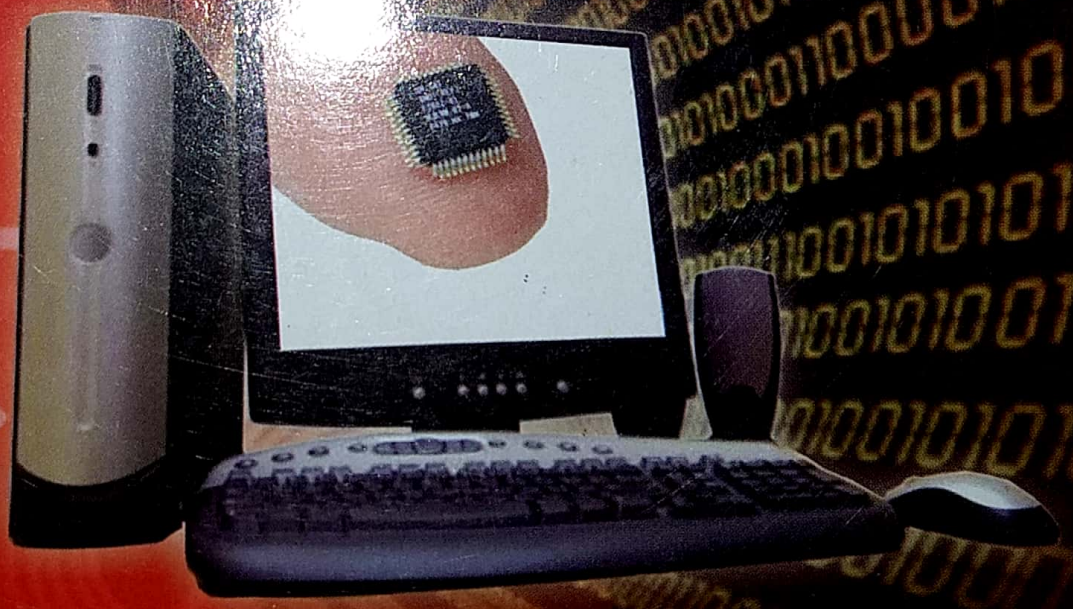
Beyond Windows

Towards Understanding Computers



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Navdeep Publications

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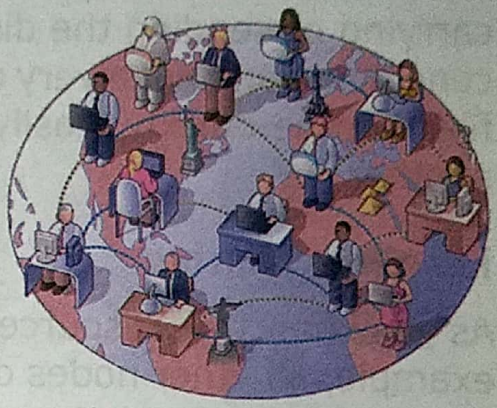
About Networking

Understanding Networking

These days no organisation can work efficiently without networking its resources. It has become a primary requirement for any workplace. These days, a network can be with wires or wireless. A wireless network is completely trouble free and also easy to maintain. Better operating systems are making networks more secure and thereby (ensuring) greater safety of data.



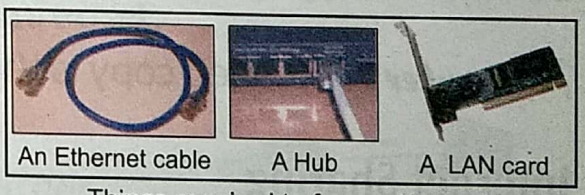
What is a Computer Network?

A computer network consists of two or more computers called (nodes, hosts or workstations) that are linked in order to share resources (such as printers and CD-ROMs), exchange files, or allow electronic communications.

Computers on a network may be linked through cables, telephone lines, radio waves, satellites, or infrared light beams.

Things you need to form a basic Network

Besides computers, one requires network interface cards, a hub or switch, network software and Ethernet cables to form computer network. Networking software like Windows NT, control and manage all types of activities on the network. The software works with the hardware to create a networking environment on each computer, allowing the user to access/view shared files and resourses. It also allows for administration of the network.



Things required to form a Network

- Hubs and switches both join PCs in a network together. A switch is more expensive and a network built with switches is generally considered faster than one built with hubs.
- An Ethernet cable plugs into a network card located in each computer on the LAN.

Advantages of a Network

A network has many advantages. Let us learn about some of these.

File Management

If network is not there, files are shared by copying them onto CDs, then carrying or sending the discs from one computer to another, which is time consuming and not a very reliable process. But in a networked environment, files can be quickly, easily and reliably transferred from one computer to another.

Resource Sharing

As you know that resources can be shared in a networked environment. For example, all other nodes can access a single printer, modem, fax machine, CD writer or any other peripheral connected to a specific node. This eliminates the need to buy multiple sets of hardware leading to significant cost saving.

Cost Saving on Software

If you have ten computers in your lab and want to install the same software in each computer, it will work out to be very expensive. But if they are networked, (special networked versions of the software are available), it will be much cheaper than buying individually 10 licensed copies.

Remember A licensed copy is the legal (authorised) copy of software.

Internet Sharing

These days broadband is becoming very popular and provides very high bandwidth, which results in fast Internet access speed. If computers are networked, all computers (in the network) can take advantage of the high bandwidth and access Internet at a fast speed.

Security

Files and programs on a network can be password protected and specific users can be given specific types of access rights to folders and files to restrict access to authorized users only.

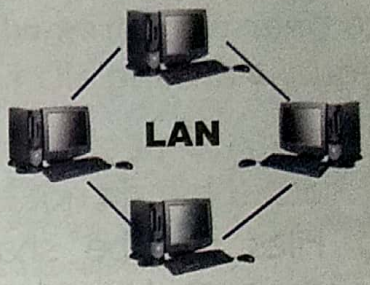
Types of Networks

The networks can be classified as follows on the basis of their geographical area coverage:

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

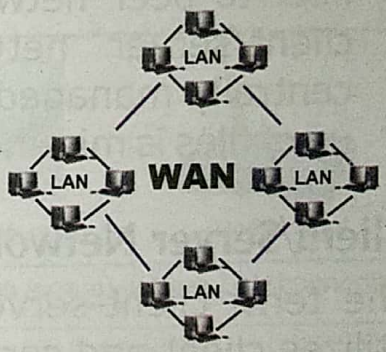
Local Area Network (LAN)

A LAN is a computer network that covers a relatively small area. Most LANs are confined to a single building or group of buildings. However, LANs can be connected to each other over any distance via telephone lines and radio waves.



Wide Area Network (WAN)

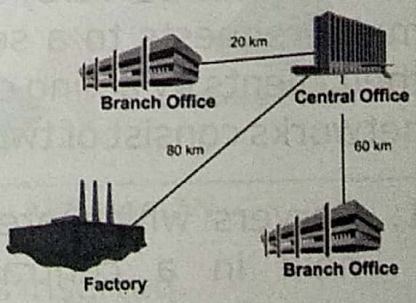
A WAN is a computer network that is spread over a large geographical area like two different cities/ countries. Typically, a WAN consists of two or more local-area networks (LANs) connected through the telephone system or can also be connected through leased lines or satellites.



Remember The largest WAN in existence is the Internet.

Metropolitan Area Network (MAN)

A MAN is a network which connects an area larger than a LAN but smaller than a WAN, such as a city, with dedicated or high-performance hardware.



Latest Trends

A Campus Area network (CAN) is a computer network made up of an interconnection of Local Area Networks (LANs) with a limited geographical area. It can be considered one form of Metropolitan Area Network (MAN) but is limited to a smaller area than a typical MAN and specific to academic settings.

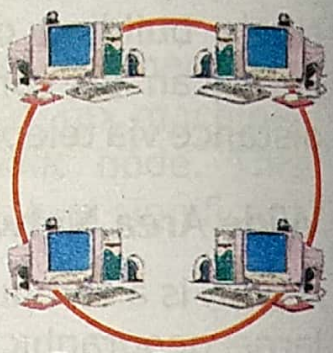
Various Network Architectures

Computer networks may be classified according to the network architecture (functional relationships which exist among the elements of the network), e.g., Client-server and Peer-to-peer architecture.

Peer-To-Peer

Peer to peer networking is common in small local area networks (LANs), particularly home networks. Most home computer networks today are peer to peer networks which allow sharing of files, printers and other resources equally among all of the devices.

- Peer-to-peer networks have nodes connected to each other but do not have servers.
- Files can be shared between nodes, and a printer connected to one node can be accessed by another node.
- Peer-to-peer networks are simpler to set up than client/server networks. But the advantage of centrally managed security and the ease of backing up of files is missing.

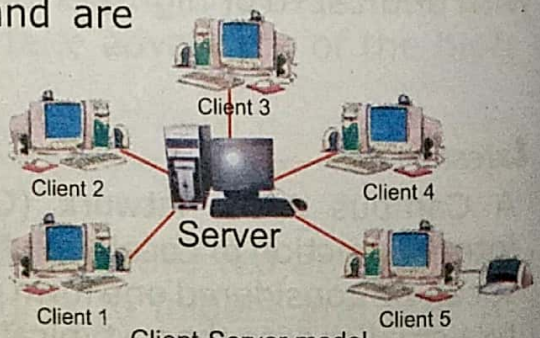


Peer-to-Peer model

Client/Server Network

The term client-server refers to a model for computer networking that utilizes client and server devices each designed for specific purposes. The client-server model can be used on the Internet (web browsers-clients, and web servers-servers) as well as local area networks (LANs). Network clients make requests to a server by sending messages, and servers respond to their clients by acting on each request and returning the results. Client/server networks consist of two types of computers.

1. Servers which are powerful computers and are held in a central location within an organisation. These provide services and information to a number of workstation computers.
2. Where the clients are usually computer workstations on the desks of employees in an organisation.



Client-Server model

Wireless LAN

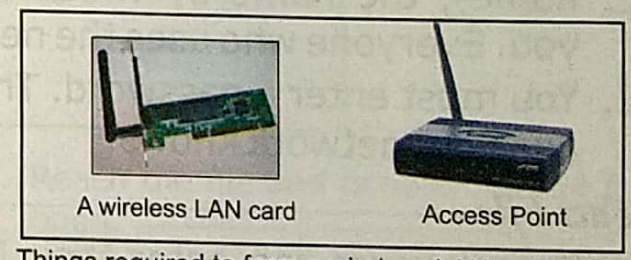
A wireless LAN (or WLAN) is one in which a moving user can connect to a local area network (LAN) through a wireless (radio) connection.

Maintenance of cabling in a network is not an easy task. Breakage, loose connections, disconnections from the hub or the switch are common occurrences. This hampers the working of a network. As long as wires are going to be there, these problems cannot be avoided. So the solution is a wireless LAN.

A Wireless network

Forming Wireless Connections

In Wired networking, one end of the cable is in the Network Interface Card (NIC) fixed in the CPU cabinet and the other end is inserted into a port on the back of the networking switch/hub. If the NIC is wireless, the card will feature a small antenna instead of an Ethernet port. The antenna transmits signals to the wireless networking switch (also called Access point), which also bears an antenna rather than ports. Normally, radio waves are used to form wireless LANs.



Things required to form a wireless LAN connection

A Wireless LAN

Remember A port is a type of socket where cable plug is inserted.

Fact File

Anybody with with a wireless client, typically a laptop or PDA, can connect to the WLAN if the access point is without authorization. Access points can be configured to require a password for client access. If there is no password, an intruder can connect to the internal network simply by enabling a wireless client to communicate with the access point.

Windows in a Networked Environment

These days, almost everywhere, you will find computers in a networked environment. You must learn the modalities of working in a network.

Logging On to the Network

To access drives and folders on other computers, of a network and gain access to printers and devices attached thereto, you must connect your computer to the network. This process of connecting to the network is called logging On. The purpose of logging on is to let the network know who you are.

The *Log in* process

Logging On consists of two identification steps.

1. You need to enter the user ID (or user name), the name by which the network knows you. Everyone who uses the network must have a user ID.
2. You must enter a password. The password is a secret word that only you and your network knows.

Fact File

Different users can enter their User IDs and passwords from the same computer. Every logged in user will be able to access only those files and folders for which the user has been authorised.

Logging Off the Computer

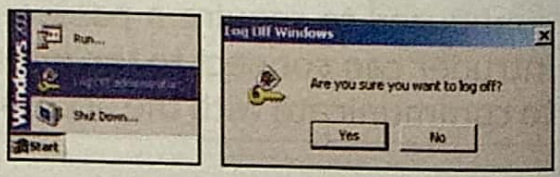
Logging off will disconnect you from the network and the network resources (like printers, disks of other computers) will not be available to you. It is wise to log off when you have to leave your computer unattended even for a short time. This way nobody will be able to misuse the network resources by using your identity.

How to Log Off

You can log off by using the Log Off option from the Start button.

1. Click on the *Start button*.
2. Select the *Log off option*.

The process will log you off the network.



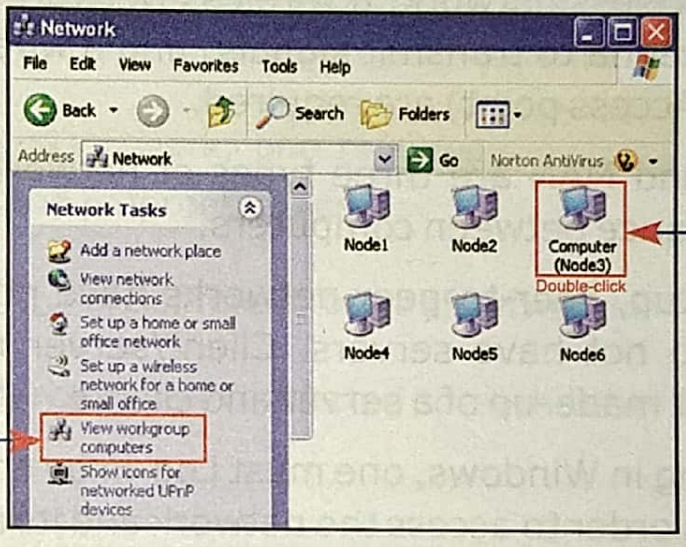
Accessing Files on Other Computers in a Network

You can access files on other computers easily once you are using the network. (if authorised to do so)

LET'S DO IT! To access files on other computers in a network using Windows XP.

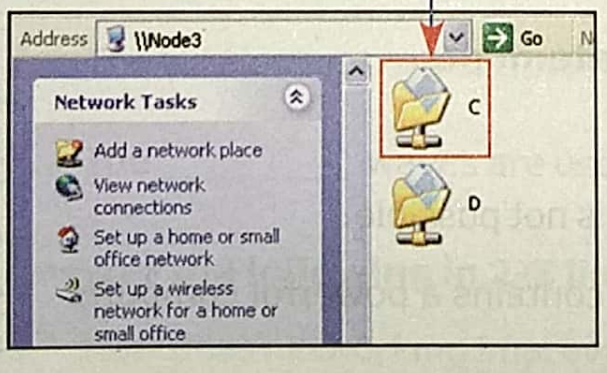
1. Double Click on the *My Network Places icon*

2. Select the *View Workgroup Computers option.* The icons for all the networked computers will appear.

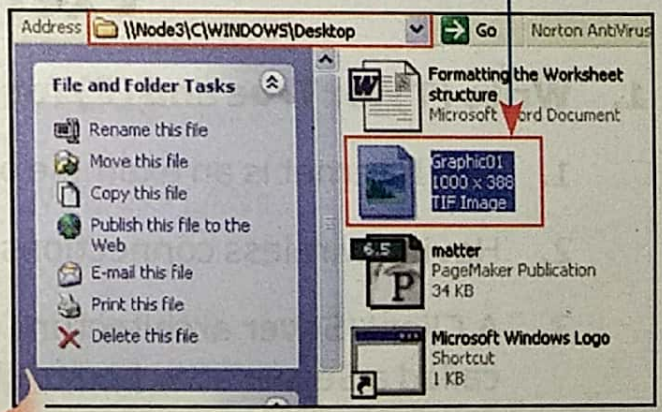


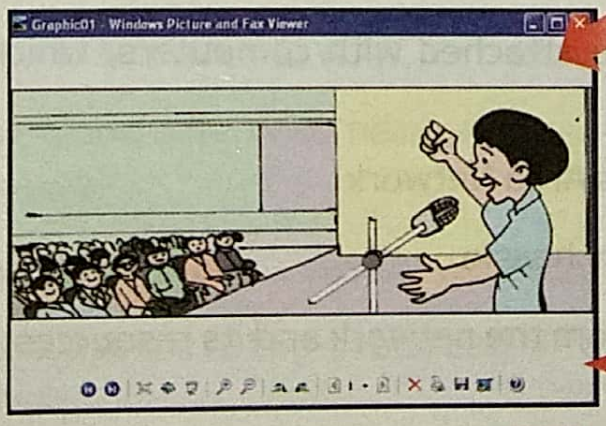
3. Double-click on the computer, files on which you want to access.

4. You will see the shared drives of that computer. Select the drive on which the file lies.



5. Reach the file and double-click on it to open.





The opened file.

Quick Recap

- A network consists of two or more computers called (nodes, hosts or workstations) that are linked in order to share resources.
- Besides computers, one requires a network interface cards, a network software and Ethernet cables to form a network.
- To form a wireless network, a wireless Network Interface Cards (which bears an antenna to transmit signals) and a wireless networking switch (also called Access point) are required.
- LAN, WAN and MAN are three types of networks depending upon the physical distance between computers.
- In a LAN setup, Peer-to-peer networks have nodes connected to each other but do not have servers. Client/server networks consist of an arrangement made-up of a server and clients.
- While working in Windows, one must Log-in by entering a user name and password, in order to access the network and its resources.

Exercise Time

1. Write (T) for True and (F) for False statements.

1. The Internet is an example of a LAN. ☐
2. Having wireless connections in a LAN is not possible. ☐
3. A Client/Sever architecture of a LAN contains a powerful computer called a Server attached to clients. ☐
4. Network Interface Cards are attached with computers, which are part of a network. ☐
5. WAN is an acronym for Wings Area Network. ☐
6. A password is an unnecessary hassle. ☐
7. Log Off will disconnect you from the network and its resources. ☐

2. Select the suitable word and fill in the blanks.

Nodes	Radio	Workstations	Access point	WAN	Antenna
Password	Peer-to-peer	Hubs or Switches	Network Interface		

1. A network consists of two or more computers called _____ or _____.
2. To establish a wired network, one requires _____ cards, network software, _____ and Ethernet cables.
3. LAN, MAN and _____ are different forms of networks.
4. _____ network have nodes connected to each other but do not have servers.
5. The _____ is a secret word that only you and your network knows.
6. A wireless network interface card bears an _____.
7. The wireless networking switch is also called an _____.
8. The _____ waves are used to form Wireless LANs.

3. Answer the following in 2-3 lines.

1. How does networking improve file management?
2. Define LAN, MAN and WAN.
3. What is the difference between Peer-to-Peer network and Client/Server network?
4. What happens in the case of Wireless networking?
5. Write the steps to Log-in and Log-off in a Windows environment.

Wireless Technologies

Wireless Technologies

Stumbling upon wires of networked computers or other personal communicating devices are going to be a thing of past. Very soon you will be working in a wireless environment, where you can see the appliances lying but not a single wire. But actually these are invisibly inter-linked using wireless technology and can interact with each other to share data and other control signals. Let us learn about the popular wireless technologies, which are becoming popular day by day.

Infrared Communication

In your daily life, many times you use infrared communication. For example, using a remote control, you switch on/off and control operations of a TV and an Air-conditioner. These days laptops and cellular phones are also equipped with IrDA interface (Infrared ports) to transfer data and communicate with each other.

Infrared communication

Although in infrared communication transmission and reception is simple and easy but the communicating devices must lie close to each other usually called, a line-of-sight distance, to be able to work.

Bluetooth Technology

Bluetooth technology uses short-range radio links to connect and replace the necessity of cables. It enables wireless data communication between bluetooth enabled devices.

The devices can be PCs, Laptops, mobile telephones and headsets, PDAs, digital cameras, MP3 players, microwave ovens and so on. Even the system unit of your computer can be paired with a bluetooth enabled wireless mouse, keyboard and monitor so that there is no tangle of wires and parts can be placed even at far distance from the system unit, as per your convenience.

Wireless Communication with Bluetooth Peripherals

Bluetooth by its nature is not designed for heavy transmissions and thus would not be a suitable technology for replacing LAN and WAN. Also normally, the distance within which bluetooth devices work is short, which may be sufficient for personal devices to interact but not for LAN or WAN.

Bluetooth Adapter

Fact File

If your PC or Laptop is not bluetooth enabled, and you want to connect a bluetooth accessory like wireless keyboard to it, a separate bluetooth adapter can be bought from any computers accessory store and fixed in the USB port of the PC or Laptop to make it bluetooth enabled. These adapters come very cheap and can be easily installed by you.

Some Uses of Bluetooth

The following are some examples of the capabilities that Bluetooth can provide consumers:

1. Make calls from a wireless headset connected remotely to a cell phone;
2. Eliminate cables linking computers to printers, keyboards, and the mouse;
3. Hook up MP3 players wirelessly to other machines to download music;
4. Set up home networks so that a person can remotely monitor air conditioning, the oven, and children's Internet surfing;
5. Call home from a remote location to turn appliances on and off, set the alarm, and monitor activity.

WiFi Technology

WiFi, stands for Wireless Fidelity and is the term for a high-speed wireless access technology. It is a method of connecting any WiFi equipped device (having built-in WiFi capability or a WiFi adapter card) by radio waves to each other, to a Local Area Network or to the Internet without wires.

The only condition is that devices must be within range of a WiFi signal. WiFi technology uses long range radio waves and the coverage range is sufficiently long.

What is a Hot-Spot?

A HOT-SPOT is a zone that is enabled with high-speed wireless Internet access.

HOT-SPOTs are generally available at convenient public locations such as airports, hotels, and restaurants. Using either a laptop or handheld PDA that is WiFi enabled, you can access the Internet at a very high speed.

Fact File

Bluetooth uses short-range radio frequencies to interconnect electronic devices such as mobile phones, digital cameras and PCs and is made for different applications. It is also slower and works within a short range.

On the other hand, WiFi uses long range radio waves and is seen as an alternative to a wired LAN. Its range area is much more and its communication speed is much greater than the than that of bluetooth.

WiMax Technology

WiMAX operates on the same general principles as WiFi – it sends data from one computer to another via radio signals. A computer (either a desktop or a laptop) equipped with WiMAX would receive data from the WiMAX transmitting station.

The difference between WiFi and Wimax

The biggest difference between WiFi and Wimax is not speed; it is distance. WiFi's range is about 30 meters. Wimax can cover an area within a radius of 50 kms with wireless access. The increased range is due to the frequencies used and the power of the transmitter. This Wimax technology will be useful to cover the whole city for the Internet and much more convenient than putting lots of WiFi Hot Spots in the city.

Fact File

At that distance, terrain, weather and large buildings will act to reduce the maximum range in some circumstances.

About Global Positioning System (GPS)

The Global Positioning System (GPS) is based on satellites that allows a user with a receiver to determine the precise coordinates of their location on the earth's surface.

The Global Positioning System (GPS) is a worldwide radio-navigation system formed from a constellation of 24 satellites and their ground stations. The ground stations monitor the GPS satellites, checking both their operational health and their exact position in space.

The GPS

Fact File

A satellite constellation can be considered to be a number of satellites with coordinated ground coverage.

The GPS Receiver

The user receiving equipment are typically referred to as a GPS receiver. They process the signals transmitted from the satellites to determine the user's position and other parameters.

A GPS receiver

Fact File

GPS receivers have been miniaturised to just a few integrated circuits and so are becoming very economical. These days the latest advanced mobile phones can act as GPS receivers.

Uses of GPS

The first and most obvious application of GPS is the simple determination of a "position" or location. GPS is the first positioning system to offer highly precise location data for any point on the planet, in any weather. For example, if a user has got a GPS system installed in his car and if he gets stranded and lost, GPS signals can locate his exact location and he can be rescued.

The system's positioning and timing data are used for a variety of applications, including air, land and sea navigation, vehicle tracking, surveying and mapping, and asset and natural resource management.

Connecting to the Internet on Mobile Phones

Gone are the days, when a mobile phone was used only for "talking anywhere". Now-a-days, more than talking, it is used for playing MP3 music, surfing the Net, sending/receiving e-mails, taking digital pictures, recording videos, mobile conferencing, communicating with PCs, etc. Smartphones today have specifications like CPU, RAM, storage space, browsers, email clients, type of display, keyboard, digital camera and its zoom specifications, Infrared (IR), bluetooth and WiFi connectivity. They have almost become miniature versions of computers. You can connect to the Internet using the mobile phone, using a GPRS or WiFi connection.

Using GPRS to connect to the Internet

The General Packet Radio Service (GPRS) is a new non-voice service that allows Mobile Phones to connect to the Internet for sending and receiving data.

With GPRS you can access websites, send e-mails, and avail other Internet services through a wireless connection. GPRS allows large amounts of data to be sent over mobile networks at a reasonably good speed and you are also always connected to the Net.

GPRS

You can also connect your Laptop or PC to the GPRS service through Bluetooth or IrDA (infrared) interfaces provided in your cell phone and computer, and surf the Net on it, by using the GPRS service of your mobile phone.

Fact File

To avail GPRS, you need a GPRS enabled handset and the service must be activated on it by the service provider. You also need to pay monthly charges to the Service provider for using the Internet.

Using WiFi to connect to the Internet

A cellphone with a WiFi is capable of using the Net at a very high speed and thus able you to download large files like big e-mail attachment, music files, etc. Doing this over GPRS can be a time consuming process because of not so high a speed. Also you do not have to pay any GPRS charges while surfing the Net using WiFi access. You just need to be at a Hot Spot to be within range of WiFi signals.

3G Mobile Technology

3rd generation (3G) networks enable network operators to offer users a wider range of more advanced services like wide-area wireless voice telephony, video calls, and broadband wireless data, all in a mobile environment.

3G

3G is considered high-speed or broadband mobile Internet access, and in the future 3G networks are expected to reach speeds of more than 2Mbps.

Activity Write the full form of the following terms:

GPS	GPRS	WiFi	3G
_____	_____	_____	_____

Quick Recap

- In infrared communication for transmission and reception of signals, devices must lie close to each other usually called, a line-of-sight distance, to be able to work.
- Bluetooth technology uses short-range radio links to connect and replace the necessity of cables.
- WiFi, stands for Wireless Fidelity and is the term for a high-speed wireless access technology. It uses long range radio waves so the distance covered is more.
- WiMAX operates on the same general principles as WiFi but will cover a radius of approximately 50 kms with wireless access.
- The General Packet Radio Service (GPRS) is a new non-voice service that allows Mobile Phones to connect to the Internet for sending and receiving data.
- 3G networks enable network operators to offer users a wider range of more advanced services like wide-area wireless voice telephony, video calls, and broadband wireless data, all in a mobile environment.
- The Global Positioning System (GPS) is based on satellites that allows a user with a receiver to determine the precise coordinates for their location on the earth's surface.

Exercise Time

1. Write (T) for True and (F) for False statements.

1. Bluetooth by its nature is not designed for heavy transmissions and thus would not be a suitable technology for replacing LAN and WAN. ☐
2. WiFi, stands for Wireless Frigidity. ☐
3. A Hot-Spot is the name of a type of tea. ☐
4. WiFi and WiMax are used for a high-speed wireless access technology. ☐
5. WiFi has a range more than WiMax. ☐
6. Using GPS, the exact location of a person on earth can be located precisely. ☐

2. Select the suitable word and fill in the blanks.

Bluetooth	3G	Hotspot
Infrared	GPS	GPRS

1. The remote control using which you switch on/off and control operations of TV and Air-conditioner uses the _____ technology.
2. _____ technology uses short-range radio links to connect and replace the necessity of cables.
3. A _____ is a zone that is enabled with high-speed wireless Internet access.
4. The _____ is a new non-voice service that allows Mobile Phones to connect to the Internet for sending and receiving data.
5. _____ networks enable network operators to offer users a wider range of more advanced services in a mobile environment
6. _____ is the first positioning system to offer highly precise location data for any point on the planet, in any weather.

3. Answer the following in 2-3 lines.

1. What is the difference between Bluetooth and WiFi?
2. What is the difference between WiFi and WiMax technology?
3. What is the use of 3G network technology?
4. What is GPS ? Write its uses.