



TOPIC 7:
COMPUTER COMMUNICATIONS
Unit two: Networks

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Unit Objectives



To be able to know the:

- Features, advantages & disadvantages of the various types of Networks
- Features of Intranets, Extranets and Internet.
- Over view of the internet and the www
- Advantages and disadvantages of internet
- Types of internet connection
- How to connect a computer to internet using Dial Up access
- Internet service providers (ISP)
- Factors to consider when choosing ISP
- Services available on the Internet
- Basic surfing and email skills with Microsoft Internet Explorer

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Types of computer networks



- A network can be relatively small or extensively large.
- The most common types of computer networks include
 - Local Area Network (LAN)
 - Peer-to-peer network
 - Client/server network
 - Personal area network (PAN)
 - Wide area network (WAN)
 - Metropolitan area networks (MANs)
 - Etc.

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Local Area Network (LAN)



- A local area network (LAN) is a network that connects computers in a small geographic area such as a building like a computer laboratory, or an office.
- The nodes are connected to the LAN via cables.
- A wireless LAN (WLAN) is a LAN that does not use physical wires, but uses wireless media such as radio waves.
- The two kinds of LAN are peer-to-peer network and client/server network

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Peer-To-Peer Network



- This is a type of network where each computer can share the hardware, data, or information located on any other computer on the network.
- Each computer stores files on its own storage devices.
- Each computer on the network contains both the network operating system and application software.

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Advantages of a Peer To Peer Network (P2P)



- A peer-to-peer network is simple to setup i.e. does not require too much configuring
- It is not expensive to set up
- It does not require a dedicated server to control the network
- It is perfect for home and small business users.

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Disadvantages of a Peer to Peer Network



- The system is not centralized, making administration difficult .
- Lack of security i.e. files can be accessed by any one on the network

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Client/Server Network



- A client/server network has one or more computers acting as a server while the other computers (i.e., clients) on the network can request services from the server.
- A client computer is a computer that can access the resources on a network.
- A server provides a centralized storage area for programs, data, and information.
- Most client/server networks have a network administrator who is in charge of the network.

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Advantages of a Client/Server Network



- All Resources are centralized and easier to access.
- Easy management and administration of the network.
- More data security since all network access is controlled through the server.
- The network is flexible, because changes and new technology can be easily included into system.

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Advantages of a Client/Server Network



- Client /Server network is faster than P2P since data and resources are handled by a dedicated machine
- It is to Backup all data stored centrally on the server.
- Client Server network can support many computers as compared to a P2P network.

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Disadvantages of a Client /Server Network



- It is expensive to set up as compared to a P2P network.
- It requires an extra computer to serve as a dedicated server.
- Maintenance – large networks will require an administrator staff to ensure efficient operation
- Dependence – When the server goes down, operations will cease across the network
- Server can get overloaded since all the processing is controlled at one point.

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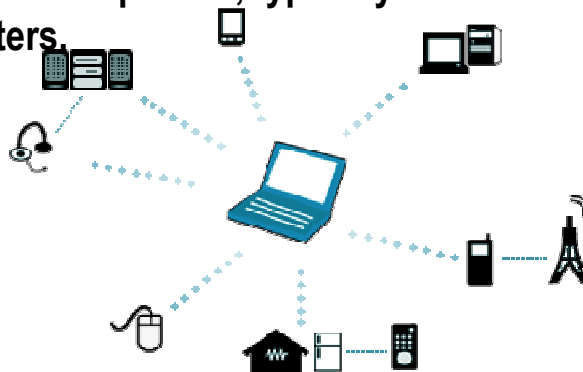
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PERSONAL AREA NETWORK (PAN)



- A personal area network (PAN) is the interconnection of computer devices within the range of an individual person, typically within a range of 10 meters.



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PERSONAL AREA NETWORK (PAN)



- For example, a person traveling with a laptop, a personal digital assistant (PDA), and a portable printer could interconnect them without having to plug anything in, using some form of wireless technology.
- Typically, this kind of personal area network could also be interconnected without wires to the Internet or other networks.

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Wide area network (WAN)



- A wide Area Network (WAN) is a network that covers a large geographic area.
- An example of a WAN is a network that connects the district office computers of a company across the country or across several counties in the world.
- Computers are often connected to a WAN via public networks such as the telephone system or by dedicated lines or satellites.

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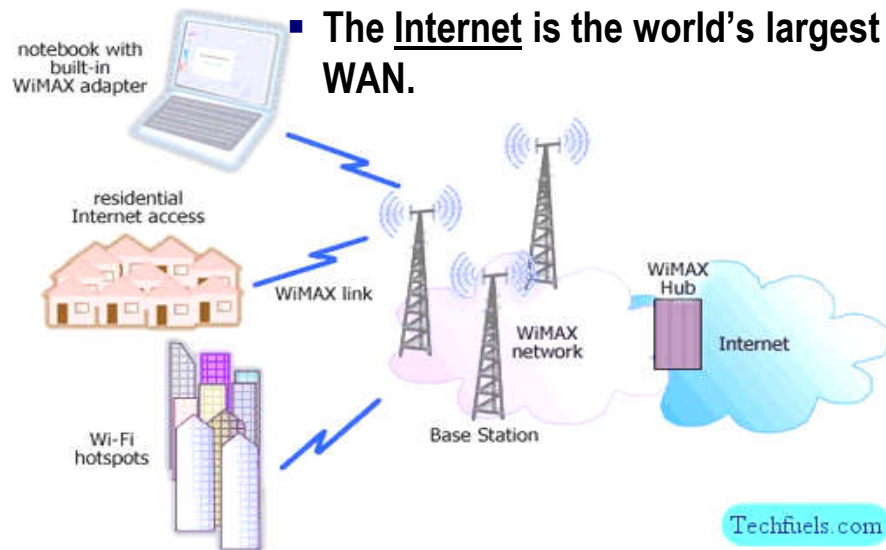
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Wide area network (WAN)



- The Internet is the world's largest WAN.



Metropolitan area networks (MANs)



- A metropolitan area network (MAN) is a large computer network that usually spans a city or a large campus.
- A MAN usually interconnects two or more LANs using a high-capacity backbone technology, such as fiber-optical links or other digital media.
- A MAN covers a smaller geographic area than a WAN.

Intranet, Extranet and Internet



- Individual Computer networks such LANS and PANs can be interconnected to form extended networks.

QN: What is the difference between Intranet, Extranet and Internet?

- Intranet is used within an organization;
- Extranet is and extension of an intranet - used even out side the organization.
- Internet is global.

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Intranet



- Intranet refers to a connection of private computer networks within an organization.
- An intranet has tools to facilitate communication between organization's employees or workgroups to improve the knowledge and data sharing capability.
- Many schools and non-profit groups have deployed intranets
- A simple intranet consists of an internal email system.
- More complicated intranets include Web sites and databases containing company news, forms, and personnel information.
- An example of an intranet is a school network.

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Advantages of Installing a School Network



- **Speed.** Networks provide a very rapid method for sharing and transferring files.
- **Cost.** Networkable versions of many popular software programs are available at considerable savings when compared to buying individually licensed copies.
- **Security.** Files and programs on a network can be safe i.e. passwords can be established for specific directories to restrict access to authorized users.

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Advantages of Installing a School Network



- **Sharing resources** such as laser printers, fax machines, modems, scanners, etc. is simplified
- **Electronic Mail.** Electronic mail on a LAN can enable students to communicate with teachers and peers at their own school.
- **Flexible Access.** School networks allow students to access their files from computers throughout the school. Students can also work cooperatively through the network.

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Disadvantages of Installing a School Network



- **Expensive to Install.** Although a network will generally save money over time, the initial costs of installation can be prohibitive.
- **Requires Administrative Time.** Proper maintenance of a network requires considerable time and expertise.
- **Must Monitor Security Issues.** Wireless networks are becoming increasingly common; however, security can be an issue with wireless networks

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EXTRANET



- **An extranet is a computer network that allows controlled access from the outside for specific business or educational purposes.**
- **Extranets are extensions to, or segments of, private intranet networks that have been built in many corporations for information sharing.**
- **Most extranets use the internet as the entry point for outsiders, a firewall configuration to limit access and a secure protocol for authenticating users**

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Advantages of extranet



- Exchange large volumes of data using Electronic Data Interchange (EDI)
- Share product catalogs exclusively with trade partners
- Collaborate with other companies on joint development efforts
- Jointly develop and use training programs with other companies
- Provide or access services provided by one company to a group of other companies, such as an online banking application managed by one company on behalf of affiliated banks.
- Share news of common interest exclusively

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Disadvantages of extranet



- Extranets can be expensive to implement and maintain within an organization (e.g., hardware, software, employee training costs)
- Security of extranets can be a concern when hosting valuable or proprietary information.

INTERNET



- The internet is a global connection of computer networks.
- The internet links together millions of computers, to exchange and share information all over the world.



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History of internet



- The Internet has its root in a networking project called the ARPANET started by the Pentagon's Advanced Research Projects Agency (ARPA).
- The goal of the project was to build a network that
- allowed scientists at different locations to share information and work together on military and scientific projects, and
- Could function even if part of the network were disabled or destroyed by a disaster such as a nuclear attack.

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History of internet



- The ARPANET became functional in September 1969, linking scientific and academic researchers in the United States.
-
- In 1986, the National Science Foundation (NSF) connected its huge network of five supercomputer centers, called NSFnet to the ARPANET, and this configuration of complex networks and hosts became known as the Internet.

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History of internet



- Today, a variety of corporations provide networks to handle the Internet traffic.
- These networks, along with telephone companies, cable and satellite companies, and the governments, all contribute toward the internal structure of the Internet.

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Uses & Advantages of getting connected to the internet



- Access a wealth of information, such as news, weather reports, and airline schedules.
- Shop for goods and services through E – commerce
- Use online banking services and manage investments.
- Do research and take online training courses.
- To Download files, software etc.
- For Advertisement. People use internet to publish information about them selves or their work

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Uses & Advantages of getting connected to the internet



- Make cheap internet calls
- Send and receive email to and from other connected users.
- Communicate with others around the world through chat rooms, videoconferencing e.t.c
- Access sources of entertainment and leisure, such as online games, magazines, and vacation planning guides, listen to music, and watch movies..

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Uses & Advantages of getting connected to the internet



- Has storage where you can store information safely and can access it anywhere.
- It is accessible 24/7 (always on)
- Search Engines like Yahoo, Google can help you get what you want – compared to looking for a information in a Library.

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Disadvantages of internet



- Computer viruses these can be downloaded and spread across machines and have destructive effects.
- Internet provides unsuitable material such as Pornography, the biggest threat related to healthy mental life.
- Theft of Personal information
If you use the Internet, you may be facing grave danger as your personal information such as name, address, credit card number etc. can be accessed by hackers or thieves.
- Spamming: Spamming refers to sending unwanted e-mails in bulk, which provide no purpose and needlessly obstruct the entire system.

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Disadvantages of internet



- Some people are getting addicted to the internet and thus causing problems with their interactions of friends and loved ones.
- Some of the sites on the internet require passwords to have access to information that you want.
- The initial cost of connecting to the internet is high. e.g. buying computers.
- Many people are computer illiterate and so can not use internet.
- There is a lot of wrong information on the internet. Anyone can post anything, and much of it is deceit/garbage

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Review Questions



1. How can the Internet be useful in the area of education?
2. List at least possible advantages and disadvantages connected with a school being online.
3. State the similarity and difference between internet and intranet.
4. List and explain some of the services offered by the internet.
5. What is an information network? Give examples of computer networks

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LESSON SUMMARY



In this lesson, we are to look at the following:

- **Types of internet connection**
- **How to connect a computer to internet using Dial Up access**
- **Internet service providers**
- **Factors to consider when choosing ISP**

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Types of internet connection



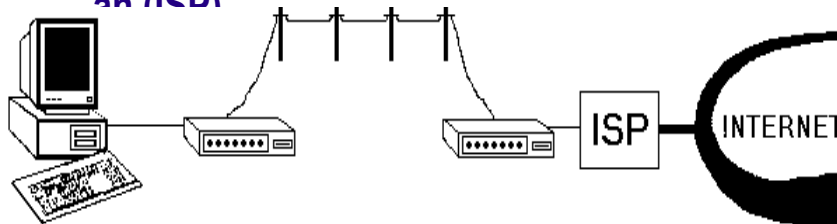
- The more technology grows, the bigger, better and faster Internet connections come up.
- The Methods of connecting to internet are Only two: The Dial Up/ Analog access which uses normal telephone lines and the wireless connectivity which requires no telephone lines
- The common Example of the wireless type is Broadband, a high speed Internet connection.
- Others examples include ISDN, DSL, Cable, 3G phones and satellite

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How to connect to internet



- We are going to describe a way of connecting to internet using the Analog/Dial Up access.
- The basic requirements for this type of connectivity are a computer, a modem, a phone line, vital software and a contract with an (ISP)



- Below are the basic requirements:

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Computer –



- Choose a computer that will be able to support the software that you would like to install.
- This computer should also be fast enough in handling different tasks.
- This computer should also support the relevant hardware parts needed in networking e.g. NIC, Modem etc
- The hardware should be easy to upgrade in case of any change in technology.

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Modem –



- This converts your digital computer information into analogue telephone signals and vice-versa. Choose the fastest modem that your ISP can handle.
- Ensure that anything you get will be upgradeable, to ensure it can keep pace increasing system speeds.
- Some people like an external modem where they can watch it blinking as it transfers data to and from the Internet.
- Many manufactures now build them into the computer. It is better to buy a computer with an

in-built modem to avoid those silly problems

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Phone Line –



- This may be your biggest expense after purchasing the equipment.
- The cable companies often give special deals to connect you with any ISP who uses their phones.
- Examples of ISPs in Uganda include Uganda Telecom and MTN, Africa Online, Infocom etc.

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Required Software –



- The computer can not communicate with the modem without installation of software
- Browser software is also required to be installed for the computer to view web pages.
- The most commonly used browser software include: Microsoft internet Explorer, Netscape Navigator, Mozilla firefox, e.t.c.
- The version of your software should be up-to-date for your computer to view all websites

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Internet Service Provider (ISP) -



- An **Internet** Service Provider is the company that takes care of the technical aspects of connecting your computer(s) to the internet.
- The lights on your modem display when they communicate to the modem of your ISP during the transfer of information in both directions.
- Always check and understand the terms and conditions of your ISP before making a contract!
- Some ISPs are very expensive but you can buy a few hours per month at a cheaper cost

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Factors to consider when choosing ISPs



- The choice of an ISP depends mainly on the kind of work you are going to do with the internet.
- The key deciding factor should be service quality and the ability to alter the package at a later date, to meet your developing needs.
- Here some factors to consider to help you choose the right service for you.

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Factors to consider when choosing ISPs



1. Availability

- You should check the services of your ISP because not all services are available on all locations especially the Wireless access services (*WiFi*). Cables are also limited specially in rural places.

2. Speed/Performance

- Exactly how important speed is depends on the type and amount of content you need to download plus the number of computers sharing the Internet connection.

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Factors to consider when choosing ISPs



3. Security Levels

- The ISP should have security systems set up to ensure that your connectivity is safe enough, to eliminate fears of hackers from the neighborhood accessing your connection. Select a service that will not compromise the privacy of your information

4. Price

- Cheap Packages for home/personal use and Expensive ones for fast and huge downloads for business use are all available.
- Choose an ISP with affordable rates after agreeing with the terms and conditions. Some ISPs charge in terms of kilo bits transferred and others in terms of time duration

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Factors to consider when choosing ISPs



5. Support Services / Customer care –

- One of the top priorities when choosing an Internet Service Provider is their ability to offer the best customer service and technical support.
- Clarify how support is offered – 24 hours a day? 7 days a week? Is this done through a premium rate phone number?

6. Restrictions of use –

- Check whether there are restrictions on use. Some ISPs stipulate for only personal Use and hinder Business Use and others limit the amount of information that can be downloaded in a given time.

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Factors to consider when choosing ISPs



7. Length of contract – Many ISPs ask you to sign up for a specific time – usually a year or eighteen months

8. Compatibility – That the speed of their modems and their software matches the speed of yours ()


9. Reliability – How long the service provider has been in business and how dependable your ISP is

10. Email addresses – Check whether the ISP has email and WWW services. Most ISPs will set up an email address when you activate your account. This would appear something like name@isp.co.ug.


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WHAT FACTORS AFFECT THE SPEED OF AN INTERNET CONNECTION?



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1. Computer Processor speed



- A person using a Computer with dual Pentium IV processor is most likely to get faster connectivity to the internet as compared to one with a Pentium III or Pentium II processor.

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2. Distance the data travels



- Actual Internet speeds will vary, depending on the distance the data travels coupled with how many servers it has to go through and the different speeds of each server.
- Additionally, the shorter the cables or the closer the computers are to the routers, the faster the connection speed.

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3. Heavy traffic on the network



- The greater the number of computers on the network is, the more the internet speed reduces.
- ISPs are allocated a certain amount of bandwidth which is shared among all of the incoming and outgoing connections.

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4. Malware, Spyware and Viruses



- Viruses hinder the operation of programs on the computer, regardless of its processor strength; this in turn slows down the speed of connectivity.

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5. Modem speed



- If the modem is substandard with a low rating, or not compatible with your ISP's modem then this will slow down the speed at which data is transmitted.

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6. Natural Conditions



- Instability in connection speed is also commonly caused by natural conditions such as stormy weather and thunder, which interfere with the transmission of signals.

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7. Modems + Routers Positioning



- Modems and Routers should be strategically positioned.
- The routers should not be put below or under tables but should be raised well to be able to send the signals directly to the receiving computers/ laptops

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8. Hardware problems.



- A poor network card, video card or signal receiver can seriously reduce the speed of the data being processed by your system, slowing down the speed at which your computer can take the information coming in.
- If your Internet service comes over the phone line and you have a faulty filter attached, the speed will be compromised

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9. Software problems



- You need good updated web browser software to display the web pages efficiently.
- Currently Internet explorer version 6 is unable to display some WebPages with advanced features.
- It is also good to have updated software and device drivers to newer versions for optimum performance.

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10. Memory available



- With each program you open on your computer, you are using up more RAM memory.
- Your computer has to write this data to the disk, and the more memory you are using up on open programs, the less memory there is available to receive the data.
- Data will slow down if your computer cannot receive it fast enough, making the Internet speed seem slow.

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11. Computer internet settings



- **Improper computer settings can also affect the speed of your internet connection. Setting your firewall, safe search and other options properly will improve the speed as well.**

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12. Technological Circumstances



- **Slow speed of an internet connection can be due to technical causes such as loose connections of cables or maintenance works being done by an your ISP.**

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13. Cookies



- When surfing, the browser collects information, such as passwords and stores it on your local hard drive in a file known as a **cookie**.
- Over time, these cookies can compromise the speed of your Internet connection, particularly if you visit many websites during a browsing session.

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CONCLUSION



- There are many other factors such as **quality or type** of internet connection, that may be specific to a particular case.
- The factors above are only the most common and general factors.
- You can however trouble shoot your computer using the internet troubleshooter to find out the cause of reduce in your connectivity.

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Internet services



After connecting to the internet, the following are the services that we can utilize online.

1. **Telnet** – One of the amazing features of the Internet that lets you use the resources of another computer in another part of the world. This is done by remotely logging to the distant computer which is called the host.
2. **Email** – It allows the transfer of messages, documents, and pictures among others, across the Internet.
3. **Mailing list** – This is based on the email protocol. As an electronic mailing list it is very convenient when somebody wants to send a message or newsletter, for example, to many people in one go.

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Internet services (cont)



4. **Internet Relay Chat (IRC)** –Allows people to converse in real time by typing questions and responses. Chats are usually organized in what we call chat rooms.
5. **File Transfer Protocol** – The standard method for transferring files, whether downloading or uploading, to and from your computer with another computer on the Internet.
6. **Newsgroups** – This is an Internet equivalent of a discussion group or an electronic bulletin board. There are newsgroups for every conceivable topic and more, e.g. educational technology.
7. **World Wide Web** – This refers to the global collection of electronic documents called WebPages stored on computers all over the world.
 - As it is the most exciting feature that has revolutionized the Internet, people use this service to surf or browse for information.

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EXAM QUESTIONS



1. Discuss the view that 'internet is a necessary evil' (20 mks) .
2. a) Explain four factors that affect the speed of an internet connection. (8 mks)
b) What should be considered when choosing an ISP? (12 mks)
3. a) State the difference that distinguishes the dial up from the wireless internet connectivity. (4mks)
b) Explain the requirements of getting connected to internet using the Analog access. (16mks)
4. a) Explain any six services of the Internet that you know. (12 mks)
b) The difference and similarity between internet, intranet and extranet (8 mks)
5. a) Write the following in full:
i) ISDN, ii) WWW, iii) VoIP, iv) VoD, v) VoM, vi) EDI, vii) IRC.

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E- Mail communications



- This is the transmission of messages via a computer network such as; a local area network or internet.
- The email can be simple text, or include an attachment such as a word processing document, a graphic, an audio clip or video clip.

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Advantages of using email as a means of communication



- Easy to use. Emails applications have user friendly tools that help during composing messages.
- Email supports sending of attachments like documents, zipped files, e.t.c
- It is very fast in terms of speed. The e-mail is delivered instantly, anywhere across the globe.
- Easy to prioritize: Since the mails have subject lines, it is easy to prioritize them and ignore unwanted mails.
- Email messages can be sent to many recipients at the same time
- Emails can also carry hyperlinks that lead to other webpages with just a click
- One can subscribe to news and other online services through email
- Email software have management features that help users to organize their messages in folders like inbox, sent, draft, etc.
- Easier for reference: When one needs to reply to a mail, there is a provision in the mailing system to attach the previous mails as references. This refreshes the recipient's knowledge, on what he is reading.
- Environment friendly: Postal mails use paper as a medium to send letters. Electronic mail thus, saves a lot of trees from being axed. It also saves fuel needed in transportation.
- Email software have address book features that may be sorted in alphabetical order.
- Email software has a good degree of security features such as username and password before sign in
- Email applications have inbuilt English dictionary which safeguards the sender from incorrect spelling and grammar.
- Email is a relatively cheap means of communication since there are no printing or postage expenses involved.
- There is flexibility in time of opening the e-mail for any time access. At any time of the day or night, one can communicate with friends, relatives, professors and business associates.
- Messages remain permanent for future and frequent accessing from anywhere.
- Use of graphics such as colorful greeting cards and interesting pictures can be sent through e-mails.
- Advertising tool: many individuals and companies are using e-mails to advertise their products, services, etc.

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Limitations of using Email as means of communication.



- Emails can carry Viruses: The recipient needs to scan the mails, as viruses are transmitted through them and have the potential to harm computer systems.
- Spam and Junk: E-mails when used to send unsolicited messages and unwanted advertisements create nuisance called Spam. Checking and deleting these unwanted mails can unnecessarily consume a lot of time, and it has become necessary to block or filter the unwanted e-mails by means of spam filters.
- E-mail spoofing is another common practice. Spoofing involves deceiving the recipient by altering the e-mail headers or the addresses from which the mail is sent.
- Hacking and email interception: The act of unauthorized attempts to bypass the security mechanisms of an information system or network is termed as hacking. After the e-mail is sent and before it is received by the desired recipient, it "bounces" between servers located in different parts of the world. Hence, the e-mail can be intercepted by a professional hacker.
- Misinterpretation: One has to be careful while posting any kind of content through an e-mail. If typed in a hurry, the matter could be misinterpreted.
- Since the content posted via e-mails is considered informal, there is a chance of business documents going unnoticed. Thus, urgent transactions and especially those requiring signatures are not managed through e-mails.
- Crowded inbox: Over a period of time, the e-mail inbox may get crowded with mails. It becomes difficult for the user to manage such a huge chunk of mails.
- Need to check the inbox regularly: In order to be updated, one has to check his e-mail account regularly, which may be expensive in the long run.
- Email cannot be used without computers especially in remote areas without electricity
- In case one forgets his/her password, signing in is not possible and this can lead to loss of information.
- Email may violate privacy in case someone else gets to know your user password since the other may check your mails.

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Components of an e-mail message



- Headers
- The message headers contain information concerning the sender and recipients. The exact content of mail headers can vary depending on the email system that generated the message. Generally, headers contain the following information:
- Subject. The theme of the email message
- Sender (From). This is the senders Internet email address.
- Date and time received (On). The time the message was received.
- Recipient (To :). First/last name of email recipient, as configured by the sender.
- CC: "Carbon copy" enables copies of the email message to be sent to third party while acknowledging other recipients
- Bcc: Enables copies of the mail message to be sent to the third party without acknowledging nay other recipients.
- Reply-to. This is the Internet email address that will become the recipient of your reply if you click the Reply button.

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- **Body**
- The body of a message contains text that is the actual content.
- The message body also may include signatures or automatically generated text that is inserted by the sender's email system.
- **Attachments**
- [Attachments](#) are optional and include any separate files that may be part of the message.
- **Signature**
- Personalized information about sender.
- The most popular web- based email software:
 - Yahoo
 - Hotmail
 - Gmail
 - Excite
 - Mail.com
 - Netscape web mail
 - AOL
 - Eudora mail