaded add-ons or plug-ins. There are many types of add-ons and plug-ins that can be easily downloaded and installed in Chrome browser along with extra features and functions.

It is noted and seen that Chrome comes with default home page and allows the user to remember their sites after their visit. It is commonly used browser nowadays as it is easy to access and is simple for user in browsing things on internet. Fig 2.2 shows the home page of Google which comes with many default items. In this the frequently visited website gets shortcut as seen in fig 2.2 where user on clicking can directly visit those particular websites. It has a provision to bookmark the webpage and has good history.

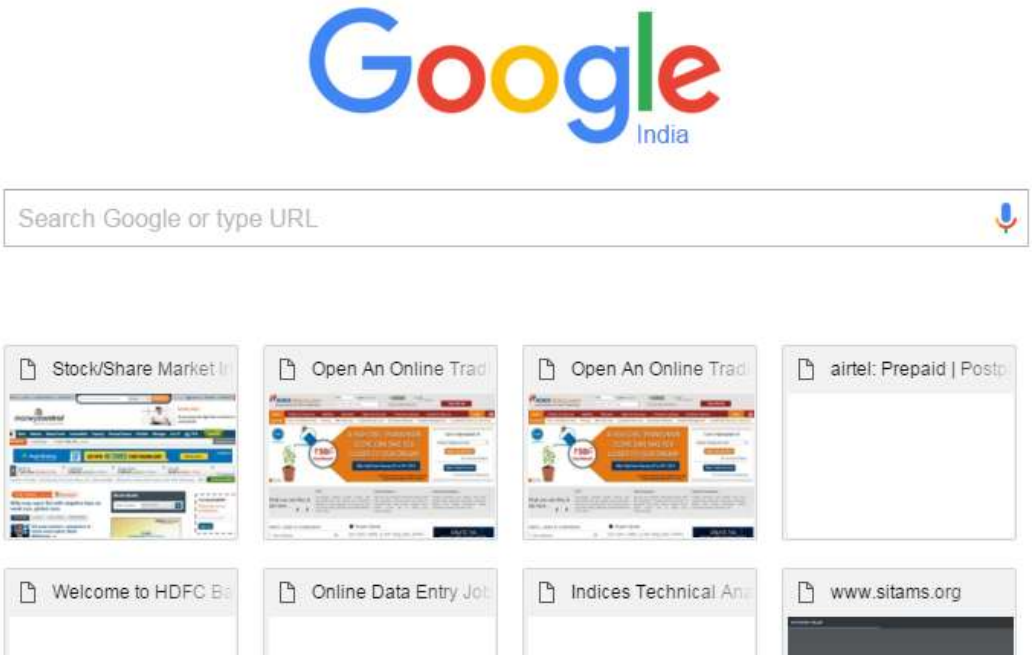

Fig 2.2 Google Homepage

Chrome tabs browsing of new power and hold the tab and drag it out on individual window. It has a provision to drag and drop tabs with existing windows that can easily combines and let you to start and work in any tab configuration which can be custom setup or tab setting in previous session.

Check your progress 1

1. Which among the following is not a web browser?

   a. Google Chrome

   b. Internet Explorer

   c. Microsoft Word

   d. Firefox

2.3 Configuration and settings

Web browsers are common platform that allow the users to visit on internet and can browse their product. Normally it is noted that every browser needs to be configured initially. After loading of windows and connecting on internet, your windows will prompt for web browser to be used in default setting. You can even

set the home page blank also so that each time you start, you will get blank page in address bar of browser. You can also type website URL of site, which you want to visit.

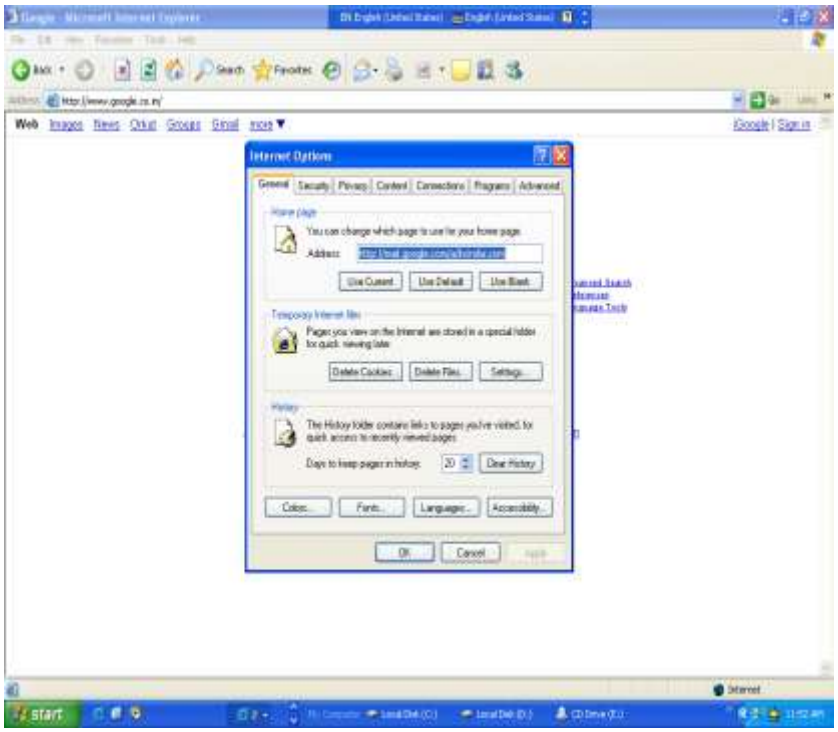

Fig. 2.3: Internet Properties option

The internet properties can be adjusted by right clicking mouse button on IE and further selecting Internet Properties option. You find that at Address space we have given www.google.com.

Click the Stop 

button present on the IE menu. In addition, enter http://www.academicsolution.com/lecture.html at address bar and click on the Go button or press Enter key. Now you will get the home page http://www.educationinfoindia.com/engg/aup.html

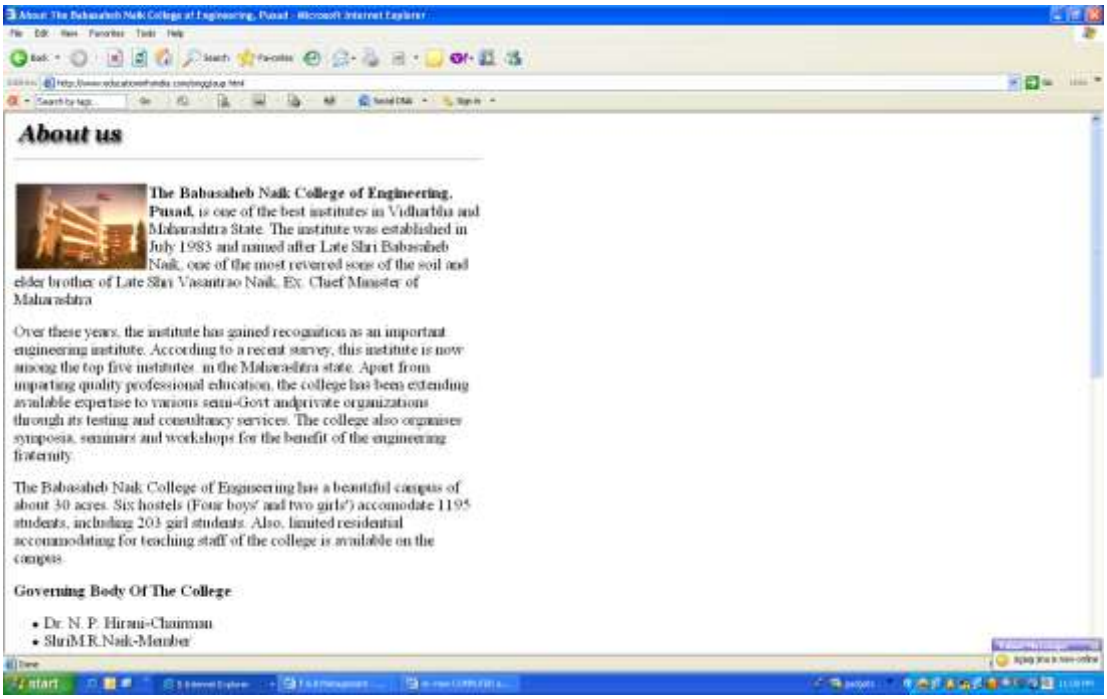

Fig. 2.4: Access a web site

While your request to access a web site is being processed, you can click Minimise button and the minimised page sits on the task bar and again double click on 

. Now type the address of the web site you want to access say www.google.com on the address Bar and click on Go 

button. Now to go back to the previous web site that is www.educationinfoindia.com, minimise the current page and click on the minimised page from the task bar. Like this, you can open up many web sites at a time and switch between them. To end the browsing session click on the Close button.

Check your progress 2

1. Web browsers can be used to:

   a. Search Website Which Is Typed By User

   b. Open Default Website

   c. Browse Automatically Without User Intervention

   d. All Of Above

2.4 FileZilla File Transfer software

FileZilla is a famous software application which is used for uploading and downloading of files online. It is an open source software which is available free of charge. It is used for secure file transfer with the help of SFTP or FTPS among Windows clients or Unix servers is done.

For using and running FileZilla software, you need to download and install the FileZilla software. Once you download, you can open and connect the program to web host, by clicking FileZilla icon located on desktop or in Windows Start menu.

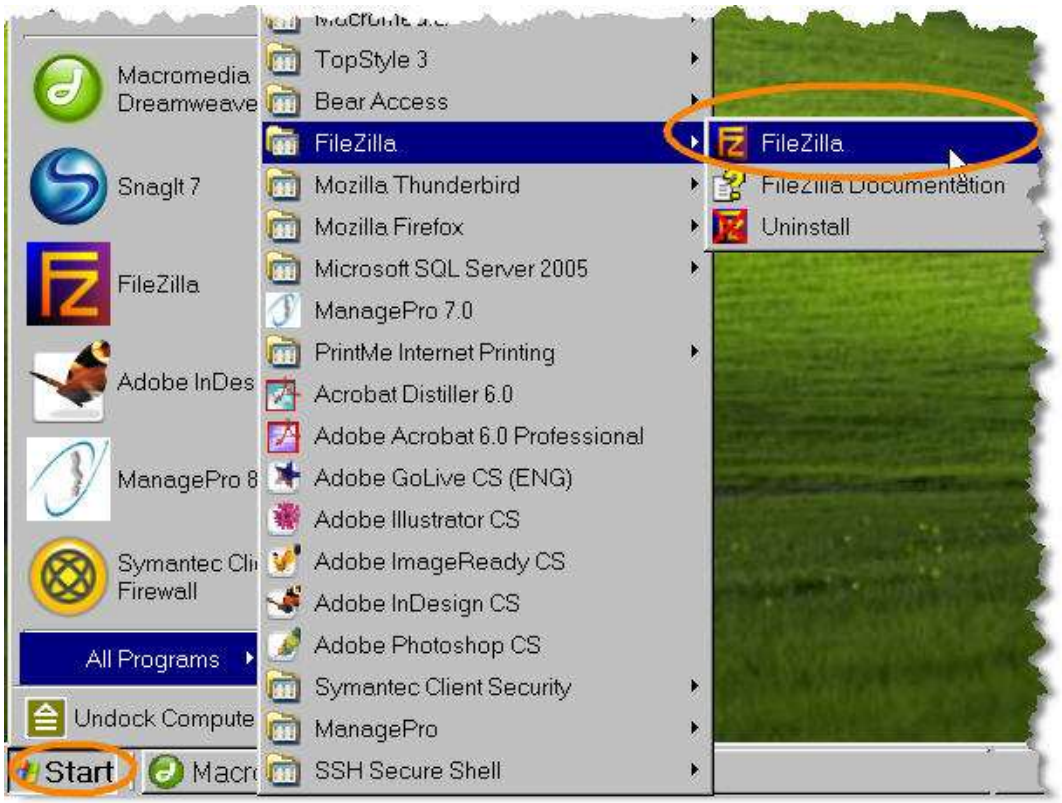

Fig 2.5 FileZilla on menu

From the File menu, select Site Manager.

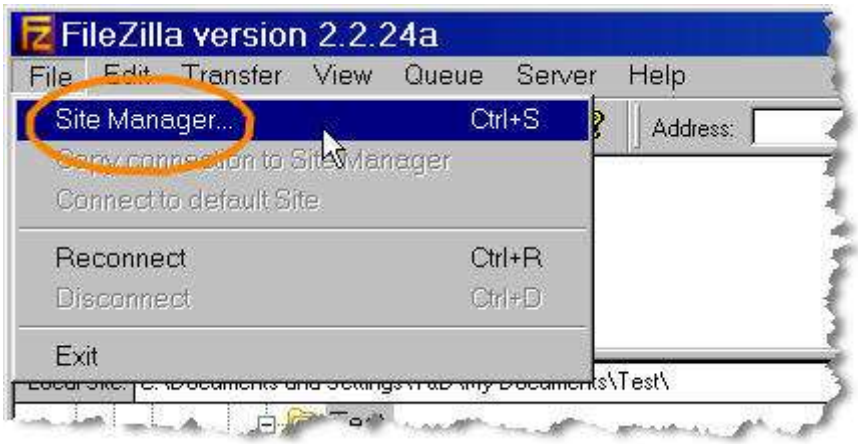

Fig 2.6 Site Manager

Now in File, Click New FTP Site.

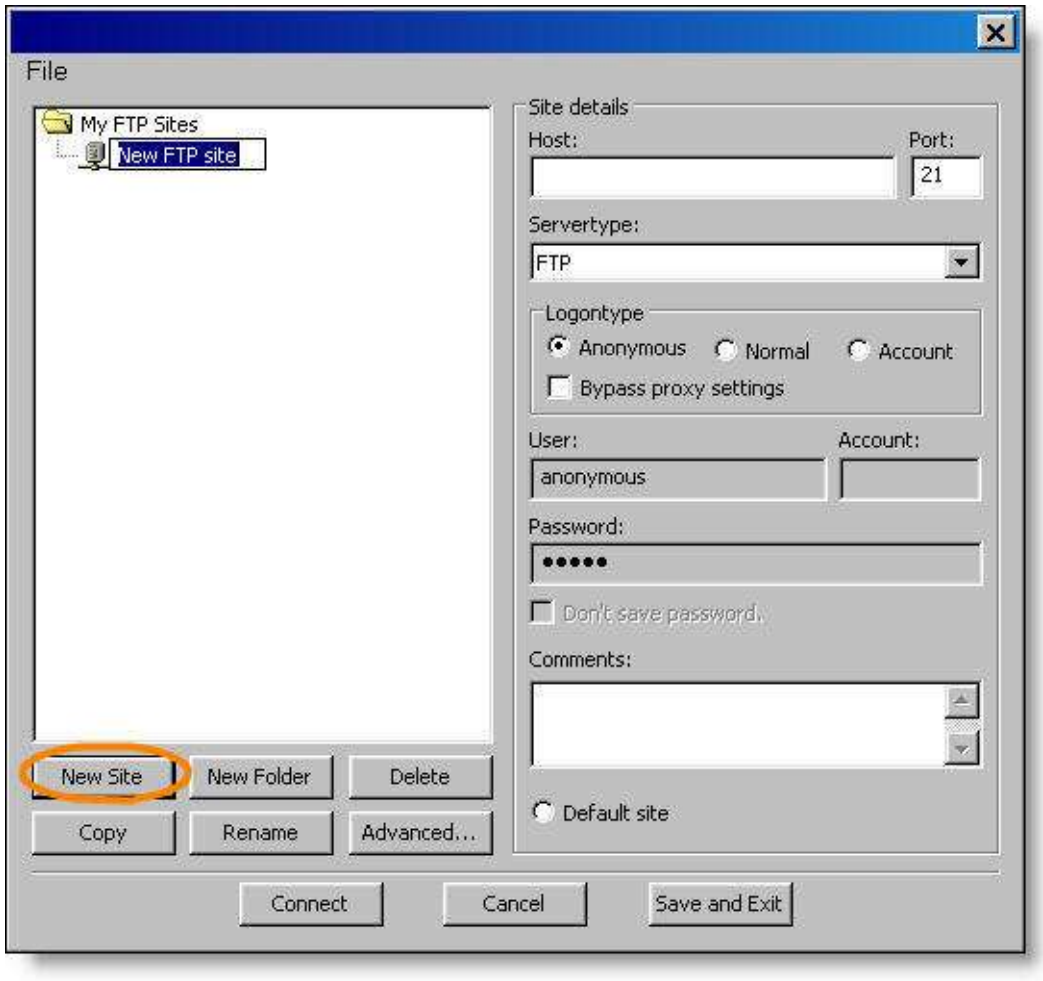

Fig 2.7 Selecting new ftp file

Now you have to enter the information by following steps shows:

Write the Server name in Host box.

Select the drop down option button in Server Type box and select:

- Select FTP over SSL for FTPS transfers.
- Select SFTP using SSH2 for SFTP transfers.

In Logontype option box, select the Normal option.

In the User box, enter the username for this server and select Don't save password box.

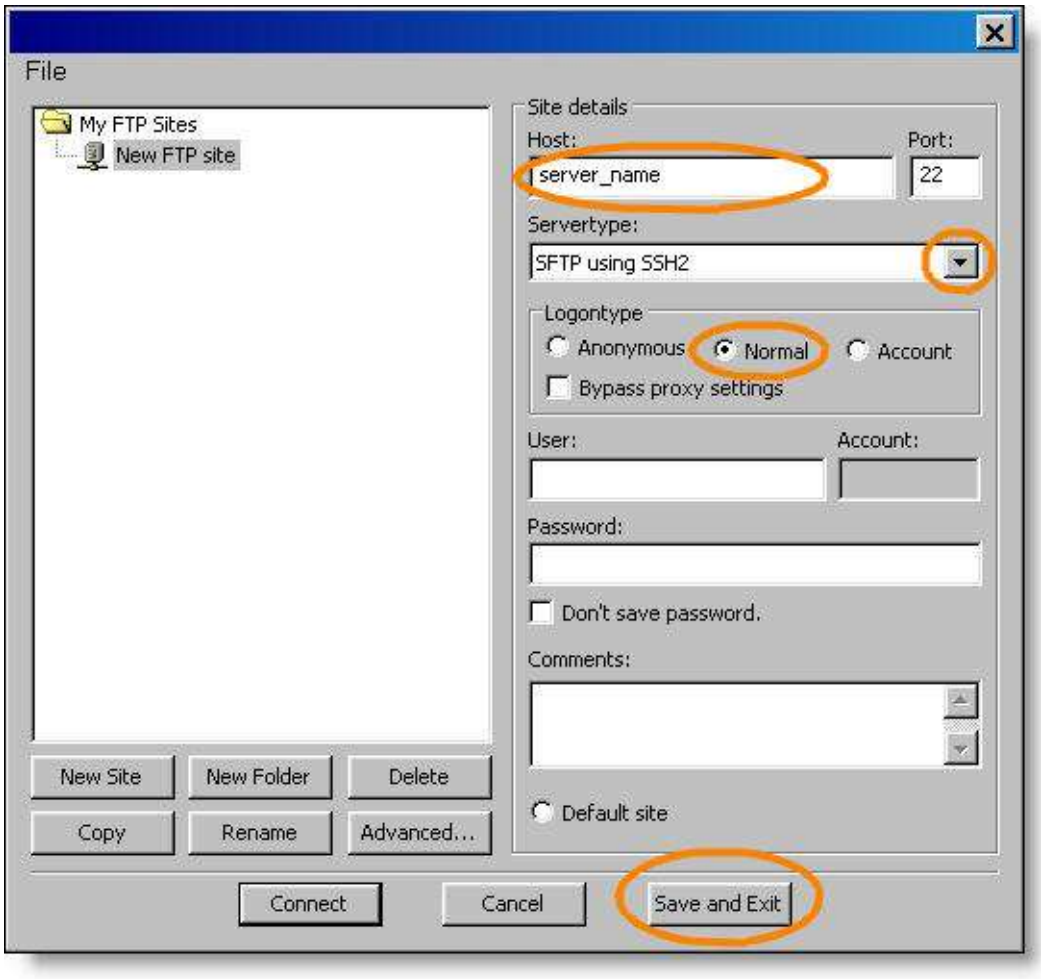

Fig 2.8 filezilla options

Now after entering all the details, click on Save and Exit option.

After giving all the details, you will see that when you open the software next time you will be able to connect directly to the server from the selected options.

Transfer Files Using FileZilla

To transfer the file using FileZilla, you can start FileZilla by clicking FileZilla icon which is placed on desktop or Windows Start menu.

Now you need to click the arrow which is placed next to Open Site Manager button, and then select the server.

Fig 2.9 filezopen

Now in Enter your Password window, in the password section, enter the password for the sever and press OK option.

Fig 2.10 filezpwd

After doing all, you will find that the FileZilla gets open. In this, you will find that the computer which is Local Site is on left of screen while server which is the Remote Site is on the right as shown in fig 2.10. In this, you can drag and drop files or folders to copy files.

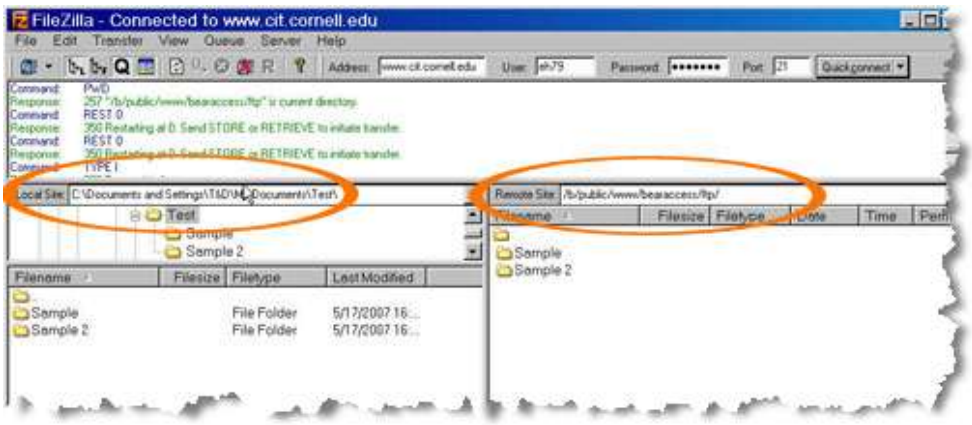

Fig 2.11 FileZilla screen

Check your progress 3

1. FileZilla is used for _____.

   a. uploading of files online

   b. downloading of files online

   c. uploading and downloading the files online

   d. transferring of files in folders in computers

2.5 Team Viewer

Team Viewer is a popular, fast, simple and friendly remote access/control and desktop sharing program which works with Internet. It immediately get control over computer anywhere on Internet by remotely resent yours and computer over internet easily. It is a full solution for remote access and supports over the Internet with any computer or server across the network in few seconds. It is a user-friendly interface which allows beginners and professionals to use even if they have not tested or used this remote Interface before.

With this, your computer screen will be visible to the user without worrying about firewalls, IP addresses and NAT. It is useful in sharing desktop with partner over the Internet in the areas of training, sales and teamwork with software, PowerPoint presentations etc.

Team Viewer appears with built-in file movement which allows you to copy files and folders from and to remote partner. It makes you to remotely control any computer from anywhere on Internet. It works with no installation and simply run with application on both sides of computer in order to connect among each other under strong firewalls. It is a secure utility which has secured data channels with key exchange and RC4 session encoding.

To work with TeamViewer, you need to download the software and run TeamViewer_Setup.exe to open the installation wizard and Double click. You will find that the setup screen will look as:

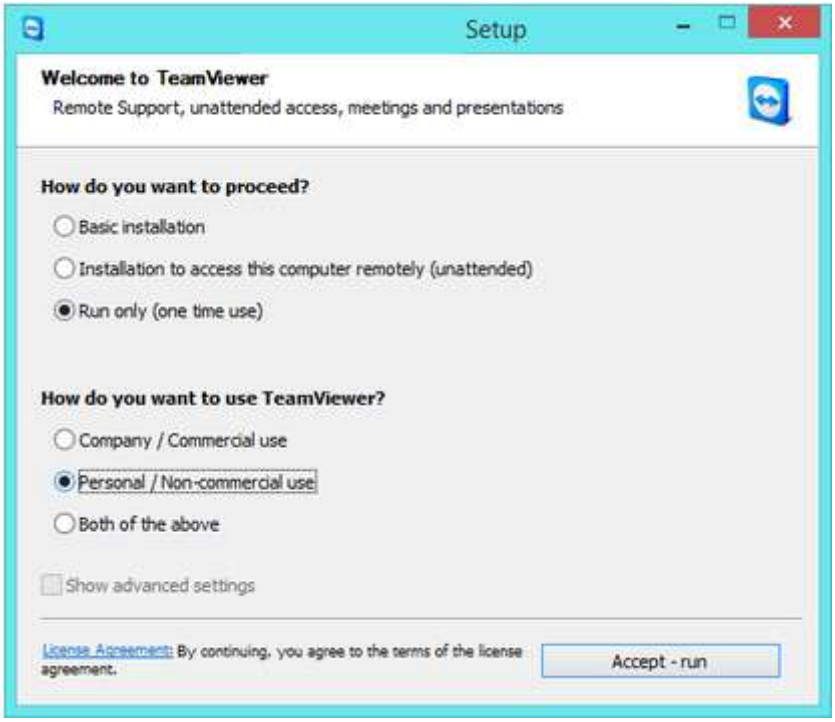

Fig 2.12 Setup screen

In the setup, you need to select run only option and personal/non-commercial use option as shown in fig 2.12. After clicking Accept-run option TeamViewer, you will find that Team Viewer is ready for use where you can connect to remote PC, by entering correct ID in Partner ID field and further click on Connect to Partner option as shown.

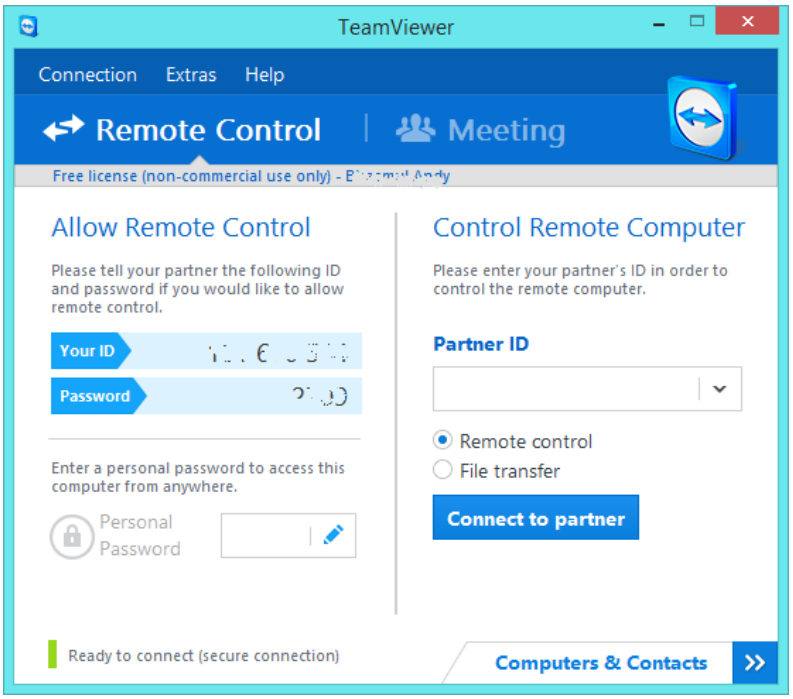

Fig 2.13 Team Viewer screen

Check your progress 4

1. Team Viewer software allow:

   a. Sharing of information

   b. Computer to work as remote host

   c. Person to view other person desktop screen

   d. All of above

2.6 Remote Desktop

Remote desktop is a program or an operating system feature that allows the user to connect to a computer in another location, see that computer's desktop and interact with it as if it were local.

A remote desktop is a separate program or feature which is available on many operating systems that allow a user to access an operating computer system's desktop. The access occurs through Internet or by another network in certain geographical location and allow users to interact with particular system that makes to be physically available on own computer. USB devices with the ability to start again with remote users desktop serves as secure portable offices.

It is noticed that the remote desktop allow user to work with workplace workstation which can be either at home or vice versa and can easily handle computer problem remotely. It will able to do administrative work easily and can show process or software application. A remote desktop is also used by computer manufacturers which will access, diagnose, repair or reconfigure users operating system, application or hardware problem.

You can setup remote desktop when you are running Windows that carries Remote Desktop connection which is mostly available on right of screen. To get started with these useful features, you need to adjust the System Properties as shown in fig 2.14.

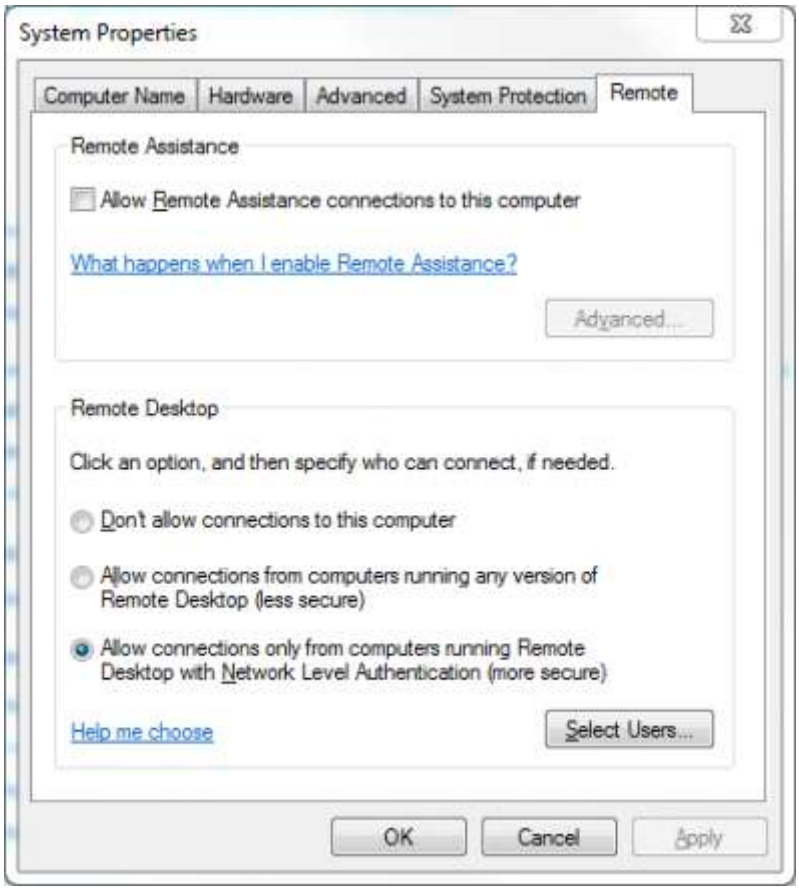

Fig 2.14 System Properties

In the System Properties, click on Remote Settings and under Remote Desktop option, you need to select allow remote connections option. This is NLA enabled, where computer will ask for username and password before fully creating a remote session making it less flat to reject service attacks.

Now after selecting, click on Apply to save your settings. On other computer, click Start-Programs-Accessories-Remote Desktop Connection. When the RDC client appears, click on Options button and spend some time on looking around at all features which can be adjusted.

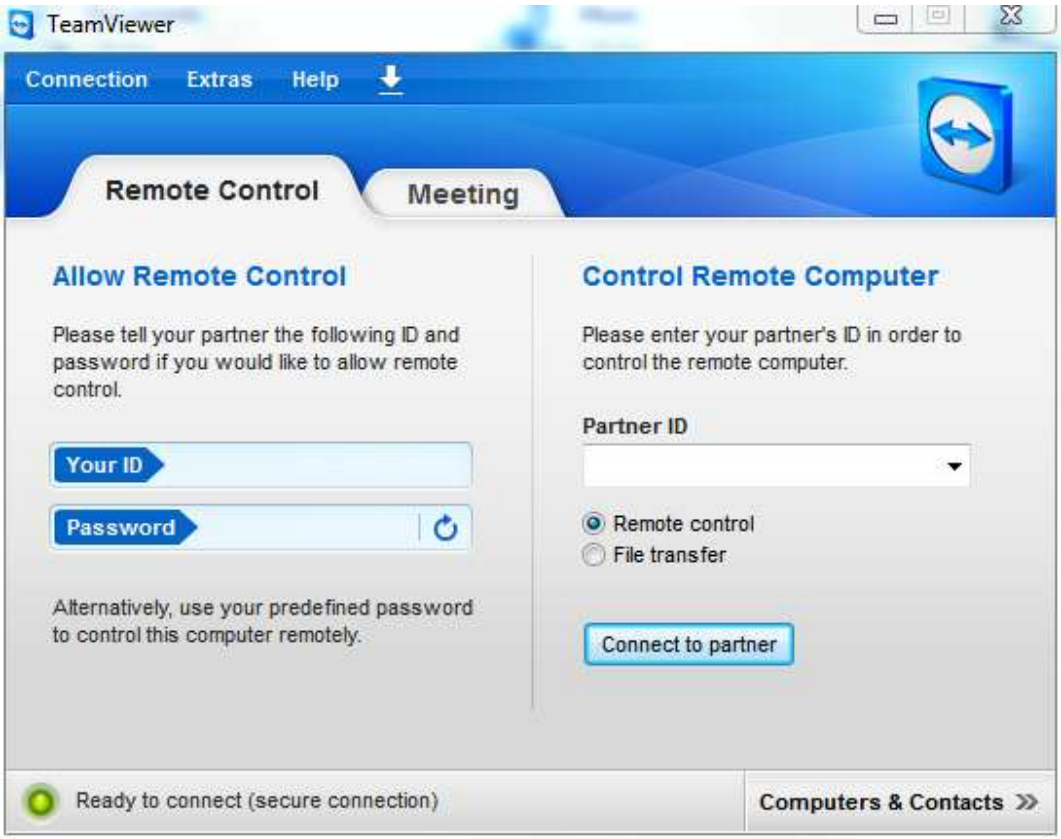

Fig 2.15 Remote Control option

Once the thing is setup correctly, you will be asked with account name and password. After giving the details, the other machine's desktop will appear in a window where you can interact with it.

Check your progress 5

1. Remote Control option allow user to access using:

   a. Remote desktop

   b. Password or login id

   c. Remote host

   d. All of above

2.7 Telnet

Telnet is a user command which is an underlying TCP/IP protocol that is required to access remote computers. With Telnet, an administrator or other user

will able to see someone else's computer remotely. On Web, HTTP and FTP protocols allow you to request particular files from remote computers, but not to actually log on as user of particular computer. With such technology, user can log on as regular user with whatever privileges you may have been issues for particular application and data that runs on computer. It is applied mostly for remote management and further for initial setup for certain devices especially for network hardware such as switches, access points, etc.

Telnet most important feature is to show zero file transfer encryption where all data transfers done on Telnet are passed around in clear text. During the initial launch of Telnet, not too many users are there on Internet, and by extension not anything near number of hackers like as we see today.

Check your progress 6

1. Telnet uses:

   a. TCP feature

   b. IP feature

   c. TCP/IP features

   a. d. none of these

2.8 Microsoft Outlook Express

Outlook Express also called as Microsoft Outlook Express is an email program which is created and launched by Microsoft which allows you to store, manage, send and receive email messages. There is much such type of email programs which are available but Outlook Express is probably the most popular among all since it is free and comes with Internet Explorer web browser. It is also known as email client which is normally used in corporate as it serves email management details.

Outlook Express is a program that is installed on your computer and allows storing and managing email messages. It is found that such email messages are present on computer and not on web server which is placed far away. In Outlook Express, there is no default email account. You can to add or setup pre-existing email account in the program. Suppose you have two email addresses, one from office and another from ISP (Internet service Provider), in such case you can add

both such email accounts in Outlook Express. After that, you can collect messages from two accounts at one place which will be on your computer.

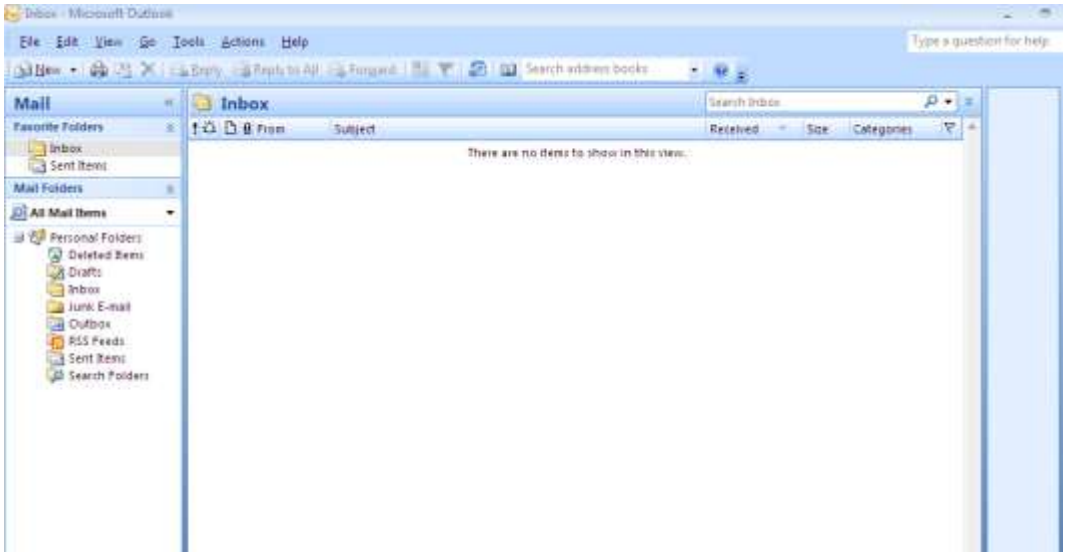

Fig 2.16 Outlook Express default screen

The process of adding or setting up of email accounts in Outlook Express is very easy and fast as it uses only program along with your email account details which can be information about email address, username, password etc. In Outlook Express, you will find step by step instructions that can be available in help menu or you can refer to web site for installation. Once configured, you can add as many email accounts as you want at a time.

From the above figure, we see that in Outlook Express, all incoming emails are arrived at INBOX folder. Apart from Inbox folder, there are three other default folders such as Sent items, Drafts and Outbox. It is found that any email you send from Outlook Express gets directly transferred to Sent Items folder. Such type of program will allow you to create an extra folder which lies under Inbox which will help in segregating messages as per needs. This is a big help in organizing your emails. It also shows automated method which is known as Outlook Express Message Rules that will help in creating certain rules which can be applied to all incoming emails. So, you can have certain messages moved to designated folders, replied to automatically or even delete without your involvement.

Check your progress 7

1. In Outlook Express, emails are present in:

   a. Sent item folder

   b. Draft folder

   c. Inbox folder

   d. Outbox folder

2.9 Let Us Sum Up

In this unit we have learnt that Internet is an arrangement of computers across the globe where every computer is part of that network. It is seen that Internet Explorer is a free web browser application which is produced by Microsoft in year 1995 based on geographical browser known as Netscape Navigator. It is found that Google Chrome is an internet browser developed and launched by Google Inc which is a mixture of minimum design having special technology that allows Web to work faster, safer and easier.

The web browsers serve as common platform which allow users to visit on internet and can browse their product. FileZilla is a famous software application which is used for uploading and downloading of files online which secures file transfer using SFTP or FTPS among Windows clients or Unix servers. Team Viewer is remote access/control and desktop sharing program which works with Internet that immediately get control over computer anywhere remotely by Internet.

Remote desktop is a program or an operating system which allow user to connect to a computer in another location. Telnet is a user command which is an underlying TCP/IP protocol that is required to access remote computers. Outlook Express is an email program which is created and launched by Microsoft that allow to store, manage, send and receive email messages.

2.10 Answers for Check Your Progress

Check your progress 1

Answers: (1 - c)

Check your progress 2

Answers: (1 - a)

Check your progress 3

Answers: (1 – c)

Check your progress 4

Answers: (1 -d)

Check your progress 5

Answers: (1 - d)

Check your progress 6

Answers: (1 –d)

Check your progress 7

Answers: (1 - c)

2.11 Glossary

1. **Internet -** It is an arrangement of computers in a network across the globe.
2. **Internet Explorer -** It is a web browser launched by Microsoft which is based on technology of Netscape Navigator.
3. **Google Chrome -** It is a web browser developed by Google Inc.
4. **FileZilla -** software used for uploading and downloading of files online.

2.12 Assignment

Explain the purpose of Telnet.

2.13 Activities

Write steps to configure Outlook Express in your computer.

2.14 Case Study

Compile and run the process of transferring of files from your computer to web using Filezila software.

2.15 Further Readings

1. Internet processes, Ronald, 2010.
2. An Introduction to Networks, Marconi, 2006.
3. Introduction to Understanding the Internet, Worth Godwin, 2010.

Block Summary

In this block, you will understand about the basic of Microsoft Outlook Express with the configuration and setting of email program techniques. The block gives an idea on Bluetooth method which can be tethered using Wifi connectivity with study on their characteristics features. The examples related to concept of web browser and their working characteristics are also discussed.

In this block, you will understand about the role of tethering in sharing PC internet connection with android phone or tablet. The concept related to Remote desktop program and its operating feature are also detailed.

Block Assignment

Short Answer Questions

1. What is the concept behind tethering?
2. What is Internet of computers?
3. What is the function of Bluetooth?
4. State the various types of Web browsers?
5. State the benefits of reverse tethering?

Long Answer Questions

1. How tethering is applied in cell phone or on laptop?
2. How to configure mails in Outlook Express?
3. How the FileZilla software is applied for uploading and downloading of files online?

Enrolment No. ☐

1. How many hours did you need for studying the units?

Unit No	**1**	**2**	**3**	**4**
Nos of Hrs				

2. Please give your reactions to the following items based on your reading of the block:

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____ _____
Language and Style	☐	☐	☐	☐	_____ _____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____ _____
Conceptual Clarity	☐	☐	☐	☐	_____ _____
Check your progress Quest	☐	☐	☐	☐	_____ _____
Feed back to CYP Question	☐	☐	☐	☐	_____ _____

3. Any Other Comments

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Education is something which ought to be brought within the reach of every one.

- Dr. B. R. Ambedkar

Dr. Babasaheb Ambedkar Open University
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Ahmedabad-382 481.