Information Technology

LIS 103

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Vice-Chancellor's Message

The Distance Learning Centre is building on a solid tradition of over two decades of service in the provision of External Studies Programme and now Distance Learning Education in Nigeria and beyond. The Distance Learning mode to which we are committed is providing access to many deserving Nigerians in having access to higher education especially those who by the nature of their engagement do not have the luxury of full time education. Recently, it is contributing in no small measure to providing places for teeming Nigerian youths who for one reason or the other could not get admission into the conventional universities.

These course materials have been written by writers specially trained in ODL course delivery. The writers have made great efforts to provide up to date information, knowledge and skills in the different disciplines and ensure that the materials are user-friendly.

In addition to provision of course materials in print and e-format, a lot of Information Technology input has also gone into the deployment of course materials. Most of them can be downloaded from the DLC website and are available in audio format which you can also download into your mobile phones, IPod, MP3 among other devices to allow you listen to the audio study sessions. Some of the study session materials have been scripted and are being broadcast on the university's Diamond Radio FM 101.1, while others have been delivered and captured in audio-visual format in a classroom environment for use by our students. Detailed information on availability and access is available on the website. We will continue in our efforts to provide and review course materials for our courses.

However, for you to take advantage of these formats, you will need to improve on your I.T. skills and develop requisite distance learning Culture. It is well known that, for efficient and effective provision of Distance learning education, availability of appropriate and relevant course materials is a *sine qua non*. So also, is the availability of multiple plat form for the convenience of our students. It is in fulfilment of this, that series of course materials are being written to enable our students study at their own pace and convenience.

It is our hope that you will put these course materials to the best use.

Prof. Abel Idowu Olayinka

Vice-Chancellor

Foreword

As part of its vision of providing education for "Liberty and Development" for Nigerians and the International Community, the University of Ibadan, Distance Learning Centre has recently embarked on a vigorous repositioning agenda which aimed at embracing a holistic and all encompassing approach to the delivery of its Open Distance Learning (ODL) programmes. Thus we are committed to global best practices in distance learning provision. Apart from providing an efficient administrative and academic support for our students, we are committed to providing educational resource materials for the use of our students. We are convinced that, without an up-to-date, learner-friendly and distance learning compliant course materials, there cannot be any basis to lay claim to being a provider of distance learning education. Indeed, availability of appropriate course materials in multiple formats is the hub of any distance learning provision worldwide.

In view of the above, we are vigorously pursuing as a matter of priority, the provision of credible, learner-friendly and interactive course materials for all our courses. We commissioned the authoring of, and review of course materials to teams of experts and their outputs were subjected to rigorous peer review to ensure standard. The approach not only emphasizes cognitive knowledge, but also skills and humane values which are at the core of education, even in an ICT age.

The development of the materials which is on-going also had input from experienced editors and illustrators who have ensured that they are accurate, current and learner-friendly. They are specially written with distance learners in mind. This is very important because, distance learning involves non-residential students who can often feel isolated from the community of learners.

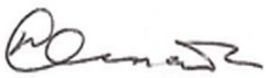
It is important to note that, for a distance learner to excel there is the need to source and read relevant materials apart from this course material. Therefore, adequate supplementary reading materials as well as other information sources are suggested in the course materials.

Apart from the responsibility for you to read this course material with others, you are also advised to seek assistance from your course facilitators especially academic advisors during your study even before the interactive session which is by design for revision. Your academic advisors will assist you using convenient technology including Google Hang Out, You Tube, Talk Fusion, etc. but you have to take advantage of these. It is also going to be of immense advantage if you complete assignments as at when due so as to have necessary feedbacks as a guide.

The implication of the above is that, a distance learner has a responsibility to develop requisite distance learning culture which includes diligent and disciplined self-study, seeking available administrative and academic support and acquisition of basic information technology skills. This is why you are encouraged to develop your computer skills by availing yourself the opportunity of training that the Centre's provide and put these into use.

In conclusion, it is envisaged that the course materials would also be useful for the regular students of tertiary institutions in Nigeria who are faced with a dearth of high quality textbooks. We are therefore, delighted to present these titles to both our distance learning students and the university's regular students. We are confident that the materials will be an invaluable resource to all.
We would like to thank all our authors, reviewers and production staff for the high quality of work.

Best wishes.



Professor Bayo Okunade

Director

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Study Session 1: Definitions of Key Terms

Introduction

In this Study Session, we will start with the definitions of some key terms in Information Technology (IT) while at the same time we shall implicitly differentiate among these terms. For example, it is generally not easy to decide as to when a particular piece of text, numbers, tables, images, or graphics serve as merely data and when they become information.

In fact, there is no hard line to tell you that a piece of text or a sample of numbers represents data or information. In this session, you shall be able to distinguish between such closely related terms.

Learning Outcomes for Study Session 1

At the end of the study Session, you should be able to:

1.1 Define the terms in Information Technology (IT)

1.2 Explain the capabilities of Information Technology

1.1 Information Technology

A. Data

Data can be defined as a symbol or a set of symbol to which meaning can be attached or which can be processed or evaluated. Data can also be in the form of numbers, text, image/graphics, and sound/voice.

Figure 1.1: Data

Source:*http://bolin.su.se/data/*

B. Information

There is no single universal definition of information, and this led to the problem associated with its definition. This problem is further compounded by the fact that information is a category word e.g. agricultural information, health information, financial information, etc.

Nevertheless, information can still be defined from several points of view, and the one that is of utmost relevance to Information Technology is when we can define information with reference to data. Thus information is data to which meaning has been attached or data that has been processed or evaluated.

In-Text Question

What is Data?

In-Text Answer

Data is a set of symbol to which meaning can be attached.

C. Technology

Technology refers to the tangible (physical component, machines and devices) and intangible (processes, knowledge, skills, procedures) resources for making; using and doing things. It is the application of scientific knowledge to industries processes.

D. Information Technology Hardware

Information Technology (IT) hardware refers to the tangible electromechanical, electronic and microelectronic devices that are used for the capture, input, processing, manipulation, storage, retrieval, output, transmission and reception of date, information, or knowledge.

IT hardware devices have the capability to accept, store and retrieve input data, and to accept, store, retrieve, interpret and execute instruction for transforming the data electronically and to produce an output in accordance with instructions. A device that has this capability and commonly referred to as a processor, microprocessor, or computer is the central element of IT hardware.

Figure 1.2: *Information Technology Hardware.*
Source:*http://spherecorporatesolutions.com/hardwaresoftware.php*

In-Text Question
What is Information?

In-Text Answer
Information is data to which meaning has been attached or data that has been processed.

E. Information Technology Software

Information Technology Software refers to a set of procedures and instructions which is used to manage the computer hardware resources and define the pattern of data processing and communication by the computer hardware system.

F. Computer

A computer is a machine or an electronic device which can accept data presented to it in a prescribed from, process the data, and output it as information for problem solving or decision making.

Figure 1.3: *Computer*
Source:*http://www.bestbuy.com/site/electronics/computers-pcs/abcat0500000.c?id=abcat0500000*

1.2 Capabilities of Information Technologies

1. They are capable of automatic operations (i.e. to a certain extent, they can work unattended to by man)
2. They are capable of repetitive/routine operations.
3. They are capable of input, arithmetic, logical, inference, heuristic, storage, retrieval and output operations.
4. They are capable of indefinite operations.
5. They are capable of sending and receiving electronic signals.

Summary of Study Session 1

In this study session, you have been able to highlight the differences between some closely related terms in Information Technology. You have also enumerated some of the capabilities of IT in general.

1. Data can also be in the form of numbers, text, image/graphics, and sound/voice.
2. Information can still be defined from several points of view, and the one that is of utmost relevance to Information Technology is when we can define information with reference to data. Thus information is data to which meaning has been attached or data that has been processed or evaluated. As for computers:
3. They are capable of repetitive/routine operations.
4. They are capable of input, arithmetic, logical, inference, heuristic, storage, retrieval and output operations.
5. They are capable of indefinite operations.
6. They are capable of sending and receiving electronic signals.

Self-Assessment Question (SAQs) for Study Session 1

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 1.1 (Tests Learning Outcomes 1.1)

1. Distinguish between IT hardware and IT software
2. Why is computer regarded as the central element of IT hardware?
3. What is the difference between data and information?
4. What are the capabilities of Information Technology?

References

Aina, L.O. (2004). The basics of Information Technology. In *Library and Information Science Text for Africa*, Ibadan: Third World Information Services p. 303

Yadav, D.S. (2008). *Foundations of Information Technology. 3rd Ed.* New Delhi. New Age International (P) Limited. 463pp

Study Session 2: Data Communication Systems

Introduction

In this study session, you will learn the basic terminology of data communication and the entities involved before communication can take place. You will also learn the fundamental types of signals that are transmitted in a data communication process. Also the processes of modulation and demodulation and the devices that make these processes attainable will be explained to you.

Learning Outcomes for Study Session 2

At the end of the study Session, you should be able to:

2.1 Define the Data Communication.

2.2 The transmission of signals along communication channels.

2.3 The processes of modulation and demodulation

2.1 Data Communication

Communication is simply the reciprocal signaling between two entities called the sender and the receiver through a medium or channel. It is the transfer and exchange of data/information between a sender (source) and a receiver (destination) through a medium or channel.

Before communication can take place, five basic entities should be involved. These include:

a. A source from which a message (data/information) originates.
b. The receiver/destination to which the data/information is sent.
c. The message which is the data or information.
d. The channel/medium through which the transfer of the message take place.
e. Procedures (protocols) which constitute a set of rules governing information flow in a communication system (e.g. the set of rules followed by two computers when they communicate with each other)

Figure 2.1: *Data Communication*
Source*: http://www.eitnotes.com/data-communication-and-transmission/*

Communication can take place in several ways:

a. One-to-one communication e.g. face-to-face dialogue and telephone conversation b) One-to-many communication e.g. Radio and T.V broadcasts
b. Many-to-one communication e.g. teleconferencing, video recording watched by an individual.
c. Many-to-many communication e.g. musical/concert performance

Box 2.1 Data Communication
It is the transfer and exchange of data/information between a sender (source) and a receiver (destination) through a medium or channel.

In-Text Question
What is communication?

In-Text Answer
Communication is simply the reciprocal signaling between two entities called the sender and the receiver through a medium or channel.

2.2 Transmitted Signals

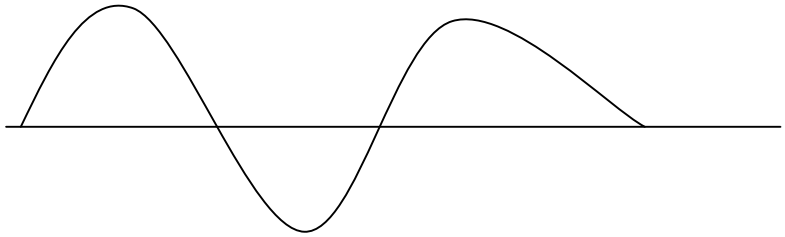
Regardless of the type of network or system or its physical characteristics, transmitted signals are carried by communication facilities in the form of waves. Signals are derived either in form of electrical signals, electromagnetic radiation or sound.

Electrical signals are transmitted via a conductor such as copper or aluminum or over a semi-conductor such as silicon. Electromagnetic radiation does not require a carrier although carriers can be used.

Electromagnetic radiation is transmitted best in a vacuum. Sound requires a physical medium such as air, water of steel for its conduction. Another kind of medium increasingly used is glass in the form of optical fibres.

Signals are propagated in either of two wave forms i.e. analog or digital form. The analog electronic signal generates a sine wave of a particular frequency. The frequency is the number of complete cycles per unit time (seconds).

The signal starts from a zero level, goes positive for a period of time, reaches a peak, returns to zero at a corresponding rate and then reaches a negative level equivalent to the positive peak. It then returns to zero at which time the signal begins a new cycle. The number of cycles per second is measured in hertz (HZ).



Analog sine waves

In-Text Question

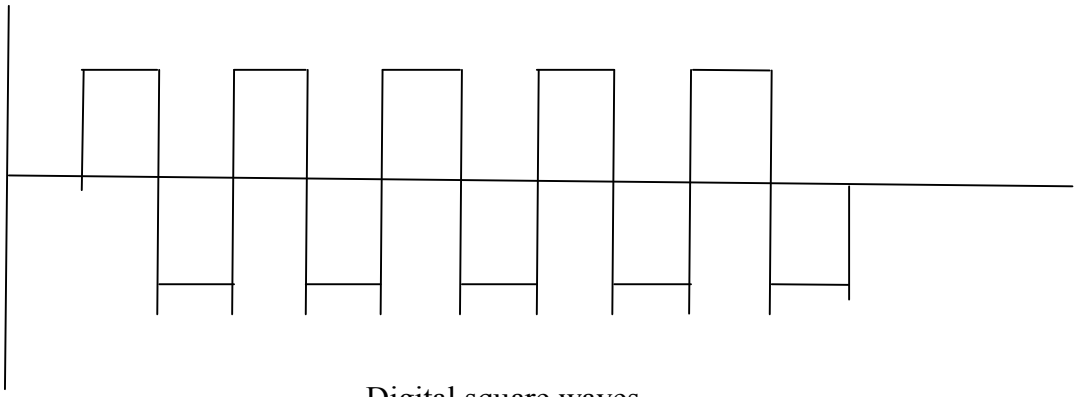
The message which is the ……..

In-Text Answer

Data or information.

Analog transmission is normally typical of voice transmission or transmission over long distances, in view of the reduced cost associated with use of cheap media and low power requirement.

Digital computers and terminals perform their data processing functions entirely in the binary digital 0 and 1thereby creating what looks like a square wave. This is known as digital transmission. If the computers and terminals are close enough to one another they can communicate with each other directly and effectively in a digital mode.



Digital square waves

Digital transmission is susceptible to signal attenuation or deterioration (loss of signal strength) in proportion to the length of transmission and also requires large power supplies. In view of these characteristics, it is only appropriate where the distance involved is relatively short and where the strength of the signal is not very important and high power is available.

Most waves are in analog form but digital square waves are found in computer communication where much distance is not involved. The greatest advantage of digital data transmission is that it is very fast and does not require additional equipment for conversion. Its use is limited however by signal attenuation, high power requirements over long distance and a high rate of data corruption in long distance data transmission.

2.3 Modulation and Demodulation

Mostly, the computer and terminals are not sufficiently in close proximity to permit direct digital communication. They are then joined by a communication carrier such as a telephone line which is an analog facility.

In order for the digital computer code to be transmitted on an analog carrier, the digital code must be modulated. Modulation is the process by which the digital information signal is attached to an analog carrier wave for it to be transmitted over a long distance.

At its destination, the transmitted modulated waves must be detached (demodulated) to recover the digital signals. The devices which perform modulation-demodulation operations are called modems (i.e. modulator-demodulator).

2.3.1 Modems

A modem (modulator-demodulator) is a device for achieving digital-analog-digital data conversion. In essence, modems are devices that provide the translation between the digital signals used by computers and terminals, and the analog signals used by the telephone line.

Effectively, this means loading the digital signal (in binary representation) into the normal carrier wave which is usually in sine wave form. This process is reversed at the receiving end of the link where the digital signal is recovered from the carrier wave.

Figure 2.2: *Modem*
Source*: http://gizmodo.com/5949695/have-cable-modem-rental-fees-actually-gotten-you-to-actually-do-anything*

There are three types of modems:

- Internal direct-connect modems (attached to the computer hardware by a cable);
- Internal modems (installed inside the computer);
- Acoustic couplers.

Modems are usually characterized by the speed at which they can load signals into the communication link as well as the method employed in timing i.e. whether they are asynchronous or synchronous. Asynchronous modems are the least complex technologically and operate at a lower speed than the synchronous modems.

In-Text Question

What are Modems?

In-Text Answer

Modems are devices that provide the translation between the digital signals used by computers and terminals, and the analog signals used by the telephone line.

In essence, modems can be classified as being high speed (more than 2400 bps) or low speed (24 bps or less). (bps=baud per second where a baud is equivalent to a bit). Modems can also be classified according to whether they are short-haul (limited distance) or long haul (extended networks); full duplex or half-duplex.

In general, the major criteria for choosing a modem are transmission rate, turn-around time, error susceptibility, reliability, cost, and maintainability. The modem transmission rate must be sufficient to handle the basic system data volumes.

Modem turn-around time is the length of time required for a modem transmitting in half duplex to shift from sending signals to receiving signals or vice versa.

Summary of Study Session 2

In this study session, you have been able to highlight the basic features of data communication, and to distinguish between analog and digital transmissions, notably the relative merits and demerits of these transmissions.

1. You have also discussed the processes of modulation and demodulation as well as modems in general.
2. It is the transfer and exchange of data/information between a sender (source) and a receiver (destination) through a medium or channel.
3. Electrical signals are transmitted via a conductor such as copper or aluminum or over a semi-conductor such as silicon. Electromagnetic radiation does not require a carrier although carriers can be used.
4. Modulation is the process by which the digital information signal is attached to an analog carrier wave for it to be transmitted over a long distance.

Self-Assessment Question (SAQs) for Study Session 2

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 2.1 (Tests Learning Outcomes 2.1)

1. Distinguish between analog and digital transmissions
2. Explain modulation and demodulation. Why are they necessary in data communication?
3. Mention the three types of Modems.
4. What are the criteria you would consider for choosing a modem?

References

Persons. Oja (2000). *New Perspectives onComputer Concepts*. *4th Edition*.. 752pp

Talabi, D. (2005). *Basic Computer Applications*. Lagos. Dataklinik Associates Limited 473 pp.

Yadav, D.S. (2008). *Foundations of Information Technology. 3rd Ed.* New Delhi. New Age International (P) Limited. 463pp

Study Session 3: Transmission Media

Introduction

Connection between sender and receiver in a communication network can be achieved either by means of a physical medium or a non-physical medium. The connection is attained either by means of wired connection or by wireless connection.

There are four basic paths that a message from a source can take to reach a destination. These are the telephone line, microwave transmission, satellite transmission, and fibre optics cable.

Learning Outcomes for Study Session 3

At the end of the study Session, you should be able to:

3.1 Discuss the Telephone line

3.2 Identify the differences between microwave transmission and satellite transmission

3.3 Explain the advantage of fibre optics

3.1 The Telephone Line

The telephone line system in most cases acts as a means of linking a node with any of the other transmission channels.

Figure 3.1: *Telephone*
Source:*http://hstrial-pmilano.homestead.com/IP-Office-New.html*

Telephone lines which may be used for data communication are of two types:

- Twisted pair wire and
- Coaxial cable.

a. Twisted pair wire

A twisted pair wire is one of the original types of wire used in telephone communication. The twisted pair is composed of a copper conductor insulated by plastic and twisted into pairs. They can support various types of low-speed data terminals.

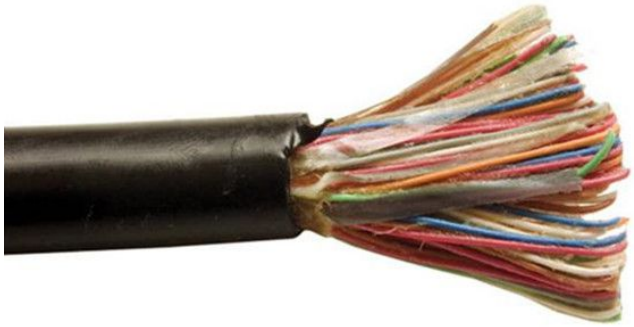


***Figure 3.2**: A Twisted pair wire.*
***Source**: http://www.alibaba.com/product-detail/Telephone-Extension-Cord-White-Phone-Cable_1884441535.html*

As greater transmission capacities were needed, bundles of insulated twisted pairs were wrapped into a large cable, often several inches thick. These cables carry as many as hundreds of twisted pairs. The cable is covered by lead or plastic and either suspended from poles or buried underground.

The problem with twisted pair is the occurrence of cross-talk at transmission frequencies above one megahertz. Attempts to overcome this problem led to the development of coaxial cable.

b. Coaxial Cable

The coaxial cable has a single wire with a very high capacity i.e. a very large bandwidth. The conductor is wrapped in insulation, which is, in turn covered by a wire mesh that keeps out electrical “noise” (static). Coaxial cable carries higher frequencies representing greater bandwidth than twisted pairs.

Figure 3.3: *Coaxial Cable*
Source*: http://mjsales.net/collections/coax-cable*

The greater capacity of coaxial cable allows it to carry many data simultaneously, eliminating the need for thousands of separate wires. Coaxial cable is often used in local networking.

3.2 Differences between microwave transmission and satellite transmission

3.2.1 Microwave Transmission

Microwave transmission does not use cables or wires (i.e. it is a wireless transmission). Rather, the signals are transmitted through the air between microwave stations. It is a radio transmission.

The transmission occurs in a straight line, so microwave relayed towers must be within sights of one another. Signals may be obstructed with greater interval because of the curvature of the earth.

Microwave transmissions typically have high bandwidth so that they can carry as many channels of color T.V. programming or thousands of telephone conversations. Signals can be adversely affected by atmospheric condition especially fog or rapidly changing temperatures. This condition is called fading.

In-Text Question

When signals can be adversely affected by atmospheric condition especially fog or rapidly changing temperature is known as ……

In-Text Answer

Fading

3.2.2 Satellite Transmission

Satellite transmission uses micro waves (radio signals). Satellites facilitate communication over long distances to overcome the problem of the curvature of the earth.

Satellite systems use geosynchronous orbiting satellites which are placed in an orbit (geosynchronous orbit) over the earth at an appropriate distance in order to maintain the orbit and to move with a relatively zero surface speed as the earth rotates. The distance is approximately 22,300 miles.

Microwave transmitters and receivers are aimed directly at the satellite. Signals transmitted to the satellite are amplified and beamed back to the earth by the satellite. Satellite transmission is at very high frequencies.

In-Text Question

Satellite Transmission uses micro waves called ……

In-Text Answer

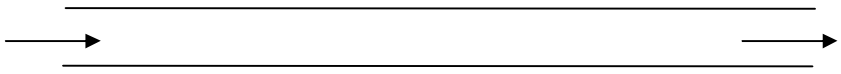
Radio Signals.

This mode of communication permits data transmission speed required for computer networking, video teleconferencing, and high-resolution graphics.

Satellite transmission is the most revolutionary among the transmission media in terms of speed, capacity and curvature of the earth.

3.3 Optical Fibres

An optical fibre is a piece of fibre that has some optical characteristics of interest. It is a very thin glass tube made such that if light enters through one end of the tube, it will pass through and be seen at the other end (a fibre is very thin)



The tube works in that manner due to the phenomenon called TIR (Total Internal Reflection).

In TIR there are two media, namely

- Light
- Glass.

The light is not seen outside the boundary of the tube but can be clearly seen at the other end (the destination). Even if you have a long distance you can still seethe light

with the same intensity at the destination as it is at the source. An optical fibre is as thin as a strand of hair. It has a diameter of between 6μm (6/1,000,000) (microns) to 200μm (microns)

Optical fibres made either of glass or plastic conduct light as much as wire conducts electrons. Information has to be first converted into light. One of the most common light sources is laser which produces fine beam which when directed into the fibre remains in the fibre until it emerges at the opposite end.

In-Text Question

Optical fibres is made up either …….and …….

In-Text Answer

Glass and Light.

Data to be sent down the fibre arrive as electrical signals. A converter accepts the electrical signals and encodes them as varying intensities of light. The light detector at the other end of the fibre reconverts the light signals into electrical signals that can be sent over conventional electronic parts.

Fibre optics technology offers many advantages over conventional electronic communication with copper cables because of the optical fibre's highly reduced weight and size, higher efficiency (little or no energy is lost unlike in electronic communication whereby they longer the distance, the more signal you lose), immunity from electronic disturbances as well as large capacity.

Summary of Study Session 3

In this study session, you have identified and examined the four basic types of transmission media that can exist or co-exist in a communication network.

- You have also discussed the two basic types of the telephone line and how the enhancement on microwave transmission led to the revolutionary development of satellite transmission.
- The operations and relative advantages of fibre optics technology (over conventional electronic communication using cable technology) were also highlighted.

Self-Assessment Question (SAQs) for Study Session 3

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study

Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 3.1 (Tests Learning Outcomes 3.1)

1. Distinguish between twisted pair wire and coaxial cable. What defect in the twisted pair led to the development of the coaxial cable?
2. Discuss the use of satellite transmission in communication networking

References

Persons. Oja (2000). *New Perspectives onComputer Concepts. 4th Edition.* Course Technology. 752pp

Shelly, Gary, Cashman, Thomas, Vermaat, Misty, and Walker, Tim. (1999). *Discovering Computers 2000: Concepts for a Connected World*. Cambridge, Massachusetts: Course Technology.

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Study Session 4: Data Transmission Techniques

Introduction

This study session will expose you to the data transmission techniques. Communication between two or more computers requires that the computer must use consistent speeds and must work in such a way that the data sent can be correctly interpreted.

Further, data may be transmitted along communication channels in a number of ways, each with trade-offs in speed, power requirement, data integrity, equipment requirement, cost, etc. Data may be transmitted in parallel or serially, as analog or digital data, asynchronously or synchronously, etc.

Learning Outcomes for Study Session 4

At the end of the study Session, you should be able to:

4.1 Discuss Serial and Parallel Transmission

4.2 Explain the basic transmission techniques.

4.1 Serial and Parallel Transmission

In serial transmission, data bits are sent and received one at a time in strict sequential order, and over a single communication channel. Serial data transmission is used for long data transmission owing to its substantial immunity to noise or interference and low power requirement. It is however slow, at least 9 times slower than parallel transmission

Parallel data transmission involves the simultaneous transmission of several bits of data along several transmission lines. This requires that all the bits to be transmitted should be assembled before transmission can commence, and that all the bits should arrive at the destination simultaneously so that they can be assembled and interpreted together.

Parallel transmission is used for internal data communication within microcomputer hardware systems, and from microcomputer hardware systems to nearby peripherals, e.g. printers. It is also used for data transmission within LANs (Local Area Networks). (These uses are in view of the expensive cable and high power requirements needed for parallel transmission.)

In-Text Question

……. is used for data transmission within LANs

In-Text Answer

Parallel Transmission

4.2 Basic Transmission Techniques.

4.2.1 Asynchronous Transmission

This is used with relatively slow devices such as terminals. Data is transmitted in short bursts at random intervals of time. The unit of data transmission is usually a character. The bit patterns of the individual characters are enclosed between a 'start' bit and a 'stop' bit to mark the beginning and end of each transmission.

The 'start' bit is a logical zero (0) while the 'stop' bit is a logical one

1. After a character is transmitted, there may be a considerable time delay before the 'start' bit for the next character is transmitted.

4.2.2 Synchronous Transmission

This is used when high speed transmission is required and when large groups of characters are normally ready for transmission at a time. Synchronous transmission involves transmitting characters as one continuous stream of bits. There are no 'start' or 'stop' bits or delays so line capacity is not wasted.

The hardware for synchronous transmission is more expensive because it must have precisely timed clocking mechanism to recognize where each character begins and ends. It can carry more bits/characters than the asynchronous transmission. It is good for carrying large volumes of data.

In-Text Question

……. high speed transmission is required and when large groups of characters are normally ready for transmission at a time

a. Synchronous Transmission
b. Asynchronous Transmission
c. None of the above
d. All of the above.

In-Text Answer

a.

4.2.3 Simplex Transmission

A simplex transmission channel can transmit signals or data in only one direction (e.g. radio and T.V broadcasts). Since this mode of transmission does not enable the

receiver to communicate with the sender, simplex transmission channels are rarely used in data communication.

4.2.4 Half-duplex Transmission

This permits transmission in both directions but only in one direction at a time. It is used in transaction processing systems whereby a user types in a request to the computer and the computer then processes the request for the user. Here we have user-to-computer transaction, and computer-to-user transaction. A common example of half-duplex transmission is the walkie-talkie.

In data communication networks, half-duplex channels require two modems between sender and receiver. These modems reverse their roles as sender and receiver depending on the direction of the transfer.

In-Text Question

Give an example of half-duplex transmission.

In-Text Answer

Walkie-talkie

4.2.5 Full-Duplex Transmission

A full-duplex channel supports simultaneous bi-directional or two-way transmission as in telephone conversation. Full duplex transmission is usually very fast and is therefore used in computer-to-computer communication.

Summary of Study Session 4

In this study session, you have also highlighted the similarities and fundamental differences between closely related transmission techniques, especially in terms of speed, power and equipment requirements.

- Parallel data transmission involves the simultaneous transmission of several bits of data along several transmission lines.
- This is used with relatively slow devices such as terminals.
- The hardware for synchronous transmission is more expensive because it must have precisely timed clocking mechanism to recognize where each character begins and ends.
- A simplex transmission channel can transmit signals or data in only one direction

Self-Assessment Question (SAQs) for Study Session 4

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 4.1 (Tests Learning Outcomes 4.1)

1. Describe and clearly distinguish between the following pairs:
   - i Serial and Parallel transmissions
   - ii Synchronous and Asynchronous transmissions
   - iii Half-duplex and Full-duplex transmissions
2. Why are synchronous and parallel transmissions more expensive than asynchronous and serial transmissions respectively?
3. With reference to IT, what is/are the basic difference(s) between "synchronous" and "asynchronous" devices? Give examples of these two phenomena.
4. Explain briefly any data transmission technique that can be used for computer-to-computer communication

References

Allen, T., and Morton, M.S.(1994). *Information Technology and the Corporation of the 1990s*. New York: Oxford University Press.

Cook, D, and Ridely, M. (2000). Computer mediated Communication Systems: will they catch on? *Canadian Library Journal*, 47, 413-417

Study Session 5: Data Traffic Control

Introduction

The last session introduced you to the data transmission techniques. This study session will reveal the fact that data communication through a computer network would not be possible but for the advanced techniques in controlling data traffic in the network. Among these techniques are protocols, handshaking, polling, and multiplexing.

Learning Outcomes for Study Session 5

At the end of the study Session, you should be able to:

5.1 Distinguish between handshaking and polling

5.2 Discuss multiplexing.

5.1 Polling and Handshaking

An important question to tackle in a computer network is: how does a computer know that another computer or terminal in the network is about to send its signals? This question is dealt with through a process called polling.

Polling refers to the way in which contact is established between nodes (a computer or terminal or a device that is capable of sending or receiving data on a network) and the host computer in a network.

In-Text Question

The way contact is established between nodes and the host computer in a network is called ……

In-Text Answer

Polling

In a centralized network (or even in a completely decentralized network), the host computer sends out on a continual basis, polling signals to each computer or terminal, one after the other, enquiring whether it is ready to transmit.

If a positive reply signal comes then the host computer asks that device to transmit and it receives the transmitted signal. When a device is not yet ready to transmit, then

a negative reply signal is given, and the host computer turns to another computer or terminal.

When the host computer has given a chance to all the computers/terminals in the network, it starts all over again. The exchange of signals back and forth between the machines in the network in the process of polling is called handshaking.

In-Text Question

What is Communication Protocol?

In-Text Answer

A communication protocol is a formal set of rules governing the format and relative timing of message exchange between communication devices

5.1.1 Protocol

Since data within a network must travel over a variety of channels, such as telephone line, microwave signals, and satellite signals, a standardized set of procedures is required for specifying how electronic components, terminals, computers and networks are designed.

These standardized sets are called protocols. A communication protocol is a formal set of rules governing the format and relative timing of message exchange between communication devices.

5.2 Multiplexing

Another consideration of data transmission is efficiency. It is rather inefficient to tie up a high-speed communication line with only one low-speed terminal or transmitting machine. Multiplexing is a method whereby such a line is shared by a number of transmitting devices.

A multiplexor is the device for achieving this. It divides the capacity of a high-speed line among the several low-speed devices. Thus, many low-speed lines or devices may communicate simultaneously over a high-speed line.

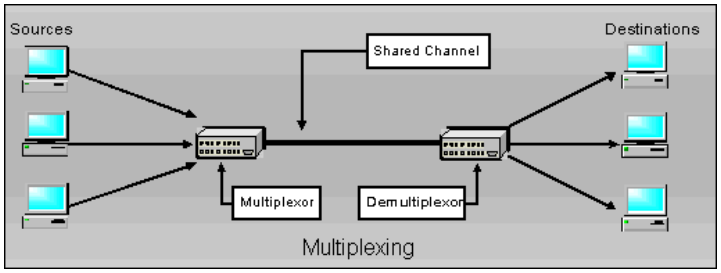


Figure 5.1: *Multiplexing*

Source*:http://www4.ncsu.edu/~chou/course/LectureNotes/multiplexing.htm*

The transmitting devices send their transmissions directly to the multiplexor which interweaves the transmission of the slower transmitting devices to form a high speed transmission to the destination of the computers.
There are three basic approaches to multiplexing.

- Time division multiplexing
- Frequency division multiplexing
- Statistical multiplexing.

a. Time Division Multiplexing (TDM)

In Time Division Multiplexing, each user or device is allocated fixed interval of time during which to transmit data, and the multiplexor outputs to a single line the data transmitted by the set of connected senders.

In-Text Question

The following are the best three approaches of Multiplexing except.

a. Time division multiplexing
b. Frequency division multiplexing
c. Statistical multiplexing.
d. None of the above

In-Text Answer

d.

b. Frequency Division Multiplexing (FDM)

In frequency division multiplexing, each sender is allocated a fixed portion of the frequency spectrum of the multiplexor output line so that each sender has a high-speed output line.

c. Statistical Multiplexing (SM)

This is a means of solving the problem of wastage of transmission capacity when a device is not used with the transmission line attached to it. A statistical multiplexor gives an unused line capacity to other terminals that are ready to transmit.

Summary of Study Session 5

In this study session, you have discussed the basic techniques that are used in controlling data traffic in a network.

- Polling refers to the way in which contact is established between nodes (a computer or terminal or a device that is capable of sending or receiving data on a network) and the host computer in a network.
- A communication protocol is a formal set of rules governing the format and relative timing of message exchange between communication devices.
- Implicitly, you have also distinguished between polling and handshaking, both of which are interwoven processes of exchange of signals among the nodes in a network.
- The basic approaches to multiplexing were also highlighted.
- Time Division Multiplexing, each user or device is allocated fixed interval of time during which to transmit data, and the multiplexor outputs to a single line the data transmitted by the set of connected senders.

Self-Assessment Question (SAQs) for Study Session 5

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 5.1 (Tests Learning Outcomes 5.1)

1. Describe and distinguish between polling and handshaking in a communication network.
2. What is a multiplexor? Describe the three basic approaches to multiplexing.

1. What do you understand by "protocol" in computer networking?
2. What is a communication protocol?

References

Derfler, F.J. and Freed, L. (2004). *How networks work* (7th ed.), Indianapolis IN: Que.

Davis, C.H. and Shaw, D. (eds.) (2011). *Introduction to information science and technology*, Medford NJ: Information Today.

Study Session 6: Data Communication Networks

Introduction

The need to share information and resources among different computers has led to linked computer systems, called networks, in which computers are connected so that data can be transferred from machine to machine.

In these networks, computer users can exchange messages and share resources – such as printing capabilities, software packages, and data storage facilities – that are scattered throughout the system. You begin this study session on communication networks by distinguishing between a network system and a closely related system known as a multi-user system.

Learning Outcomes for Study Session 6

At the end of the study Session, you should be able to:

6.1 Differentiate between a network system and a multi-user system

6.2 Identify the fundamental types of network

6.1 Network system Vs. Multi-user system

Data communication networks are a group of independent computer systems (communication nodes) interconnected and integrated with telecommunications (transmission lines) to facilitate communication among them.

Computers were expensive when they were developed. Computers then were so big and specialized and needed experts to operate and maintain them. In such situations, each computer was used by more than one person. This was a multi-user system.

Nowadays, this is still a multi user system. This involves time division or time-sharing such that there is the simultaneous use of a computer system from multiple terminals so as to reduce the time needed in solving problems and also reduce cost. Such multiple terminals when used this way are referred to as dumb terminals.

They do not have any processing power but only have communication facility. The dumb terminals rather depend on the Central Processing Unit of a computer. The concept of multi-user systems is based on the premise that the PC has a high processing power to serve different users together.

For example, several people can log on to the computer via the dumb terminals. Each user is allocated time in microseconds, and the computer will attend to the different users unnoticed as if each of them is having the computer to himself.
Conversely, you can have for example, three computers, each of them a computer in its own right. It has processing capability on its own, whether connected or not. This is a Network system.
Both the multi-user and Network systems have their merits and demerits. For example, the capacity utilization of a Network System is higher but the multi-user system is cheaper. However, if the CPU of the multi-user system breaks down, all the terminals are 'dead', but in a network, the breakdown of any of the host stations does not imply the total collapse of the whole network.

6.2 Types of Network

On the basis of geographical coverage, data communication networks fall into two broad categories:

- Local Area Network (LAN)
- Wide-Area Network (WAN)

Both LAN and WAN are often described in terms of area or radius of coverage. For example, the network will be regarded as a LAN so long as it does not extend beyond a certain radius.

Local-Area Network (LAN)

A Local-Area Network is a data communication network which covers a limited geographical area (and sometimes housed within a particular building) connected directly by a physical medium (hard-wired), which is usually inexpensive low-noise medium such as coaxial cable. More recently, however, there has been wireless Local Area Networks (WLANs) such as Wi-Fi.

Figure 6.1: *Local Area Network*
Source*: http://www.internet-beginner.net/networking/local-area-network.internet*

Wide-Area Network (WAN)

A Wide-Area Network (WAN) is a data communication network, which covers a large and dispersed geographical entity such as a metropolis (MAN), region, nation, or the world as a whole. A WAN can exist in two forms:

a. Private data communication networks (including remote access networks)
b. Public data communication networks

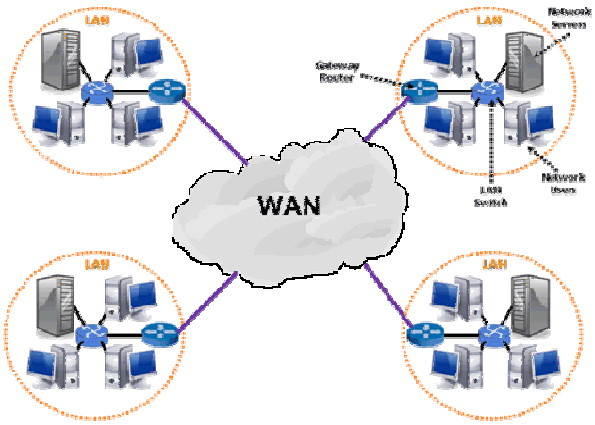


Figure6.2: *Wide Area Network*
Source*: http://www.netprivateer.com/lanwan.html*

Private data communication networks offering remote access are networks restricted to a closed community of users who share a common interest. These networks are resource sharing and mission-oriented.

Public data communication networks, which are also referred to as Value Added Networks (VAN) on the other hand provide common service over voice telephone circuits to a wide audience of users over large geographical areas.

In-Text Question

What does WAN stand for?

In-Text Answer

Wide Area Network. (WANs)

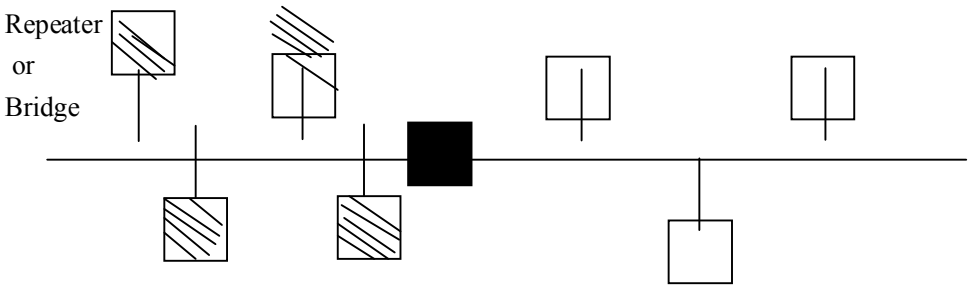
WANs often provide links between several LANs usually crossing geographical boundaries. WANs generally make use of the telephone line.

C. Combining Networks

Sometimes, it is necessary to connect existing networks to form an extended communication system. This can be done by connecting the networks to form a larger version of the same "type" of network.

For example, in the case of bus networks based on the Ethernet protocols (Ethernet= a set of standards for implementing a LAN with a bus topology), it is often possible to connect the buses to form a single large bus.

This is done by means of different devices known as repeaters, bridges, and switches, the distinctions of which are subtle yet informative. The simplest of these is the **repeater**, which is little more than a device that connects two buses to form a single long bus. The repeater simply passes signals back and forth between the two original buses (usually with some form of amplification) without considering the meaning of the signals.



A repeater or bridge connecting two buses.

A **bridge** is similar to, but more complex than, a repeater. Like a repeater, it connects two buses, but it does not necessarily pass all messages across the connection. Instead, it looks at the destination address that accompanies each message and forwards a message across the connection only when that message is destined for a computer on the other side.

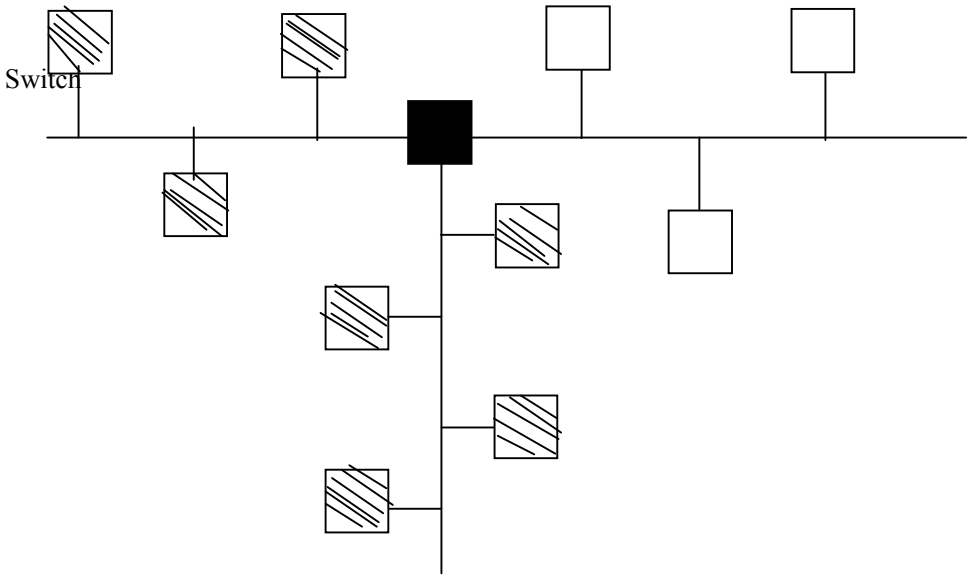
In-Text Question

…….. is complex than a repeater.

In-Text Answer

Bridge

Thus, two machines residing on the same side of a bridge can exchange messages without interfering with communication taking place on the other side. A bridge produces a more efficient system than that produced by a repeater.



A switch connecting multiple buses

A **switch** is essentially a bridge with multiple connections, allowing it to connect several buses rather than just two. Thus, a switch produces a network consisting of several buses extending from the switch as spokes on a wheel.

As in the case of a bridge, a switch considers the destination addresses of all messages and forwards only those messages destined for other spokes. Moreover, each message that is forwarded is relayed only into the appropriate spoke, thus minimizing the traffic in each spoke.

It is important to note that when networks are connected via repeaters, bridges, and switches, the result is a single large network. Each computer continues to communicate over the system in the same manner (using the same protocols) that it would if the system had been constructed originally as a single large network.
That is, the existence of repeaters, bridges, and switches is transparent to the individual computers in the system.
Sometimes, however, the networks to be connected have incompatible characteristics. For instance, the characteristics of a ring network using the token ring protocol are not readily compatible with an Ethernet bus network using CSMA/CD (=Carrier Sense, Multiple Access with Collision Detection).

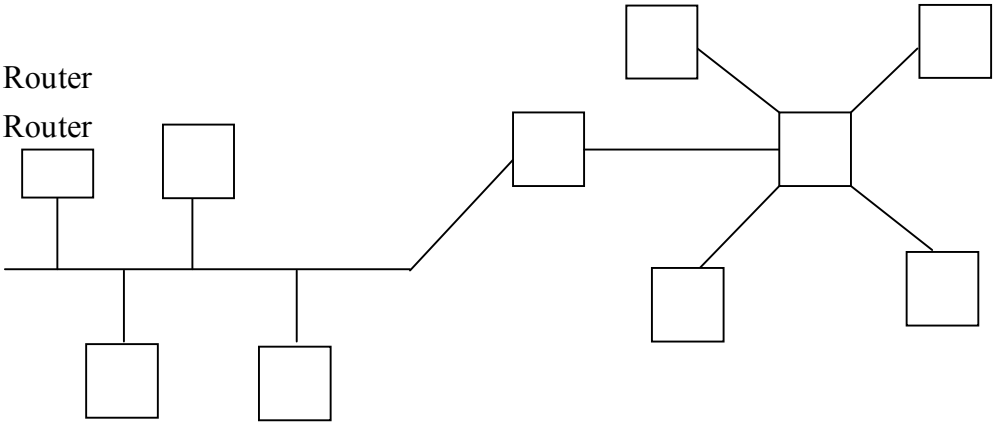
In-Text Question
…….is the connection between two networks to form an internet is handled by a machine
In-Text Answer
Router.

In these cases, the networks must be connected in a manner that builds a network of networks, known as an internet, in which the original networks maintain their individuality and continue as independent networks (Note that the generic term*internet*is distinct from the *Internet)*.

Figure 6.3: *Router*
Source*: https://en.wikipedia.org/wiki/Wireless_router*

The Internet, written with an upper case I, refers to a particular, worldwide internet that we will study in subsequent lectures of this course.

The connection between two networks to form an internet is handled by a machine known as a **router.** A router is a computer belonging to both networks that forwards messages in one network into the other network.



A router connecting a bus network to a star network to form an internet.

Note that the task of a router is significantly greater than that of repeaters, bridges, and switches because a router must convert between the idiosyncrasies of the two original networks.

For example, when transferring a message from a network using the token ring protocol to a network using CSMA/CD, a router must receive the message using one protocol and then transmit it to the other network using another protocol.

As another example of the complexities resolved by a router, consider the problem posed when the two networks being connected use different addressing systems to identify the computers in the networks.

When a computer in one network wants to send a message to a computer in the other, it cannot identify the destination computer in the manner to which it is accustomed. In such cases, a new internet-wide addressing system is established.

The result is that each machine in an internet has two addresses**:** its original network address and its new internet address.

To send a message from a computer in one of the original networks to a computer in the other, the computer at the origin bundles the destination's internet addresses with the message, and sends the bundles to the router using the local network's original addressing system.

The router then looks inside the bundle, finds the internet address of the message's ultimate destination, translates that address into the address format that is appropriate for the other network, and forwards the message to its destination.

In short, messages within each of the original networks continue to be transferred by means of each network's original addressing system, and the router is charged with the task of converting between the systems.

Summary of Study Session 6

In this study session, you have been able to distinguish between a multi-user system and a network system.

- You have also distinguished between a Local Area Network (LAN) and a Wide Area Network (WAN) as well as between internet and the Internet.
- When networks are combined, the devices that are used for such connections include repeaters, bridges, switches, and routers.
- The operations and differences among these devices are also highlighted

Self-Assessment Question (SAQs) for Study Session 6

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 6.1 (Tests Learning Outcomes 6.1)

1. Distinguish between a multi-user system and a network
2. What are the differences among a repeater, a bridge and a switch? How is a router different from these three?
3. What is a network system?
4. Name two basic types of a network system

References

Derfler, F.J. and Freed, L. (2004). *How networks work* (7th ed.), Indianapolis IN: Que.

Ince, D. (2011). *The computer: a very short introduction*, Oxford: Oxford University Press.

Study Session 7: Inter-nodal Connection and Network Topology

Introduction

Another way of classifying networks is based on the topology of the network, which refers to the pattern in which the machines are connected. It is important for you to remember that a network's topology might not be obvious from its physical appearance, and that more importantly, the connections between machines, even in a Local Area Network, do not need to be physical as wireless connections are becoming quite common in such networks.

Learning Outcomes for Study Session 7

At the end of the study Session, you should be able to:

7.1 Identify the two basic line configurations in communication networking

7.2 Identify the five basic topologies in use in communication networking

7.1 Inter-nodal Connection

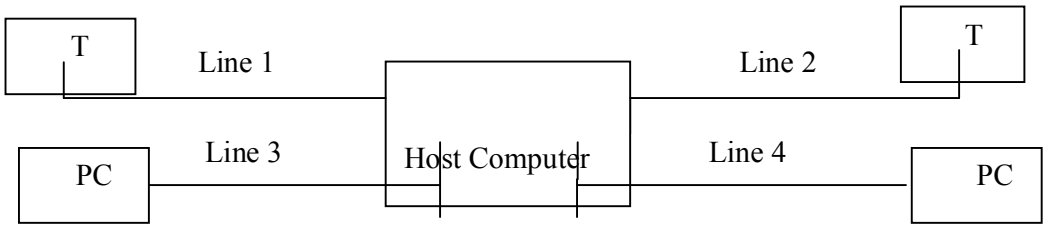
A communication network consists of two or more computer hardware systems connected by channels and data communication devices. There are several ways in which computers, terminals, and microcomputers can be connected, either directly to each other or through a host computer.

There are generally two major line configurations:

- Point-to-point lines
- Multidrop or multipoint lines.

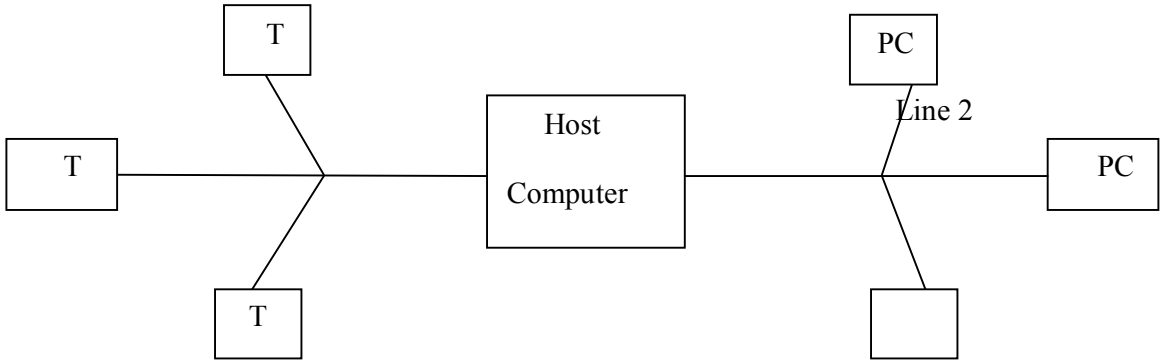
In a point-to-point network or line configuration, the terminals or personal computers are connected directly to the host computer. Only one terminal or personal computer is used for each line into the host computer.

A point-to-point network may connect a terminal and a computer, a microcomputer and a large computer or two computers of identical processing power. In many cases point-to-point lines are used when powerful computers are to communicate with each other.



Schematic representation of point-to-point line configuration
T= Terminal; PC=Personal Computer

In a multidrop or multipoint line, more than one terminal or microcomputers are on a single line connected to a host computer. However, on each line, only one personal computer or terminal at a time can transmit to the host computer. In the example given below, there are three terminals on line 1 and three personal computers on line 2



Schematic representation of a multidrop or multipoint line configuration.
T = Terminal, PC = Personal Computer

7.2 Network Topology

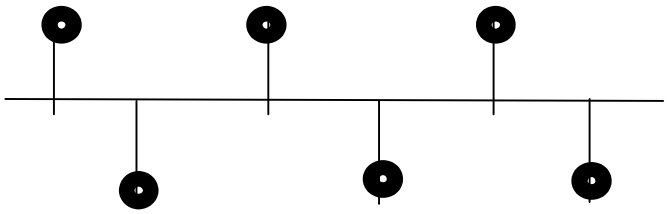
Network topology refers to the way in which the various computers of the network are physically connected together.

There are five basic topologies in use:

1. Bus Network
2. Star Network
3. Ring Network
4. Hierarchical Network,
5. Composite Network.

1. Bus Network

A bus network consists of a single cable to which a file server and a number of nodes (devices) are connected directly. Data is transmitted in either direction from any one node to the other and can be received by all nodes in the network.



However, since the data channel is shared by all nodes, only one node can send a message to the file server at a time but all nodes can receive simultaneously from the file server (multipoint connection).

In-Text Question

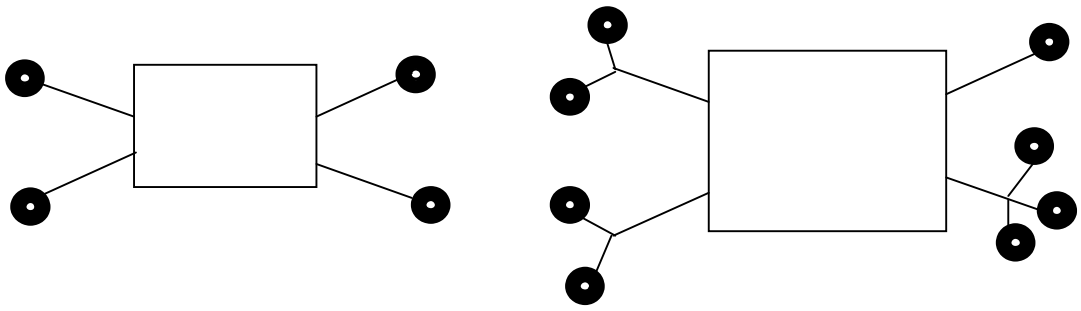
A …… consists of a single cable to which a file server and a number of nodes (devices) are connected directly.

In-Text Answer

Bus network

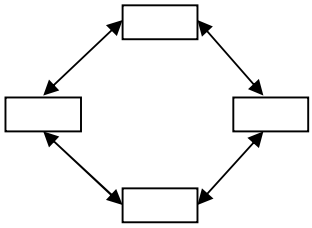
2. Star Network

A star network consists of a central host computer (which controls the flow of data through the entire network) to which all the nodes in the network are connected to form a star shape. A pure star network consists of only point-to-point lines between the nodes and the host computer but most star networks include both point-to-point and multidrop lines.



3. Ring Network

In a ring network, a series of nodes (one of which is designated a monitoring node but there is no central processing node) are linked point-to-point by a single communication cable that forms a ring which could either be uni-directional or bi-directional (although in either case a message can only be sent in one direction at any one instance).



Messages are sent from node to node with the aid of a token which also contains the address of both the source and the destination. As a message goes through the channel, each node examines the token to see if the destination's address matches its own.

If a match is made, the message is downloaded and the token is returned to the source (in a reversed order) with an accompanying message that the sender's message has been received.

In-Text Question

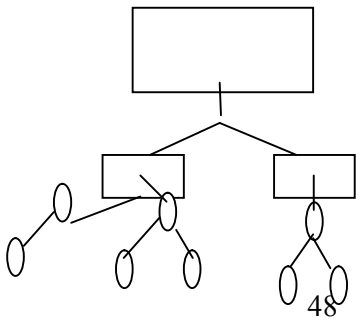
A ……..consists of a central host computer to which all the nodes in the network are connected to form a star shape.

In-Text Answer

Star network

4. Hierarchical/Tree Network

Hierarchical networks consist of several computing levels. Depending on the processing power required, as we move up the hierarchy there are fewer and fewer nodes, each of which has greater responsibility or processing power as well as access to more comprehensive collection of information. In essence, the user can step up the hierarchy of processing power until the processing needs are met.



5 Composite Network:

A composite network consists of many configurations connected together.

Summary of Study Session 7

In this study session, you have discussed the two major line configurations that are used between nodes and host computer communication.

- You have also discussed the five basic topologies that are used in computer networking.
- A bus network consists of a single cable to which a file server and a number of nodes (devices) are connected directly.

Self-Assessment Question (SAQs) for Study Session 7

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 7.1 (Tests Learning Outcomes 7.1)

1. Distinguish between point-to-point and multi-point line configurations in a communication network.
2. Describe three types of network topology in data communication networks.
3. What do you understand by point-to-point line connection in Local Area Networking?
4. Name two types of network topology in Local Area Networking

References

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Study Session 8: Information Technology Services

Introduction

It is important for you to note that as the need to produce and record information expands, so does the need to collect, manage and disseminate that information. Information Technologies, such as microcomputers, telecommunications, and high-density storage devices, are having a major impact on the way information is handled.
Because Information Technologies are becoming both more efficient and less costly, the opportunities for their applications and services produced there from have never been greater. The specific information technology services that will be discussed in this lecture include: Desktop Publishing, CD-ROM, Video conferencing, and Teleconference.

Learning Outcomes for Study Session 8

At the end of the study Session, you should be able to:

8.1 Explain component of Desktop publishing

8.2 Similarities and differences between video conferencing and teleconferencing.

8.1 Desktop Publishing

Desktop publishing is the product of technological advances in personal computing, print graphics, and computer-generated typography. Desktop publishing allows the operator to combine text and image files, manipulate those files, and format the resulting page-usually using a “mouse” and a microcomputer.
In a typical African setting, for example, where the local market for a given textbook may only be several hundred copies in a given year and local currency available may not allow prices to be high enough to cover costs, there may not be any incentive for local publishers to produce textbooks.
In this case, universities and schools may consider producing their own texts with microcomputers in the relatively small numbers their classes may require.
The currently available software permits almost all scientific formulae and technical drawings or graphs to be reproduced with a quality very similar to type setting. Desktop publishers use programs like Adobe InDesign and QuarkXpress to create page layouts for documents they want to print.

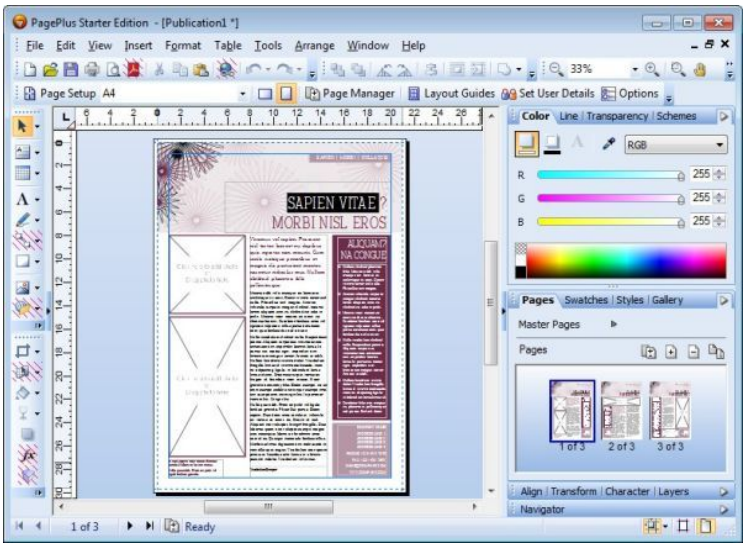

Figure 8.1: *Desktop Publishing*

Source*:http://www.techsupportalert.com/best-free-desktop-publishing-program.htm*

These desktop publishing programs can be used to create books, magazines, newspapers, flyers, pamphlets, and many other kinds of printed documents. Publishers may also use programs like Adobe Photoshop and Illustrator to create printable images. Even word processing programs like Microsoft Word can be used for basic desktop publishing purposes.

The advantage of desktop publishing is that it allows the author to convert the manuscript into final form without requiring the services of a commercial typesetter. It also permits text to be stored electronically, corrections to be made, and revisions included very easily and cheaply. New editions can be brought out frequently at little additional cost.

However, it can have the limitation that the author may neither receive recognition for the work nor royalties from the sale of it.

In-Text Question

Publishing software are the following except

a. Adobe Photoshop
b. Adobe Illustrator
c. Microsoft Word
d. None of the above.

In-Text Answer

d.

8.1.1 CD-ROM

CD-ROM (Compact Disc, Read-Only Memory) is a high-density storage medium on which electronic data is etched by laser on to a compact disc master. Plastic copies can be produced from the master. CD-ROMs are very durable; they are scratch resistant because the "read" head of the CD-ROM drive does not touch the disc.

CD-ROMs offer rapid search response time in respect to the size of the database(s) being searched. A single disc can hold still images, motion video, audio, and digital data (hence CD-ROMs are referred to as multi-media).

Figure 8.2: *CD-ROM*
Source*: https://en.wikipedia.org/wiki/CD-ROM*

The most impressive aspect of the CD-ROM is its storage capacity. A single CD-ROM can store as much data as 340,000 printed pages of information. Discs can hold very large databases, such as Agricola or Medline; or they can be used to store full text medical books, a high school science library, or an agricultural library.

Furthermore, for institutions with inadequate collections and difficulty in obtaining journal articles or other source documents, full text articles on CD-ROM present a viable solution for building hardcopy collections. In essence, the full text and images of several years of a scientific journal can be placed on CD-ROMs. Another attraction of CD-ROM is its relatively low manufacturing cost per unit of information.

8.2 Differences between video conferencing and teleconferencing.

8.2.1 Videoconferencing

Videoconferencing is the conduct of a videoconference (also known as a video conference or video teleconference) by a set of telecommunication technologies which allow two or more locations to communicate by simultaneous two-way video and audio transmissions. It has also been called 'visual collaboration' and is a type of groupware.

Videoconferencing differs from videophone calls in that it is designed to serve a conference or multiple locations rather than individuals.

Like all long distance communication technologies (such as phone and Internet), by reducing the need to travel, which is often carried out by aero plane, the technology also contributes to reductions in carbon emissions, thereby helping to reduce global warming.

Videoconferencing uses audio and video telecommunications to bring people at different sites together. This can be as simple as a conversation between people in private offices (point-to-point) or involve several (multipoint) sites in large rooms at multiple locations. Besides the audio and visual transmission of meeting activities, allied videoconferencing technologies can be used to share documents and display information on whiteboards.

In-Text Question

Videoconferencing is also known as ……..

In-Text Answer

Visual collaboration

Technological developments by videoconferencing developers in the 2010s have extended the capabilities of video conferencing systems beyond the boardroom for use with hand-held mobile devices that combine the use of video, audio and on-screen drawing capabilities broadcasting in real-time over secure networks, independent of location.

Figure 8.3: *Video Conferencing*

Source:*http://www.onlineconferencingsystems.com/what-is-video-conferencing-used-for/*

Mobile collaboration systems now allow multiple people in previously unreachable locations, such as workers on an off-shore oil rig, the ability to view and discuss issues with colleagues thousands of miles away.

8.2.2 Teleconference

A teleconference or teleseminar is the live exchange and mass articulation of information among several persons and machines remote from one another but linked by a telecommunications system. Terms such as audio conferencing, telephone conferencing and phone conferencing are also sometimes used to refer to teleconferencing.

The telecommunications system may support the teleconference by providing one or more of the following: audio, video, and/or data services by one or more means, such as telephone, computer, telegraph, teletypewriter, radio, and television.

Internet telephony involves conducting a teleconference over the Internet or a Wide Area Network. One key technology in this area is Voice over Internet Protocol (VOIP). Popular software for personal use includes Skype, Google Talk, Windows Live Messenger and Yahoo Messenger.

In-Text Question

VOIP stands for ……

In-Text Answer

Voice over Internet Protocol (VOIP)

Computer conferencing is the use of computer and telecommunications technology to hold discussions between people operating computers in separate locations. It may refer to:

- Teleconference supported by one or more computers
- Web conferencing
- Data conferencing
- Distributed computer applications:
    - Instant messaging
    - Online chat

Figure 8.4:*Teleconference using a video link. Simply due to costs, teleconferences are frequently limited to audio links (telephone or computer-based).*

Summary of Study Session 8

This study session exposed us to the roles of Desktop Publishing, CD-ROM, Video conferencing, and Teleconferencing systems in this modern era of Information and Communication Technologies (ICTs).

- You have understood the peculiar advantages and capabilities of these technologies and their applications in the world-wide information-sophisticated societies.
- Videoconferencing is the conduct of a videoconference (also known as a video conference or video teleconference) by a set of telecommunication technologies which allow two or more locations to communicate by simultaneous two-way video and audio transmissions.
- A teleconference orteleseminar is the live exchange and mass articulation of information among several persons and machines remote from one another but linked by a telecommunications system.

Self-Assessment Question (SAQs) for Study Session 8

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 8.1 (Tests Learning Outcomes 8.1)

1. What are the advantages and disadvantages of Desktop Publishing?
2. Distinguish between computer conferencing and video conferencing
2. What are the capabilities of video conferencing and teleconferencing systems?
1. What is the full meaning of CD-ROM?
2. What is the full meaning of DVD? How does it differ from CD-ROM?

References

Allen, T., and Morton, M.S.(1994). *Information Technology and the Corporation of the 1990s*. New York: Oxford University Press.

Cook, D, and Ridely, M. (2000). Computer mediated Communication Systems: will they catch on? *Canadian Library Journal*, 47, 413-417

Study Session 9: The Internet

Introduction

This study session provides us with a look at the phenomenon called the Internet. In this session, you shall learn how the Internet evolved, and the two major programs that populate the Internet. You shall also discover the two major protocols that are used in the Internet as well as World Wide Web, hypertext, and hyperlink.

Learning Outcomes for Study Session 9

At the end of the study Session, you should be able to:

9.1 Trace the evolution of Internet

9.1 Evolution of Internet

Internet is the name for a vast, worldwide system consisting of people, information, and computers. It is so huge and complex that it is beyond the comprehension of a single human being.

The roots of the Internet lie in a project called the ARPANET, which was sponsored by the United States Department of Defense – Advanced Research Projects Agency (ARPA). The department of defense was interested in building a network that could maintain itself under adverse conditions. (A NETWORK is simply two or more computers connected together).

The project was started in 1968 and soon evolved into a more general goal of developing techniques to build a large-scale network. ARPANET continued for years and was gradually phased out after having been officially declared completed.

By then the technology to connect computers reliably and economically had been developed and today the ARPANET's spiritual descendants form the global backbone of what we call, INTERNET.

In-Text Question

The roots of the Internet lie in a project called the ……..

In-Text Answer

ARPANET

Client and Servers

Internet is populated by two types of computer programs: servers and clients. Servers are programs that provide resources. Clients are programs that you use to access those resources.

The Internet contains millions of computers as well as a lot of wires, cables, telephone lines, and satellite links and so on; and the whole purpose of all of this equipment is simply to let the clients and the servers talk to one another. In other words, the Internet was constructed so that client programs (which you use) can talk to server programs (which provide resources).

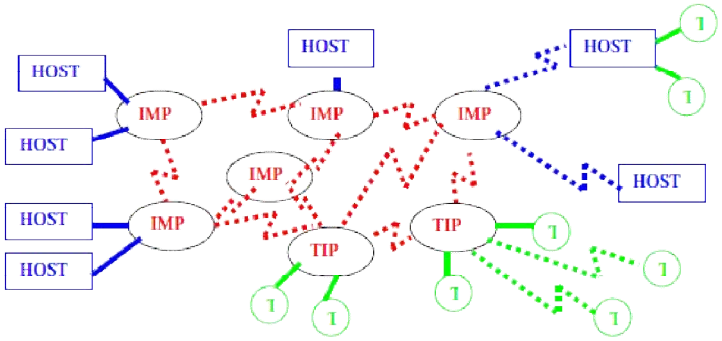

Figure 9.1:*ARPANET*

Source*: http://nrg.cs.ucl.ac.uk/internet-history.html*

Host and Terminals

There are two meanings for the word "host". Within the Internet, each computer is called a host (or node). Within a time-sharing system - such as UNIX, the main computer, which supports each user on a separate terminal, is also called a host. If such a computer were connected to the Internet, it would be both a time-sharing host and an Internet host.

A terminal has a keyboard, screen, and perhaps a mouse. All of the terminals are connected to the host, which provides the computing power for everybody. This arrangement is called a time-sharing system.

Protocols Used In Internet

The Internet is built on a collection of networks covering the world. These networks contain many different types of computers and somehow, something must hold the whole thing together. That common characteristic is TCP/IP.

To ensure that different types of computers can work together, programmers write their programs using standard PROTOCOLS. A protocol is a set of rules describing in technical terms, how something should be done on a computer.

In-Text Question

What does TCP stand for?

In-Text Answer

Transmission Control Protocol

For example, there is a protocol describing exactly what format should be used for sending a mail-message. TCP/IP is a common name for collection of more than 100 protocols used to connect computers and networks. The actual name, "TCP/IP", comes from the two most important protocols: TCP (Transmission Control Protocol) and IP (Internet Protocol).

- Transmission Control Protocol (TCP)

This deals with packets over networks. The packets are small pieces of data meant for effective and safe communication over the network. To send a block of data over a communication channel, the data is divided into various pieces and these pieces of data are communicated as packets.

These packets have to follow a long path, traversing from one computer or node to another computer. This process is called routing. The size of packets is decided on the basis of network capability. The TCP also ensures the safe delivery at the destination and the assembling of all the packets to get the complete lot of data at the destination computers.

- Internet Protocol (IP)

This mainly deals with addresses of computers. The Internet Protocol decides the address of computer to be labeled on the packet. This allows various computers or intermediate nodes to read the address of the destination computer and route the packet to the destination node.

World Wide Web

The World Wide Web, also known as the Web, the WWW or W3, was initially developed by the European Laboratory for Particle Physics, otherwise known as CERN, in order to build a distributed hypermedia system.

It is an interconnected assembly of resources available on the Internet that can be displayed by means of a type of software program known as a 'Web browser' or 'Web navigator'. This system aims to provide global access to a universe of documents, most of them in the form of 'hypertext'. Hypertext is similar to regular text in many aspects - it can be stored, read, searched or edited. However, unlike regular text, it contains pointers to other text. In this way, it generates 'hyperlinks' which form a web and continue to provide information and documents on a particular topic.

To access the World Wide Web, one needs a Web browser to read documents and retrieve them onto his computer from other sources. Information providers set up hypermedia 'servers' from which browsers access documents.

There are over 30 different Web browsers currently in use, but only a few have gained widespread acceptance. Internet Explorer, Mozilla Firefox, and Netscape navigator are perhaps still the most popular browsers on the Web.

Hypertext

Although the World Wide Web uses the Internet, the web is based on another concept entirely. That concept is hypertext, and is referred to in the names of the standards and protocols that the World Wide Web uses, i.e. Hypertext Mark-up language (HTML) and Hypertext Transfer Protocol (HTTP).

Hypertext explores the idea that electronic documents, unlike paper documents, don't have to be static. When you ran across an interesting work or concept in a printed newspaper article, for instance, you must go to a dictionary or encyclopedia or library to look up the references yourself.

In-Text Question

WWW stands for ……..

In-Text Answer

World Wide Web

The most the article can do is to cite these references in footnotes. However, if a hypertext article is displayed for you on a computer screen, the computer can bring the references right to you. Instead of merely giving the reference name, the hypertext article contains pointers to a web of interrelated documents; each with links to move and cut ideas with similar subjects or examples. To access these documents, all you have to do is click the reference.

Summary of Study Session 9

In this study session, you have been exposed to the evolution and aims of the Internet and World Wide Web as well as the similarities and differences between clients and servers, hosts and terminals, and hypertext and hyperlinks. The two most important protocols used on the Internet were also highlighted.

Self-Assessment Question (SAQs) for Study Session 9

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 9.1 (Tests Learning Outcomes 9.1)

1. Briefly explain the evolution of the Internet and the World Wide Web
2. Distinguish between clients and servers; and hypertext and hyperlinks
3. What is Internet?
4. What do you understand by www?

References

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Sherman, C and Gary, P (2001). The Invisible Web: Uncovering Information Sources Search Engines Can't See. Medford, N.J: CyberAge Books

Study Session 10: Web Browsers, Search Engines, and Net Surfing

Introduction

This session will expose you to other Internet applications. Web browsers are applications that retrieve content in the form of HTML from WEB SERVERS. Browsers keep track of the users input actions. A web search engine, on the other hand, is an interactive tool to help people locate information available via the World Wide Web. Web search engines are actually databases that contain references to thousands of resources.

Users are able to interact with the database by submitting queries that "ask" the database if it contains resources that match specific criteria. Net surfing is the process of visiting the different web sites on the Internet hosted by the various companies, organizations, educational institutions, magazines and individuals.

Learning Outcomes for Study Session 10

At the end of the study Session, you should be able to:

10.1 The functions and operations of Web browsers

10.2 The operations of search engines

10.3 Internet browsing.

10.1 Web Browsers

Software packages that allow users to access hypertext on the Internet fall into one of two categories: packages that play the role of clients, and packages that play the role of servers.

A client package resides on the user's computer and is charged with the tasks of obtaining materials requested by the user and presenting these materials to the user in an organized manner. It is the client that provides the user interface that allows a user to browse within the Web.

Hence the client is often referred to as a **browser**, or sometimes as a Web browser. The server package (often called a Web server) resides on a computer containing hypertext documents to be accessed. Its task is to provide access to the documents on its machine as requested by clients.

Figure 10.1: *Web Browser*
Source*: https://www.youtube.com/watch?v=IRJpGdXtJKU*

In summary, a user gains access to hypertext documents by means of a browser residing on the user's computer. This browser, playing the role of a client, obtains the documents by soliciting the services of the Web servers scattered throughout the Internet. Hypertext documents are normally transferred between browsers and Web servers using a protocol known as the Hypertext Transfer Protocol (HTTP).
Thus web pages can be viewed by using Web browsers. Web browsers are programs which are used in viewing documents or pages written in HTML. When you use Web browser for net surfing, it acts as a client and connects you to the desired server after specifying the URL address (Uniform Resource Locator).

In-Text Question
What is the full meaning of HTTP?
In-Text Answer
Hypertext Transfer Protocol (HTTP)
It then takes you to the homepage of the server. The home page is usually the first page by which you may navigate to the other related pages. The home page provides the link to the other relevant pages available at the server.

Internet explorer and Netscape communicator (initially called as Netscape navigator) are two browsers that are very popular.

10.2 Web Search Engines

Since there are literally thousands of websites on the Internet, it is usually a great problem for the user to find the appropriate site or sites of his interest. The solution to this problem is to use a search engine. Search engines are actually websites and they contain links to millions of web pages.

In-Text Question

What is full meaning of URL?

In-Text Answer

Uniform Resource Locator

All you have to do is to type in the URL of the search engine and type in the keyword of the document you are searching. The method of inputting the keyword varies slightly according to the search engine.

After typing the keyword in the dialog box for search, press (or click on) the button "search" and you will get a list of hypertext documents which contain the keyword you have entered. The next step is to select an appropriate document and click on it to enter its site.

You can then view its pages and browse through its content. Some popular search engines are as follows:

www.google.com

www.lycos.com

www.altavista.com

www.hotbot.com

www.yahoo.com

www.webcrawler.com

www.excite.com

10.3 Internet Browsing

Internet browsing or net surfing is the process of visiting the different web sites on the Internet hosted by the various companies, organizations, educational institutions, magazines and individuals.

In-Text Question

Mention three popular web search engines?

In-Text Answer

- www.google.com
- www.lycos.com
- www.yahoo.com

The Internet contains a wealth of information that can help you in any sphere of activity. Armed with a good Internet browser, you can easily get around to the myriad of sites, gathering imperative information, conducting market research, reading

publications and staying in touch with what's happening at your business associations.

In-Text Question

What is Internet Browsing?

In-Text Answer

Internet browsing or net surfing is the process of visiting the different web sites on the Internet hosted by the various companies, organizations, educational institutions, magazines and individuals.

Summary of Study Session 10

In this study session, the students have been exposed to the phenomena of Web browsers and search engines.

1. Browsers are client packages that reside on the user's computer and are charged with the tasks of obtaining materials requested by the user and presenting these materials to the user in an organized manner.
2. Similarly, Web search engines are interactive tools to help people locate information available via the World Wide Web. Actually, they are databases that contain references to millions of resources.
3. Other hand, Internet browsing is the process of visiting the different websites on the Internet.

Self-Assessment Question (SAQs) for Study Session 10

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 10.1 (Tests Learning Outcomes 10.1)

1. Name three popular web browsers that are used in Nigeria
2. Differentiate between a search engine and a web browser
3. Name three search engines
4. What is Internet browsing?

References

Berners-Lee, T. (1999). Weaving the Web: the past, present and future of the World Wide Web by its inventor. London: Orion

Berners-Lee, T., Hendler, J. and Lassila, O. (2001). The semantic web, *Scientific American*, May 2001 issue, 34 - 43

Devine, J and Francine Egger-Sider (2009). Going Beyond Google: The Invisible Web in Learning and Teaching. New York: Neal-Schuman

Study Session 11: Internet Addressing System

Introduction

It is expected at this point that you already have a firm understanding of the basics of Internet and its applications. The Internet is a web, which has very large number of computer systems connected to each other. The computers, web pages, and documents on the Internet are located by their addresses; the addressing systems include IP address, domain name and Uniform Resource Locator (URL). All these will be discussed in this study session.

Learning Outcomes for Study Session 11

At the end of the study Session, you should be able to:

11.1 Discuss the IP addressing systems.

11.1 IP Address

To identify each computer uniquely on the network, each system is identified by an IP (Internet Protocol) address. The IP uses Internet address information to deliver mail and other data from computer to computer. However, it may be difficult to remember numeric addresses when we want to contact someone, using electronic mail.

If you want to get connected to another computer, you need to know the computer's address. An IP address is an identifier for a particular machine on a particular network; it is part of a scheme to identify computers on the Internet. An IP number consists of four sections separated by periods. Each section contains a number ranging from 0 to 255, for example, 202.50.2.3

These four sections represent both the machine itself and host, and the network that the host is on. The network portion of the IP address is allocated to Internet Service Providers (ISP).

The IP addresses have the following characteristics in common:

- IP addresses are unique
- All machines connected to the Internet agree to use the same scheme for establishing an address.

Domain Name

A domain name is a way to identify and locate computers connected to the Internet. No two organizations can have the same domain name. Simply put, a domain name is an Internet address, which can be used as the basis of an E-mail Address, a Website Address, or both. E-mail addresses always have the '@' symbol in them, and the web site addresses usually contain 'www'.

For example, if your company's name is DTK Books Limited, then you might choose to register the Domain Name www.dtkbooks.com (usually in lower case letters). This can then be used to give you a range of E-mail addresses for your employees or family members as the case may be; for example: doyin@dtkbooks.com, tutu@dtkbooks.com

So by registering one domain name, you get several different, individualized E-mail addresses. Even better, the domain can also be used in a slightly different format to give you a Website address such as www.foursquarenigeria.org

Adomain namealways contains two or more components separated by periods, called "dots". Further examples of domain names are: www.nasa.gov, netscape.com, tcs-co.in.

In-Text Question

The …… uses Internet address information to deliver mail and other data from computer to computer.

In-Text Answer

Internet Protocol (IP)

The top-level portion of a domain name describes the type of organization holding that name. Outside of the United States, country codes serve as top-level domains. For example, Canada's top-level domain is ca. The United Kingdom's top-level domain is uk. Thus, the top-level domains were assigned organization wise, and by country.

3-letter DNS category Domain Name	Meaning
com	commercial (linkserve.com)
edu	Educational (oauife.edu)
gov	Government (whitehouse.gov)
int	International Organization
mil	Military (army.mil US army)
net	Network Provider (usa.net)
org	Noncommercial organizations
aero	Air Transport Industry
biz	Businesses
coop	Cooperatives

2-letter DNS Country Domain Name	Meaning
de	Germany
it	Italy
us	USA
uk	United Kingdom
in	India
ng	Nigeria
za	South Africa
ca	Canada

Thus you can have "linkserve.com.ng" representing Linkserve on the Internet as a commercial venture in Nigeria. Usually, companies use their names or known aliases as part of their domain names (www.cadburynigeria.com)

2. Domain Name Service (DNS)

Sun Microsystems developed the Domain Name System (or Service) (DNS) in the early 80s as an easier way to keep track of addresses. The DNS establishes a hierarchy of domain names, which are groups of computers on the Internet. The DNS gives each computer on the Internet an Internet address or domain name, using easily recognizable letters and words instead of numbers.

Domain name service (DNS) enables Internet clients and hosts to refer to one another using human-readable names likewww.microsoft.com, rather than IP addresses like 207.68.156.61, which are harder to remember and convey no information about the site.

Each domain name corresponds to numeric IP (Internet protocol) addresses. The Internet uses the numeric IP address to send data. For instance, you may be connecting to a World Wide Web server with the domain name such as www.yahoo.com, but as far as the network is concerned, you are connecting to the web server with the IP address associated with that domain name.

The numeric IP addresses are the official addresses of the net. Domain names are used only for the convenience of human beings. This means that, before a domain name can be used, it must be translated into a numeric IP address. All of this is done automatically by an Internet service called DNS.

In-Text Question

…….. developed the Domain Name System (or Service) (DNS) in the early 80s.

In-Text Answer

Sun Microsystems.

Uniform Resource Locator (URL)

URL stands for Uniform Resource Locator, which is simply an address of a document on the web or, more accurately, on the Internet. Although a URL can look complex and long, it is made up of four basic parts- protocol, host name, folder name and file name- each of which has a specific function.

E.g. http://www.webconnect.com/virtual/index.html

All URLs follow this format regardless of the service being used or the document being retrieved.

- **Protocol:** The first element in the URL is the protocol. This is the service that provides the resource, followed by a colon. The default taken is http**:** if you don't specify other service. The protocol specifies the computer language used to transfer information. Specifically, a protocol tells the browser where the information is located [for example, on a web server, an FTP (File transfer protocol) server, a local hard drive, and so on]. The protocol tells the browser what to expect from the document retrieval process.

Protocol	Use
http://	For HTML documents and associated files on the web
Ftp://	For documents on the FTP server
Gopher://	For documents on the Gopher server
telnet://	To open a telnet connected to a specific host

- **Host name:**host name is the server that contains the resource, preceded by two slashes (either in the form of a domain name or an IP address).In other words the hostname is the name of the server that holds HTML documents and related files.

E.g. In the previous example, the hostname is www.webconnet.com.

➢ **Folder name:** folder name is the name of the folder that holds the document. Folders perform the same function on a web server that they perform on your PC (i.e. they organize documents). There's virtually no limit to how deep you can nest folders, and there's no limit as to what files the folders can contain.

Figure 11.1: *Folder*
Source*: http://www.amazon.com/b?ie=UTF8&node=705333011*

In-Text Question

……. name is the name of the folder that holds the document.

In-Text Answer

Folder

➢ **File name:** file names are the names of specific documents. It identifies the file (an HTML document, an image, a text file, and so on) to be displayed. In the above example, the file index.html is displayed.

Figure 11.2: *Files*
Source: http://www.imperva.com/Products/FileSecurity

Summary of Study Session 11

In this study session, students have been exposed to the various addressing systems associated with the Internet.

These include:

- IP address,
- Domain name
- Uniform Resource Locator (URL).

The need for, and differences among these addressing systems were also highlighted in the lecture. The Domain Name Service provides the translation between the numeric IP Address used by the computer machine and the domain names used for the convenience of humans.

Self-Assessment Question (SAQs) for Study Session 11

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 11.1 (Tests Learning Outcomes 11.1)

1. Distinguish between IP Address and URL
2. Differentiate between Domain Name and Domain Name Service
3. What is the full meaning of URL?
4. Distinguish between a file name and a folder name in a network

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Study Session 12: Internet Services

Introduction

In this study session, there will be a discussion of various traditional services on the Internet which you will benefit for. You call these traditional services because they mostly deal with conventional computer-to-computer communication for which the Internet was originally developed.

Specifically, there are many services and tools which are out there and some have been for much longer. They include: Electronic mail, File transfer protocol (FTP), Telnet, Usenet news, Mailing lists, and Gopher.

Learning Outcomes for Study Session 12

At the end of the study Session, you should be able to:

12.1 Define of Internet Service Provider

12.2 Discus the Electronic Mail

12.3 Discuss the File Transfer Protocol.

12.1 Internet Service Providers (ISP)

Internet Service Provider (ISP) is the agency which enables users to access Internet services. The ISP is equipped with all tools and technology to provide you the Internet access. You need to register and have account with one of these agencies. An Internet Service Provider (ISP) acts as a conduit for individuals to dial in before getting patched through to the Internet backbone.

An ISP simply leases a high-speed connection to the Internet backbone network or gateway and provides lower speed access to its registered users. They also provide variety of value-added services such as e-mail and web pages with local content.

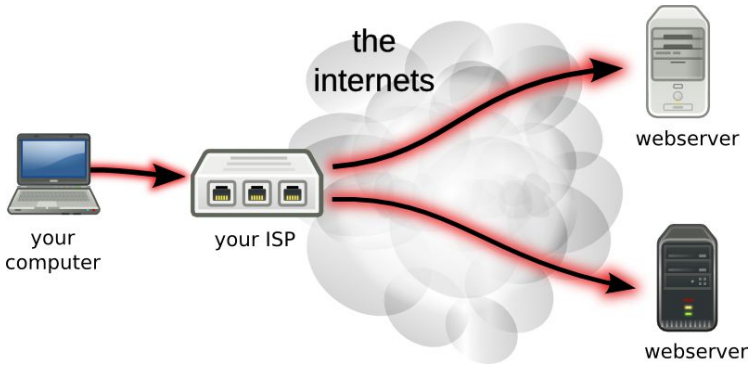

Figure 12.1: *Internet Service Provider (ISP).*

Source:*http://www.hotcopas.net/2015/11/beberapa-organisasi-yang-secara-rahasia.html*

You connect to your ISP using your modem via a telephone line or any other delivery channel available. Thus, an individual can have doyin@yourdomain.com as his e-mail address or doyin@yourdomain.com if he takes the free web based mail services such as yahoo or any of the many available. Linkserve, Hyperia, Microcom, Datanet, and Skannet are some of the ISPs in Nigeria.

12.2 Electronic Mail

Electronic Mail, popularly known as E-mail, had become an important means of communication in this decade. E-mail is now one of the popular media of communication. This medium is being widely used to send and receive letters/notes or draft, let it be personal or official. One of the main advantages of this medium is that these mails are delivered almost instantly.

Technically, E-mail refers to the sending of documents in electronic form from one computer to another computer. Every recipient of the E-mail must have an E-mail address.

This mail address is used to send the mail. Earlier E-mail was considered good for sending and receiving only short messages but because of a rapid growth in the bandwidth of the channel, it is now possible to send large messages with attachment which may have images, graphics or animations, voices, etc.

Figure 12.2: *E-mail*

Source*: http://nulink.com/email/*

The conventional methods of communication, which include ordinary mail, take several days or weeks to get the mail delivered. Further, letters can be misplaced, lost or damaged in conventional mail delivery. E-mail is a much more reliable and cost effective mail service. To send or receive messages using E-mail service, every sender or recipient must have a unique E-mail address.

In-Text Question

Electronic Mail is popularly known as ……..

In-Text Answer

E-mail

The letters or messages are sent electronically to the recipient over communication channels like telephone links, radio links, satellite, etc. The E-mail is delivered to the inbox of the mail recipient. E-mail addresses appear to be little complex, but they have a simple meaning. E-mail address is usually divided into two parts comprising the name of the user and the name of the server on which the user has his address. The following are few examples of email addresses:

dsy_iet@cse.ietlko.com

girish@cse.iitk.ac.in

Here the first portion, e.g. , dsy_iet or girish is called Mail Id. The second half is the address of the server where this Mail Id is registered. The general syntax for the mail is Username@ address of Server, where dsy_iet is the name of the user who has a mail account at server cse.ietlko.com server. The letter after the dot (.) denotes the type of server and its location.

One can easily see that the mail address rkag@unisa.edu.au has the username rkag and is present at University of South Australia (unisa), and educational institution located in Australia.

Sending and receiving an E-mail is very simple and it requires only a few clicks of mouse.

File Transfer Protocol (FTP)

Ftp is part of the TCP/IP protocol suite. It is a protocol or set of rules, which enables files to be transferred between computers. Ftp works on the client/server principle. A client programme enables the user to interact with a server in order to access information and services on the server computer.

Files that can be transferred are stored on computers called FTP servers. To access these files, an FTP client programme is used. This is an interface that allows the user to locate the file(s) to be transferred and initiate the transfer process.

In-Text Question

……. is part of the TCP/IP protocol suite

In-Text Answer

FTP

12.2.1 Telnet

Telnet is a protocol or set of tools, which allows you to log on to any computer on the Internet. Telnet is a service on the Internet which enables an Internet host to become the terminal of a remote computer.

It is therefore a very strong and powerful facility where one host may get the full command of another machine. After logging in you may use the software and other programs stored on the remote computer you logged in.

By Telnet you can therefore use the computer you had logged in, as if you have full control of that computer. But one should not suppose that through Telnet one can connect to and use any computer on the Internet. To use Telnet you have access permission usually in the form of an account and password. Telnet facility is usually used to search an information archive such as a public library or a public database.

Telnet is very useful in accessing various services, which are not available on the host computer. You can run a desired program on the remote computer and see the results on your own computer. Whenever any person develops any utility or service on his host computer, Telnet users can access those services or programs from their computers.

Telnet is very similar to the utility called Remote Login. It is also called emulation protocol as once the connection between the host computer and the remote computer

is established, the host computer's commands are executed on the remote computer and the results are displayed on the host computer.

12.2.2Usenet

Usenet stands for Users network. Usenet allows the users from different geographical locations to share their views on any topic of interest. It was first started in 1979 and today it has more than 10 million users.

Usenet is the international meeting place where people gather to meet and discuss various subjects ranging from business, academic, sport, music, tourism, games, etc.It is very similar to the Bulletin Board System (BBS) that serves the local users using a direct dial up to Internet Service Providers. The Usenet is related to news groups.

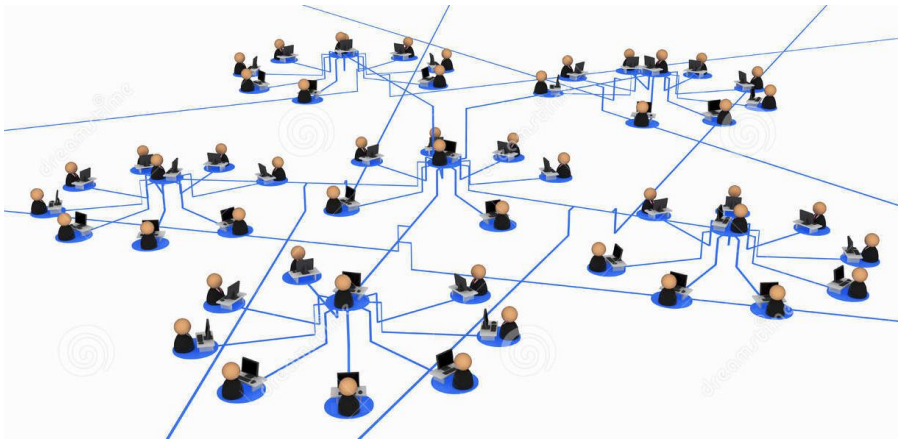

Figure 12.3: *Users network*
Source*: http://www.dreamstime.com/stock-photos-business-symbols-user-network-image10113303*

The News Groups have actually nothing to do with news but they work as bulletin boards. The person may put a notice highlighting his views, etc. on some topic. This notice may be seen by all the users of new groups. Each message from a user appearing on the Usenet is called an article.

Each article contains a header just like an e-mail. To read and post the articles, the Usenet news servers are required. The local Internet Service Provider makes available this server. The Usenet is a global bulletin board service that uses the Internet as an access point.

In-Text Question

……. allows the users from different geographical locations to share their views on any topic of interest.

In-Text Answer
Usenet

12.2.3Mailing Lists

The Usenet group is open to all, but if the interest of individual is confined to a smaller domain, a mailing list may be used. Discussion groups or announcements of a specific nature generally use mailing lists. Usually servers allow more and more users to enlist themselves in the mailing lists by sending an e-mail message. A discussion group of members restricted to only subscribers as per the mailing list receive messages from the server as soon as someone has sent one. Normally there is no charge for using a mailing list.

12.2.4Gopher

Gopher is a service on the Internet, which allows users to access resources such as files or text. Gopher is a protocol used for searching and retrieving information from remote sites on the Internet. It is an alternate way of accessing information which is a little different from visiting websites using hypertext transfer protocol.

***Figure 12.4**: Gopher*
***Source**: http://www.drachmi.com/*

Gopher is based on client server architecture just like web browsers. It is the same as the World Wide Web with the difference that information in it is stored in a hierarchical order. Mostly, educational institutions and universities create Gopher

resources like, for example, university directories. The information contained in the Gopher space is usually reliable and stable.

A Gopher menu may always call another gopher menu. Gopher service is faster in the sense that it contains the listing only in an indexed manner.

The difference between web browsing and visiting a Gopher space is that in the former, you see the graphical pictures/text, etc. while Gopher presents you with a menu. The web pages are full of hypertext, and by clicking on them you may navigate from one pool of resources to another.

In Gopher service, the menus are presented before you. These menus are clickable items and clicking on them, you may go to another menu or get the information in the form of text. To use the Gopher service, you have to use Gopher Protocol. The Gopher service may be accessed by specifying its URL as stated below

gopher://gopher.kent.edu

The URL of the site has to be accessed using Gopher protocol just like you use Hypertext Transfer Protocol (http) to access normal web pages.

Summary of Study Session 12

In this Study session, you have described some of the various services available on the Internet. The benefits and capabilities of these services were highlighted.

1. The role of Internet Service Providers (ISPs) in accessing the Internet was highlighted as well.
2. You have also been able to distinguish between the closely related phenomena of Internet and Intranet.
3. An Internet Service Provider (ISP) acts as a conduit for individuals to dial in before getting patched through to the Internet backbone.
4. E-mail is now one of the popular media of communication. This medium is being widely used to send and receive letters/notes or draft, let it be personal or official.
5. Files that can be transferred are stored on computers called FTP servers. To access these files, an FTP client programme is used. This is an interface that allows the user to locate the file(s) to be transferred and initiate the transfer process.
6. Telnet is a protocol or set of tools, which allows you to log on to any computer on the Internet. Telnet is a service on the Internet which enables an Internet host to become the terminal of a remote computer.

Self-Assessment Question (SAQs) for Study Session 12

Now that you have completed this study session, you can assess how well you have achieved its Learning outcomes by answering the following questions. Write your answers in your study Diary and discuss them with your Tutor at the next study Support Meeting. You can check your answers with the Notes on the Self-Assessment questions at the end of this Module.

SAQ 12.1 (Tests Learning Outcomes 12.1)

1. What do you understand by ISP?
2. What is Intranet?
3. How does the ISP get you connected to the Internet?
4. Clearly distinguish between the Internet and Intranet

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